CHAPTER II
Strategies and Conceptual Corridors

The goals of this First Tier EIS are to define the general concept and scope of the best improvement strategy for meeting the future transportation needs of the I-70 Study Corridor. The physical and operational characteristics of each strategy need to be defined in sufficient detail to support the decision-making process through the differentiation of the individual qualities and attributes of each competing improvement strategy. The benefits and costs of each improvement concept need to be sufficiently defined to inform decision-makers of the tradeoffs of each strategy. Furthermore, sufficient detail definition of the preferred strategy and its characteristics is needed to allow for the defendable identification of the next steps within the tiered process and the limits and scope of the second tier studies.

This chapter of the First Tier EIS provides a description of the potential strategies identified (i.e., initial strategies) and evaluated to address the transportation needs identified in the previous chapter. A cursory assessment of the initial strategies was performed to assess the ability of each strategy, as a stand-alone improvement concept, and to meet the goals of the study as defined in the purpose and need (see Chapter I – Purpose and Need). Based on this assessment, a set of strategies (i.e., reasonable strategies) was identified that could reasonably be expected to solve the defined needs of the I-70 corridor. Each of these independent strategy concepts were then evaluated through a coordinated assessment of their respective engineering, environmental and socio-economic attributes to develop a recommendation for a preferred strategy. This process of screening the initial strategies through a testing of the purpose and need and then a more detailed evaluation of the reasonable strategies was coordinated with the public and agency coordination program (see Chapter V – Comments and Coordination). Through a collaboration of the study's public and agency involvement with the engineering and environmental impact evaluation, a general consensus of the potentially affected public and review agencies was developed in support of the preferred strategy recommendation.

Exhibit II-1 shows in diagrammatic form the I-70 First Tier EIS process of developing public/agency consensus though a progressively more detailed identification of the engineering and environmental impacts of the competing strategies. As shown in the exhibit, this chapter provides the definitions of the improvement strategies in ascending level of detail according to the following naming conventions:

- ***Range of Strategies (Initial Strategies)***
  - ***Reasonable Strategies***
    - ***Recommended Preferred Strategy***
      - ***Conceptual Corridors (1-mile wide)***
        - ***Preferred Conceptual Corridors (Final EIS)***
          - ***Selected Preferred Strategy and Conceptual Corridors (Final EIS)***

Through the tiered EIS process, the degree of detail of the engineering and impact studies is consistent with the corresponding scope of the improvement decisions. As a First Tier EIS, the extent of the definition and assessment is limited to the degree necessary to support the decision-making process of the best overall improvement strategy for the corridor. More detailed definitions and assessments can then be provided as the range of strategies narrows. Consequently, the assessment of the initial strategies is based on the ability of the strategies to solve the I-70 corridor's transportation-related problems. For the evaluation of the reasonable strategies, the physical attributes of the competing strategies were generalized to determine the feasibility of the strategy's implementation. Each reasonable strategy was defined in sufficient detail to determine the potential viability of the concept and whether issues exist that prevent or preclude its implementation. It is in the subsequent second tier documents that the specific engineering and environmental issues will be identified for the various location alternatives within the context of the selected preferred strategy. Table II-1 shows the decision-making process, the relationship of the various types of strategy evaluations and the corresponding level of detail of the engineering and environmental analyses.

Table II-1: Tiered Decision and Evaluation Process for I-70 Study Corridor

Name of Strategy/ Alternative Grouping	Description	Description of Study Decision	Evaluation Methodology and Process	Product of Decision	Level of Detail
First Tier Environmental Impact Statement					
Initial Strategies	Improvement strategy initially identified as potentially capable of addressing needs of study corridor.	Screen out and eliminate those concepts not warranting further more detailed definition and evaluation.	Testing of the effectiveness of accomplishing the stated Purpose and Need of the study corridor, including coordination with agency and public comment.	Reasonable Strategies	Operational analysis of transportation-related benefits and impacts.
Reasonable Strategies	Improvement concept that is practical or feasible from a technical and economic standpoint for application to the study corridor.	Identify and recommend the "best" or preferred strategy.	Evaluation of overall technical merits and costs considering engineering, environmental, and socio-economic issues, including coordination with agency and public comment.	Recommend -ed Preferred Strategy	Alignments of strategies are not defined but rather issues and "tight spots" are reviewed for engineering, environmental and public opinion feasibility. Focus on 10-mile wide corridor centered on I-70.
Conceptual Corridor	1-mile wide alignment corridors within the Recommended Preferred Strategy that are practical or feasible from a technical and economic standpoint.	Screen out and eliminate those corridors not warranting further more detailed definition and evaluation in the second tier studies.	Evaluation of overall technical merits and costs considering engineering, environmental, and socio-economic issues, including coordination with agency and public comment	Preferred Conceptual Corridor(s)	Define conceptual alignments and characteristics of corridors at a scale of approx. 1"=400' in special areas to 1"=2,000' in general. Review probability of impacts to natural and man-made environments.
Selected Preferred Strategy and Conceptual Corridor(s)	Preferred strategy and conceptual corridor(s) within that strategy that is selected by the sponsoring agencies for implementation to the study corridor. Provides the basis for the subsequent second tier studies.	Identify and select the "best" or preferred strategy and its conceptual corridor(s) for more detailed study in the second tier documents.	Evaluation of comments and input from reviewing agencies and public opinion received through the review of the Draft First Tier EIS.	Selected Preferred Strategy and Conceptual Corridor(s)	Refine conceptual alignments and characteristics of corridor(s) at a scale of approx. 1"=400' in special areas to 1"=2,000' in general. Review probability of impacts to natural and man-made environments.
Second Tier Environmental Documents (Future Studies to be Completed by MoDOT)					
Improvement Alternatives	Approximately 500-foot wide highway alignments within the Selected Conceptual Corridor(s).	Identify and select the "best" or preferred alternative alignment for implementation.	Evaluation of overall technical merits and costs considering engineering, environmental, and socio-economic issues, including coordination with agency and public comment	Selected Alternative	To be determined as appropriate based on specific nature of Second Tier Study.

A. Initial Strategies

1. OVERVIEW OF INITIAL STRATEGIES

Based on an understanding of the current and projected transportation needs of the I-70 corridor, as defined in the purpose and need, the following strategies were identified for potential application to the I-70 corridor. These initial strategies are defined below and brief summaries of the physical and operational characteristics of these strategies are presented in Appendix A.

a. Strategy No. 1 ("No-Build")

The "No-Build" Strategy refers to the future baseline conditions if no capacity improvements on I-70 were implemented. This future baseline strategy does not include capacity improvements to I-70. It does, however, include projects at other locations that are expected to be completed and could influence travel characteristics on I-70. This strategy provides a basis of comparison for the analysis of the benefits of the other improvement strategies.

b. Strategy No. 2 (TSM/TDM)

Transportation System Management generally includes low-cost traffic-flow improvements to manage congestion. The term TSM is used to encompass a wide range of strategies aimed at making efficient use of existing transportation facilities. TSM strategies can include use of the following:

- ***Interchange Improvements*** - TSM strategies along the I-70 corridor could include relatively low-cost improvements to interchanges to improve the through capacity for both I-70 and the intersecting highway. However, through the operational analyses of the "No-Build" Strategy, it was determined that no current interchanges negatively affect the current or future through capacity of I-70. Though interchange congestion is not a systematic problem with the I-70 corridor, minor improvements at existing interchanges could enhance the overall operations of the corridor. These improvements could include enhanced ramp termini with cross highways and streets, greater spacing of outer roadways to meet current MoDOT spacing criteria and the use of access management in the interchange areas.

- ***Commercial Vehicle Operations*** – The movement of goods into and out of urban and rural areas is an essential part of Missouri's economy. Traditional CVO strategies are devised to improve commercial vehicle efficiencies and safety through the removal of operational and physical restraints, changes to business operating practices and development of effective public policy. Typical physical constraints may include vertical height limitations and horizontal restrictions at interchanges along and providing access to the I-70 corridor. Operational constraints include excessive time spent at weigh stations and inspection facilities by compliant, safe-operating commercial vehicles or excessive delays for commercial vehicle traffic on the interstate due to traffic congestion. Resolutions to these constraints include improved geometric design at grade-separated interchanges and changes in business operating practices such as temporal changes for pick-up and delivery. The most commonly considered technique for relief of truck-induced congestion is the separation of trucks from other traffic. The separation of truck traffic could be accomplished by building a separate truck lane or restrict trucks to specific general lanes on the freeway system.

- ***Intelligent Transportation System*** – Intelligent transportation systems are systems that utilize advanced technologies, including computer, communications and process control technologies, to improve the efficiency and safety of the transportation network. ITS encompasses a variety of components that are deployed by both public and private entities and can be deployed apart from or in combination with traditional transportation facility infrastructure improvements. ITS deployments which support the purpose and need of the I-70 corridor include ITS-CVO, Road-Weather Information Systems, Incident Detection and Management, and Traffic and Travel Information Systems.

  - ***ITS-CVO:*** The ITS-CVO applications include a broad range of deployments that are focused on improved commercial vehicle safety and efficiency. The most appropriate application for the I-70 corridor is Commercial Vehicle Electronic Clearance. Commercial Vehicle Electronic Clearance uses automatic vehicle identification systems, high-speed weigh-in-motion systems and roadside databases to electronically identify and check the safety, credentials and size and weight data for commercial vehicles while they travel on the interstate. AVI equipment includes roadside readers and antennae and in-vehicle transponders to communicate a vehicle's unique identification code with the roadside equipment. Through the use of the AVI equipment, weigh-in-motion equipment and statewide and interstate commercial vehicle databases, legal commercial vehicles can travel on the interstate without stopping at weigh stations and state enforcement officials at weigh stations can concentrate their enforcement activities on non-compliant or questionable commercial carriers. These systems also improve safety on the interstate by reducing or removing commercial vehicle queues that back up from the weigh station onto the Interstate.

  - ***Road/Weather Information Systems:*** R/WIS includes weather detection and forecasting technologies, deployed on the interstate in combination with information dissemination systems. These systems alert drivers to upcoming hazardous driving conditions resulting from weather conditions and also provide data and information to the Department of Transportation and other agencies responsible for road maintenance and emergency response. The systems include technologies that detect changes in atmospheric and road surface conditions. Potential conditions to be monitored include water surface levels of nearby streams and rivers, precipitation, fog and other visibility impairing atmospheric conditions, and road surface temperature, ice and the presence of de-icing materials. Information dissemination systems associated with R/WIS can include electronic roadside signing (or variable message signs), commercial and highway advisory radio broadcasts, in-vehicle information systems and pre-trip information sources such as the Internet and local television broadcasts. These information systems can be deployed in the form of a travel information system to alert drivers to upcoming conditions and take corrective actions.

  - ***Incident Detection and Management Systems:*** Incidents that cause non-recurring congestion are responsible for a significant proportion of the delays and costs. For example, Caltrans estimates that over 50 percent of all delays experienced by motorists are caused by non-recurring incidents. Lane-blocking incidents lasting more than 45 minutes typically occur at a rate of one per 100 million vehicle miles.

    Typical capacity reductions during incident conditions are shown in Table II-2:

Table II-2: Capacity Reduction per Type of Incident

Type of Incident	No. of Lanes	No. of Lanes Blocked	Percent Capacity Reduction
Accident on Shoulder	3	0	26%
Vehicle Stall	3	1	48%
Non-injury Accident	3	1	50%
Accident	3	2	79%

Incident detection and management systems focus on enhancing incident detection and response. Incident detection along the I-70 corridor would be enhanced through the use of advanced sensor technologies and communication systems which would allow local emergency service providers to more quickly and accurately identify a variety of incidents. The incident management systems would improve the coordination between jurisdictions and the immediate deployment of actions to minimize the effects of incidents. Technologies which encompass an incident detection and management system include in-road and non-intrusive vehicle detectors, video surveillance equipment, wide-area network communications between the various emergency service providers along the corridor and central or distributed command and control centers. These systems can also provide inputs to travel and tourism information systems, providing data on road closures and delays.

- ***Traffic and Travel Information Systems*****:** Traffic and travel information systems provide travelers on the I-70 corridor with pre-trip, en-route and on-site traffic and travel information. The specific information provided by these systems could include interstate and local arterial traffic conditions, weather conditions along the roadway, incidents and delays, alternative route and modal choices and construction activities along the corridor. Additionally these systems can provide localized travel and tourism information such as information on special events (i.e. State Fair or University of Missouri sporting events), seasonal traffic conditions, roadside services or amenities (i.e. gas stations, restaurants and lodging), and the location of the nearest hospitals, medical facilities, police and fire and rescue. Traffic and travel information systems can use a variety of information dissemination resources including variable message signs, highway advisory radio, in-vehicle displays, cable television broadcast, commercial radio and the Internet.

Travel demand management measures employ services that are designed to reduce congestion on the existing transportation infrastructure by encouraging commuters or employers to use modes other than single occupant vehicles, alter the time and location of trips, support ridesharing or support increased transit use.

Within the statewide I-70 corridor, TDM strategies could include increases in intercity transit service. Within urban sections in St. Charles County, Columbia and Kansas City, other strategies such as ridesharing, park-and-ride and commuter oriented express bus service could be explored.

c. Strategy No. 3 (Widen Existing I-70)

This strategy involves the improvement and total reconstruction of the existing I-70 roadway along the existing freeway alignment. Future 2030 travel demands dictate that six lanes be provided in the rural areas and eight lanes through Columbia and in the metropolitan areas of Kansas City and St. Louis. The eight lane section in metropolitan Kansas City would likely extend from Concordia to the I-470 interchange. Considerations would need to be given to the continuation of these lanes through the I-470 interchange to the west as part of the ongoing I-70 Major Investment Study, which is currently being conducted by MoDOT for I-70 in Jackson County. Similarly, in the St. Louis area eight lanes would need to be provided from Warrenton to the east, into the St. Louis metropolitan area. Continuation of these lanes into the St. Louis area east of the US 40/61 Interchange would need to be considered.

In coordination with the FHWA, it has been determined that there is insufficient space within the existing 40-foot (12.2 m) median to widen the existing four-lane roadway section to the inside and maintain compliance with current federal roadside standards. To widen the existing I-70 pavement in compliance with federal standards would require additional widening on the outside of the existing lanes in conjunction with closing the median with a median barrier. Other influencing factors include the need to minimize delays to motorists during construction.

- ***Strategy Options*** – As an option to widening along the existing alignment, in urban-like areas where widening may be prohibitive due to adjacent land use, localized relocations or bypasses could be constructed and should be considered. Areas where local bypasses could be constructed, either to the north or south of the local community, include Columbia, Warrenton, Wright City and Wentzville. In the Kansas City area, from I-470 to Grain Valley, roadway widening would likely occur along the existing alignment and a bypass option would not be considered.

- ***Physical Characteristics*** – In the rural areas, construction of a new six-lane roadway along the existing I-70 alignment would be provided. In the urban areas, a total of no less than eight lanes through either a widening of the existing alignment or through a localized four-lane relocation (providing a total of eight lanes) would be provided. In addition, minor localized alignment adjustments would be provided in isolated areas to address existing alignment deficiencies (e.g., smoothing out a tight curve). The new lanes would be constructed and staged such that traffic would be maintained on the existing four lanes during construction. The resulting roadway section would provide an extra-wide median reserved for future lane expansion and transportation improvements. Approximately 150 feet (45.7 m) of additional right-of-way width on either the north or south side of the existing right-of-way would be required. With the widening, all mainline I-70 bridges and crossroad bridges would need to be replaced. All interchanges would be reconstructed in their current general configuration. The necessary reconstruction of the interchanges provides the opportunity to implement improved access management in the immediate interchange area.

- ***Operational Characteristics*** – The improved I-70 would function similar to the existing I-70. Mixed-use traffic would utilize all travel lanes. As an option during normal operations, trucks could be prohibited from using the inside lane(s). With this option, trucks would be restricted to the outside two lanes, resulting in greater overall system carrying capacity and less impedance for the general motorist.

d. Strategy No. 4 (New Parallel Facility)

This strategy involves the construction of a new parallel facility across the state, located in close proximity to existing I-70. The basis of this concept is to provide improved and superior service to the long distance, interstate traveler. This new facility would connect to the existing I-70 roadway within the metropolitan areas of Kansas City and St. Louis and its alignment and operation would be totally independent of the existing I-70 roadway. The new facility could potentially accommodate the interstate auto or truck through higher speed and safer service.

With this concept, access would be very limited; interchanges would likely be limited to five or six intermediate points across the state. Even though the new facility would be independent, it would function in tandem with the existing I-70 to provide improved system capacity and operation. Longer distance travel would utilize the new facility, thereby freeing up capacity along the existing I-70 for more local travel.

- ***Strategy Options*** – Alignment options are unlimited. At this level of analysis, alternative alignments for the concept were not developed. Rather, physical and environmental constraints within five miles of the existing I-70 alignment were cataloged and reviewed to determine the feasibility and practicality of constructing a new facility. Two alignment options were conceptualized – one entirely north of existing and one entirely south.

- ***Physical Characteristics*** – Construct a new four-lane divided interstate-type highway on new location, providing a total of eight lanes across the state. Termini would entail connections to the metropolitan highway networks of Kansas City and St. Louis, likely a relatively short distance east of I-470 and near Lake St. Louis, respectively. Options in St. Louis include connections to I-64 in Wentzville and Route 370 farther to the east. Similar to the Widening Strategy, an extra wide median would be constructed as a proviso for future improvements. Pavement and bridge strength and overall width, as well as alignment design, would depend on the desired operational characteristics. Operational options include special provisions for high-speed service and a truckway.

  Interchanges would be limited to only major north-south routes, with adjustments for appropriate spacing. Assumed candidate interchange locations include:

  - ✓ Route 13 (Lafayette County)
  - ✓ US 65 (Saline County)
  - ✓ US 63 (Boone County)
  - ✓ US 54 (Callaway County)
  - ✓ Route 19 (Montgomery County)

- ***Operational Characteristics*** – It would not be functionally practical to restrict trucks to the new parallel route, given that the existing I-70 would still need to continue to provide local truck service. However, the concept is based on the premise that improved and superior service provided by the new facility would attract the long-distance traveler, both auto and truck. Options to create this incentive include a higher speed freeway, ranging from 70 mph (112.7 km/hr) to 80 mph (128.7 km/hr), or a high-speed truckway. A high-speed truckway would have the same physical attributes as the high-speed freeway, with smoother curves and gentler grades, but would also have thicker pavement and stronger bridges to accommodate heavier truckloads and longer combination vehicles.

e. Strategy No. 5 (New Parallel Toll Road)

This strategy involves the construction of a new parallel toll road across the state, located in close proximity to and parallel to existing I-70. The basis of this concept is to provide improved and superior service to the long distance, interstate traveler, and then capture that benefit through the collection of tolls. Toll revenue could offset partially or as a whole the cost of construction and additional maintenance. The toll road would connect to the existing I-70 roadway within the metropolitan areas of Kansas City and St. Louis and its alignment and operation would be totally independent of the existing I-70 roadway. The new facility could potentially accommodate the interstate auto or truck through higher speed and safer service.

Access would be very limited; interchanges would likely be limited to five or six intermediate points across the state. Even though the new facility would be independent, it would function in tandem with the existing I-70 to provide improved overall system capacity and operation. Longer distance travelers could realize greater travel benefits, and thereby be more willing to pay for the travel benefits. By diverting long distance I-70 travel to the new toll road, capacity along the existing I-70 would be available for more local travel.

- ***Strategy Options*** – Similar to the New Parallel Facility Strategy, specific alignment options have not been identified. Given the high sensitivity of the toll road traffic and revenue to the toll rate, optional rates were considered – a high rate and a low rate. Though alignment options are unlimited, it was assumed, based on preliminary findings, that the toll road would be located to the north of existing I-70. Again, physical and environmental constraints within five miles of the existing I-70 alignment were cataloged and reviewed to determine the feasibility and practicality of constructing a new parallel toll road.

- ***Physical Characteristics*** – Construct a new four-lane divided interstate-type toll road on new location, providing a total of eight lanes across the state. Termini would entail connections to the metropolitan highway networks of Kansas City and St. Louis, likely a relatively short distance east of I-470 and near Lake St. Louis, respectively. Options in St. Louis include connections to I-64 in Wentzville and Route 370 farther to the east. An extra wide median would be constructed as a proviso for future improvements. Pavement and bridge strength and overall width, as well as alignment design, would depend on the desired operational characteristics. Operational options include special provisions for high-speed service and a truckway.

  Interchanges would be limited to only major north-south routes, with adjustments for appropriate spacing. Assumed candidate interchange locations would be identical to the New Parallel Facility Strategy.

  Tolls would be collected via barrier (on-line) toll plazas near the termini, and by ramp terminal (off-line) plazas at the intermediate access points. Mainline service areas would be provided at up to four locations.

- ***Operational Characteristics*** – As with the other parallel route strategy, restricting trucks would be logistically prohibitive. However, given the parallel nature of existing I-70 and the toll road, in order for this concept to be financially feasible, improved and superior service must be provided by the toll road to attract the travelers willing to pay for the improved service, both auto and truck. Options to create this incentive include a higher speed freeway, ranging from 70 mph (112.7 km/hr) to 80 mph (128.7 km/hr), or a high-speed truckway. A high-speed truckway would have the same physical attributes as the high-speed freeway, with smoother curves and gentler grades, but would also have thicker pavement and stronger bridges to accommodate heavier truckloads and longer combination vehicles.

  Operational characteristics of the toll road would include the use of automatic vehicle identification and electronic toll collection technologies to further draw interstate travel to the facility. These technologies have additional benefits through the reduction of perpetual toll collection costs. An electronic toll collection use of approximately 30 percent was assumed.

f. Strategy No. 6 (High-Occupancy Vehicle (HOV) Lanes)

HOV lanes are freeway lanes designated for preferential treatment for high-occupancy vehicles (i.e., vehicles with more than one occupant). Priority treatments for high occupancy vehicles are generally intended to help maximize the ability to move people along a roadway by increasing the system's overall vehicle occupancy rate. This is done to provide buses, vanpools and carpools with a travel time reduction relative to the non-HOV lane users as an attraction to convert motorists from single-occupant to multiple-occupant vehicles. The HOV lane needs to provide a significant travel time advantage in order to induce individuals to choose the rideshare or transit mode and therefore increase the roadway's person moving capacity. HOV facilities are appropriate in urban corridors where significant traffic congestion is observed or forecast, affinities for ridesharing and transit use are rather high, and an opportunity exists to provide a preferential means of circumventing congestion.

To create HOV lanes, it would not be practical to convert existing travel lanes for exclusive HOV use. Consequently, it was assumed that the existing four-lane roadway would be widened to the outside, adding a new lane in each direction, and the existing inside lanes would then be converted to HOV use. The outside two lanes would be restricted to mixed use, including freight trucks. This strategy would not provide a reconfiguration of I-70's roadway section, nor would localized I-70 alignment adjustments be provided.

g. Strategy No. 7 (High-Speed Rail)

Improved high-speed passenger rail service would be provided between Kansas City and St. Louis by either upgrading existing tracks or by constructing a new rail corridor. Passenger rail service within a corridor paralleling I-70 between St. Louis and Kansas City has been studied as part of two recent passenger rail initiatives. The evaluation of passenger rail service between Kansas City and St. Louis was completed as part of an evaluation study prepared for MoDOT in December, 1998. The study was entitled *Evaluation of Passenger Service: St. Louis to Kansas City*. The purpose of the report was to provide information regarding future options for passenger rail service provided by Amtrak across the State of Missouri.

A second ongoing intercity rail transit planning effort is the Midwest Regional Rail Initiative. The purpose of the initiative is to examine how to develop an improved regional rail system serving nine midwestern states. The proposed Midwest Regional Rail System would utilize a 3,000-mile (4,828-km) long existing track system to connect rural, small urban and large urban areas. The system would provide a hub and spoke system with a major hub in Chicago. The proposed system would improve existing Amtrak rail lines across Missouri to achieve travel speeds of 80 mph (128.7 km/hr) connecting Kansas City with St. Louis and then to the major Chicago hub. Current Amtrak service between Kansas City and St. Louis utilizes the existing Union Pacific Railroad tracks roughly located along US 50 and the Missouri River, with stations in Independence, Lee's Summit, Warrensburg, Sedalia, Jefferson City, Hermann, Washington and the large urban areas.

- ***Expansion of Existing Service*** - As part of MoDOT's 1998 study, a passenger rail forecast model was used to test the ridership impacts of incremental changes in Amtrak rail service. The options studied included: 1) maintaining the current service level but using a Flexliner car that could improve travel speeds to nearly 80 mph using existing tracks; 2) adding a third round trip; 3) adding one additional trip from Jefferson City to both Kansas City and to St. Louis; and 4) adding both service to Jefferson City and the additional round trip between St. Louis and Kansas City. Rail stations would include the same stations as presently serviced by Amtrak.

Rail passenger forecasts were completed for these service options for the year 2010. The ridership projections indicate modest gains under all four service options investigated. Year 2010 base or no-build ridership was forecast at 260,000 annual passengers, which equates to 712 average daily passengers. The year 2010 ridership forecasts for the four service options ranged from 280,400 to 286,500 annual riders. This equates to a range of 768 to 785 average daily rail passengers.

With the Midwest Regional Rail Initiative scenario, rail service would increase three-fold from the current two round trips to six round trips between St. Louis and Kansas City. Travel speeds can reach as high as 110 mph (177 km/hr) on some segments of the rail system, but would be limited to 80 mph (128.7 km/hr) given the condition of track in Missouri. The ridership for the Kansas City to St. Louis portion of the MWRRI is forecast to be 675,000 in the year 2010, or approximately 1,850 passengers per day.

- ***New Guideway*** - The achievement of travel speeds greater than 80 mph would require construction of new track on new right-of-way. As an independent improvement, an 80-foot wide corridor is considered to be wide enough to accommodate double track high-speed rail. If new high-speed rail tracks were to be provided in concert with other corridor improvements, such as widening of existing I-70 or the construction of a new parallel route, an approximate envelope of 40 feet (12.2 m) would be required for double track. If constructed, the new rail line would be located along I-70, connecting Kansas City, St. Louis and Columbia.

2. SCREENING OF INITIAL STRATEGIES

a. Purpose and Need Screening

As described in the Purpose and Need Statement for the I-70 First Tier EIS, several goals and objectives for the I-70 improvements have been defined based on the understanding of the current and projected transportation-related problems in the study corridor. An initial, screening of the potential improvement concepts entails an evaluation of the ability of each strategy to meet the needs of the corridor (i.e., Purpose and Need). Through this screening process, the subsequent, more detailed evaluation can then focus on those strategies that are reasonable and viable solutions (i.e., Reasonable Strategies). Table II-3 summarizes the assessment of the initial improvement concepts in accomplishing the purpose and need:

As shown in the summary, three mutually exclusive strategies would potentially accomplish all six of the study's goals – I-70 Widening, New Parallel Facility and New Parallel Toll Road. The other competing strategies could potentially accomplish some of the study's goals, but would not meet the study's purpose and need.

- **Strategy No. 1 (No-Build)** – This strategy would not accomplish the goals of improving the corridor's ability to meet future travel needs, but would preserve the existing infrastructure. System operations would continue to worsen as travel demands increase. However, this strategy should be carried forward as a comparison for determining the benefits of other improvement strategies. Since this strategy is contained in each of the other strategies, all of the conceptual strategies would preserve the existing I-70 corridor.

Table II-3: Strategy Screening

	Roadway Capacity	Traffic Safety	Roadway Design Features	System Preservation	Move Goods Efficiently	Access to Recreation Facilities
Strategy No. 1 No-Build				✓		
Strategy No. 2 TSM/TDM		✓ (2)		✓	✓ (3)	
Strategy No. 3 I-70 Widening	✓	✓	✓	✓	✓	✓
Strategy No. 4 New Parallel Facility	✓	✓	✓	✓	✓	✓
Strategy No. 5 New Parallel Toll Road	✓	✓	✓	✓	✓	✓
Strategy No. 6 HOV Lanes				✓		
Strategy No. 7 High Speed Rail	✓ (1)			✓		

NOTES:
1. Expansion of existing rail service between Kansas City and St. Louis could increase daily ridership to 2,600 persons in 2030.
2. Improvements could be implemented in localized areas to reduce accidents.
3. Weigh-in-Motion scales and commercial vehicle operations (CVO) measures could improve truck efficiencies.

- **Strategy No. 2 (TSM/TDM)** – This strategy would not sufficiently address the everyday, reoccurring transportation needs of the corridor. Elements of this concept could provide some operational relief on a continual basis, but not to an extent that this strategy alone would accomplish all the goals of the study. From a TSM perspective, existing and future I-70 congestion is systemic; isolated capacity improvements at interchanges would not improve the system's overall performance. However, corridor-long ITS improvements, in combination with a statewide implementation plan, would benefit non-reoccurring congestion caused by incidents or other special events. Improved commercial vehicle operations through weigh-in-motion scales or electronic cargo processing could enhance truck efficiencies. Though TDM measures could provide some minor relief to travel demands in the urban areas of the corridor, through ridesharing or telecommuting programs, the travel patterns and characteristics of this largely rural corridor are too highly dispersed for these tools to systematically affect the corridor's travel demands.

- **Strategy No. 3 (I-70 Widening)** – This strategy would potentially accomplish all of the study's goals by directly improving the corridor's operational and physical characteristics.

- **Strategy No. 4 (New Parallel Facility)** - This strategy would potentially accomplish all of the study's goals by directly improving the corridor's operational and physical characteristics.

- **Strategy No. 5 (New Parallel Toll Road)** - This strategy would potentially accomplish all of the study's goals by directly improving the corridor's operational and physical characteristics.

- **Strategy No. 6 (HOV Lanes)** – Due to the highly dispersed nature of the origination and destination points for daily I-70 travel, HOV applications, which are dependent on well-defined and concentrated travel characteristics, would not likely improve the operations of the I-70 corridor. HOV applications typically lend themselves to more urban-like settings. Typically, rural interstate occupancy rates are around 1.6 – considerably higher than midwestern urban areas. Travel benefits potentially offered by the HOV lanes, in terms of travel timesavings, would not likely be significant enough to convert single-occupant users to multiple occupant vehicles. Intercity bus service could be expanded, but would not measurably reduce non-HOV vehicle demand.

High occupancy vehicle lanes on freeways have been implemented in a number of urban corridors in cities throughout the U.S. HOV lanes typically accommodate large bus volumes or are in corridors characterized by high levels of commuter oriented traffic congestion. I-70 across Missouri serves a variety of travel needs of which commuter travel is a relatively small portion of the total trips. While no formal studies of vehicle occupancy have been completed in the rural segments of I-70, experience has shown that vehicle occupancy for statewide travel is considerably higher than for urban commute peak periods. Given the differing characteristics of travel within the I-70 corridor, the HOV lane strategy was dropped from further consideration.

- **Strategy No. 7 (High-Speed Rail)** – Though high-speed rail service between Kansas City and St. Louis would provide some travel reduction on I-70, and has many other merits unrelated to I-70, this concept would not address all of the goals of this study.

  Recent passenger rail feasibility studies have developed transit ridership forecasts using a market share methodology. The market share approach includes estimating the level of travel projected to occur between destinations and then estimating transit's share of this travel. Factors such as travel time, the cost of travel, the quality of the service and intermodal connectivity are factors used to estimate transit market share.

  The current market share of passenger rail transit for travel between St. Louis and Kansas City is not large. Annual passenger rail ridership between Kansas City and St. Louis was 207,300, or an average of 568 riders per day, in 1998. Approximately nine percent of this travel was business related. Ridership tends to be seasonal, with lower ridership occurring in January and September and higher ridership during the summer months. Travel also peaks on weekends. A survey of existing riders completed as part of the project indicated that 67 percent of travelers would travel by auto if the train was not available, 22 percent would fly, 7percent would ride the bus and four percent would not travel.

  Based on the findings of the MoDOT-commissioned report entitled *Evaluation of Passenger Service: St. Louis to Kansas City*, future ridership in 2030 could approach 3,000 daily riders if existing Amtrak service was expanded and improved. Current daily auto travel between the metro areas of Kansas City and St. Louis is around 6,000 trips. Including trips to and from Jefferson City with the greater metro areas, daily travel increases to around 8,400 trips. Current Amtrak service is approximately 700 passengers per day, or about eight percent of the travel market, not including air transportation or travel beyond Missouri. If high-speed service was provided through a new rail fixed guideway between Kansas City and St. Louis, additional market share could potentially be gained. This concept, however, would not serve the Jefferson City travel market. If the market share could be doubled or tripled through high-speed service with an aggressive service plan with well integrated intracity transit service at both ends, daily ridership might reach 4,000 to 6,000 riders per day by 2030. This diversion of travel to an alternative mode would provide some reduction in travel demand along I-70 (approximately 2,500 to 5,000 vehicles per day). This diversion would equate to around a four to nine percent reduction in 2030 travel demand along I-70 in the rural areas. This potential future service provided by the high-speed rail system would approximately equal 12 to 25 percent of the capacity of a single directional highway lane.

b. Recommendation of Reasonable Strategies

Table II-4 presents the findings of the purpose and need screening of the initial strategies and the identification of the reasonable strategies. Though Strategy No. 1 (No-Build) would not accomplish the goals of the study, it should continue to be considered as a basis of comparison. Both Strategy No. 2 (TSM/TDM) and Strategy No. 7 (High-Speed Rail) fail to accomplish the study's goals, but do possess attributes beneficial to the I-70 corridor. To the extent practicable, provisions for these two improvement strategies should be considered in each of the reasonable strategies. Strategy No. 6 (HOV) is not considered a reasonable improvement strategy.

Table II-4: Purpose and Need Screening of Strategies

Strategy	Carry Strategy Forward for More Detailed Evaluation (Reasonable Strategies)	Eliminate Strategy from Further Consideration as Standalone Strategy
Strategy No. 1 (No-Build)	✓	
Strategy No. 2 (TSM/TDM)		✓
Strategy No. 3 (I-70 Widening)	✓	
Strategy No. 4 (New Parallel Facility)	✓	
Strategy No. 5 (New Parallel Toll Road)	✓	
Strategy No. 6 (HOV Lanes)		✓
Strategy No. 7 (High-Speed Rail)		✓

B. "No-Build" Strategy

1. GENERAL DESCRIPTION

The "No-Build" Strategy defines the future baseline conditions for the I-70 corridor and involves the ongoing preservation and rehabilitation of the existing I-70 pavement and bridges. This strategy does not include capacity improvements to I-70. It does however include projects at other locations that are reasonably anticipated to be completed within the study horizon, but not necessarily planned, that could influence travel characteristics on I-70.

2. 2030 BUILD-OUT HIGHWAY NETWORK

A number of projects are either planned or are reasonably foreseeable that would have an impact on the I-70 Study Corridor. These projects are not limited to those that are included in the Missouri State Transportation Improvement Program (STIP), but rather reflect the reasonably anticipated long-range improvements to the various corridors outside of the I-70 Corridor. The roadways identified may be improved by 2030 (the First Tier EIS design year), although funding is not programmed at this time and the roadways are not identified as priorities on MoDOT's mid-range Transportation Investment Strategy. Inclusion in this list does not imply a commitment by MoDOT that construction of these improvements will occur prior to 2030. Rather, this list is based on needs identified and solutions proposed in either ongoing or completed studies for these projects. These assumed improvements establish a baseline condition for this First Tier EIS. The anticipated and assumed improvements include:

Major East-West Corridors:

- **US 36** - Widened and improved to a four-lane expressway for the entire length between I-29 and the Mississippi River. It has been proposed that US 36 be designated as I-72 but no action has been taken in this regard and no timetable established.

- **US 40** – Improved to an eight-lane or six-lane freeway from Downtown St. Louis to Route DD and then four-lanes to connection with I-70.

- **US 50** – Widened and improved to a four-lane highway to provide a freeway or expressway facility from I-435 in Kansas City to I-44 located southwest of St. Louis.

Major North-South Corridors:

- **Route 13** – Four-lane highway from Springfield to Richmond.
- **US 65** – Four-lane highway from Arkansas to Trenton.
- **US 63** – Four-lane highway from West Plains to Kirksville.
- **US 54** – Four-lane highway from Camdenton to US 61.
- **Route 19** – Four-lane highway from US 54 to US 61.

3. PAVEMENT AND BRIDGE MAINTENANCE

The existing pavement and bridges along the I-70 corridor must be operated and maintained into the indefinite future for the "No-Build" Strategy, including snow removal, mowing, guard fence repair, sign replacement and other general maintenance requirements. This work would not address the continued general deterioration of the facility.

To address continued deterioration, rehabilitation work would have to be completed on an on-going basis.

It is assumed that all pavement would need to be milled and overlayed on a 10-year cycle, but a larger amount would need to be done over the first three years of the study timeframe to address the 54 percent of the pavement that has already fallen into the poor and very poor rating categories based on the pavement serviceability rating. Twenty-four lane miles of pavement would need to be totally replaced each year over the full 30-year period to replace pavement reaching the poor and very poor ratings and which would not benefit from overlays.

On average, seven bridges will require major repairs or redecking each year over the full 30-year period in order to keep bridges from falling into such disrepair that their condition might require closure or emergency repairs.

4. OTHER IMPROVEMENTS

Other possible improvements that could occur, but that are not included in the costs presented in the next section, include the improvement of rest areas to provide additional truck parking, the addition of climbing lanes at Mineola Hill in Montgomery County to increase safety, the construction of additional interchanges in developing areas to provide additional local access to the highway, and other small projects designed to provide localized safety or congestion improvements.

5. CAPITAL COSTS

a. Construction Costs

Since the "No-Build" Strategy would entail no construction activities to expand the capacity of the I-70 corridor, this strategy would incur no direct improvement construction costs. Major rehabilitation costs are considered as part of the operations and maintenance costs.

b. Rehabilitation and Operations and Maintenance Costs

Major rehabilitation costs, considered as part of the operations and maintenance costs for this strategy, consist of activities to rehabilitate the existing facility over the next 30 years (Table II-5). These costs include a two percent increase per year in construction costs and a six percent discount rate for present value calculations. Based on the general service condition of the existing I-70 pavement and bridges, it is assumed that approximately 24 miles of pavement and seven bridges would be replaced annually. Additionally, roughly 80 miles (128.7 km) of pavement would be milled and inlayed per annum on a perpetual basis.

Using a MoDOT historical average of $24,500 per annual lane mile to operate and maintain an interstate highway, and allowing for a two percent increase each year in these costs, estimated costs for 30 years of operations and maintenance, consisting of general everyday O&M activities, were also estimated.

Table II-5: 30-year Rehabilitation and O&M Costs

Operations and Maintenance Costs	Total 30-year Costs	Present Value of Annual Costs (6% Discount Rate)	Equivalent Uniform Annual Costs
Major Rehabilitation	$647,802,600	$274,915,208	$19,972,291
O&M	$198,784,000	$83,866,000	$6,093,000
Total (Rounded)			**$26,070,000**

C. Widen Existing I-70 Strategy

1. GENERAL DESCRIPTION

This strategy involves the improvement and reconstruction of the existing I-70 roadway to provide six or eight travel lanes along the existing I-70 alignment. Optional means of adding travel lanes to the existing four-lane roadway section were investigated and evaluated. In the rural areas, the existing four-lane roadway would be expanded to six lanes to meet future travel demands. Minor alignment adjustments would be made, both vertically and horizontally, in the rural areas. In the urban areas of the Kansas City metropolitan area, Columbia, Warrenton, Wright City, and Wentzville, where the adjacent constraints require an urban-type roadway section, I-70 would be improved by either widening the existing roadway to no less than eight lanes, or by constructing a local relocation around the urbanized area.

2. DESIGN CRITERIA

Design criteria for this strategy follow basic interstate design criteria, including the following:

- Large radius horizontal curves including the flattening of curves greater than two degrees to two degrees or less.

- Vertical curves that are modified to improve sight distance and reach desired K-values.
- Flattening of vertical grades to a maximum of four percent and a desirable maximum of three percent.
- In the rural areas, a wider median (60 feet [18.3 m] minimum) to meet or exceed current design standards and allow for additional lanes and/or some other means of transportation within the median at sometime in the future. In the urban areas, provide a median barrier with 12-foot (3.7 m) wide inside shoulders.
- Vertical clearance of 16.5 feet (5.0 m) for bridges over roadways and 23.0 feet (7.0 m) for bridges over railroads.
- Six lanes of traffic at all locations, with additional lanes in urban areas (i.e., higher traffic volume areas) as required by traffic volumes.
- Twelve-foot lanes with 12-foot (3.7 m) shoulders on both the median and outside edges.
- Interchanges that provide adequate distance between ramp terminals and between ramp terminals and outer roadways, per MoDOT's current standards for interchanges. (MoDOT is currently considering new guidelines for improved management of access control along its highways and interchanges.)

Though it is desirable to correct existing conditions to meet all current design criteria, some design exceptions could be required for locations where existing deficiencies, as discussed below, can not be corrected.

3. EXISTING I-70 SUFFICIENCY REVIEW

The following section summarizes an analysis of the adequacy or sufficiency of the existing I-70 highway to meet the desired design criteria and serviceability for an interstate-type highway. This review included the geometric (i.e., horizontal and vertical alignment), bridge condition, interchange layouts and pavement condition attributes of the existing I-70 highway. Improvements to the existing I-70 highway should evaluate the ability of the new construction to upgrade or improve these elements of highway to meet the desired criteria and improve the overall serviceability of the corridor. For the alignment elements, improvements should consider the ability to upgrade these deficiencies to meet the desired criteria. Bridge and pavement condition deficiencies would be addressed through the replacement of those elements that have inadequate service ratings.

a. Geometrics

A review of the geometrics of existing I-70 was done to determine if the existing highway meets current design criteria.

Horizontally, all curves meet the design criteria maximum of three degrees, while there are four curves along the alignment that exceed the desirable maximum curvature of two degrees.

Only 45 percent of the vertical curves on existing I-70 meet the desirable design criteria (upper limit) values. Another 29 percent fall within the range of acceptable values, while a full 26 percent fall below the minimum (lower limit) values. Many of these substandard vertical curves could likely be corrected by a short increase in vertical curve lengths, and should be individually reviewed at the time of design. It is probable that some curves would not be correctable due to other factors restraining the grade.

b. Interchanges

Table II-6 lists information on the 54 interchanges between I-470 in Jackson County and the Lake St. Louis exit in St. Charles County, inclusive. Of these, 46 are diamonds, five are half or three-quarter diamonds and three are directional. The existing interchanges were evaluated to determine whether they provide a minimum spacing of 700 feet (213.4 m) between ramp termini and a minimum spacing of 430 feet (131.1 m) between ramp termini and outer roads, per MoDOT's current design standards for interchanges.

Table II-6: Summary of Existing I-70 Interchange Configurations

County	Exit No.	Interchange Type	Distance in Feet			Urban Like
			Between Ramps	Ramp to N.O.R.	Ramp to S.O.R.	
Jackson	20	Diamond	300	300	N/A	Yes
Jackson	21	Diamond	1,400	850	N/A	Yes
Jackson	24	Diamond	300	225	N/A	Yes
Jackson	28	Diamond	466	645	334	Yes
Lafayette	31	Diamond	350	680	Slip Ramps	Yes
Lafayette	37	3/4 Diamond	390	240	Slip Ramps	Yes
Lafayette	38	1/2 Diamond	410	530	280	
Lafayette	41	Diamond	350	300	370	
Lafayette	45	Diamond	380	240	300	
Lafayette	49	Diamond	429	240	176	
Lafayette	52	Diamond	400	190	175	
Lafayette	58	Diamond	310	N/A	N/A	Yes
Lafayette	62	Diamond	380	250	280	
Saline	66	3/4 Diamond	420	540	Slip Ramps	
Saline	71	Diamond	400	300	120	
Saline	74	Diamond	400	250	Slip Ramps	
Saline	78	Cloverleaf	N/A	N/A	N/A	
Saline	84	Diamond	470	N/A	350	
Cooper	89	Diamond	500	150	250	
Cooper	98	Diamond	350	160	540	
Cooper	101	Diamond	650	N/A	620	
Cooper	103	Diamond	380	N/A	160	Yes
Cooper	106	Diamond	380	N/A	180	
Cooper	111	Diamond	450	400	N/A	
Boone	115	Diamond	300	N/A	180	
Boone	117	Diamond	500	220	180	
Boone	121	Diamond	500	600	1250	
Boone	124	Diamond	430	525	400	Yes
Boone	125	Diamond	400	N/A	300	Yes
Boone	126	Diamond	350	N/A	N/A	Yes
Boone	127	Diamond	425	N/A	N/A	Yes
Boone	128	Diamond	500	450	400	Yes
Boone	131	Diamond	425	N/A	450	
Boone	133	Diamond	350	650	450	
Callaway	137	Diamond	360	650	500	
Callaway	144	Diamond	375	400	400	
Callaway	148	Diamond	525	N/A	865	Yes
Callaway	155	Diamond	450	300	380	

Callaway	161	Diamond	450	N/A	400	
Montgomery	170	Diamond	475	150	150	
Montgomery	175	Diamond	650	350	325	
Montgomery	179	Diamond	450	225	133	
Montgomery	183	Diamond	450	850	N/A	
Warren	188	Diamond	475	950	525	
Warren	193	Diamond	540	130	N/A	Yes
Warren	199	Diamond	550	210	160	
Warren	200	1/2 Diamond	270	120	0	Yes
St. Charles	203	Diamond	500	225	225	Yes
St. Charles	208	Diamond	475	110	110	Yes
St. Charles	209	1/2 Diamond	475	-20	-50 & 150	Yes
St. Charles	210	Directional	N/A	N/A	N/A	
St. Charles	212	Diamond	580	N/A	280	Yes
St. Charles	214	Diamond	440	80	110	Yes

The diamond interchange at Adams Dairy Parkway in Jackson County (Exit 21) and the directional interchange at US 65 in Saline County (Exit 78) meet current standards. The directional interchange at US 40/61 (Exit 210) meets current standards for geometrics on major movements, but is deficient in some minor movements (i.e. westbound I-70 to eastbound US 40/61) and includes left-hand exits that are not desirable.

None of the remaining 50 interchanges meet the 700 feet (213.4 m) between ramp termini standard, and only six interchanges completely meet the 430 feet (131.1 m) between ramp termini and outer roads standards. Nineteen of the 50 interchanges have been identified as candidates for tight urban diamond interchanges due to extensive development adjacent to the existing interchanges.

Seven of the interchanges meet the minimum requirements for distance between ramp termini and outer roads. However, moving ramp termini to meet the 700 feet (213.4 m) between ramp termini criteria would reduce the distance between ramp termini and outer roads resulting in the interchanges no longer meeting criteria.

MoDOT is currently considering new guidelines regarding access management along and around its highways and interchanges. These guidelines provide guidance regarding the desired spacing between breaks in access along I-70 and the state crossroads with which it interchanges. Currently, no existing interchanges strictly meet MoDOT’s access management guidelines.

c. Pavement and Bridge Conditions

Pavement rating data were evaluated for each of four different pavement rating systems for which MoDOT keeps records. A detailed listing of the average scores and number of miles of roadway falling into the five condition classifications (Very Good, Good, Fair, Poor, and Very Poor) can be found in Chapter I – Purpose and Need, C. Purpose and Need, 4. System Preservation. Depending on the rating system used, 34 to 54 percent of the existing I-70 Study Corridor pavement is in Poor or Very Poor condition.

MoDOT has ranked the 130 bridges within the study corridor on a scale of 0 to 9. The average ratings for the deck, superstructure and substructure of bridges within each county have been calculated and tabulated in Chapter I – Purpose and Need. The bridges within the I-70 Study Corridor average 27 years of age with ratings as follows:

- Decks – 6.2 (Generally Fair)
- Superstructures – 6.5 (Generally Fair)
- Substructures – 7.0 (Generally Good)

A sufficiency rating, resulting from a combination of structural adequacy, structural safety, serviceability, functional obsolescence, and essentiality for public use, has been calculated for the I-70 Study Corridor bridges in each county and are tabulated in Chapter I – Purpose and Need. The I-70 bridges within the I-70 Study Corridor score an overall average value of 86.6 percent, while the bridges over I-70 score an average value of 66.4 percent. Within the study corridor, nine bridges currently have sufficiency ratings below 50 percent.

4. IMPROVEMENT STANDARDS

Chapter I – Purpose and Need establishes the need for increased capacity along the I-70 Study Corridor to meet current and future travel demands. Strategy No. 3 (Widen Existing I-70) entails adding additional travel lanes to the existing four-lane I-70 section to serve the corridor's travel demands based on the desired level of service. In the rural areas, six lanes are needed to adequately serve future traffic. Eight or more lanes are needed in the urban areas of Kansas City, Columbia, Warrenton, Wright City, and Wentzville. However, there may be several methods or approaches for adding additional lanes to the existing four-lane I-70 roadway section. The intent of this section is to describe the typical roadway and interchange improvement options for I-70. Based on a review of these options, typical roadway sections and interchange configurations were selected for application, in general, to the I-70 Study Corridor for this improvement strategy.

a. Roadway Improvement Options

As stated in the purpose and need, the existing I-70 roadway section in the rural areas, in general, consists of four travel lanes with narrow shoulders and a 40-foot (12.2 m) wide median.

Five options have been identified for the widening/reconstruction of I-70 in the rural areas, which comprise the majority of the study corridor. All options assume full reconstruction of the existing I-70 roadway to provide a six-lane section. In some cases, provisions have been included for the future expansion of the corridor beyond six lanes. Overall, due to poor serviceability of the existing pavement, the existing pavement would not be used in place and the entire roadway section would be reconstructed. There are spot locations within the study corridor where the pavement has been recently rebuilt. Wherever possible, the improvements would try to incorporate the existing pavement into the reconstructed I-70. However, some of the options lend themselves better to reusing these recently improved sections, while others require the complete reconstruction of the corridor. The five options are defined as follows:

- Roadway Option 1 – Construct two additional lanes in existing median.

- Roadway Option 2 – Reconstruct to urban section about centerline of existing I-70.

- Roadway Option 3 – Same as Roadway Option 2 (above) except centerline shifted to one side.

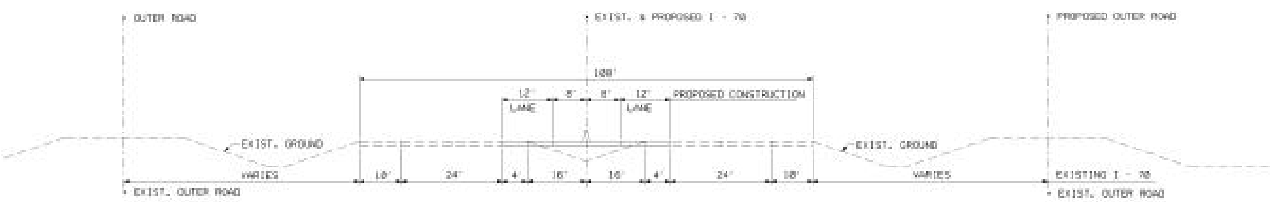
- Roadway Option 4 – Reconstruct to rural section about centerline of existing I-70.

- Roadway Option 5 – Same as Roadway Option 4 (above) except centerline shifted to one side.

Roadway Option 1

Roadway Option 1 (Figure II-1) would construct two 12-foot (3.7 m) lanes, two seven-foot (2.1 m) shoulders, and a concrete median barrier in the 40-foot (12.2 m) median of the existing roadway. All existing lanes and outside shoulders would be rehabilitated (i.e., reconstructed) to provide adequate pavement structure and a smoother ride. In those areas where recent paving improvements have been performed, the existing pavement could be incorporated into the improvements. This roadway option would require a design exception for the narrow inside shoulder and would not provide for future growth to eight lanes. No overhead bridge structures would have to be replaced, though the inside shoulder width may need to be reduced from seven feet (2.1 m) to accommodate existing bridge pier columns at the centerline of I-70. Bridges on I-70 would have to be widened or replaced to handle the additional roadway width.

Figure II-1: Roadway Design Standard - Option 1

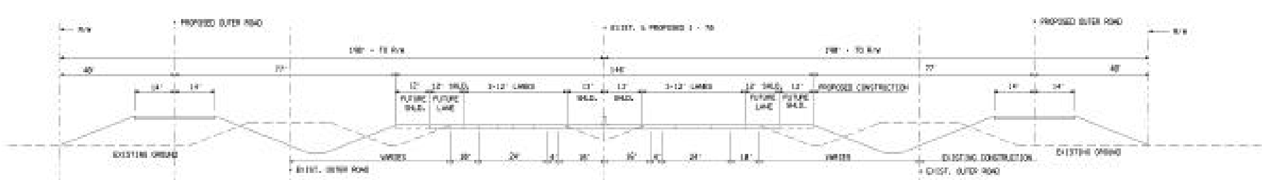


Roadway Option 2

Roadway Option 2 (Figure II-2) would reconstruct the highway about the existing centerline to provide for three 12-foot (3.7 m) lanes with 12-foot (3.7 m) shoulders in each direction, separated by a concrete median barrier. This strategy would provide for future growth to eight lanes through the addition of one lane in each direction on the outside of the roadway. The following would be required:

- Reconstruction of all bridges both on and over I-70.
- Reconstruction of all interchanges due to conflicts with the existing bridges. Interchanges could be reconfigured to meet current design standards where possible.
- The purchase of additional right-of-way on both sides of existing I-70.
- Reconstruction of outer roadways in most locations.

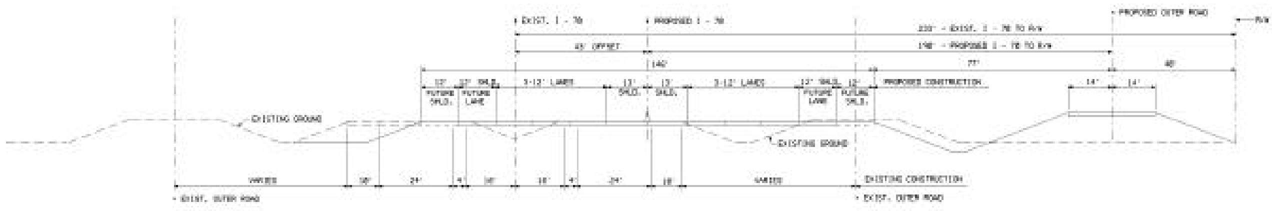
Figure II-2: Roadway Design Standard - Option 2



Roadway Option 3

Roadway Option 3 (Figure II-3) provides the same ultimate cross section as Roadway Option 2, but the roadway would be shifted to one side of the existing highway so that additional right-of-way would be required on only one side. This option would provide for easier staging of construction.

Figure II-3: Roadway Design Standard - Option 3

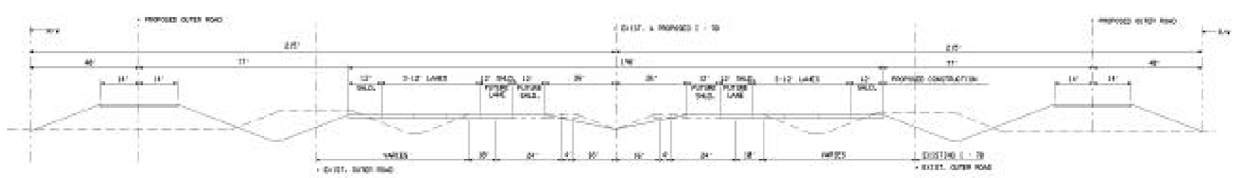


Roadway Option 4

Roadway Option 4 (Figure II-4) would reconstruct the highway about the existing centerline to provide for three 12-foot (3.7 m) lanes with 12-foot (3.7 m) shoulders in each direction, separated by a 100-foot (30.5 m) depressed grass median. This strategy would provide for the future growth of the Corridor to eight lanes through the addition of one lane in each direction on the inside of the roadway. As an option, additional space could be provided within the median for future transportation improvements, resulting in a total median width of 124 feet (37.8 m) (60 feet [18.3 m] of clear zone, 24 feet [7.3 m] of future widening and a 40-foot [12.2 m] space provision for future expansion). The following would be required with this roadway option:

- Reconstruction of all bridges both on and over I-70.
- Reconstruction of all interchanges due to conflicts with the existing bridges. Interchanges could be reconfigured to meet current design standards where possible.
- The purchase of additional right-of-way on both sides of existing I-70.
- Reconstruction of outer roadways in most locations.

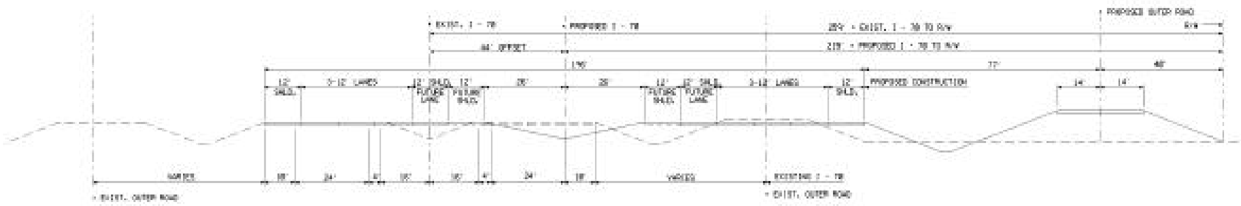
Figure II-4: Roadway Design Standard - Option 4



Roadway Option 5

Roadway Option 5 (Figure II-5) provides the same ultimate cross section as Roadway Option 4, but the roadway would be shifted to one side of the existing highway or the other so that additional right-of-way would be required on only one side. This option would provide for easier staging of construction. This roadway option also has the option of providing additional median space for future corridor expansion.

Figure II-5: Roadway Design Standard - Option 5



Summary of Rural Roadway Improvement Roadway Options

The purpose and need for the I-70 improvements establishes the ultimate goals of the improvements upon the completion of the construction. In addition to these goals, MoDOT has established goals relating to the implementation of these improvements, most notably the maintaining of four travel lanes during construction and the minimization of construction-related delays and detouring. Other goals include the minimization of impacts to adjacent land use and development and traffic safety during construction.

Table II-7 presents a summary of the evaluation of the roadway improvement options. For each of the evaluation issues, a rating is provided as to how well each roadway option would accomplish the stated goal.

Table II-7: Summary Evaluation of Rural Roadway Improvement Options

Issue	Option 1	Option 2	Option 3	Option 4	Option 5	Comment
Purpose and Need						
Roadway Capacity	+	+	+ +	+ + +	+ + +	Each of the options would provide six lanes in the rural areas, but Options 3, 4 and 5 would provide additional space for future lanes. Roadway Options 4 and 5 would provide additional space for future yet-to-be-defined transportation improvements.
Traffic Safety		+	+	+ + +	+ + +	Roadway Option 1 would not improve the safety of the existing roadway section, due to the narrow medians and median barrier. Though Roadway Options 2 and 3 would provide wider shoulders, they would introduce a median barrier which would likely increase the incidence of PDO-type crashes. Roadway Options 4 and 5 have the advantage of effectively eliminating cross-over type accidents by virtue of an extra-wide median and would provide superior flexibility to address roadway alignment deficiencies. Interchanges would need to be reconstructed with improved safety for all options except for Roadway Option 1.
Roadway Design Features		+	+	+ +	+ +	Roadway Option 1 would not meet current interstate type standards for shoulder width. Roadway Options 4 and 5 exceed current standards and have the added benefit of superior flexibility for addressing alignment deficiencies.
System Preservation	+	+ +	+ +	+ +	+ +	Each option would replace the existing I-70 pavement and I-70 bridges, though some of the existing pavement could be re-utilized with Roadway Option 1. However, all other options would require the complete reconstruction of all interchanges and all bridges over I-70.

Goods Movement	+	+	+	+	+	Each of the options would provide improved service to truck traffic through improved operations.
Access to Recreational Facilities	+	+	+	+	+	Each of the options would provide improved service and access to recreation-oriented traffic.
Implementation Goals						
Maintenance of Traffic				+	+ + +	Roadway Options 1, 2 and 3 could be constructed while maintaining the existing four lanes but not without significant construction staging, detouring and constraints to the contractor. Roadway Option 4 would provide better separation from existing travel lanes and construction zones, but Roadway Option 5 is far superior in providing sufficient buffers from the construction such that mainline I-70 traffic can be unimpeded, in general, during construction.
Construction Traffic Safety				+	+ + +	Similar to the Maintenance of Traffic issue, traffic safety during construction would be superior with Roadway Option 5 due to better buffers between the construction activities and the ongoing traffic operations.
Impacts to Adjacencies			+		+	Roadway Options 3 and 5 each have the advantage of better flexibility in determining the location and extent of the new construction to limit impacts to adjacent land use. If a particular resource or issue needs to be avoided, widening can occur in the opposite direction.

Rating: "+" = Addresses stated goal.
"+ +" = Addresses stated goal better.
"+ + +" = Addresses the stated goal the best.

As shown in the preceding table, Roadway Option 5 is the best roadway section for accomplishing both the stated purpose and need goals and MoDOT's implementation goals. For these reasons, it is recommended that Roadway Option 5 be the typical section and roadway standard for Strategy No. 3 (Widen Existing I-70) in the rural areas. Of course, in some atypical areas within the rural areas of the study corridor, this section may not be most appropriate and deviations may be necessary. However, changes in the roadway section should be limited in extent and the overriding goals of the purpose and need should not be compromised.

Figure II-5 shows the recommended typical section for Strategy No. 3 (Widen Existing I-70) in the rural areas. As a further refinement to this option, a 40-foot (12.2 m) wide space provision could be provided in the median for a yet to be defined future transportation improvement. It is recommended that to the fullest extent reasonably possible, this space provision be maintained and continuous within the improvements to the study corridor to allow for the growth and sustenance of the corridor well into the future. It is also recommended that frontage roads be continuous throughout the corridor for better incident management.

Summary of Urban Roadway Improvement Options

In some areas of the study corridor, such as in the urban areas of Kansas City, Columbia, Warrenton, Wright City and Wentzville, where I-70's adjacent land use densities preclude the expansion of the existing I-70 right-of-way to the extent necessary for Roadway Option 3, a more urban-like section would be necessary. Roadway Options 2 or 3 would be utilized in the urban areas within the study corridor. Figure II-2 shows the assumed urban widening section for Strategy No. 3 (Widen Existing I-70). Additional study beyond this First Tier EIS would be necessary to determine whether Roadway Option 2 or Roadway Option 3 would be best at a certain location.

Localized relocations of I-70 would utilize an ultimate section similar to Roadway Option 4 and 5. Provisions for the future transportation improvement would be included in the local relocation areas.

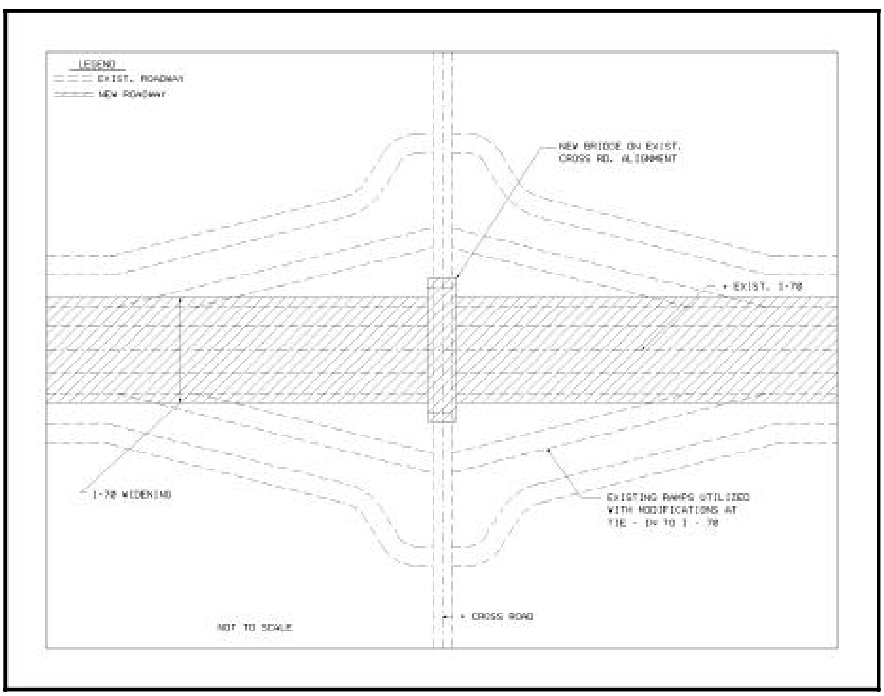
b. Interchange Improvement Options

There are 54 interchanges between Interstate 470 in Jackson County and the Lake St. Louis exit in St. Charles County, inclusive. Of these, 46 are diamonds, five are half or three-quarter diamonds, and three are directional interchanges. Depending on the type of interchange, the widening/reconstruction roadway option constructed for the adjacent I-70 segments, and the amount of development immediately adjacent to the interchange ramps and outer roadways, the following interchange options have been developed.

Interchange Option 1

Interchange Option 1 (see Figure II-6) provides for using the existing interchange configuration when widening the roadway. The outer roadways and ramps would be left in their current location and reconfigured at their tie-in with the widened I-70 lanes. To accommodate the number of lanes required on I-70, a new bridge would need to be constructed. This would be done in-place if possible, or offset to the side if required. Under this option, the distance between ramp terminals and from ramp terminals to outer roadway intersections would not be improved.

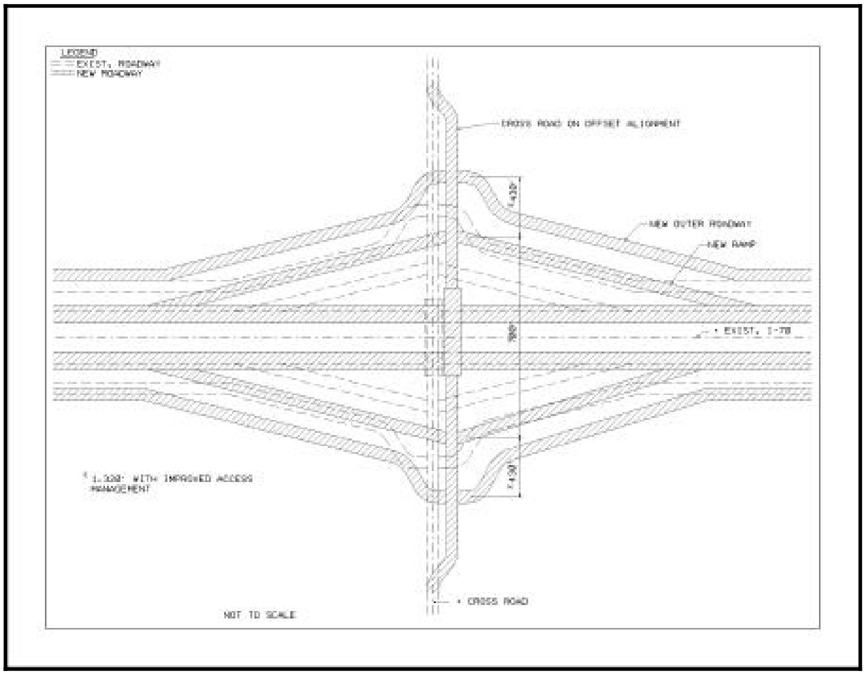
Figure II-6: Typical Interchange Layout - Option 1



Interchange Option 2

Interchange Option 2 (see Figure II-7) provides for improving the interchange to meet current design standards. This option would be used with roadway improvements that are built about the existing I-70 centerline. All outer roadways and ramps would be reconstructed to meet current design standards. As an option, the interchange could be reconstructed with a greater degree of access management pursuant to guidance currently under consideration by MoDOT.

Figure II-7: Typical Interchange Layout - Option 2



Interchange Option 3

Interchange Option 3 is similar to Interchange Option 2, except it is for use with roadway options that are shifted to one side of the existing alignment. The outer roadway on one side would remain, with the ramps on that same side being reconstructed in essentially the old location. The outer roadways and ramps on the opposite side would be rebuilt to provide the minimum distances required by the design standards. Again, as an option, the interchange could be reconstructed with a greater degree of access management pursuant to guidance currently under consideration by MoDOT. The configuration of the interchange would be similar to Figure II-7, but would be shifted either north or south.

Summary of Interchange Interchange Options

Combinations and variations of the three interchange options would certainly be possible. Each existing I-70 interchange would need to be specifically evaluated to determine how best to improve it. In general, it is recommended that with the necessary reconstruction of each interchange, opportunities to improve and enhance the degree of access management at the interchange be considered. Given the high degree of development surrounding the majority of I-70's interchanges, it is recommended that Interchange Option 3 be the improvement concept at each interchange. This option has the ability of being flexible to limit the impacts to adjacent land use and development. Interchange Option 3 would also incorporate improvements to the control of access along the interchange crossroad, pursuant to MoDOT's access management guidelines.

c. Access Management Guidelines

Access management involves the thoughtful planning and design of points of access to the public roadway system. Sound application of access management can have a significant beneficial impact on safety and the ability of a roadway to successfully carry traffic.

MoDOT's goals in implementing a comprehensive set of standards for access management include the following:

- Improved roadway safety.
- Improved traffic operations.
- Protection of past investments in the roadway system.
- Creation of better conditions for non-automobile modes of transportation.

Minimum Spacing Between Interchanges

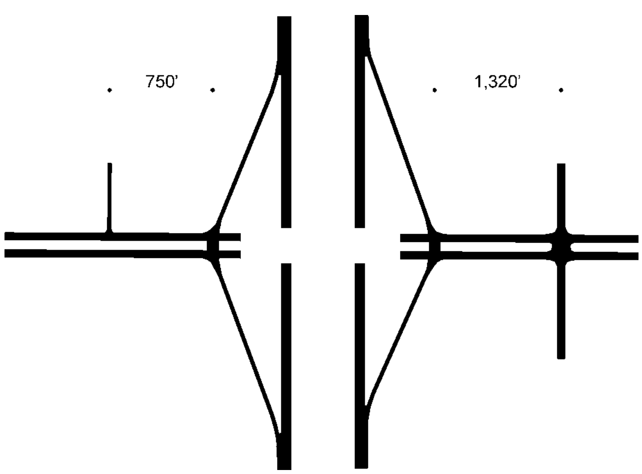
With the improvements to I-70, for the most part, existing interchanges will likely continue in their current locations. In order to maintain smooth traffic flow and to allow for safe and efficient weaving of traffic that is entering and exiting the highway, any new or relocated interchanges should provide a two mile (3.2 km) spacing minimum from the closest existing interchange in current or projected urban areas. A minimum five-mile (8 km) spacing should be provided in rural areas.

Clearance of Functional Areas of Interchanges

At interchanges along I-70, adequate areas need to be provided for traffic to make the transition from the highway to a lower classification of roadway. The functional area of the interchange is the area in which merging and diverging of traffic takes place. Drivers must travel along an exit ramp, find acceptable gaps, change lanes (weave), and merge within this distance.

Figure II-8 shows the desired degree of access management to be provided at each I-70 Study Corridor interchange that is improved.

Figure II-8: Access Management at Interchange Areas



In order to provide a safe distance for this activity to occur, a spacing of about 1,320 feet (402.3 m) needs to be provided from the end of the off-ramp to the first private driveway on the left-hand side, median opening, or intersection with a public road, in urban areas. When only right turns into or out of driveways or public roads are involved, a shorter clearance area of 750 feet (228.6 m) may be used. Though rural clearance areas require additional clearances, it is assumed that the high level of development around almost all of the I-70 interchanges would allow for the application of the urban standard.

Improvements to I-70 will need to consider MoDOT's access management guidelines.

5. PHYSICAL CHARACTERISTICS

a. Alignment

Given the varying nature of the I-70 corridor, with some sections being more rural-like while other sections are more urban-like, a combination of the roadside options provides a more practical approach over the exclusive use of any one option over the entire length of the corridor.

For the purposes of defining the construction costs and range of potential impacts, it was assumed that as much as possible, the divided rural section (Roadway Option 5) would be applied to the Widening I-70 Strategy. This option would provide superior mitigation of impacts during construction and would provide the most ideal roadway section upon completion. Furthermore, given the overriding goal of maintaining four lanes of traffic during construction and minimizing disturbances to existing traffic, this option would have the least impact to the existing traffic. In addition, this option would be a conservative assumption when characterizing the range of potential impacts to the surrounding environments. In general, the rural section would extend from around Grain Valley, on the west side of the study corridor, to the western edge of the Columbia area. The rural section would then extend from the eastern edge of Columbia to the Warrenton area. Exceptions to the rural section may be necessary in the Odessa area, where the existing median width varies, and the area around Mineola Hill where special environmental considerations exist.

In the urban areas of the study corridor, it was assumed that the urban section with a concrete median barrier (Roadway Option 2) would be used. This section would be used in only those locations where extensive urban development precludes the ability to provide a full rural section. These areas include: Kansas City, from I-470 to the Grain Valley; Columbia, extending through the city limits; and the Warrenton, Wright City and Wentzville area, extending from Warrenton to the St. Louis metropolitan area. Though the areas between Warrenton, Wright City and Wentzville could possibly be expanded using the rural section, given the relatively close proximity of these communities and the need for a consistent roadway section, it was assumed that the urban section would extend from Warrenton to the eastern terminus of the study corridor.

One of the distinct advantages of the recommended roadway standard for this strategy (Roadway Option 5), having greater separation between the opposing travel lanes, is the ability to make line and grade adjustments to the existing I-70 alignment. To the extent reasonably possible without incurring significant additional construction costs or impacts, minor adjustments to the horizontal and vertical alignments would be made. For the most part, the alignment of I-70 would be unchanged. However, there are four horizontal curves within the study corridor that exceed the desirable curvature. A cursory review of these areas suggests that each could be adjusted pursuant to the project criteria without unreasonable impacts. For those vertical curves that exceed the minimum allowable values, approximately 26 percent of the curves in the corridor, each would be adjusted as permitted by the adjacent controls and constraints.

b. Interchanges

With the widening of I-70 using Roadway Option 5, the reconstruction of all existing interchanges would be required. Existing I-70 interchanges would be reconstructed wherever possible to meet current design standards. Bridges would be constructed adjacent to existing structures and approach roadways realigned to allow the existing bridge to remain open to traffic during construction.

General summaries of how the typical interchanges would be improved with Strategy No. 3 (Widen Existing I-70) include:

- To the extent possible, all applicable interchanges would be improved utilizing Interchange Option 2 or 3, depending on the nature of the adjoining I-70 widening.
- The US 54 interchange would be improved for the westbound to southbound movement, and its complement, through directional ramps. These ramps could be added to the existing interchange or perhaps the existing US 54 interchange could be relocated to provide better overall service.
- The cloverleaf interchange at I-70 and US 65 would be reconstructed in a similar fashion with consideration given to the addition of a collector-distributor roadway system on the I-70 portion of the interchange.
- The directional interchange at I-70 and US 40/61 would be reconstructed to eliminate left-hand exits and other unusual geometrics. A new fully-directional interstate to interstate interchange would be provided to accommodate the future upgrade of US 40/61 to an interstate facility (i.e., I-64). This interchange would have all right-hand entrances and exits and include high-speed fly-over or loop ramps in all directions.
- To the extent reasonably possible, improved access management at all reconstructed interchanges in the study corridor would be accomplished based on MoDOT's access management guidance. Given the long-term permanence of the I-70 improvements, additional investments in the interchange areas for better control of access should be included to preserve the long-term viability and operations of the interchange areas.

c. Localized Relocation Options

As an option to the widening of the existing right-of-way, localized relocations of I-70 may be advantageous in some areas. In those areas where adjacent land use and development may be such that unacceptable impacts would be realized, a local relocation of I-70 could be considered. Candidate locations for local relocations include the urban areas of Kansas City, Columbia, Warrenton, Wright City and Wentzville. Within each of these areas, the I-70 roadway currently consists of an urban section with a median barrier.

Kansas City Area

The Kansas City area of the study corridor extends from I-470, the western terminus of the study corridor, to Grain Valley. Within this area the study corridor is very urban-like with frontage roads and adjacent development. The I-70 roadway currently consists of an urban-type section from I-470 to Route 7, and a rural-type section from Route 7 to Grain Valley. Even though this area has considerable adjacent development, in general, the available space within the existing I-70 right-of-way is sufficient to allow for widening of the existing roadway without undue impacts to the adjacent land use and development. In this area, a local relocation of I-70 was not considered due to the available space for widening within the existing right-of-way. Furthermore, given the higher degree of development in areas farther north or south of the existing right-of-way, relocating I-70 as an option to urban widening in this area would likely incur greater and unacceptable impacts.

Columbia Area

Due to high levels of development adjacent to the highway through Columbia and the volume of local traffic utilizing this segment of I-70, the relocation of through traffic to a bypass facility could be warranted. Such a facility would be constructed on a new alignment and would leave I-70 west of Columbia, pass around Columbia to the north or south and reconnect with I-70 east of Columbia. This option could include interchanges at US 63, Route 763 and Route E for a northern relocation or at US 63, Route 163, and Route TT for a southern relocation.

Warrenton/Wright City/Wentzville Area

Due to high levels of development adjacent to the highway through these cities and the volume of local traffic utilizing this segment of I-70, the relocation of through traffic to a bypass facility could be warranted. Such a facility would leave I-70 west of Warrenton, pass around the three cities to either the north or south, and reconnect with I-70 east of the interchange with US 40/61. If the by-pass were built on the north side of the cities, the east end could be tied into US 61 north of Wentzville rather than I-70. Another connection option for a northern relocation would be a further extension to the east with a connection to Route 370. Route 370 roughly parallels I-70 north of St. Charles and includes a bridge crossing over the Missouri River. Several candidate interchanges could be included with this scenario, but regardless of the location of the bypass, interchanges be provided for Warrenton via Route 47 and Wright City via either Route J or Route F. If a southern relocation was constructed, the relocated facility could tie into the extension of Page Avenue at US 40/61, or could tie back into I-70 near the existing US 40/61 and I-70 interchange. Given the close proximity of these three communities, it is recommended that a single relocation around all three communities be considered as an option.

d. Missouri River Crossing

One of the most significant engineering and environmental challenges within the study corridor is the crossing of the Missouri River floodplain area near Overton Bottoms. The Missouri River is perhaps the greatest natural feature within the I-70 corridor. Given the inherent challenges of improving I-70 through this sensitive area, special considerations were given to how I-70 might be widened in this area.

With the improvements to the existing I-70 corridor, the present Missouri River crossing lacks the ability to be expanded to increase the capacity of the crossing. The existing Rocheport Bridge consists of a through-truss bridge superstructure. This type of bridge can not be widened. The existing bridge consists of a single bridge deck configuration with two 12-foot (3.7 m) traffic lanes in each direction separated by a six-foot median (two, two-foot [0.61 m] inside shoulders plus a two-foot [0.6 m] median barrier), and two three-foot (0.9 m) outside shoulders. The approximate width of 60 feet (18.3 m) would not allow for any additional lanes of travel, but would accommodate three lanes in one direction with full-width (12-foot [3.7 m]) inside/outside shoulders for either the proposed eastbound or westbound travelway. With the conversion of the existing bridge to one-way travel, an adjacent structure would need to be constructed for the opposing travel lanes. The new bridge would need to provide sufficient room for three travel lanes and full-width (12-foot [3.7 m]) shoulders on both the inside and outside. Provisions for future widening beyond 2030 would need to be considered as part of the planning and design of the new bridge. Utilization of the existing I-70 bridge would not provide for a fourth directional lane to be added in the future, unless substandard (six-foot [1.8 m]) shoulders were to be accepted. To conform to the design criteria set forth in this EIS, a new I-70 bridge would need to be built to replace the existing bridge at the time the fourth directional lane is added throughout the project length, sometime after 2030.

e. Mineola Hill

Another notable tight spot within the I-70 corridor is the Mineola Hill area, located east of Kingdom City and west of Danville. As described in Chapter III – Affected Environment, this area is notable due to the presence of several sensitive resources and the tight physical constraints of the area. Located in the Loutre River Valley, the Mineola Hill area contains the Graham Cave State Park, the Graham Homestead and “Slave” Rock (see Chapter III – Affected Environment). Furthermore, from a traffic service standpoint, the vertical grades in this area are substandard with grades that exceed acceptable limits. Given the tight physical constraints of this area, the typical roadway improvement standard, including the extra wide median, could not be accommodated.

At this level of detail and assessment, this area was reviewed to determine if the widening of I-70 could be accomplished without incurring unacceptable impacts to the surrounding resources. It was determined that in addition to widening the existing I-70 right-of-way within this area, other viable options exist such as providing a local relocation of I-70 around the noted resources. It was determined through this general review that the surrounding issues would not necessarily preclude the implementation of the Widening I-70 Strategy, but that more detailed evaluation of this sensitive area would be necessary to more definitively identify the nature of the improvements to I-70 within the Mineola Hill area.

f. Other Improvements

Rest Areas

Due to overcrowding at existing rest areas along the corridor, the four existing rest area sites (facilities on both sides of the highway for eight total) would need to be expanded or replaced (possibly at new locations) to handle the higher volumes of vehicles, particularly trucks, that use the rest area facilities. Improvements to the existing I-70 rest areas within the study corridor would be included with Strategy No. 3 (Widen Existing I-70).

Weigh Stations

Entrances to and exits from existing weigh station locations in Lafayette and St. Charles Counties would need to be modified to accommodate the reconfiguration of the highway.

If a bypass facility is constructed around Warrenton, Wright City and Wentzville, the construction of new weigh stations would be included because the weigh stations at Foristell would be bypassed.

Improvements to the existing I-70 weight stations would be included with Strategy No. 3 (Widen Existing I-70).

Existing I-70 at Bypass Locations

If one or more bypasses are constructed, the needs of existing I-70 at these locations must be evaluated and considered.

At a minimum, maintenance and rehabilitation of the existing pavement and bridge structures must take place to maintain the roadway for traffic not using the bypass.

Because median widths are below desirable values, construction of a concrete median barrier or barrier cable in the median would need to be considered to decrease the chance for crossover collisions.

Emergency Access to Bypasses

Bypass facilities would provide no access at most crossroads to fire, ambulance, and other emergency services responding to highway accidents and fires. To solve this problem, access locations for emergency use only would be provided at appropriate locations where other roads cross over or under the bypass facility.

6. OPERATIONAL CHARACTERISTICS

A widened/reconstructed I-70 would provide the same open access to all vehicles and the same posted speed limits as the original facility.

In locations with more than two lanes of roadway in each direction, consideration could be given to restricting trucks to the two outside lanes to avoid the bunching of traffic caused by truck maneuvers at speeds below the posted speed limit.

7. CAPITAL COSTS

a. Construction Costs

Construction costs for the Widen Existing I-70 Strategy include costs for constructing all roadway and bridge improvements. Construction costs are based on current construction costs and do not reflect inflation. These costs include design and construction administration costs and the costs of the I-70 improvements, including continuous frontage roads and access management enhancements at the interchange areas. Construction cost estimates are provided in Table II-8 for widening along the existing alignment through the urban areas, as well as for the localized relocations of Columbia and the Warrenton/Wright City/Wentzville area.

Table II-8: Construction Cost Estimates for Strategy No. 3 (Widen Existing I-70)

Construction Costs	No Bypasses	With Bypasses
ROW Acquisition	$ 125,000,000	$ 99,000,000
Construction	2,209,016,000	2,137,845,000
Access Management	500,000,000	500,000
Total (Rounded)	**$2,834,000,000**	**$2,737,000,000**

b. Rehabilitation and Operations and Maintenance Costs

Table II-9 presents the major rehabilitation and operations and maintenance costs for Strategy No. 3 (Widen Existing I-70). These estimates include the costs of maintaining and rehabilitating the existing I-70 pavement and bridges, with or without the relocation options of this improvement strategy. Portions of the existing I-70 facility would need to be rehabilitated through milling and inlaying prior to the full implementation of this improvement strategy. It is assumed that prior to completing the construction of this strategy, these rehabilitation efforts would be necessary and would occur early in the 30-year study period to address the very poor pavement needing immediate attention. Also included in the life-cycle considerations for this strategy is the necessary rehabilitation work for the new improvements that would occur later in the study period to address the rehabilitation of new pavement. Rehabilitation costs are the present value of costs to be incurred over the 30-year study period.

Using a MoDOT historical average of $24,500 per annual lane mile (1.6 km) (four-lane) and $28,500 per annual lane mile (1.6 km) (six-lane) to operate and maintain an interstate highway, and allowing for a two percent increase each year in these costs, cost estimates for 30 years of operations and maintenance were estimated.

Table II-9: Rehabilitation and O&M Costs for Strategy No. 3 (Widen Existing I-70)

Operations and Maintenance Costs	Total 30-year Costs	Present Value of Annual Costs (6% Discount Rate)	Equivalent Uniform Annual Costs
Widening – No Local Relocations (Bypasses)			
Major Rehabilitation	$75,639,634	$28,858,498	$2,096,538
O&M	$226,563,190	$93,844,177	$6,817,677
Total (Rounded)			**$8,910,000**
Widening – Urban Relocations (Bypasses)			
Major Rehabilitation	$93,078,359	$36,630,428	$2,661,161
O&M	$253,636,909	$102,966,279	$7,480,388
Total (Rounded)			**$10,140,000**

D. New Parallel Facility Strategy

1. GENERAL DESCRIPTION

This strategy involves the construction of a new parallel roadway within five miles either north or south of the existing alignment. Options include a divided high-speed highway with or without the consideration of a future high-speed rail corridor within the new parallel highway corridor. Highway design speeds of 70, 75 and 80 mph (112.7, 120.7 and 128.7 km/h) were evaluated.

This roadway would provide only five or so interchange locations along its length in comparison to the 54 interchange locations along the existing I-70. It would be designed to handle the increase in traffic volumes by splitting a large amount of the through traffic away from existing I-70. The facility could also be designed as a truckway that would be limited to use by large trucks that currently make up almost one-third of all vehicles on the existing highway.

2. DESIGN CRITERIA

Design criteria for this strategy follow basic interstate design criteria, including the following:

- Large radius horizontal curves with maximum three degree curves and desirable maximum two degree curves.
- Vertical curves that meet all required K values.
- Vertical grades set to a maximum of four percent and a desirable maximum of three percent.
- A 124-foot (37.8 m) wide median to meet current design standards and allow for additional lanes and/or some other means of transportation in the median in the future.

- Four lanes of traffic at all locations, with additional lanes in urban areas as required by traffic volumes.
- Twelve-foot (3.7 m) lanes with 12-foot (3.7 m) shoulders on both the median and outside edges.
- Interchanges that provide adequate distance between ramp terminals and between ramp terminals and outer roadways.
- Full implementation of MoDOT's access management guidelines for both the new route and the existing I-70.

For 75 or 80 mph (120.7 or 128.7 km/h) facilities, horizontal and vertical curve criteria would have to be interpolated from the existing 70 mph (112.7 km/h) criteria to account for the higher speeds.

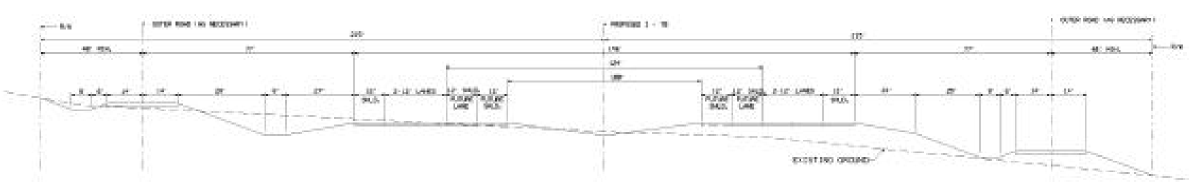
3. IMPROVEMENT STANDARDS

a. Roadway Improvement Options

Pursuant to the goals established in the purpose and need, the roadway section for the parallel route strategies was defined to accommodate future traffic growth within the corridor, to promote traffic safety, and to be "state of the art" regarding the latest standards in highway design. This section would be consistent with the rural widening section identified for Strategy No. 3 (Widen Existing I-70).

The roadway standard for Strategy No. 4 (New Parallel Facility) would consist of two 12-foot (3.7 m) lanes with 12-foot (3.7 m) wide inside and outside shoulders in each direction, separated by an extra wide 124-foot (37.8 m) depressed grass median. This strategy would provide for the future growth of the corridor to six lanes through the addition of two lanes in each direction on the inside of the roadway. Other features include frontage roads as needed. The extra wide 124-foot (37.8 m) median would provide space for the future travel lanes (24 feet[7.3 m]), for clear zone requirements (60 feet [18.3 m]), plus a 40-foot (12.2 m) space provision reserved for future expansion of the study corridor. The actual clear zone requirement would need to be adjusted pursuant to the facility's design speed. It is assumed that the typical right-of-way width for this section would be approximately 500 feet (152.4 m), providing sufficient room for deeper cuts and higher embankment sections for better roadway grades and alignments. Figure II-9 shows the typical roadway configuration for this strategy.

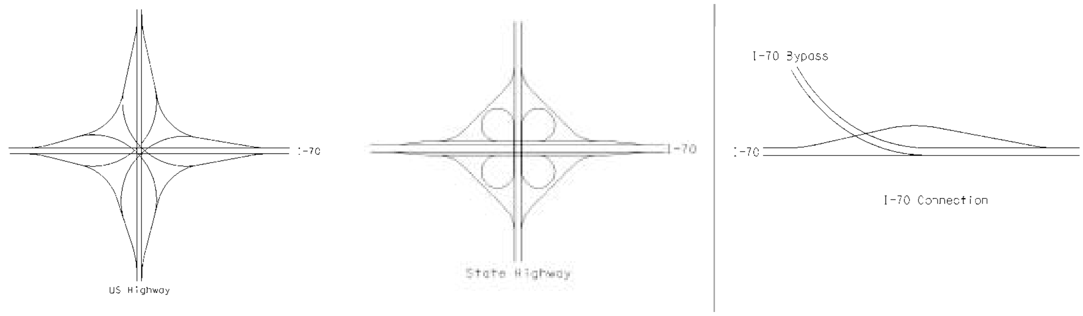
Figure II-9: Typical Roadway Section Strategy No. 4 (New Parallel Facility)



b. Interchange Improvement Options

Three basic interchange configurations, as shown in Figure II-10, have been identified for this strategy. The desired configuration would depend on the type of crossroad and the traffic volumes. In general, interchanges with US Highways would be fully directional interchanges, interchanges with state highways would be cloverleaf interchanges with collector-distributor roads, and the connection between I-70 and the parallel facility at either end of the corridor would be a directional facility as shown in the figure.

Figure II-10: Typical Interchange Layouts for Strategy No. 4 (New Parallel Facility)



4. PHYSICAL CHARACTERISTICS

a. Alignment

For the definition of the reasonable strategies and the subsequent assessment of the environmental impacts, a specific alignment for Strategy No. 4 (New Parallel Facility) was not identified. Rather, the physical and environmental constraints of the I-70 Study Corridor, defined for the purposes of this study as a 10-mile (16.1 km) wide corridor centered on the existing I-70 alignment, were reviewed and assessed to determine if any features would preclude the implementation of this strategy. Through a review of the environmental setting of probable and likely locations for the alignment of this strategy, as defined in Chapter III – Affected Environment, it was determined that no physical or environmental constraints or issues exist that would necessarily prevent the construction of a new parallel facility. Given the inherent latitude and flexibility of establishing a specific location for the new parallel facility, in general, isolated environmental features and constraints would be avoided. Through more detailed route location studies, alignments could be defined to avoid the most significant resources and impacts. Should this strategy be advanced to a more detailed evaluation, more specific alignments would need to be defined and assessed.

Though no specific alignments were defined, several features and issues were identified that would control or affect the determination of the likely location of the new parallel facility. These issues were identified and considered to determine the likely conceptual location of the new parallel facility and the limitations these issues would have on the facility's location. These issues include the Missouri River, the location of interchange connections to the major north-south highways, and the urbanized areas.

- **Missouri River** – Several issues relating to the Missouri River floodplain within the I-70 Study Corridor would limit the apparent opportunities for a new parallel facility to cross the river complex. As described in Chapter III – Affected Environment, the Big Muddy National Wildlife Refuge, the Overton Bottoms Conservation Area and other related and adjoining natural features that exist within the floodplain area create a fairly narrow window for the crossing of the Missouri River. The existing impacts of the current I-70 bridge and roadway embankment on the floodplain provide a logical crossing location where additional incremental impacts might be realized. Furthermore, space provisions, 300 feet (91.4 m) on both sides of the existing I-70 right-of-way, have been provided through the floodplain area as part of the ongoing floodplain reclamation activities for the future expansion of I-70 through this area. Therefore, it is likely that the best location for a new crossing of the Missouri River would need to be situated immediately adjacent to the existing Rocheport Bridge.

- **North-South Highway Connections** – The concept of the New Parallel Facility Strategy is to provide priority service to the interstate traveler. Consequently, very limited access to local travelers would be provided. Only a few interchanges would be provided and these connection points would be limited to major north-south routes, such as Route 13, US 65, US 63, US 54 and Route 19. Consequently, the locations of these connection points would affect the determination of the route alignment in the immediate vicinity of these connection points.

- **Urbanized Areas** – The current and projected expansion of urban areas within the I-70 Study Corridor limit the likely location of the new parallel facility in several locations. Perhaps the most obvious example is the Columbia area where the ongoing expansion of the urban boundary to the south would likely preclude the new parallel facility from being located south of Columbia without incurring additional travel distance and construction costs.

The typical section of the new parallel facility would consist of a divided four-lane section with a wide grassy depressed median. A typical 500-foot (152.4 m) wide right-of-way is assumed. This right-of-way width would be sufficient to provide an extra-wide median area for future yet to be defined transportation improvements. In general, this right-of-way width should be sufficient for the more stringent design criteria of a higher speed highway. It is assumed that no rail construction would take place as part of the initial roadway construction, but roadway horizontal and vertical curvature, right-of-way width and bridges could be constructed to be compatible with and provide for high-speed rail construction at a later date.

Frontage or service roads would be provided as necessary to maintain local access and grade-separation bridges would be provided as necessary to maintain local road continuity.

b. Interchanges

Candidate interchange locations for a parallel facility would be limited to the locations and likely types shown in Table II-10.

Table II-10: Candidate Interchange Locations/Types for New Parallel Facility Strategy

Candidate Interchange Location	Type of Interchange
Route 13	Cloverleaf w/ CD Road
US 65	Fully Directional
US 63	Fully Directional
US 54	Fully Directional
Route 19	Cloverleaf w/ CD Road

Note: CD = Collector/Distributor configuration.

c. Missouri River Crossing

The Missouri River crossing would consist of two parallel structures with a separation of 124 feet (37.8 m) from inside edge of pavement to inside edge of pavement. Each structure would consist of two 12-foot (3.7 m) traffic lanes and full-width (12 feet [3.7 m]) inside/outside shoulders. Provisions for future lane widening of the structure to accommodate increased traffic volumes would be incorporated into the facility during the design phase of the project. The crossing of the Missouri River would likely be located in close proximity to the existing I-70 bridge crossing.

d. Other Improvements

Rest Areas

It is assumed that a total of four rest areas would be constructed in each direction on the new parallel facility. These rest areas would provide restrooms, telephones, picnic facilities and vending machines. Care would have to be taken to provide facilities with adequate parking for trucks.

Weigh Stations

Because a new parallel facility would by-pass the existing I-70 weigh stations in Lafayette and St. Charles Counties, the construction of two new weigh stations in each direction would be included.

Existing I-70 Improvements

At a minimum, maintenance and rehabilitation of the existing I-70 pavement and bridge structures must take place to maintain the existing roadway for traffic not using the parallel facility. In addition to the normal upkeep of the system, even with the parallel route improvements, capacity improvements or safety enhancements may still be necessary along the existing highway. For the purposes of this study, it was assumed that improvements to the existing I-70 interchanges would be performed to upgrade the control of access in the interchange areas, thereby improving the interchange efficiencies and safety. These improvements to the existing interchanges would be consistent and similar to the improvements of the Widen Existing I-70 Strategy. Should this strategy advance to more detailed analysis and evaluation, considerations would need to be given to the need for additional capacity improvements to the existing I-70 roadway even with the construction of a parallel route. The degree of the need for improvements to the existing highway would depend on the extent of traffic diversion to the new route.

Regarding safety issues along the existing highway, because the existing I-70 median widths are below desirable values, the need for a concrete median barrier or barrier cable in the median would need to be evaluated to determine if there are locations with higher than normal crossover accidents.

Emergency Access

A new parallel facility would provide minimal access for fire, ambulance, and other emergency services responding to highway accidents and fires. To solve this problem, access locations for emergency use only would be provided at appropriate locations where other roads cross over or under the bypass facility.

5. OPERATIONAL CHARACTERISTICS

A new parallel facility could be designed and operated as either a freeway or an exclusive truckway, with posted speed limits of 70, 75 or 80 mph (112.7, 120.7 or 128.7 km/h). As a freeway the highway would be open to both cars and trucks. Use of a speed limit above 70 mph (112.7 km/h) would encourage its use because of the time saved over driving 70 mph 112.7 km/h) on existing I-70.

As a truckway, the facility would be designated for use exclusively by heavy trucks. Use of a speed limit above 70 mph (112.7 km/h), and the ability to navigate without smaller cars, trucks and other vehicles on the road, would encourage its use by truck drivers because of the time saved over driving 70 mph (112.7 km/h) on existing I-70.

6. CAPITAL COSTS

a. Construction Costs

Construction costs for the New Parallel Facility Strategy include costs for constructing all roadway and bridge improvements. Construction costs are based on current construction costs and do not reflect inflation. These costs include design and construction administration costs, and the costs of the I-70 parallel route improvements, including constructing access management enhancements at existing I-70 interchange areas. Table II-11 presents the estimated construction costs for Strategy No. 4 (New Parallel Route).

Table II-11: Construction Cost Estimates for Strategy No. 4 (New Parallel Facility)

Construction Costs	
ROW Acquisition	$ 126,000,000
Construction	1,757,223,000
Access Management	500,000,000
Total (Rounded)	**$2,351,000,000**

b. Rehabilitation and Operations and Maintenance Costs

Table II-12 presents the major rehabilitation and operations and maintenance costs for Strategy No. 4 (New Parallel Facility). These estimates include the costs of maintaining and rehabilitating the existing I-70 pavement and bridges, plus the costs associated with maintaining and operating the new construction. Based on the service condition of the existing I-70 Study Corridor infrastructure, it is assumed that the ongoing rehabilitation of the existing I-70 facility would include the annual replacement of approximately 24 lane-miles (38.6 lane-km) of pavement, the milling and inlaying of roughly 80 lane-miles (128.7 lane-km) of pavement, and the replacement of seven bridge decks. In addition, rehabilitation work later in the study period is assumed to address the future rehabilitation of the new pavement along the parallel route. Rehabilitation costs are the present value of costs to be incurred over the 30-year study period.

Using a MoDOT historical average of $24,500 per lane mile (1.6 km) (four-lane) and $28,500 per lane mile (1.6 km) (six-lane) to operate and maintain an interstate highway, and allowing for a two percent increase each year in these costs, 30 years of operations and maintenance along the new and existing routes are estimated in Table II-12.

Table II-12: Rehabilitation and O&M Costs for Strategy No. 4 (New Parallel Facility)

Operations and Maintenance Costs	Total 30-year Costs	Present Value of Annual Costs (6% Discount Rate)	Equivalent Uniform Annual Costs
Major Rehabilitation	$675,400,000	$281,400,000	$20,443,404
O&M	$359,752,000	$141,683,000	$10,293,114
Total (Rounded)			**$30,740,000**

E. New Parallel Toll Road Strategy

1. GENERAL DESCRIPTION

A toll road on separate alignment would geometrically be the same as the new parallel facility described earlier. The exceptions would be the use of the toll collection facilities and the layout of interchanges to facilitate toll collection.

Three toll collection configurations warrant consideration. Each of these toll collection concepts would provide a closed system whereas all travel on the new parallel toll road would be tolled. Each of these concepts would capture all potential toll revenue on the new route. These concepts include:

- Minimum Interchange Spacing Scenario
- Moderate Interchange Spacing Scenario
- Frequent Interchange Spacing Scenario

a. Minimum Interchange Spacing

In this scenario, only the three US designated highways, US 65, US 63 and US 54, would have access to the toll road. With only three access points, tolls could be collected using four mainline barrier toll plazas. Average interchange spacing would be 48 miles (77.2 km). No ramp toll collection would be used in this plan.

b. Moderate Interchange Spacing

This plan would provide access to the toll road at six locations: Route 13, US 65, US 63, US 54, Route 19 and Route 47. Average interchange spacing would be 28 miles (45.1 km). Toll collection for this plan would be a combination of two barrier plazas, one at each end of the project, plus 12 exit ramp toll booths.

c. Frequent Interchange Spacing

The plan that allows the greatest degree of access to the toll road would provide nine interchange locations. These locations are: Route 131 (Odessa), Route 13 (Higginsville), Route 23 (Concordia), US 65 (Marshall), Route 5 (Booneville), US 63 (Columbia), US 54 (Kingdom City), Route 19 (Montgomery City) and Route 47 (Warrenton). Average interchange location spacing would be 20 miles (32.2 km). Table II-13 summarizing this information follows.

Table II-13: Toll Road Interchange Spacing Scenarios

	SCENARIO		
	Minimum Spacing	**Moderate Spacing**	**Frequent Spacing**
Interchange Locations	US 65 US 63 US 54	Route 13 US 65 US 63 US 54 Route 19 Route 47	Route 131 Route 13 Route 23 US 65 Route 5 US 63 US 54 Route 19 Route 47
Toll Collection Barrier Plazas	4	2	2
Ramp Collection	None	12	18
Average Interchange Spacing	48 miles	28 miles	20 miles
Electronic Toll Collection (ETC)	Yes	Yes	Yes

2. DESIGN CRITERIA

Design criteria for the toll road would be the same as used for the new parallel facility as described in Section F. The use of a wide median, full-width shoulders and a higher-than-normal design speed will make the new parallel roadway or the toll road a much safer and more attractive facility than existing I-70.

3. IMPROVEMENT STANDARDS

a. Typical Roadway Section

The typical roadway section will be the same as that described for the new parallel facility with the exception of widening at barrier toll plazas.

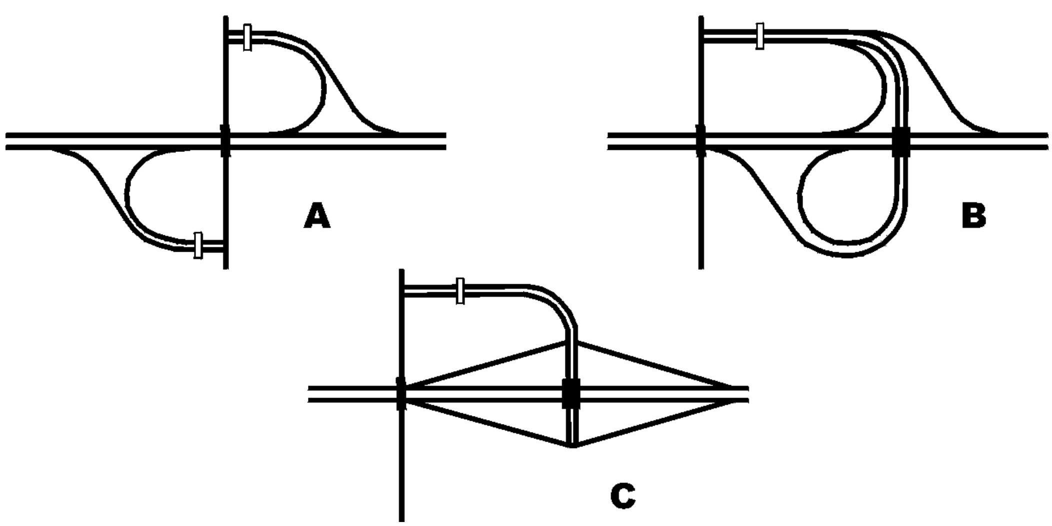
b. Typical Interchange Layout

While the new parallel facility would use typical rural diamond interchange configurations, the toll road would use a modified diamond to reduce toll collection costs.

A folded diamond configuration (Layout A) that places both the entrance and exit ramps on one side of the roadway into the same quadrant would be used to limit toll collection and ticket dispersal to two locations for each interchange.

Two other types of interchanges that can be used where applicable are the trumpet design (Layout B) and the normal diamond that is offset to one side of the crossroad (Layout C). Figure II-11 presents a conceptualization of these three interchange types.

Figure II-11: Toll Road Typical Interchanges



As was the standard for the New Parallel Route Strategy, MoDOT's access management guidelines would be applied to the existing I-70 Study Corridor interchanges.

c. Typical Toll Plaza Configuration

Barrier Toll Plaza

The minimum interchange spacing scenario would use four barrier plazas to collect all tolls. A barrier plaza extends across all lanes of the mainline roadway with lanes added to facilitate toll collection. All vehicles without provisions for electronic toll collection would be required to stop to pay tolls or take a ticket. Vehicles equipped with ETC would not be required to stop. The number of lanes at a barrier plaza is determined by dividing the number of users per hour by the rate of passages through the booth. If change is made in the transaction, a rate of 200 to 300 vehicles per hour is typical. If only a ticket is taken, a rate of 500 to 700 vph can be used. The rate of flow through an exclusive ETC lane can vary from 1,000 to 1,500 vph depending on the speed allowed through the detector.

Ramp Toll Collection

In the moderate and frequent interchange spacing scenarios, a barrier plaza would be located at each end of the project and ramp toll collection would be used on all exit ramps from the mainline. Entrance ramps would be “folded” to pass through the opposite side of the exit tollbooth. The tickets can be dispensed either manually or automatically. An exclusive electronic toll collection lane can be added to the exit tollbooth for convenience of frequent users. As with the barrier toll plaza, the ramp toll plaza would be sized to serve the traffic demand efficiently.

d. Typical Rest Area Locations

Currently there are four rest areas within the project limits, two east and two west of Columbia. Average spacing of rest areas is approximately every 40 miles (64.4 km). During peak periods of usage, these existing rest areas are loaded to capacity. The number of rest areas on the new parallel facility should be at least the same as existing but should be constructed with greater capacity.

A toll road rest area can be developed commercially with food and fuel provisions. The franchising of these facilities would be at the direction of the toll road authority. Commercial rest areas would aid long distance trips by negating the need to exit the toll road for fuel.

4. PHYSICAL CHARACTERISTICS

The physical alignment and roadway standard characteristics of the toll road would be the same as the new parallel facility.

a. General Features

The wide median, full shoulders and high design speed would allow the toll road to be posted at a higher speed than the existing facility thus reducing overall trip time.

The wide median on the toll road would be available to accommodate other transportation modes and serve as a utility corridor.

Clear zones and gentle side slopes would allow errant vehicles to recover control and would also reduce severity when accidents occur. Interchange lighting would be an important feature of the new facility.

b. Toll Plaza Locations

Toll plaza locations were presented in Table II-13. The minimum interchange spacing scenario will use four barrier toll plazas. The moderate and frequent interchange spacing scenarios will each use two barrier plazas plus toll collection plazas on each exit ramp. Other toll collection schemes will be considered as final design of the facility progresses.

c. Existing I-70 Improvements

At a minimum, maintenance and rehabilitation of the existing I-70 pavement and bridge structures must take place to maintain the existing roadway for traffic not using the parallel toll road. In addition to the normal upkeep of the system, even with the parallel toll road improvements, capacity improvements or safety enhancements may still be necessary along the existing highway. For the purposes of this study, it was assumed that improvements to the existing I-70 interchanges would be performed to upgrade the control of access in the interchange areas, thereby improving the interchange efficiencies and safety. These improvements to the existing interchanges would be consistent and similar to the improvements of the Widen Existing I-70 Strategy. Should this strategy advance to more detailed analysis and evaluation, considerations would need to be given to the need for additional capacity improvements to the existing I-70 roadway even with the construction of a parallel toll road. The degree of the need for improvements to the existing highway would depend on the extent of traffic diversion to the new route.

Regarding safety issues along the existing highway, because the existing I-70 median widths are below desirable values, the need for a concrete median barrier or barrier cable in the median would need to be evaluated to determine if there are locations with higher than normal crossover accidents.

5. ELECTRONIC TOLL COLLECTION (ETC)

Electronic toll collection is an important and integral part of a toll road system. As drivers become familiar with the system, usage can be expected to make up half of all toll collection. In the near future, new cars will be equipped with transponders for use on all toll facilities. Exclusive ETC lanes at tollbooths would make the ETC system more attractive for general usage. As ETC usage increases, costs of toll collection decrease.

This corridor provides an opportunity for the implementation of an exclusive ETC operation, thus reducing the cost of toll collection significantly. The adjacent free system, existing I-70, would provide a route for those motorists who choose to not use the ETC system.

6. OPERATIONAL CHARACTERISTICS

Operational characteristics of the toll road would be similar to the new parallel facility described earlier. Two significant differences would be the steps needed to pay tolls and the possible commercialization of the rest areas. The posted speed limit may be higher on the toll road than on the new parallel roadway or the existing I-70 facility.

7. CAPITAL COSTS

a. Construction Costs

Construction costs for the New Parallel Toll Road Strategy include costs for constructing all roadway and bridge improvements for the frequent interchange spacing scenario. Construction costs are based on current construction costs and do not reflect inflation. These costs include design and construction administration costs, and the costs of the I-70 parallel toll road improvements, including toll facility costs and costs associated with access management enhancements at existing I-70 interchange areas. Construction cost estimates for Strategy No. 5 (New Parallel Toll Road) are presented in Table II-14.

Table II-14: Construction Cost Estimates for Strategy No. 5 (New Parallel Toll Road)

Capital Costs	
ROW Acquisition	$ 126,000,000
Construction	1,810,154,000
Access Management	500,000,000
Total (Rounded)	**$2,407,000,000**

b. Rehabilitation and Operations and Maintenance Costs

Table II-19 presents the major rehabilitation and operations and maintenance costs for Strategy No. 5 (New Parallel Toll Road). These estimates include the costs of maintaining and rehabilitating the existing I-70 pavement and bridges. Rehabilitation of the existing I-70 facility would include the annual replacement of approximately 24 lane-miles (38.6 lane-km) of pavement, the milling and inlaying of roughly 80 lane-miles (128.7 lane-km) of pavement, and the replacement of seven bridge decks. In addition, rehabilitation work later in the study period would be necessary to address the future rehabilitation of new pavement along the parallel toll road. Rehabilitation costs are the present value of costs to be incurred over the 30-year study period.

Using a MoDOT historical average of $24,500 per annual lane mile (1.6 km) (four-lane) to operate and maintain an interstate highway, and allowing for a two percent increase each year in these costs, 30 years of operations and maintenance were estimated. Included in the annual costs to operate a toll road are additional costs associated with the collection of tolls and additional administration costs for the toll authority, based on the frequent interchange spacing scenario. Based on typical annual costs for toll collection, assumed at a rate of around $25,500 per annual lane mile, these costs were included in the O&M costs for the New Parallel Toll Road Strategy. Table II-15 presents the rehabilitation and O&M costs estimates for the toll road strategy.

Table II-15: Rehabilitation and O&M Costs for Strategy No. 5 (New Parallel Toll Road)

Operations and Maintenance Costs	Total 30-year Costs	Present Value of Annual Costs (6% Discount Rate)	Equivalent Uniform Annual Costs
Major Rehabilitation	$675,400,000	$281,400,000	$20,443,404
O&M	$359,752,000	$141,683,000	$10,293,114
Toll Collection and Admin.			$20,400,000
Total (Rounded)			**$51,140,000**

F. Transportation Impacts of Reasonable Strategies

This section describes the evaluation of the transportation impacts and travel efficiencies for the three reasonable strategies – Strategy No. 3 (I-70 Widening), Strategy No. 4 (New Parallel Facility) and Strategy No. 5 (New Parallel Toll Road). Chapter I – Purpose and Need presents the analysis and evaluation of the travel characteristics and patterns for the I-70 corridor and the existing and projected traffic volumes for Strategy No. 1 (“No-Build”). The travel characteristics of the “No-Build” Strategy provide a basis of comparison for the evaluation of the travel efficiency performance of each of the reasonable strategies.

1. TRAVEL DEMAND FORECASTS

Travel demand forecasts were prepared to assess the impact of the Reasonable Strategies on addressing traffic level of service and safety considerations. The methodology used to analyze travel impacts, the forecasted daily traffic volumes, the associated level-of-service and projected impacts to safety are described in this section.

a. Forecasting Methodology

General Travel

MoDOT provided a statewide travel demand model to support the transportation evaluation for the First Tier EIS. The model provides the capability to estimate and forecast traffic under a variety of conditions and assumptions. The statewide model utilizes TRANPLAN software.

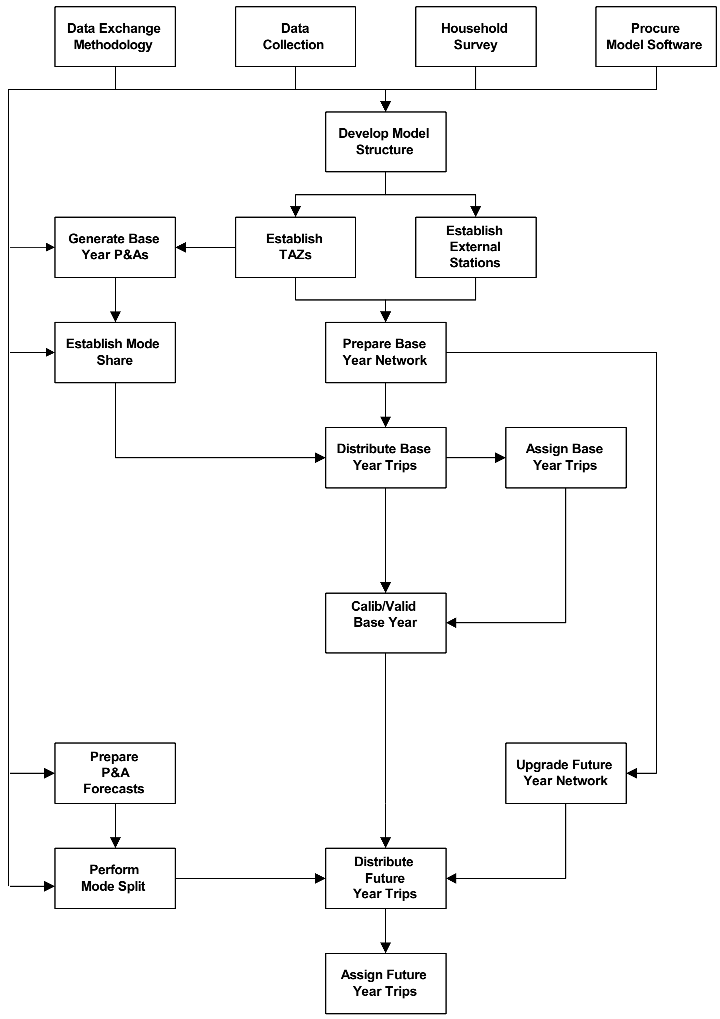
TRANPLAN follows the four-step travel demand model of trip generation, trip distribution, mode choice and trip assignment for highway systems. Available highway assignment methodologies include equilibrium, stochastic, iterative and incremental. Highway programs include capabilities for selected link and sub-area analyses.

The traditional four-step travel demand forecasting process generally requires three preliminary steps: data collection, traffic analysis zone definition and network building. These seven steps, when implemented with TRANPLAN or other software, result in an overall process of 24 steps. Figure II-12 represents the process graphically.

Data for building networks was taken from MoDOT’s Geographic Information System database. Population data came from two primary sources: the Missouri Office of Administration, Division of Budget and Planning, and Census Counts 98 (a provider of census data and estimates). The MOA provides the most current population projections by county and Census Counts 98 provides the best population employment estimate by block group. The MOA provides five-year incremental population projections by county up to 2025. The MOA has recently updated its projections. The most recent projections were provided for this project with the understanding that the projections have not been officially adopted, although few changes are expected.

The model produces average annual daily traffic volumes that represent the sum auto and truck travel in the roadway network. Traffic volumes are assigned to each segment of the highway network, by travel direction. The assignment process constrains the volumes according to the roadway capacities, resulting in another output that is typical of congested speeds. This simulated representation of traffic provides the basis for evaluating the ability of a roadway network to accommodate future travel. Estimates of future travel are based on projections of population, households and employment combined with representations of proposed transportation networks.

Figure II-12: Travel Demand Model Process



Truck Considerations

Truck traffic was treated as a unique trip purpose in order to identify truck trip impacts within the travel model. To do so, a separate trip table was generated for trucks similar to that generated for the passenger vehicles. The truck trip generation process was categorized into three truck types: four-tire vehicles; single-unit trucks (six tires or more) and combination vehicles. Trip generation rates were based on the following employment categories:

- Agriculture, Mining and Construction
- Manufacturing, Transportation, Communication, Utilities and Wholesale Trade
- Office and Services

The truck trips were assigned to the same roadway system as passenger vehicles.

Toll Road Considerations

Toll roads are not specifically modeled as a separate process. The effect of tolls on travel is determined by applying a penalty, or impedance, to travel times on the roadway network.

Testing the impact of tolls was accomplished by assigning an extra time value that represents a certain cost to the travel time. Two toll scenarios were assumed for the evaluation of Strategy No. 5 (New Parallel Toll Road) – a low toll rate scenario and a high toll rate scenario. Table II-16 presents the assumed toll rates by vehicle class for the two toll road scenarios. Based on the potential travel time saved by a toll road, the cost of the toll, and the average Missouri resident income, the monetary effect of tolls was represented as a time penalty in the model.

Table II-16: Assumed Toll Rates

Toll Rate Scenario	Auto Toll Rate	Truck Toll Rate
Low	$0.03 per Mile	$0.05 per Mile
High	$0.08 per Mile	$0.10 per Mile

b. Reasonable Strategy Travel Forecasts

The statewide travel model was used to test the transportation impacts of the reasonable strategies. The "No-Build" Strategy, as described in Chapter I - Purpose and Need, provides a basis of comparison for the potential effects of each reasonable strategy. Traffic forecasts (2030) were developed for the following strategies and listed in Table II-17:

- **Strategy No. 1 ("No-Build")** - This strategy represents the base condition with no capacity improvements to I-70. This strategy includes the transportation improvement program projects and other planned or reasonably anticipated projects for major corridors, as described in Chapter I – Purpose and Need.

- **Strategy No. 3 (Widen Existing I-70)** – This strategy consists of the six-lane widening of the existing I-70 pavement with a posted speed of 70 mph (112.7 km/h). Two strategy options were considered in the Columbia and the Warrenton to Wentzville areas:

  - Option No. 1 – Widen existing.
  - Option No. 2 – Local relocation.

- **Strategy No. 4 (New Parallel Facility)** – This strategy consists of constructing a new parallel four-lane highway in close proximity to existing I-70. System interchange connections were assumed at Route 13, US 65, US 63, US 54, Route 19 and Route 47. It was also assumed that the new highway would have a posted speed of 80 mph (128.7 km/h). Two options were considered:

  - Option No. 1 – An alignment north of existing I-70.
  - Option No. 2 – An alignment south of existing I-70.

- **Strategy No. 5 (New Parallel Toll Road)** – This strategy consists of constructing a new parallel four-lane toll road in close proximity to and north of existing I-70. System interchange connections were assumed at Route 13, US 65, US 63, US 54, Route 19 and Route 47. It was also assumed that the new highway would have a posted speed of 80 mph (128.7 km/h). Two options were considered:

  - Option No. 1 – Low toll rate.
  - Option No. 2 – High toll rate.

Table II-17: Forecast Traffic 2030

Section	Location	Exit		County	Strategy No. 1 "No-Build"	Strategy No. 3 (I-70 Widening)			Strategy No. 4 (New Parallel Facility)				Strategy No. 5 (New Parallel Toll Road)			
						Option No. 1	Option No. 2		North		South		Low Toll		High Toll	
		From	To				Existing	Bypass	Existing	Bypass	Existing	Bypass	Existing	Toll Road	Existing	Toll Road
1BP	West of I-70 Connection				- -	- -	- -		125,700	- -	122,900	- -	120,400	- -	119,100	- -
1	West of I-470	- -	15		116,000	116,000	118,400		82,300	43,400	74,100	52,000	92,700	27,700	104,300	14,700
2	I-470 to Woods Chapel	15	18		112,700	118,100	118,200		87,400	51,600	77,600	63,200	94,100	31,500	103,300	18,300
3	Woods Chapel to MO-7	18	20	Jackson	105,300	111,700	111,900		79,100		69,100		86,600		95,900	
4	MO-7 to Adams Dairy	20	21		92,200	101,900	102,000		69,800		59,200		74,600		83,100	
5	Adams Dairy to MO-AA/MO-BB	21	24		84,400	93,500	93,200		58,100		48,200		65,600		74,500	
6	MO-AA/MO-BB to MO-H/MO-F	24	28		76,400	83,400	83,100		44,200		34,200		54,700		64,900	
7	MO-H/MO-F to MO-D/MO-Z	28	31		75,400	81,700	82,000		41,600		31,600		52,300		63,400	
8	MO-D/MO-Z to MO-131	31	37		62,600	69,100	69,900		29,500		21,000		39,200		50,700	
9	MO-131 to MO-O/MO-M	37	41		56,700	63,600	64,400		24,000		14,900		33,800		45,200	
10	MO-O/MO-M to MO-E/MO-H	41	45		58,100	64,300	65,200		23,600		14,800		34,100		45,700	
11	MO-E/MO-H to MO-13	45	49	Lafayette	57,400	63,600	64,600		22,900		14,200		33,300		45,000	
12	MO -13 to MO-T	49	52		55,700	60,400	61,300		16,000	53,100	11,600	58,300	30,100	31,600	42,300	18,100
13	MO-T to MO-23	52	58		57,000	61,700	62,600		17,300		12,900		31,400		43,600	
14	MO-23 to MO-Y/MO-VV	58	62		55,700	60,200	61,100		15,500		11,500		29,800		42,100	
15	MO-Y/MO-VV to MO-127	62	66		54,600	59,000	59,900		14,300		10,300		28,700		40,900	
16	MO-127 to MO-EE/MO-K	66	71		54,800	59,200	60,100		14,400		10,200		28,900		41,100	
17	MO-EE/MO-K to MO-YY	71	74		54,800	59,200	60,100		14,400		10,200		28,900		41,100	
18	MO-YY to US-65	74	76	Saline	54,200	58,500	59,500		14,300		9,600		28,500		40,700	
19	US-65 to MO-J	76	84		51,300	55,600	56,600		10,300	53,200	9,500	53,800	24,900	31,700	37,300	18,300
20	MO-J to MO-K	84	89		51,400	55,700	56,700		10,500		9,700		25,100		37,400	
21	MO-K to MO-41/MO-135	89	98		51,600	55,900	56,900		11,100		10,300		25,300		37,600	
22	MO-42/MO-135 to MO-5	98	101		52,900	57,200	58,100		11,800		11,000		26,500		38,900	
23	MO-5 to MO-B	101	103	Cooper	54,600	58,800	60,100		13,500		12,400		28,100		40,400	
24	MO-B to MO-87	103	106		51,400	56,900	57,600		12,700		13,000		26,100		38,100	
25	MO-87 to MO-179	106	111		53,400	59,000	60,100		16,400		16,800		28,400		40,700	
26	MO-179 to MO-BB	111	115		55,900	61,500	62,600		18,900		19,300		30,900		43,200	
27	MO-BB to MO-J/MO-O	115	117		57,300	63,000	20,300	43,000	20,200		20,800		32,300		44,500	
28	MO-J/MO-O to US-40/MO-UU	117	121		61,600	67,600	25,700		26,600		27,200		37,400		49,200	
29	US-40/MO-UU to MO-E/MO-740	121	124		78,200	85,100	45,300	41,600	43,800		44,200		54,900		66,200	
30	MO-E/MO-740 to Loop 70	124	125		84,100	94,200	54,900		55,800		56,000		64,100		73,500	
31	Loop 70 to MO-163	125	126	Boone	71,000	83,700	46,500		48,800		49,200		54,500		61,900	
32	MO-163 to MO-763	126	127		81,200	97,200	60,100		62,400		62,300		67,500		73,500	
33	MO-763 to Loop 70	127	128		73,700	86,900	49,200		49,300		49,500		57,300		65,500	
34	Loop 70 to US-63	128	128A		92,300	103,600	66,000		65,000		65,100		74,000		83,500	
35	US-63 to St. Charles	128A	131		79,100	86,100	45,900	40,200	49,200	45,200	49,500	43,300	54,200	32,900	64,600	19,700

36	St. Charles to MO-Z	131	133		65,700	70,900	30,700		34,000		35,000		39,200		50,500	
37	MO-Z to MO-DD/MO-J	133	137		55,100	59,000	19,000		21,500		21,800		26,900		38,900	
38	MO-DD/MO-J to MO-M/MO-HH	137	144	Callaway	48,900	52,600	53,000		16,900		17,100		20,500		32,600	
39	MO-M/MO-HH to US-54	144	148		50,800	54,600	55,100		17,000		17,500		22,200		34,300	
40	US-54 to MO-A/MO-Z	148	155		48,600	52,800	54,100		5,500	53,900	3,900	53,600	20,400	33,500	31,300	21,800
41	MO-A/MO-Z to MO-D/MO-YY	155	161		49,800	54,000	55,300		6,200		4,300		21,600		32,500	
42	MO-D/MO-YY to MO-161/MO-J	161	170		49,400	53,700	55,000		5,800		3,900		21,300		32,200	
43	MO-161/MO-J to MO-19	170	175	Montgomery	49,300	53,600	54,800		5,900		3,800		21,300		32,200	
44	MO-19 to MO-F	175	179		52,100	56,000	57,400		9,500	50,400	6,600	52,100	22,900	33,900	33,800	22,200
45	MO-F to MO-E/MO-Y	179	183		52,000	56,000	57,300		9,400		6,600		22,800		33,700	
46	MO-E/MO-Y to MO-A/MO-B	183	188		53,300	57,500	58,900		11,000		8,200		24,300		35,300	
47	MO-A/MO-B to MO 47	188	193	Warren	57,300	62,200	62,300		16,100		13,200		29,200		40,000	
47 BP	MO-A/MO-B to MO-W	- -	- -		- -	- -		44,900								
48	MO-47 to Exit 199	193	199		66,800	71,200	25,300	47,100	22,200	53,000	20,500	52,300	35,900	36,600	46,400	25,000
49	Exit 199 to MO-J/MO-F	199	200		65,000	69,700	23,900		20,800		19,400		34,300		44,600	
50	MO-J/MO-F to MO-W/MO-TT	200	203		77,400	84,900	40,100		35,800		34,500		48,600		57,400	
51	MO-W/MO-TT to Exit 208	203	208	St. Charles	83,500	91,500	45,700		42,800		41,200		55,300		63,900	
52	Exit 208 to MO-Z	208	209		93,900	105,300	59,800		56,200		55,100		69,200		76,200	
53	MO-Z to US-61	209	210		111,100	125,000	79,800		74,300		74,300		85,800		93,500	
54	US-61, US-40 to MO-A	210	212		108,100	135,700	91,700		77,100		75,900		85,500		94,000	
55	MO-A to Lake St. Louis	212	213		117,000	145,800	147,400		121,100		118,900		117,400		118,700	
56	East of Lake St. Louis	213	- -		145,100	152,800	153,700		144,700		146,900		145,100		144,300	

2. OPERATIONAL ANALYSIS

a. Methodology

Level-of-service calculations were performed for the I-70 corridor for each improvement strategy using the freeways module of the Highway Capacity Software. This program estimates the LOS for freeway sections based upon hourly volumes, percent of heavy vehicles in the vehicle mix and the freeway segments attributes. LOS is a measure of the operational performance of a roadway in terms of travel speed and vehicle density. (Chapter I – Purpose and Need provides a brief description of the LOS categories.)

The hourly volumes used in the level of service analysis were derived from the model. The model generates volumes for a 24-hour period, but hourly volumes are required for level of service analysis. Peak hour traffic percentages were derived from traffic counts along I-70 and applied to the 24-hour counts to estimate the peak hour volumes. The peak hour percentages ranged from a high of 13 percent in Jackson County near Kansas City, to a low of seven percent in the rural areas of I-70.

A directional split in the traffic was assumed to be 60/40. The American Association of State Highway and Transportation Officials suggests the directional distribution varies between 55 and 70 percent, with the percentage being towards the lower end of this range for rural areas.

Once the 24-hour model volumes were converted into peak hour volumes, they were input into the Highway Capacity software, which has certain variables that affect the estimated LOS. These variables, their settings and a brief description of them are as follows:

- Peak Hour Factor = .90

  This variable adjusts the volume for peak conditions and has a range of 0.25 to 1.00, with a default value of 0.90. The value of 0.90 increases the peak 15 minutes by 10 percent to reflect the fact the volume for the peak hour is not consistent throughout the hour.

- Terrain = Rolling

  The terrain variable adjusts the impact of heavy vehicles on the service flow rate of the freeway segment. The choices for this variable are level, rolling, mountainous or user-defined grade. The rolling variable was used because it is the terrain type used in the MoDOT road inventory.

- Percent trucks and buses = Varies According to Available Counts

  The percent trucks used in the LOS calculations was derived using both total average daily traffic and truck ADT maps from MoDOT. The highway capacity software limits the input to integer values and cannot exceed 25 percent. For areas where the truck traffic was greater than 25 percent, the percent of recreation vehicles was used to add the additional percentage needed. Percent of recreation vehicles was set to zero unless used to augment the truck percentage.

- Free Flow Speed = Posted Speed

  The free flow speed represents the speed at which traffic travels when not affected by congestion. Most segments of I-70 have a posted speed limit of 70 mph (112.7 km/h) but the section through Columbia has a posted speed of 60 mph (96.6 km/h). These posted speeds were assumed for Strategy No. 3 (I-70 Widening). For both Strategy No. 4 (New Parallel Facility) and Strategy No. 5 (New Parallel Toll Road), a free flow speed of 80 mph (128.7 km/h) was assumed for the parallel route with unchanged posted speed limits on the existing.

- Number of Lanes = Depends on Improvement Strategy

  For Strategy No. 1 ("No-Build"), the number of travel lanes is based on the current laneage of the I-70 corridor. For Strategy No. 3 (I-70 Widening), it was assumed that three lanes in each direction would be provided, including through Columbia and the metropolitan areas of Kansas City and St. Louis. Relocations of I-70, whether localized as part of the I-70 Widening Strategy or across the whole state as in Strategy No. 4 (New Parallel Facility) or Strategy No. 5 (New Parallel Toll Road), would consist of a four-lane relocation.

Using the highway capacity software settings listed above, a lookup table (Table II-18) was created to identify the LOS of freeway segments based on the number of lanes and the percent trucks in the vehicle mix.

Table II-18: Level of Service Lookup Table for a Two Lane Freeway

% Trucks	A	B	C	D	E	F
13%	0-1,000	1,001-1,600	1,601-2,331	2,332-2,926	2,927-3,428	3,429+
14%	0-985	986-1,575	1,576-2,295	2,296-2,880	2,881-3,375	3,376+
15%	0-969	970-1,551	1,552-2,260	2,261-2,835	2,836-3,323	3,324+
16%	0-955	956-1,527	1,528-2,226	2,227-2,793	2,794-3,273	3,274+
17%	0-940	941-1,505	1,506-2,192	2,193-2,751	2,752-3,224	3,225+
18%	0-927	928-1,483	1,484-2,160	2,161-2,711	2,712-3,177	3,178+
19%	0-913	914-1,461	1,462-2,129	2,130-2,671	2,672-3,131	3,132+
20%	0-900	901-1,440	1,401-2,098	2,099-2,633	2,634-3,085	3,086+
21%	0-887	888-1,420	1,421-2,069	2,070-2,596	2,597-3,042	3,043+
22%	0-875	876-1,400	1,401-2,040	2,041-2,560	2,561-3,000	3,001+
23%	0-863	864-1,381	1,382-2,012	2,013-2,525	2,526-2,959	2,960+
24%	0-851	852-1,362	1,363-1,985	1,986-2,491	2,492-2,919	2,920+
25%	0-840	841-1,344	1,345-1,958	1,959-2,457	2,458-2,880	2,881+
26%	0-835	836-1,335	1,334-1,946	1,947-2,441	2,442-2,861	2,862+
27%	0-829	830-1,326	1,327-1,933	1,934-2,425	2,426-2,842	2,843+
28%	0-824	825-1,318	1,319-1,920	1,921-2,410	2,411-2,824	2,825+
29%	0-818	819-1,309	1,310-1,908	1,909-2,394	2,395-2,805	2,806+
30%	0-813	814-1,301	1,302-1,895	1,896-2,376	2,377-1,785	2,786+

Roadway capacities were calculated for each segment of the I-70 corridor, by direction, in the statewide travel demand model. A base capacity was also assigned to the roadways by functional classification. The capacity of a roadway is the number of vehicles that are able to travel on it for a given time period, usually one hour. The base capacities were factored depending upon the area type, terrain, access control, and whether the highway is divided or not. Table II-19 contains the base capacities for each functional classification and the factors used for adjustment.

Table II-19: Base Capacity Adjustment Factors

Link Type	Hourly Base Lane Capacity	Area Type			Terrain		Access Control			Divided Highway	
		Urban City	Suburban	Rural	Level	Rolling	Full	Partial	None	Divided	Not Divided
Interstate	2100	0.90	1.00	1.00	1.00	0.75	1.00			1.00	
Freeway	2100	0.90	1.00	1.00	1.00	0.75	1.00			1.00	
Expressway	1900	0.80	0.86	1.00	1.00	0.75	1.00	0.80	0.70	1.00	0.90
Principal Arterial	1800	0.80	0.86	1.00	1.00	0.75	1.00	0.80	0.70	1.00	0.90
Other Principal Arterial	1550	0.80	0.86	1.00	1.00	0.75	1.00	0.80	0.70	1.00	1.00
Minor Arterial	1000	0.85	0.86	1.00	1.00	0.75	1.00	0.85	0.75	1.00	1.00
Collector	800	0.95	1.00		1.00	0.85	1.00	0.90	0.80	1.00	1.00
Major Collector	800			1.00	1.00	0.85	1.00	0.90	0.80	1.00	1.00
Minor Collector	800			1.00	1.00	0.85	1.00	0.90	0.80	1.00	1.00
Local Modeled	600	0.75	0.85	1.00							
Ramp	1500										

Note: Hourly capacity corresponds to level of service E

Because the capacities developed using the factors in Table II-19 are hourly capacities and the model is for a 24-hour period, another adjustment was made. The capacities were converted from hourly rates to daily rates by using the adjustment factors in Table II-20.

Table II-20: Capacity Conversion Factors (24-Hour to Peak-Hour)

Link Type	Factor
Interstate	13
Freeway	13
Expressway	13
Principal Arterial	10
Other Principal Arterial	10
Minor Arterial	10
Collector	9
Major Collector	9
Minor Collector	9
Local Modeled	7

LOS calculations were performed using the freeways module of the highway capacity software. This program estimates the LOS for freeway sections based upon hourly volumes, percent heavy vehicles in the vehicle mix, and the freeway segments attributes.

The hourly volumes used in the level of service analysis were derived from the model. The model generates volumes for a 24-hour period, but hourly volumes are required for level of service analysis. Peak hour traffic percentages were derived from traffic counts along I-70 and applied to the 24-hour counts to adjust them. The peak hour adjustment percentages ranged from a high of 13 percent in Jackson County near Kansas City, to a low of seven percent in some of the more rural areas of I-70.

A directional split in the traffic was assumed to be 60/40. The American Association of State Highway and Transportation Officials suggests the directional distribution varies between 55 percent and 70 percent, with the percentage being towards the lower end of this range for rural areas.

b. Summary of Travel Efficiencies

Table II-21 summarizes the LOS calculations for the freeway mainline lanes for each of the reasonable strategies for 2030. The results indicate the following:

- **Strategy No. 1 ("No-Build")** - By 2030, the entire length of I-70 would have exceeded the accepted level-of-service standards and would be operating under unacceptable conditions.

- **Strategy No. 3 (Widen Existing I-70)** - Widening I-70 to six through-travel lanes would provide sufficient travel capacity in 2030 for most of the corridor except near I-470, through Columbia and near US 61/US 40. In these areas, the projected LOS is shown to exceed the target LOS standard – LOS D in urban areas. In these areas, additional lanes would be necessary, either through lanes or auxiliary lanes. From approximately the Concordia area into Kansas City, eight lanes would need to be provided. Similarly, through Columbia, whether as part of Option No. 1 or Option No. 2, eight travel lanes (four in each direction) would need to be provided. Near St. Louis, eight lanes would be necessary from around Warrenton into the St. Louis area. These eight lanes could be provided along the existing I-70 alignment (Option No. 1) or as a local bypass (Option No. 2).

- **Strategy No. 4 (New Parallel Facility)** – Under this strategy, the complete bypass of I-70 would improve traffic conditions on the existing I-70 mainline due to the high diversion of traffic to the new parallel facility. Due to the higher assumed operating speed of 80 mph (128.7 km/h) for the new route, even though the operating conditions would be degraded along the new route, a high percentage of traffic would divert to the parallel facility. Consequently, the existing I-70 would have acceptable operations in 2030, for the most part, while the new route would be considered unacceptable (LOS E). Through the Columbia area, some additional improvements to existing I-70 would be required due to the remaining local traffic. Similarly, additional capacity along existing I-70 would be needed within the Kansas City and St. Louis areas, though not to the same extent as the localized relocation concepts of Strategy No. 3 (Widen Existing I-70). The new parallel route would operate similarly for either a south or north relocation.

Table II-21: 2030 Levels of Service for Reasonable Strategies

Section	Location	Exit		County	Strategy No. 1 "No-Build"	Strategy No. 3 (I-70 Widening)			Strategy No. 4 (New Parallel Facility)				Strategy No. 5 (New Parallel Toll Road)			
						Option No. 1	Option No. 2		North		South		Low Toll		High Toll	
		From	To				Existing	Bypass	Existing	Bypass	Existing	Bypass	Existing	Toll Road	Existing	Toll Road
1BP	West of I-70 Connection			Jackson	- -	- -	- -		F		F		F		F	
1	West of I-470	- -	15		F	F	F		F	E	E	F	F	B	F	B
2	I-470 to Woods Chapel	15	18		F	F	F		F	E	E	F	F	B	F	B
3	Woods Chapel to MO-7	18	20		F	F	F		E		D		F		F	
4	MO-7 to Adams Dairy	20	21		F	F	F		F		F		F		F	
5	Adams Dairy to MO-AA/MO-BB	21	24		F	F	F		F		E		F		F	
6	MO-AA/MO-BB to MO-H/MO-F	24	28		F	F	F		E		C		F		F	
7	MO-H/MO-F to MO-D/MO-Z	28	31		F	F	F		D		C		F		F	
8	MO-D/MO-Z to MO-131	31	37	Lafayette	F	E	E		C		B		D		F	
9	MO-131 to MO-O/MO-M	37	41		F	D	D		B		A		C		D	
10	MO-O/MO-M to MO-E/MO-H	41	45		F	D	D		B		A		C		E	
11	MO-E/MO-H to MO-13	45	49		F	D	D		B		A		C		D	
12	MO -13 to MO-T	49	52		F	D	D		B	E	A	E	C	C	D	B
13	MO-T to MO-23	52	58		E	D	D		B		A		C		D	
14	MO-23 to MO-Y/MO-VV	58	62		E	C	C		A		A		C		D	
15	MO-Y/MO-VV to MO-127	62	66	Saline	D	C	C		A		A		B		C	
16	MO-127 to MO-EE/MO-K	66	71		D	C	C		A		A		B		C	
17	MO-EE/MO-K to MO-YY	71	74		D	C	C		A		A		B		C	
18	MO-YY to US-65	74	76		D	C	C		A		A		B		C	
19	US-65 to MO-J	76	84		D	C	C		A	E	A	E	B	C	C	B
20	MO-J to MO-K	84	89		D	C	C		A		A		B		C	
21	MO-K to MO-41/MO-135	89	98		D	C	C		A		A		B		C	

22	MO-42/MO-135 to MO-5	98	101	Cooper	E	C	C		A		A		B		C	
23	MO-5 to MO-B	101	103		E	C	C		A		A		C		C	
24	MO-B to MO-87	103	106		E	C	C		A		A		B		C	
25	MO-87 to MO-179	106	111		E	C	C		A		A		C		C	
26	MO-179 to MO-BB	111	115		E	C	C		B		B		C		D	
27	MO-BB to MO-J/MO-O	115	117	Boone	E	C	B	B	B		B		C		D	
28	MO-J/MO-O to US-40/MO-UU	117	121		E	D	B		B		B		C		D	
29	US-40/MO-UU to MO-E/MO-740	121	124		F	D	C	B	C		C		D		E	
30	MO-E/MO-740 to Loop 70	124	125		F	E	D		D		D		E		F	
31	Loop 70 to MO-163	125	126		F	E	D		D		D		E		E	
32	MO-163 to MO-763	126	127		F	F	E		E		E		F		F	
33	MO-763 to Loop 70	127	128		F	D	D		D		D		D		E	
34	Loop 70 to US-63	128	128A		F	E	E		E		E		F		F	
35	US-63 to St. Charles	128A	131		F	D	C	B	D	C	D	C	D	C	E	B
36	St. Charles to MO-Z	131	133		E	D	B		C		C		C		D	
37	MO-Z to MO-DD/MO-J	133	137		E	C	B		B		B		B		C	
38	MO-DD/MO-J to MO-M/MO-HH	137	144	Callaway	D	C	C		A		A		B		C	
39	MO-M/MO-HH to US-54	144	148		D	C	C		A		A		B		C	
40	US-54 to MO-A/MO-Z	148	155		D	C	C		A	E	A	E	B	C	C	B
41	MO-A/MO-Z to MO-D/MO-YY	155	161		D	C	C		A		A		B		C	
42	MO-D/MO-YY to MO-161/MO-J	161	170		D	C	C		A		A		B		C	
43	MO-161/MO-J to MO-19	170	175	Montgomery	D	C	C		A		A		B		C	
44	MO-19 to MO-F	175	179		D	C	C		A	D	A	E	B	C	C	B
45	MO-F to MO-E/MO-Y	179	183		D	C	C		A		A		B		C	
46	MO-E/MO-Y to MO-A/MO-B	183	188		D	C	C		A		A		B		C	
47	MO-A/MO-B to MO 47	188	193	Warren	E	C	C		A		A		C		C	
47 BP	MO-A/MO-B to MO-W	- -	- -		- -	- -	A	C	- -	D	- -	D	- -	C	- -	B
48	MO-47 to Exit 199	193	199		F	D	B	C	B		B		C		D	
49	Exit 199 to MO-J/MO-F	199	200		F	D	B		B		B		C		D	
50	MO-J/MO-F to MO-W/MO-TT	200	203		F	E	C		C		C		D		E	
51	MO-W/MO-TT to Exit 208	203	208	St. Charles	F	E	D		C		C		D		E	
52	Exit 208 to MO-Z	208	209		F	F	E		D		D		E		F	
53	MO-Z to US-61	209	210		F	F	F		F		F		F		F	
54	US-61, US-40 to MO-A	210	212		F	F	F		F		F		F		F	
55	MO-A to Lake St. Louis	212	213		F	F	F		F		F		F		F	
56	East of Lake St. Louis	213	- -		F	F	F		F		F		F		F	

- **Strategy No. 5 (New Parallel Toll Road)** – Due to the impact of enacting tolls, less traffic would be attracted to the new parallel route as compared to Strategy No. 4. As shown, the higher the cost of travel (i.e., toll rate), the less attractive the toll road becomes. With either of the toll rate options however, sufficient traffic would be diverted to the toll road, for the most part, to alleviate the projected operational problems on the existing I-70 roadway. The toll road would operate at acceptable limits under either toll rate scenario. For the higher toll rate, those sections of existing I-70 in the urban areas would have unacceptable operations. This would suggest that shorter distance trips would be less likely to pay a toll for the benefits of faster travel. Similar to Strategy No. 4 (Widen Existing I-70), through the Columbia area, some additional improvements to existing I-70 would be required due to the remaining local traffic. Similarly, additional capacity along existing I-70 would be needed within the Kansas City and St. Louis areas, though not to the same extent as the localized relocation concepts of Strategy No. 3 (Widen Existing I-70).

3. TRAFFIC ACCIDENT ANALYSIS

a. Methodology

Accident information for this analysis was obtained through the MoDOT traffic management system database and reports prepared for other purposes. Summaries of reported accidents on I-70 were prepared to identify probable causes related to roadway geometry, conditions and traffic volumes. The analysis of the existing accident experiences of I-70 is presented in Chapter I – Purpose and Need. The analysis of the existing conditions not only provides the justification for the need for safety improvements, but also provides a bench mark for the comparison of the safety benefits of the reasonable strategies.

The methodology utilized to estimate the safety benefits of each strategy entailed establishing new and improved accident rate projections for each of the improvements. These new rates were then applied to the projected travel demand for each strategy to determine the number of projected accidents. These projections can then be compared to the “No-Build” Strategy to estimate the safety benefits of each strategy. Of course, travel remaining on the existing I-70 would be exposed to the same accident risk that currently exists.

Utilizing the current accident experiences of I-70, the record of accidents along I-70 was dissected to eliminate those types of accidents that would most likely be eliminated or reduced by virtue of the new and improved roadway section with each of the strategies. While literature specifically related to expected accident rates is practically non-existent, the Federal Highway Administration has published data indicating that increased investment in roadway improvements reduces the severity of accidents. The Road Information Program research suggests that making lanes wider, widening shoulders and improving bridges reduces accident experience by various percentages. The procedure for estimating what impact certain improvements might have on accident experience in future years incorporated the FHWA report findings.

Accident data obtained from MoDOT has accidents categorized by type, such as rear-end, left turns, and sideswipes. While this type of accident is not consistent with the kinds expected on I-70, the accident data for I-70 does include crashes on ramps and at ramp intersections with local streets. Some 26 categories are included in the MoDOT reporting system. The FHWA fact sheet lists accident reductions for intersection improvements, bridge improvements, roadway improvements, and roadside improvements. Each of these major groups have sub-features with varying percent reductions. The percent reductions were applied to the appropriate accident type and a weighted rate developed for application in estimating future accident expectations for each of the improvement strategies.

Table II-22 presents the current accident rates on I-70, by type, and the projected accident rates for the improved I-70.

Table II-22: Projected I-70 Accident Rates

Severity	Existing I-70 Accident Rate (100MVMT)	Improved I-70 Accident Rate (100MVMT)
PDO	103.7	73.9
Injury	42.5	30.4
Fatal	1.2	0.6
Total	**147.4**	**104.9**

b. Accident Forecasts

The estimated number of accidents for each of the strategies provides a basis to compare the relative differences between improvements and to estimate safety benefits associated with each. Estimates were performed for the "No-Build" Strategy at the current accident rates on I-70. For the improvement strategies, future accidents were estimated by applying the improved accident rates, with the percentage of reduction based on information reported in the FHWA fact sheet. The fact sheet provides reduction factors associated with different types of roadway improvements. These improvements are consistent with the types of improvements that can be expected from upgrades to I-70 or construction on a new location. For strategies in which operations on I-70 are continued for some sections, as in a bypass strategy, forecasts of accidents were prepared for the bypassed section and added to the improved section to estimate total accidents in the corridor. Table II-23 presents the projected 2030 accidents for each of the reasonable strategies.

Table II-23: Estimated 2030 Accidents by Strategy and Severity

Strategy/Severity	PDO	Injury	Fatal	Total
Strategy No. 1 ("No-Build)	4,553	1,833	44	**6,430**
Strategy No. 3 (Widen) Option 1	3,568	1,468	29	**5,065**
Strategy No. 3 (Widen) Option 2	3,811	1,563	32	**5,406**
Strategy No. 4 (Parallel Route) Option 1	4,482	1,828	39	**6,349**
Strategy No. 4 (Parallel Route) Option 2	4,398	1,796	38	**6,232**
Strategy No. 5 (Toll Road) Option 1	4,358	1,769	40	**6,167**
Strategy No. 5 (Toll Road) Option 2	4,513	1,826	42	**6,381**

4. SUMMARY OF USER BENEFITS

a. Methodology

A determination of user benefits was based on data generated by the statewide travel demand model. The establishment of benchmarks, by which improvement scenarios can be evaluated, is dependent upon daily vehicle miles traveled, daily vehicle hours traveled, and annual accidents by severity. The costs associated with these parameters, in terms of the value of time, the costs of operating a vehicle and the average cost of an accident, were applied to the parameters for future years following construction of each strategy as compared to the "No-Build" Strategy.

b. Vehicle Operating Benefits

The cost of travel under various improvement strategies in 2030 were determined as follow:

- Calculate the cost of travel on I-70 under the “No-Build” Strategy. This value represents the total cost to travel on I-70 within the study corridor if no improvements are made.

- Calculate the cost of travel on I-70, in tandem with each improvement strategy (travel in the Corridor), to reflect the total cost of travel regardless of whether travel was on the existing or improved I-70, or the new facility.

For calculating vehicle operating costs, $0.30/mile (1.6 km) (at 75 percent autos) was assumed for autos and $0.60/mile (1.6 km) for trucks (at 25 percent trucks). The assumed values represent current costs. The vehicle operating benefits are shown in Table II-24.

Table II-24: Vehicle Operating Costs

Improvement Strategy	Annual 2030 VMT	VMT Difference from “No-Build”	Total Annual Cost	Cost Difference from “No-Build”
Strategy No. 1 (“No Build”)	99,415,707,000	N/A	$37,280,890,125	**N/A**
Strategy No. 3 (Widen) Option 1	99,472,793,000	57,086,000	$37,302,297,375	**$21,407,250**
Strategy No. 3 (Widen) Option 2	99,462,171,500	46,464,500	$37,298,314,313	**$17,424,188**
Strategy No. 4 (Parallel Route) Option 1	99,475,749,500	60,042,500	$37,303,406,063	**$22,515,938**
Strategy No. 4 (Parallel Route) Option 2	99,523,455,000	107,748,000	$37,321,295,625	**$40,405,500**
Strategy No. 5 (Toll Road) Option 1	99,411,984,000	-3,723,000	$37,279,494,000	**-$1,396,125**
Strategy No. 5 (Toll Road) Option 2	99,392,456,500	-23,250,500	$37,272,171,188	**-$8,718,938**

c. Travel Time Benefits

The calculation of travel time benefits for the improvement strategies was performed in a manner similar to the operating costs. Vehicle hours traveled, as determined by the statewide travel demand model, were used with a value of travel time equal to $10/hour for autos and $23/hour for trucks. Trucks are considered to represent an average of 25 percent of the traffic stream in the I-70 Corridor. Table II-25 presents the benefits associated with travel time for the various strategies.

Table II-25: Travel Time Costs

Improvement Strategy	Annual 2030 VHT	VHT Difference from “No-Build”	Total Annual Cost	Cost Difference from “No-Build”
Strategy No. 1 ("No-Build")	8,777,593,000	N/A	$155,802,275,750	**N/A**
Strategy No. 3 (Widen) Option 1	8,787,521,000	9,928,000	$155,978,497,750	**$176,222,000**
Strategy No. 3 (Widen) Option 2	8,729,632,000	-47,961,000	$154,950,968,000	**-$851,307,750**
Strategy No. 4 (Parallel Route) Option 1	8,774,636,500	-2,956,500	$155,749,797,875	**-$52,477,875**
Strategy No. 4 (Parallel Route) Option 2	8,762,409,000	-15,184,000	$155,532,759,750	**-$269,516,000**
Strategy No. 5 (Toll Road) Option 1	8,773,651,000	-3,942,000	$155,732,305,250	**-$69,970,500**
Strategy No. 5 (Toll Road) Option 2	8,773,651,000	-3,942,000	$155,732,305,250	**-$69,970,500**

d. Accident Benefits

Accident costs for the improvement strategies were calculated by applying the following Missouri average costs for accidents:

- Property Damage Only $3,220 per accident
- Injury $44,100 per accident
- Fatal $3,390,000 per accident

These costs were applied to the accident estimates for each of the improvement strategies. Table II-26 presents the estimated costs.

Table II-26: Accident Costs

Cost of Accidents (Strategy/Severity)	Cost of Accident by Type				Cost Difference from "No-Build"
	PDO	Injury	Fatal	Total	
Strategy No. 1 ("No-Build")	$ 14,660,167	$ 80,818,555	$ 149,700,790	$ 245,179,512	**N/A**
Strategy No. 3 (Widen) Option 1	$ 11,490,525	$ 64,736,878	$ 98,217,873	$ 174,445,277	**-$70,734,235**
Strategy No. 3 (Widen) Option 2	$ 12,272,480	$ 68,916,866	$ 107,998,729	$ 189,188,076	**-$55,991,436**
Strategy No. 4 (Parallel Route) Option 1	$ 14,432,550	$ 80,620,374	$ 132,864,948	$ 227,917,873	**-$17,261,639**
Strategy No. 4 (Parallel Route) Option 2	$ 14,161,596	$ 79,190,550	$ 129,220,667	$ 222,572,814	**-$22,606,698**
Strategy No. 5 (Toll Road) Option 1	$ 14,033,997	$ 78,032,754	$ 134,157,894	$ 226,224,645	**-$18,954,866**
Strategy No. 5 (Toll Road) Option 2	$ 14,531,215	$ 80,511,564	$ 142,836,974	$ 237,879,753	**-$7,299,759**

e. Total Benefits

Table II-27 summarizes the operating, travel time and accident cost savings for the reasonable strategies.

Table II-27: Cost Savings Summary for Reasonable Strategies (2030)

Improvement Strategy	Travel Time	Operating Cost	Accident Cost	Total	Cost Difference from "No-Build"
Strategy No. 1 ("No-Build")	$ 155,802,275,750	$ 37,280,890,125	$ 245,179,512	$ 193,328,345,387	**N/A**
Strategy No. 3 (Widen) Option 1	$ 155,978,497,750	$ 37,302,297,375	$ 174,445,277	$ 193,455,240,402	**$126,895,015**
Strategy No. 3 (Widen) Option 2	$ 154,949,672,250	$ 37,298,314,313	$ 189,188,076	$ 192,437,174,639	**-$891,170,748**
Strategy No. 4 (Parallel Route) Option 1	$ 155,242,511,750	$ 37,303,406,063	$ 227,917,873	$ 192,773,835,686	**-$554,509,701**
Strategy No. 4 (Parallel Route) Option 2	$ 155,749,797,875	$ 37,321,295,625	$ 222,572,814	$ 193,293,666,314	**-$34,679,073**
Strategy No. 5 (Toll Road) Option 1	$ 155,532,759,750	$ 37,279,494,000	$ 226,224,645	$ 193,038,478,395	**-$289,866,992**
Strategy No. 5 (Toll Road) Option 2	$ 155,732,305,250	$ 37,272,171,188	$ 237,879,753	$ 193,242,356,191	**-$85,989,196**

G. Overall Evaluation of Reasonable Strategies

1. OVERALL COMPARISON OF REASONABLE STRATEGIES

Based on the more detailed definition and assessment of the transportation impacts of the reasonable strategies, as presented in the preceding sections, an overall comparison of the engineering and traffic characteristics of each reasonable strategy was performed. This evaluation was performed in concert with a general assessment of the environmental and socio-economic impacts of each strategy as presented in Chapter IV – Environmental Consequences. As shown in the following summary table (Table II-28), evaluation factors reflecting engineering, traffic, environmental and social and economic issues were assessed and quantified for each of the reasonable strategies. Wherever these performance measures could not be quantified, subjective ratings were utilized, as per the scaling system shown in the table's corresponding legend and as shown below.

- Benefits >> Adverse Impacts
- Benefits > Adverse Impacts
- Benefits = Adverse Impacts
- Benefits < Adverse Impacts
- Benefits << Adverse Impacts
- Avoidance Recommended

a. Engineering

The following section summarizes the major engineering impact factors for the Reasonable Strategies:

- **Capital Cost (Order of Magnitude)** – Construction and right-of-way costs for the three "build" strategies would be relatively similar, varying by approximately 20 percent. The lowest capital cost strategy would be either of the parallel route strategies ($2.3B). In addition to uncertainties relating to the level of detail, these estimates reflect the variable alignments, interchanges, pavement section, design criteria and others. The estimated implementation cost of the Widen I-70 Strategy ranges from $2.6B to $2.7B, depending on the degree of interchange improvements, six-or-eight lane section, and the degree of alignment adjustments, including local bypasses. These cost estimates were based on current (FY 2001) unit costs and represent the total cost of implementation (i.e., design and construction administration).

- **Annual O&M and Preservation Cost** – Annual costs for the perpetual operations and maintenance of the I-70 system, including both the existing I-70 and any new construction, would vary depending on the relationship of any the improvements to the existing infrastructure. In the case of the Widen I-70 Strategy, approximately $17M could be saved per year due to the infusion of new construction into the existing I-70 roadway and the total replacement of the existing infrastructure. For the other strategies, additional annual costs would be incurred due to the addition of new highway miles that would need to be maintained. An additional $5M per year, approximately, would be required for the New Parallel Facility Strategy, and an additional $25M would be required annually for the New Parallel Toll Road Strategy. Extra annual costs for the toll road would be required for the toll collection activities and the additional administration. This estimate includes the use of ETC technologies to reduce the demand for toll collectors. A 30-year study period was utilized for this comparison with a discount rate of six percent. The estimates for the new parallel route strategies include the costs of maintaining and rehabilitating the existing I-70 pavement and bridges.

Table II-28: Overall Comparison of Reasonable Strategies (Summary of Impacts)

EVALUATION FACTOR	UNIT	I-70 IMPROVEMENT (REASONABLE STRATEGIES)						
		No-Build	Widen I-70		New Parallel Facility		New Parallel Toll Road	
			Widening	*Urban Bypass*	*North*	*South*	*Low Rate*	*High Rate*
ENGINEERING								
Capital Cost (Order of Magnitude):								
- New Construction	$Billion	$0	$2.7	$2.6	$2.3	$2.3	$2.3	$2.3
- Right-of-Way	$Billion	$0	$0.125	$0.099	$0.126	$0.126	$0.126	$0.126
Total	$Billion	**$0**	**$2.8**	**$2.7**	**$2.4**	**$2.4**	**$2.4**	**$2.4**
Annual O&M and Preservation Cost [1]	$Million	$26.1	$8.9	$10.1	$30.7	$30.7	$51.1	$51.1
Constructability:								
- Construction Staging	Rating	NA	○	○	●	●	●	●
- Maintenance of Traffic (Construction Delay)	Rating	NA	●	◒	●	●	●	●
Implementation	Rating	NA	●	●	○	○	○	○
TRAFFIC								
2030 Daily Traffic Volumes (New / Exist):								
- I-70 East Location	vpd	49,400	53,700	55,000	53,900 / 5,800	53,600 / 3,900	33,500 / 21,400	21,800 / 32,200
- I-70 Central Location	vpd	71,100	83,700	41,600 / 46,500	53,200 / 48,800	53,800 / 49,200	31,700 / 54,500	18,300 / 61,900
- I-70 West Location	vpd	55,700	60,200	61,100	53,100 / 15,500	58,300 / 11,500	31,600 / 29,800	18,100 / 42,100
Long-Term Corridor Capacity (2030):								
- Vehicle Capacity (Directional)	vph	4,200	6,300	6,300	8,400	8,400	8,400	8,400
- V/C Ratio Rural Areas (New / Exist)	V/C	0.9	0.7	0.7	0.9-1.0 / 0.1-0.3	1.0 / 0.1-0.2	0.5-0.6 / 0.4-0.5	0.3-0.4 / 0.6-0.7
Traffic Operations (2030):								
- % Corridor at Target LOS	%	0%	100%	100%	94%	94%	89%	89%
- Change in KC to St Louis Travel Time	Min.	NA	-16	-16	-34	-34	-42	-42
Travel Efficiencies (2030):								
- Change in Daily VHT	Hours/Day	NA	27,160	-131,680	-86,430	-8,180	-41,610	-10,820
- Change in Daily VMT	Miles/Day	NA	156,400	127,300	164,500	295,200	-10,200	-63,700
Service to Trucks	Rating	●	◒	◒	●	●	◒	◒
Traffic Delay During Maintenance Activities	Rating	●	◒	◒	○	○	○	○
Change in 2030 Accidents (Total Corridor):								
- Study Corridor Accident Rate [2]	Rate	146	113	111	95	95	95	95
- Construction Work Zone Accidents	Rating	NA	●	◒	○	○	○	○

Table II-28: Overall Comparison of Reasonable Strategies (Summary of Impacts – Continued)

EVALUATION FACTOR	UNIT	I-70 IMPROVEMENT (REASONABLE STRATEGIES)						
		No-Build	Widen I-70		New Parallel Facility		New Parallel Toll Road	
			Widening	*Urban Bypass*	*North*	*South*	*Low Rate*	*High Rate*
Incident Management	Rating	<	=	>	>>	>>	>>	>>
Impacts to Emergency Services	Rating	NA	=	=	<	<	<	<
ENVIRONMENTAL								
Natural Resources Impacts	Rating	NA	=	< ⚑ (S. Col.)	<<	⚑ (Columbia)	<< ⚑ (S. Col.)	<< ⚑ (S. Col.)
Missouri River Impacts	Rating	NA	=	=	=	=	=	=
Cultural Resources Impacts	Rating	NA	=	=	=	=	=	=
Hazardous Wastes Impacts	Rating	NA	=	=	=	=	=	=
Parklands Impacts	Rating	NA	=	=	=	⚑ (S. Col.)	⚑ (S. Col.)	⚑ (S. Col.)
Floodplains	Rating	NA	=	=	<	<	<	<
Secondary Impacts	Rating	NA	<	<	<	<	<	<
Joint Development Opportunities	Rating	<<	>	>	>	>	>	>
SOCIAL AND ECONOMIC								
Impacts to Existing Structures	Rating	NA	<<	<	=	=	=	=
Noise Impacts	Rating	NA	<<	<	<	<	<	<
Compatibility with Land Use	Rating	NA	=	>	<	<	<	<
Impacts to Existing I-70 Business Operations:								
- During Construction	Rating	NA	<	=	=	=	=	=
- Long Term	Rating	NA	=	>	<<	<<	<	<
Environmental Justice	Rating	NA	=	=	=	=	=	=
Cost-Effectiveness								
- User Cost Savings [3]	$M	NA	$166	$579	$509	$149	$302	$311
- Toll Revenue [4]	$M	NA	NA	NA	NA	NA	$68	$54
- Benefit/Cost Ratio	Ratio	NA	1.2	4.5	3.9	1.1	2.4	2.3

Benefits >> Adverse Impacts
Benefits > Adverse Impacts
Benefits = Adverse Impacts
Benefits < Adverse Impacts
Benefits << Adverse Impacts
Avoidance Recommended

NOTES:
1. Equivalent Uniform Annual Cost (EUAC) for 30-Year Term with 6% Discount Rate.
2. Accidents per 100 Million Vehicle Miles of Travel.
3. EUAC (30 Years, 6%) for total statewide user savings (vehicle operations, travel time and accidents).
4. EUAC (30 Years, 6%) for toll revenue assuming full capture of toll road traffic.

- **Constructability** – This measure is a subjective rating of the ease of construction and the resulting inconvenience to both the traveling public and MoDOT. From both a construction staging and a maintenance of traffic perspective, the new parallel route strategies would be preferred over the widening strategy. These strategies would each be constructed "off line" and would not be located in the existing I-70 right-of-way. Consequently, construction would not be impeded by the need to stage and remobilize the construction operations. Nor would existing I-70 operations be impeded by the construction activities. For the Widen I-70 Strategy, the concept would entail constructing the new lanes in stages such that four lanes would always be provided to serve existing I-70 traffic at its current posted speed. Temporary transitional mainline detours would be required at the ends of each construction segment. With this concept, temporary construction delay would be minimal for the mainline I-70 traffic. However, temporary delays would be experienced at each interchange area during construction, but only for the exiting and entering traffic and the crossroad traffic.

- **Implementation** – This factor represents the ability of each strategy, irrespective of the timing or nature of construction funding, to be implemented in accordance with the needs of the corridor as they develop, in both time and space. Currently, roadway congestion problems are evident in the urban areas of Kansas City, Columbia and St. Louis. The rural-like areas of the corridor currently operate acceptably. Over the course of time, as traffic continues to grow, the congested areas will continue to expand such that by 2030 the operations of the entire corridor will be unacceptable. Given the dynamic of I-70's congestion problems, the Widen I-70 Strategy provides greater implementation flexibility in that the improvements can be implemented more readily and more directly as the future problems develop. A case in point would be the Columbia area – an area with an existing need for congestion relief. With the parallel route strategies, in order to address this pressing need, either the entire improvement or significant adjacent sections of the strategy would need to be constructed, or significant detouring would be required. (Temporary construction and detouring were not included in the cost estimates for these strategies.) With the Widen I-70 Strategy, the improvements could be more focused on the direct needs of I-70, without incurring construction costs unnecessarily. Of course, this issue is moot if the improvements are implemented as a whole and not phased.

b. Traffic

The following section summarizes the major traffic impact factors for the reasonable strategies:

- **2030 Daily Traffic Volumes** – In general, increased capacity along I-70 would result in higher I-70 traffic volumes. This increase, ranging from approximately 10 percent for the Widen I-70 Strategy to around 20 percent for the New Parallel Facility Strategy, would occur due to a reorientation of travel destinations created by the enhanced mobility. To a much lesser extent, some route diversion from adjacent routes would also occur. For the New Parallel Facility Strategy, as much as approximately 90 percent of I-70 travel in the rural areas would utilize the new facility due to its higher travel speeds. Depending on the toll rate, between 40 percent and 60 percent of the I-70 traffic would use the toll road. With either the Widen I-70 or the New Parallel Facility Strategies, the I-70 traffic would be fairly evenly distributed between the new and existing facilities through the Columbia area. If the new route were to be a toll road, more local Columbia traffic would utilize the existing freeway.

- **Long-Term Capacity** – The long-term capacity of the improvements is measured by two factors. The first factor is the total vehicular capacity provided by the combination of existing I-70 and the new construction. The second factor measures the relationship of the system's vehicular capacity rate relative to the rate of vehicles in the rural areas (i.e., V/C Ratio). Each of the parallel route strategies would provide a total of eight travel lanes. In the rural areas, the Widen I-70 Strategy would provide six travel lanes to meet future travel demands. Due to the increased I-70 traffic volumes created by the New Parallel Facility Strategy, little additional capacity would be available for future growth in travel along the new route. However, considerable capacity would be unused along existing I-70. For the Widen I-70 Strategy, approximately 70 percent of the six-lane capacity would be utilized. Depending on the toll rate, only around 40 to 60 percent of the system's capacity would be utilized by 2030 with the New Parallel Toll Road Strategy.

- **Traffic Operations (2030)** – The future operations and performance of the improvements are measured by the percentage of the I-70 system that would meet the target performance standard (i.e., Level of Service) and by the change in travel time to traverse the Corridor. For the Widen I-70 Strategy to function acceptably for its entire length, three segments would need to be widened to four travel lanes in each direction. The first section is from the western end of the project limits to Exit 58 in Lafayette County, near Concordia. The second section is entirely in St. Charles County, from Exit 203 near Wentzville, to the project limits near Lake St. Louis. The segment through or around Columbia would also need to provide a total of eight lanes. Approximately 70 miles (112.7 km) of the total 200-mile (321.9 km) long corridor would need to provide eight lanes by 2030.

  For the parallel route strategies, some operational problems would remain along the existing I-70 roadway in the urban areas. Though, to varying degrees, a parallel route would pull interstate-type travel from existing I-70, local traffic would remain, and in the urban areas would exceed the acceptable capacity of the existing four lanes. Consequently, unless widening is provided to existing I-70 in the metropolitan areas of both Kansas City and St. Louis, future traffic operations and performance would not meet the target service level, even with the implementation of a parallel route.

  Each of the strategies would improve the total travel time across the corridor, as compared to the No-Build Strategy. Depending on the strategy, between 16 and 42 minutes of travel time could be saved.

- **Travel Efficiencies (2030)** – Travel efficiencies are quantified by the change in daily statewide miles and hours of travel created by the improvements. A decrease in daily travel, measured by either miles or hours, would reflect an improvement in the system's overall efficiency. Overall, the Widen I-70 Strategy (Urban Bypass Option) and the New Parallel Facility Strategy (North Option) would provide the best reductions in daily hours of travel. Each of these strategies would increase the daily statewide miles of travel. Only the New Parallel Toll Road Strategy would improve both daily hours and miles of travel, but these improvements would not be as measurable.

  When examining the travel model results for the I-70 strategies, daily vehicle hours of travel decreases with the exception of the Widen I-70 Strategy (Urban Widening Option). For the other strategies, the decreases in daily VHT reflect the expected improvements in travel speeds and lower travel times that would result with the completion of the strategies. The increase in VHT for the Widen I-70 Strategy is due to the additional I-70 regional travel created by the improved mobility. This induced traffic results in higher regional traffic volumes on I-70, shifting some of the existing local traffic volumes to alternate routes. When totaled, statewide daily VHT would increase. This indicates that shorter, local trips that currently use I-70 would take longer due to being displaced from I-70 by the increased use of I-70 for longer trips.

Of all of the improvement strategies, the Widen I-70 Strategy (Urban Bypass Option) would reduce the VHT by the greatest amount. This indicates an improvement that would address both statewide travel and more localized congestion issues in the urban-like areas of Columbia, Warrenton, Wright City, and Wentzville. The parallel route strategies, while addressing statewide long-distance travel, have less impact in relieving traffic congestion in the urban areas.

The New Parallel Facility Strategy would have the largest increase in daily VMT. This is due in great part to the additional mobility and superior operating speed of the new facility, ranging from 70 to 80 mph (112.7 to 128.7 km/h). Additional travel is created by the superior travel operations, thereby creating greater daily VMT. Furthermore, some additional VMT could be created due to out-of-direction travel that would result from the improvements. Depending on the trip, the superior operating speeds of the new route would more than compensate for some out-of-direction travel, thus causing additional travel distance. The southern route would have the greatest increase in daily VMT due to its proximity to the south side of Columbia, which has greater local travel demands. Being closer to the center of Columbia and having a better connection for the movement between Kansas City and Jefferson City would result in greater service to local travel and a shift of travel from the improved US 50 to the new parallel route. This shift would result in some travel time benefits, but longer travel distances.

- **Service to Trucks** - For each of the improvement strategies, service to trucks would be enhanced. Each of the strategies would provide better separation of tractor-trailers and autos. With the Widen I-70 Strategy, trucks could be restricted to the outside two lanes. This may require legislative action to enable MoDOT to enforce the restriction. For the New Parallel Facility Strategy, long-haul interstate-oriented trucks would likely utilize the new facility, thereby providing separation from the local traffic that would likely remain on existing I-70.

  Though design options for the New Parallel Facility Strategy do exist that could further provide attractions for truckers, preliminary discussions with the trucking industry suggest that these enhancements may not fully reap the benefits available. The concept of a higher speed truckway with greater load limits and provisions for longer combination vehicles would be attractive to some over-the-road haulers, but not necessarily to all. Several factors influence this. Motor carriers typically operate their fleets at optimal operating speeds, typically around 65 mph (104.6 km) on freeways. Furthermore, increasing load limits would require a retooling of the trucking fleet – a cost that would need to be evaluated. Finally, due to the highly dispersed nature of interstate truck movements, not all truck movements could fully capitalize on the benefits of a truckway. Should either of the new parallel route strategies be selected, the option of a high-speed truckway would need to be evaluated further to determine if its benefits justify the additional construction costs.

- **Traffic Delay During Maintenance Activities** – Maintenance activities will be necessary for all improvements. The Widen I-70 Strategy would be superior to the other improvement strategies due to the ability to maintain two lanes in each direction along the facility being maintained. The relocation strategies would provide an alternative route to avoid the maintenance areas, but for the facility being maintained, traffic would be reduced to one lane during some maintenance activities.

- **Change in 2030 Accidents** – Each of the improvement strategies would improve the overall safety of the study corridor. Depending on the strategy, between nine and 14 fatalities could be saved in 2030. A decrease in fatalities and personal injury accidents would result from each of the strategies due to the safer I-70 system.

  The forecast of future accidents for each of the improvement strategies was based on current accident rates adjusted to reflect improved roadway geometry. These estimates were based on changes in VMT within the study corridor, including both existing I-70 and the new route, as appropriate. As a measure of the inherent overall safety of the I-70 roadway system, regardless of the corridor's traffic volumes, system accident rates were compared for each reasonable strategy. These rates reflect the combined I-70 corridor's roadway system, including both the new and existing facilities, appropriately. As shown, each of the strategies would improve the safety of the system, but the parallel route strategies would provide the greatest safety improvement.

  A significant number of accidents occur in construction zones. A subjective rating was used to measure how each strategy could affect traffic safety during the construction of the improvements. Given the "off-line" nature of the new parallel route strategies, these strategies would be viewed most favorably regarding this issue. Though the widening concept would provide as much separation of the construction activities from the existing lanes as possible, a higher potential for construction-related accidents in the areas of the interchanges would exist.

- **Incident Management** – Incident management is a subjective measure of MoDOT's ability to keep the I-70 system operational in the event of a significant incident that temporarily closes one or more of the travel lanes. All of the strategies would improve MoDOT's ability to manage the system and would provide greater operational flexibility. The new parallel route strategies would provide MoDOT the greatest incident management capabilities.

- **Impacts to Emergency Services** – This factor considers the impacts of the strategies on existing emergency services. To some degree, each of the strategies would benefit current emergency services through an overall reduction of accidents within the study corridor. However, an extra burden on emergency services would be created by the construction of additional highway centerline-miles that would need to be served by the Missouri Highway Patrol and local emergency services.

c. Environmental

In order to determine the environmental feasibility of improving I-70 between Kansas City and St. Louis, previously recorded environmental constraints and issues were inventoried and reviewed within the study corridor. For the purposes of this study, data were collected and reviewed within a 10-mile (16.1 km) wide band centered along the existing I-70 roadway extending from the study termini in the Kansas City and St. Louis metro areas. Inventoried sites and known constraints are shown in Chapter III – Affected Environment and Chapter IV – Environmental Consequences. Even though alternative alignments were not developed at this stage of the study for the parallel route strategies, a review of the environmental data suggests that no known sites, controls or constraints would preclude or prevent the construction of these concepts. Through ongoing discussions with the various resource agencies, including the US

Army Corps of Engineers, the US Fish and Wildlife Service, the US Environmental Protection Agency, the Missouri Department of Natural Resources, and others, a number of important environmental impact issues have been identified that will need to be addressed through the EIS process, but none that would affect the feasibility of constructing the improvements. In the case of the Widen I-70 Strategy, which would have a more fixed location with less maneuverability to avoid constraints, no known environmental constraints were identified that would prevent the widening of the existing I-70 right-of-way.

Given the abstract nature of the environmental impact assessment for the reasonable strategies, quantification of the impacts to the natural environment was not possible at this stage of the study. However, through Geographic Information Systems analyses of the study corridor, estimates of probable impacts based on typical surface area percentages were developed for some of the more important impact factors. The following table (Table II-29) presents the likely range of impacts for the reasonable strategies to provide a sense of relative impact potential in order-of-magnitude terms.

Table II-29: Range of Environmental Impacts for Reasonable Strategies

Natural Environment Impact Issue	Widen I-70 Strategy	Parallel Route Strategies
Forests	230 Acres	1,700 to 2,800 Acres
Wetlands	80 Acres	400 to 430 Acres
Farmland	1,300 Acres	3,000 to 3,700 Acres

Some of the findings of the environmental review of the study corridor are as follows:

- **Natural Resources and Other Impacts** - There are a number of parkland and natural feature issues on the south side of Columbia that could preclude the construction of the I-70 improvements to the south of Columbia.

- **Missouri River Impacts** - Regardless of the chosen strategy, the crossing of the Missouri River would likely need to occur in the vicinity of the existing I-70 bridge at Rocheport. As part of the current and ongoing planning for the reclamation of the Missouri River floodplain area, being performed jointly by the US Army Corps of Engineers, US Fish and Wildlife Service, and Missouri Department of Conservation, provisions have been planned for the eventual expansion of the existing I-70 right-of-way to either the north or south of existing I-70.

- **Secondary Impacts** – Secondary impacts are not expected to be a differentiating factor between the various strategies. With the Widen I-70 Strategy, the existing I-70 development trends would continue. Similarly, due to some mitigating factors relating to the very limited access of the parallel route strategies, it is not anticipated that these strategies would measurably shift the current development trends.

- **Joint Development Opportunities** – With the new construction, each of the reasonable strategies would provide relatively equal opportunities to combine the development of the I-70 improvements with other initiatives. Other initiatives could include system enhancement measures, recreational trail improvements or linear parks.

d. Social and Economic

The following section summarizes the major socio-economic impact factors for the reasonable strategies:

- **Impacts to Existing Structures** – Due to the dependency of the widening strategy to the existing I-70 alignment and the relatively built-up character of the adjacent land use at the interchange areas, this strategy would likely have greater impacts to existing structures than the other strategies. The parallel route strategies would have greater alignment flexibility and maneuverability to avoid direct impacts to dwellings and businesses. It is estimated that a maximum of 120 - 150 businesses and residences could be impacted by the Widen I-70 Strategy in the rural areas.

- **Noise Impacts** – Each of the strategies would have noise impacts that would require the consideration of noise abatement. Due to the built-up nature of the existing I-70 right-of-way and the higher concentration of receptors, it is estimated that the Widen I-70 Strategy would have greater impacts to the aural environment.

- **Compatibility of Land Use** – Existing I-70 has created a development spine across the state that has over the years grown in intensity and breadth. It is anticipated that the Widen I-70 Strategy would continue this development trend, and to some extent, accelerate its growth due to the improved access provided at the interchanges and the slightly higher traffic volumes. The new parallel route strategies would be predominately located in farming and agricultural land uses. Consequently, the Widen I-70 Strategy would best match existing land use.

- **Impacts to Existing I-70 Business Operations** – This factor is a subjective rating of how the existing I-70 businesses would be impacted by each of the strategies. During construction, any loss of business caused by the construction would be mitigated by the temporary nature of the impacts and the fact that directional signage and access would be maintained. However, in the urban areas such as Columbia, these impacts may be more noticeable given the higher amount of local patronage and nearby business competition that would not be impacted by the construction. From a long-term perspective, case studies have suggested that population centers of 2,000 persons or more typically do not experience long-term losses of business due to bypass improvements. Based on an inventory of existing businesses along existing I-70, it is estimated that up to 130 - 150 businesses could experience a loss of income should the New Parallel Facility Strategy be constructed. However, the degree of this impact, if at all, would depend on a number of factors, including the amount of traffic that would remain on the existing facility and the spatial relationship of the existing and new facilities to aid in access and visibility. Regardless of the degree of impact, the Widen I-70 Strategy would have the additional benefit of promoting the growth of existing I-70 businesses through higher traffic volumes and improved access, at least for those businesses that would not be displaced by the improvements.

- **Environmental Justice** – Based on field reviews, analyses of census data, and input from the public received at public meetings and through public comment, no areas of minority or low income populations have been identified that could be potentially impacted, either directly or indirectly, by the improvements to I-70 within the study corridor.

- **Cost Effectiveness** – These factors provide a comparison of the benefits offered by the various strategies, in terms of the traditional user cost savings of travel time, vehicle operations and accident reduction, with the costs of implementation. For the New Parallel Toll Road Strategy, annual toll revenue is included as part of the benefit analysis. The benefits are then compared to the capital and O&M costs to determine if commensurate benefits are provided. As shown, all of the reasonable strategies would provide benefits in excess of the investment's costs. Assuming rapid implementation of the improvements, the Widen I-70 (Urban Bypass Option) and the New Parallel Facility (North Option) would have the highest benefits relative to the strategy's costs. The concept of a parallel toll road would provide overall benefits in excess of the costs, but would not provide the same degree of benefit as the parallel freeway. Less travel would be attracted to the new route with tolls and more travel would remain on the existing roadway. Consequently, the system would operate less efficiently. As shown, annual toll revenue could range from $54M to $68M per year. This revenue would more than offset the additional O&M costs associated with the toll road ($25M). However, the annualized costs of constructing the toll road, normalized over the 30-year study period at a discount rate of six percent, would be around $131M, for a total additional implementation cost of $156M. Toll revenue would therefore not cover the costs of implementation, but could contribute about 39 percent of the implementation cost. This comparison does not include any debt service that may be required if bond financing was utilized.

2. PREFERRED STRATEGY RECOMMENDATION

The process of evaluating the various improvement strategies and recommending the preferred strategy involves a balancing of the benefit/impact tradeoffs with regard to the engineering, traffic, environmental and social considerations, with the concerns and interests of the commenting public and review agencies. Particular issues and concerns, which may be important to some, may in fact conflict with the concerns of others. It is therefore the overall total-project comparison of the strategies that helps guide the selection of the best strategy. The following section summarizes a review of the strategies regarding their relative effectiveness in meeting the purpose and need, their overall benefits and impacts and public input.

a. Effectiveness in Accomplishing Purpose and Need

Several goals and objectives for the I-70 improvements have been defined based on the description of the current and projected transportation-related problems in the study corridor. Each of the strategies would accomplish in varying degrees the stated purpose and need for the proposed action. However, in evaluating the relative effectiveness of the strategies in accomplishing the defined goals, some distinguishing considerations become apparent. Overall, the Widen I-70 Strategy best meets the purpose and need based on the individual elements of the study's goals.

✓ **Roadway Capacity** – The parallel route strategies would provide a total of eight lanes, thereby providing greater long-term capacity. However, the Widen I-70 Strategy best provides the new capacity as warranted based on future travel demands, while providing the ability to add additional capacity in the future as travel demands continue to grow, including provisions for future transportation improvements within the median area. Additional system capacity via passenger rail within the median could be added more readily with the parallel route strategies due to the more stringent alignment criteria – milder grades and curves.

- ✓ **Traffic Safety** – Each of the improvement strategies would enhance the safety of the I-70 roadway system. The degree of improvement depends on the extent of the new construction and the amount of existing I-70 that remains. The parallel route strategies, by virtue of the new parallel highway with its superior accident rate, would provide the best overall system accident rate.

- ✓ **Roadway Design Features** – The Widen I-70 Strategy would be the only concept that would replace the existing I-70 roadway, in its entirety, with a new configuration that would meet current standards for freeway construction.

- ✓ **System Preservation** – The Widen I-70 Strategy would be the only concept that would immediately replace the existing I-70 infrastructure in its entirety, and would best provide for the preservation of the existing corridor beyond 2030.

- ✓ **Goods Movement** – Each of the strategies would improve the efficiency of freight movements, but the parallel route strategies would provide the best service to trucks. Though the degree of benefit of a high-speed truckway needs further clarification and analysis, this concept would provide superior service to trucks.

- ✓ **Access to Recreational Facilities** – Each of the strategies would equally provide improved access to recreational facilities.

b. Comparison of Overall Benefits and Impacts

Each of the strategies would have varying degrees of adverse impacts and benefits, and for a number of the impact issues, none of the strategies differentiate themselves (see Summary of Impacts). The following summary table (Table II-30) shows a subjective judgement based on the findings of the impact evaluation regarding which reasonable strategy best balances the benefits and impacts of the improvements. For each of the major evaluation factors, the distinguishing factors or issues that support the rationalization of the best strategy determination have been listed. The highlighted strategy signifies which strategy is best for each category. For purposes of this summary, the various design options within each strategy were not differentiated. Upon the selection of the preferred strategy, further details of its design options can be developed.

Table II-30: Summary of Impacts

Major Categories (Evaluation Factors)	Widen I-70	New Parallel Facility	New Parallel Toll Road	Distinguishing Factors or Issues
Engineering				✓ Capital Cost (Order of Magnitude) ✓ Constructability
Traffic				✓ Change in Travel Time (2030) ✓ Incident Management
Environmental				✓ Natural Resources Impacts
Social and Economic				✓ Impacts to Existing Structures ✓ Impacts to I-70 Business Operations ✓ Cost-Effectiveness

As shown, the parallel route strategies are viewed more favorably in terms of the engineering and traffic aspects of the overall evaluation. Distinguishing factors affecting this judgement include capital costs and constructability for the engineering category, and travel time and incident management for traffic. Overall, each of the reasonable strategies would greatly improve the traffic operations of the corridor, but the parallel route strategies are superior in offering lower travel times and better flexibility for the handling of incidents. Regarding impacts to the natural and cultural environment, the Widen I-70 Strategy is clearly superior. Of all the major evaluation categories, it is this factor where the relative differences between the reasonable strategies are most distinctive. For the last category, the issue of cost-effectiveness clearly eliminates the New Parallel Toll Road from further consideration. Toll revenue would not be sufficient to cover either the costs of construction or any debt service costs associated with bond financing. Toll revenue could help defray some of the construction costs, but not significantly. Because both of the other reasonable strategies are cost-effective solutions, each has been highlighted for the social and economic category. However, a lack of clarity regarding a preference on the issue of impacts to existing I-70 structures and businesses has resulted due to the conceptual nature of this evaluation. Consequently, no distinction is evident for this issue for either the Widen I-70 or New Parallel Route Strategies. The Widen I-70 Strategy would potentially impact a greater number of structures, but the New Parallel Facility Strategy would most likely have more negative impacts on existing I-70 businesses over the long run. These contrasting aspects require a much greater level of detail to accurately identify any distinctions regarding this issue.

c. Public/Agency Participation and Comment

The I-70 First Tier EIS employed a number of public involvement tools to facilitate factoring public input into the improvement strategy evaluation process. The study used both aggressive outreach and passive input avenues to encourage and facilitate involvement from citizens and travelers. Using both quantitative and qualitative methods, the study has gathered both "soft" and "hard" data. More details of the public/agency participation are described in Chapter V – Comments and Coordination.

In summary, while there is a diversity of opinion with the public in general, two messages may be drawn from public involvement to date.

- **Message No. 1 - Concern for Safety**

  The clearest message is that the experience of driving on I-70 elicits strong concerns from Missourians. While they may recommend a variety of solutions, Missourians are uniformly concerned for their safety when traveling on I-70. Much of this concern centers on the number of freight trucks and the speed at which they drive. There was a common perception expressed that enforcement of speed and weight limits was lax and that if trucks were simply separated from smaller passenger vehicles, many safety concerns would be alleviated.

- **Message No. 2 - Improvement Strategy Preference**

  When citizens express an opinion specifically on an improvement strategy, the preponderance of public input to date has expressed a preference for widening the existing I-70. It is important to note that most of the open-ended comments received concerned a variety of issues and often did not take a specific stand on an improvement strategy. When forced to express a preference in the context of a questionnaire or the telephone survey, citizens expressed a clear preference for widening the existing highway. At the same time, they expressed a higher degree of opposition to building a new parallel facility.

d. Preferred Strategy Recommendation

Based on its ability to effectively accomplish the purpose and need, its superiority regarding the balance of benefits and impacts, and its consistency with the general public and agency consensus, Strategy No. 3 (Widen Existing I-70) is the recommended preferred strategy (see Table II-31).

Table II-31: Recommended Preferred Strategy

Recommended Preferred Strategy:	Characteristics and Issues:
Strategy No. 3 (Widen Existing I-70) *"Rebuild and reconstruct existing I-70 on its current alignment"*	• Urban area options (local relocations): ✓ Columbia ✓ Warrenton/Wright City/Wentzville • Rural area options: ✓ Widening to the north or south ✓ Continuous frontage roads ✓ Provisions for future transportation corridor • Interchanges: ✓ Access management ✓ Relocations/displacements • Special study areas: ✓ Overton Bottoms ✓ Mineola Hill • ITS implementation • Maintenance of traffic

H. Recommended Preferred Strategy

Several issues regarding the recommended Preferred Strategy (Strategy No. 3 - Widen Existing I-70) warrant more detailed consideration and discussion to assure the acceptability of its impacts and to support the decision-making process as part of this First Tier EIS. Further clarity of its implications on the affected environment would provide decision-makers better assurances of its appropriateness. Furthermore, additional decisions regarding the strategy's conceptual options could be made within the First Tier EIS, or at least further clarified, to further refine the scope of the subsequent Second Tier Studies.

Based on discussions with resource agencies and the general public, several issues were identified for further, more detailed evaluation as part of this First Tier EIS in support of the preferred strategy recommendation. Table II-32 presents each of these important issues and the study approach utilized by the First Tier EIS.

The following section provides greater detail and embellishments of the recommended Preferred Strategy (Strategy No. 3 - Widen Existing I-70) relative to these issues.

Table II-32: First Tier EIS Approach to Preferred Strategy Issues

Issue	Study Approach
Urban Area Options (Local Relocations)	More detailed conceptual studies were performed in the urban areas of Columbia and Warrenton/Wright City/Wentzville. (Relocation of I-70 within the Kansas City area was not identified as a reasonable option to widening the existing highway.) In these areas, two conceptual options were further studied: relocate I-70 on a new alignment or improve the existing I-70 roadway. For the relocation option, one-mile wide conceptual corridors were identified and evaluated. Improvements to the existing I-70 through these urban areas were also defined in greater detail (1”=200’ or 1”=300’).
Rural Area Options	In the rural areas of the I-70 Study Corridor, more detailed engineering and environmental assessments of the immediately adjacent areas were performed to formulate recommendations whether the widening should occur to the north of south of the existing right-of-way. Continuous frontage roads on both sides of I-70 were included.
Interchanges	More detailed conceptual studies (1”=200’) at a majority of the interchanges in the study corridor were performed. This entailed the development of conceptual interchange layouts with the inclusion of access management improvements per MoDOT’s guidelines.
Special Study Areas	More detailed conceptual studies were performed at Overton Bottoms and Mineola Hill to assure construction feasibility and better enumerate the range of possible impacts to the surrounding environmental issues and resources. Additional and focused agency coordination regarding these special areas was performed to develop agency consensus regarding the acceptability of the Widening Strategy’s impacts.
ITS Implementation	More detailed definitions and cost estimates were developed for the implementation of ITS improvements to the I-70 Corridor in conjunction with the implementation of the Widen Existing I-70 Strategy.
Maintenance of Traffic	More detailed assessments were performed regarding the impacts of the Widen Existing I-70 Strategy related to the maintenance of traffic during construction.

1. GENERAL DESCRIPTION

The Widen Existing I-70 Strategy involves the complete reconstruction of existing I-70 to provide six-eight lanes of roadway within the existing I-70 corridor. This strategy can be divided into two different types of Interstate roadway, each with their own unique characteristics – rural and urban.

- **Rural Areas** – The Widen I-70 Strategy in these areas would typically provide six travel lanes with a 124-foot (37.8 m) wide median to allow for the addition of future lanes and some type of future transportation improvement. The rural area consists of two distinct areas – western rural area and eastern rural area. The western rural area extends from the edge of the Kansas City metropolitan boundary, roughly around Grain Valley, to the Columbia urbanized area. The eastern rural area extends east of the Columbia urbanized area to just west of Warrenton. These areas are characterized by dispersed development around the existing I-70 right-of-way such that a wider rural interstate-type section can be implemented without unacceptable impacts to adjoining land use. Table II-33 shows a summary of the limits of these areas.

- **Urban Areas** – These areas are characterized by tighter physical constraints reflected by the tighter urban-like roadway section of the existing I-70 section. For the most part, in these areas the existing I-70 section consists of a divided median with a concrete barrier. In these areas, the adjoining land use is more densely developed and populated such that extensive widening of the I-70 right-of-way is prohibitive. Therefore in these areas, an urban improvement section would be utilized for the widening of existing I-70. These urban areas consist of three distinct areas – Kansas City, Columbia and Warrenton/Wright City/Wentzville. In the Kansas City area, extending west of Grain Valley, a relocation of I-70 is prohibitive due to the expanse of the urbanization. The existing right-of-way in this area is generally wide enough to allow for the urban widening of the I-70 roadway without incurring unreasonable impacts to the surrounding land use. The Columbia area extends to just west of and east of the Columbia urban boundary and within this area, opportunities exist for the consideration of an I-70 bypass or a widening of the existing I-70 roadway. Similar to the Columbia area, in the Warrenton/Wright City/Wentzville area, options include the relocation of I-70 or the widening of I-70 utilizing an urban section. Table II-33 shows the limits of these areas.

Table II-33: Limits of Rural and Urban Areas within Study Corridor

Name of Area	General Type of Roadway	Begin Location (Exit No.)	End Location (Exit No.)	Approx. Length (Miles)
Kansas City	Urban	I-470 (Exit 15)	Grain Valley (Exit 24)	9
Rural (West)	Rural	Grain Valley (Exit 24)	Stadium Blvd. (Exit 124)	100
Columbia	Urban	Stadium Blvd. (Exit 124)	Lake of Woods (Exist 131)	7
Rural (East)	Rural	Lake of the Woods (Exit 131)	Warrenton (Exit 193)	62
Warrenton/Wright City/Wentzville	Urban	Warrenton (Exit 193)	Lake St. Louis (Exit 214)	21

As shown in Table II-33, the I-70 Study Corridor extends from the I-470 interchange in the Kansas City area to the Lake St. Louis interchange in the St. Louis area. Logical termini for this study consist of connections to the respective interstate highway systems in Kansas City and St. Louis. In Kansas City, the logical terminus for the I-70 improvements is the I-470 interchange. I-70 through the I-470 interchange currently consists of six through lanes. Any additional lane recommendations for the I-70 improvements can tie into and balance with the interchange ramps for I-470. For long-term considerations west of this terminus, MoDOT is currently conducting a major investment study that will consider the continuation of the I-70 improvements into downtown Kansas City, as well as other improvements to the travelshed. In the St. Louis area, the logical system connection is the I-64 interchange (currently the US 61/40 interchange). However, for lane balance and continuity, additional I-70 through lanes would be needed west of the Lake St. Louis interchange as a continuation of the six-to-four lane drop that occurs just west of Lake St. Louis. (Construction is underway to move the current lane drop location from east of the Lake St. Louis interchange to just west of the interchange.)

2. DESIGN CRITERIA

Design criteria for each type of roadway is presented in Table II-34.

The following access management guidelines were used in evaluating interchanges:

- Distance between interchange ramps – 700 feet (213.4 m)
- Distance from ramp terminal to right-in, right-out only access – 700 feet (213.4 m)
- Distance from ramp terminal to full access – 1,320 feet (402.3 m)

The following high-speed rail criteria were used to evaluate the compatibility of high-speed rail with the existing highway alignment. The additional median space provided with the improvements is to be reserved for a future transportation improvement. Currently, the most apparent future use of this space provision is for high-speed rail. However, the nature and extent of these future improvements have not been defined. Furthermore, it is not the intent of the Widen Existing I-70 Strategy to be designed for full compatibility with a future high-speed rail improvement. However, reasonable accommodations may be made such that portions of the corridor could be potentially used by high-speed rail.

- Maximum Horizontal Curvature (79 mph [127.1 km/h]) – 2 degrees, 3 minutes
- Maximum Horizontal Curvature (110 mph [177.0 km/h]) – 1 degree, 3 minutes
- Maximum allowable Vertical Grade – 2.0 percent
- Maximum K value (sag & crest) – 286
- Vertical clearance – 23.0 feet (7.0 m)

Table II-34: Design Criteria

Roadway Designation	Unit	Rural	Urban	Bypass	US Routes	State Routes	Ramps
Functional Classification		Interstate	Interstate	Interstate	Principal Arterial	Principal Arterial	Ramp
Avg. Daily Traffic (Design)		All	All	All	> 1700 (4 LN.)	> 1700 (2 LN.)	N/A
Design Speed (Mph)		70	70	70	70	60	50
Pavement Structure Design Figure (See MoDOT Design Manual)		6-03.8, 6-03.9	6-03.8, 6-03.9	6-03.8, 6-03.9	6-03.7, 6-03.9	6-03.6	6-03.2, 6-03.3
Lane Width (Min.)	Ft.	12	12	12	12	12	18
Outside Shldr. Width (Min.)	Ft.	12	12	12	10	10	10
Inside Shldr. Width (Min.)	Ft.	12	12	12	4	N/A	4
Safety Clear Zone (Min.)	Ft.	30	30	30	30	30	
Median Width (Min.)	Ft.	124	Barrier	124	60	N/A	N/A
Slopes (H:V)							
Backslope		4:1	4:1	4:1	4:1	4:1	4:1
Fillslope		4:1	4:1	4:1	4:1	4:1	4:1
Foreslope		6:1	6:1	6:1	6:1	6:1	6:1
Ditch Depth (Min.)	Ft.	4	4	4	4	4	4
Max. Curvature	Deg.	3	3	3	3	4 3/4	6
Grade (Max/Des)	%	Exist/3	Exist/3	4/3	4	4	5
Stopping Sight Distance	Ft.	625-850	625-850	625-850	625-850	525-650	400-475
Crest Vertical Curve	K-Value	294-544	294-544	294-544	294-544	208-318	121-170
Sag Vertical Curve	K-Value	150-220	150-220	150-220	150-220	120-160	90-110
Passing Sight Distance (Min.)	Ft.	N/A	N/A	N/A	2500	2100	N/A
Superelevation (Ft/Ft)		0.08	0.08	0.08	0.08	0.08	0.08

NOTES:
1 – See MoDOT Design Manual for Figures.
2 – Rural& Urban – Match I-70 unless deficiency can reasonably be corrected.

3. DESIGN STANDARDS

Chapter I – Purpose and Need establishes the need for increased capacity along the I-70 Study Corridor to meet current and future travel demands. The recommended preferred strategy entails adding additional travel lanes to the existing four-lane I-70 section to serve the corridor's travel demands based on the desired level of service. In the rural areas, six lanes are needed to adequately serve future traffic. Eight or more lanes are needed in the urban areas of Kansas City, Columbia and the metropolitan area of St. Louis.

The intent of this section is to provide additional descriptions of the typical roadway and interchange improvement options for the Widen Existing I-70 Strategy.

a. Roadway Improvement Options

As part of the evaluation of the reasonable strategies, several alternative means of adding travel lanes to the existing typical rural and urban I-70 sections were identified. Through a review of the benefits of each of these options, a recommended roadway design standard was identified. Figures II-13 through II-17 show the roadway standards for the Widen Existing I-70 Strategy for typical rural widening, urban widening and local relocation applications.

As shown, the rural widening and local relocation typical sections are consistent with the definitions presented earlier for the reasonable strategies. Additional sections have been developed for tight urban-like areas with adjacent frontage roads. Figure II-16 shows the urban widening section illustrating the use of a clear zone between I-70 and the frontage road, or the use of a wall or barrier to separate the frontage road from I-70. As another option in the tight urban-like areas, Figure II-17 shows an elevated widening section. This section could be superimposed on top of the existing I-70 right-of-way without conflicting with the existing travel lanes, requiring a splitting of the bridge structures. The section could also be added in the median of the existing I-70 section, resulting in the reconstruction of the existing pavement to provide room for the bridge foundational elements.

Figure II-13: Rural I-70 Widening Typical Section

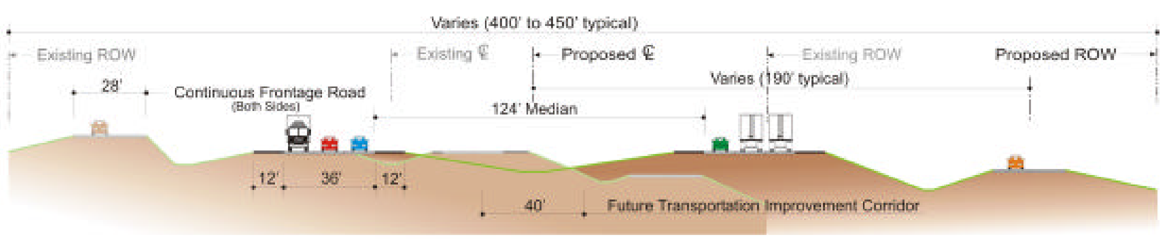


Figure II-14: Local I-70 Relocation Typical Section

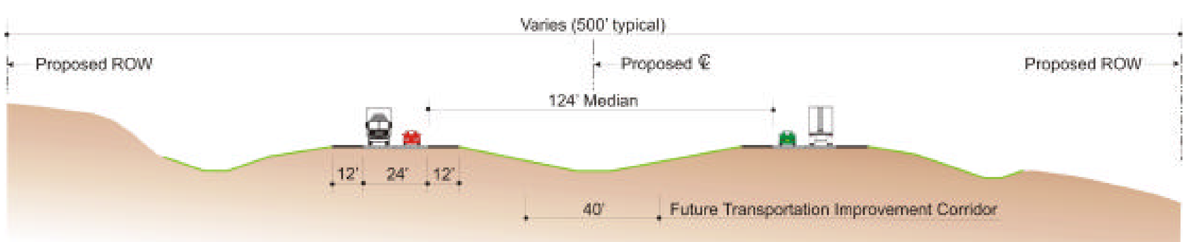


Figure II-15: Urban I-70 Widening Without Frontage Roads Typical Section

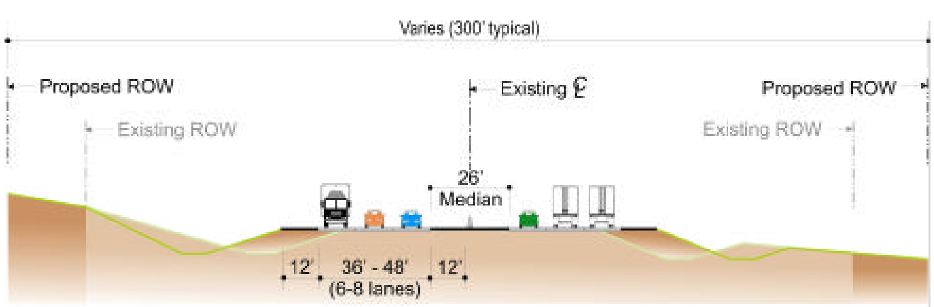


Figure II-16: Urban I-70 Widening With Frontage Roads Typical Section

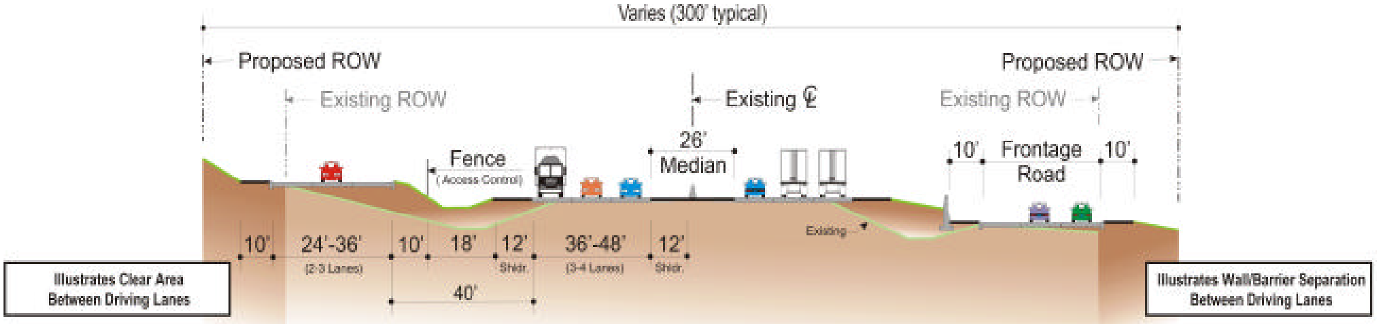
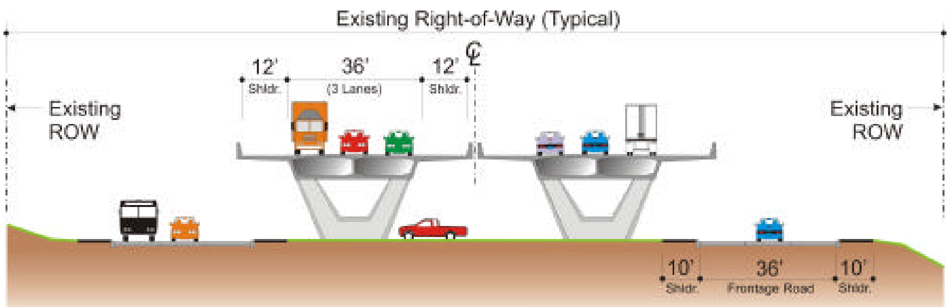


Figure II-17: Urban I-70 Elevated Widening Typical Section



b. Interchange Improvement Options

There are a number of different types and configurations of interchanges along the I-70 Study Corridor. Every interchange and its surroundings are different. Each existing I-70 interchange would need to be specifically evaluated to determine how best to improve it. In general, it is recommended that with the necessary reconstruction of each interchange, opportunities to improve and enhance the degree of access management at the interchange be considered. Given the high degree of development surrounding the majority of I-70's interchanges, it is recommended that alignment or configuration adjustments be made wherever reasonable, without compromising the access management goals.

The access management guidelines outlined earlier in this chapter provide the general guidelines for the conceptual interchange improvements and the degree of improved access control.

4. KANSAS CITY AREA

The recommended means of widening I-70 through the Kansas City area is to center the improvements along the existing centerline of I-70 using an urban widening section. Given the available space within the existing right-of-way through this area, the widening for the most part can be accomplished within the existing right-of-way, except at the interchange areas. It is not anticipated that an elevated widening section would be warranted through this area. Rather, an at-grade widening would be utilized with adjustments to the adjacent frontage roads as necessary.

With the projected travel demands of this area, eight through-lanes are needed. The seventh and eighth would be added at the Grain Valley interchange and these lanes would tie into the ramps at the I-470 interchange. In the future, depending on the findings of the I-70 major investment study, a study currently being conducted for the I-70 travelshed within the Kansas City metropolitan area, the seventh and eighth lanes could be extended through the I-470 interchange to and from the west. The transition from the urban roadway section to the rural roadway section that continues to the east would be located near the Grain Valley interchange.

It is not anticipated that adjustments to the existing I-70 alignment would be necessary in the Kansas City area.

With the widening of I-70 per the design standard indicated earlier, complete reconstruction of all existing interchanges within the Kansas City area would be required. (Reconstruction of the I-470 interchange will depend on the findings of the ongoing I-70 Major Investment Study.) The reconstruction and widening of the existing I-70 corridor provides a unique opportunity to implement access management guidelines that increase both the functionality and safety of the interchanges along the corridor.

Table II-35 presents a summary of the interchanges within the Kansas City area. As shown, the recommended degree of improved access management resulting from the interchange improvements is shown with a rating – high, medium or low.

Table II-35: Interchange Summary I-70 Kansas City Area

No.	Interchange Name	Type	Access Mgmt.	Comment
15	I-470	Clover Leaf (Freeway to Freeway)	High	This interchange is the terminus for the study corridor. Capacity improvements to the Corridor would tie into the interchange. This interchange already provides full access control. Reconstruction of this interchange will depend on the findings of the ongoing I-70 MIS. For this study, the seventh and eighth lanes to and from the east would be added at this location.
16	Little Blue Pkwy.	Diamond	Med.	Adequate control of access is currently provided. No modification of existing access management is necessary.
18	Woods Chapel Road	Diamond	Low	Low degree of access management is provided on Woods Chapel Road. Little opportunity is available to improve degree of access control at the interchange area.
20	Route 7	Diamond	Low	Low degree of access management is provided on Route 7. Development has occurred adjacent to current right-of-way and effectively prohibits the expansion of the interchange without unreasonable impacts. Little opportunity is available to improve degree of access control at the interchange area.
21	Adams Dairy Parkway	Diamond	Med.	Opportunity is available to secure better access control.

Improvements in the Kansas City area would need to be coordinated with the Mid-America Regional Council.

5. EAST AND WEST RURAL AREAS

a. Rural Widening

In the rural areas, each section of the existing I-70 roadway was investigated regarding the best means of widening – to the north or to the south. This assessment (see Appendix B) was based on the generalized impacts to issues adjacent to the existing right-of-way. In addition to engineering considerations such as costs, terrain and displacements, considerations were given to impacts to wetlands, threatened and endangered species, natural communities, floodplains, parklands, hazardous waste sites and cultural resources. The goal of this investigation was to identify critical issues or major constraints that would dictate or influence the recommendation of a widening configuration. Based on the recommendation of the individual issues, an overall widening configuration recommendation was made for each section. Another issue considered in the overall widening recommendation for each section of I-70 was the predominant recommendation of the adjoining sections of I-70. It is desirous to limit the number of changes in configuration between adjoining sections of I-70 to minimize the extent of traffic detouring during construction.

The analysis of the rural widening areas determined widening configuration recommendations (i.e., widen to the north or south) based on the avoidance of known environmental constraints and sensitive areas. Sensitive areas included both the natural and manmade environments. For those areas where the sensitivities are not as apparent at this level of detail, the widening configuration was based primarily on engineering judgements. These considerations included anticipated construction costs, the extent of necessary grading, relocations of existing frontage roads, and potential displacements of existing structures. Additional study in the second tier documents would better determine the exact widening configuration and would better consider design refinements to avoid and minimize impacts to the adjacencies. Furthermore, more detail design would identify further refinements to the alignment and grade of the interstate to minimize the construction limits and disruptions to adjacent land use.

b. Rural Alignment

For the most part, the horizontal alignment of I-70 through the rural portions of the corridor would follow the existing horizontal alignment, with the roadway being widened to the north or south to provide a 124-foot (37.8 m) median as indicated above. However, several locations would require a deviation from the existing horizontal alignment to improve the geometry to desirable criteria levels or eliminate excessive earthwork. Through more detailed design, to be performed after this study, it may be determined in some local areas to offset the alignment in one direction or the other to further minimize impacts to adjacent areas. Table II-36 shows the more significant areas within the study corridor where alignment adjustments would likely occur.

Table II-36: Summary of Rural Area Horizontal I-70 Alignment Adjustments

Location	County	Deficiency	Correction
Odessa	Lafayette	Split Horizontal Alignment with Steep Grades	To the extent possible without incurring unreasonable construction costs or additional right-of-way, reconstruct to consistent 124’ median. Improve vertical grades. Further study required to determine best option at this location.
West Side of Auxvasse Creek	Callaway	Split Horizontal Alignment with broken back curves	Reconstruct to consistent 124’ median with single curve.
Mineola Hill	Callaway and Montgomery	5% to 6% grades	Further study required to determine best option for this location.

c. Rural Interchanges

With the widening of I-70 per the design standard indicated earlier, complete reconstruction of all existing interchanges within the I-70 corridor would be required. The reconstruction and widening of the existing I-70 corridor provides a unique opportunity to implement access management guidelines that increase both the functionality and safety of the interchanges along the corridor.

Conceptual layouts of possible interchange improvements have been completed for a representative set of I-70 rural interchanges. These conceptual layouts can be found in Appendix C. As a representation of the types of interchange concepts likely to be implemented with the Widen I-70 Strategy, this set of typical rural interchanges was identified to better characterize the types and magnitude of potential impacts at the interchange locations. The conceptual interchange layouts included in Appendix C are intended to represent examples of the potential implications of implementing the access management guidelines with the Widen I-70 Strategy. These layouts are in concept only and are subject to change and further refinement through the second tier studies and subsequent design development.

The following table (Table II-37) presents a summary of the rural interchanges where conceptual interchange layouts are provided in Appendix C. Not all interchanges located within the rural areas of the study corridor are identified in the table. As shown, the degree of improved access management resulting from the interchange improvements is shown with a rating – high, medium or low.

Table II-37: Interchange Summary I-70 Rural Areas

No.	Interchange Name	Type	Access Mgmt.	Comment
24	Grain Valley	Single Point Diamond	Med.	Current dense development on south side discourages complete implementation of access management.
28	Oak Grove	Diamond	Med.	Construct new bridge just west of existing bridge. Existing major development, particularly south of I-70, discourages total implementation of access management.
31	Bates City	Folded Diamond	High	Construct new bridge just east of existing bridge. Reconstruct interchange with improved access management.
37	Odessa	Diamond	High	Optional concepts have been identified for Odessa. Due to the tight spacing between interchanges, Exit 37 and Exit 38 should be considered together. One option would be to reconstruct the existing Route 131 interchange at its current location with full ramp movements. Improved intersection spacing and access management on Route 131 would be provided. With this option, Exit 38 would be eliminated. (Exit 37 and Exit 38 are too closely spaced together.) Another concept for Odessa would entail moving Exit 37 (Route 131) to the west, just west of the outlet mall. The new Route 131 interchange would consist of a diamond interchange with full implementation of access management. The existing Route 131 interchange and overpass would be eliminated and continuous frontage roads would be provided. With the improved spacing, Exit 38 could be reconstructed with full ramp movements and full implementation of access management. Issues to be considered include the location and route designation of Route 131.
38	Odessa	Diamond	High	See comment for Exit 37.
49	Route 13	Diamond	High	Complete new bridge just west of existing bridge.
58	Concordia	Single Point Diamond	Med.	Existing dense development south of I-70 will prevent total implementation of access management.
66	Sweet Springs	Diamond	High	Relocate interchange 400' east.
78	US-65	Directional	High	Directional ramps to/from south. Loops with CD road on I-70 to/from north.
101	Route 5	Diamond	High	Relocate interchange 400' east with major realignment of Route 5 south of I-70.

103	Route B	Partial Folded Diamond	High	Complete new bridge just west of existing bridge.
106	Route 87	Diamond	High	Complete new bridge just west of existing bridge.
115	Rocheport	Diamond		Relocate interchange 200' west with realignment of Route BB north of I-70.
148	Kingdom City	Directional	High	Relocate interchange 3200' east of current location. Relocate US54 both north and south of I-70. Provide diamond interchanges north and south of I-70 to tie in "old" US54. Grade separate "old" US-54 with I-70.
179	High Hill	Diamond	Med.	Relocate interchange 1600' east of current location. Geometrics of location will not allow full implementation of access management.
183	Jonesburg	Diamond	Med.	Complete new bridge just west of existing bridge. Dense development on south side of I-70 will prohibit complete implementation of access management.

d. Future Transportation Improvements

In the rural locations of the study corridor, the extra wide median provides the opportunity to incorporate additional transportation improvements some time in the future when demand warrants additional capacity in the Corridor. This 40-foot (12.2 m) space provision within the median is the byproduct of the construction staging concept developed for this strategy that is based on the overall goal of maintaining four lanes of traffic during construction. As a result, an extra wide median would be provided with the Widen Existing I-70 Strategy. Consequently, it is recommended that this additional space be reserved and maintained for future capacity improvements when travel demands dictate. Through this provision, MoDOT would have greater flexibility and design latitude for the I-70 Study Corridor improvements to effectively and efficiently serve the travel demands of the State well beyond 2030. The investments in the I-70 Study Corridor would have sufficient inherent expandability that the improvements would truly be a long-term improvement for the Corridor.

Though the design parameters of the I-70 improvements would not be dictated by the consideration of the future expansion of the Corridor into this 40-foot (12.2 m) space, considerations should be given during the design of the I-70 improvements to not preclude the reasonable use of this space sometime in the future. Furthermore, some design considerations could be afforded within the I-70 improvements such that any future improvements within the 40-foot (12.2 m) space would not incur any unreasonable costs that could have been avoided through more advanced design consideration. One considerable challenge with this consideration is defining what those future improvements might entail. The concept is that it would be prudent and wise to allow for a horizontal space envelope within the Corridor for a future, yet to be defined transportation improvement. It is conceivable that the form of this future improvement might entail an alternative mode of transportation, including possibly high-speed rail. However, the timing of these improvements would likely be well into the future and the design standards and technology of this alternative mode of transportation may have changed considerably from what they are today.

Using today's standards for high-speed rail, a quick assessment of the Corridor's alignment characteristics was performed to determine the extent of design compatibility the existing I-70 alignment offers with high-speed rail. This assessment is not intended to imply that high-speed rail will someday be provided within the study corridor. For the purposes of this assessment, high-speed rail is defined as rail service at speeds greater than 79 mph (127.1 km/h). Above this design speed, special signal and control methods would be required.

For horizontal curves, only the reverse curves crossing under the existing railroad between High Hill and Jonesburg do not meet horizontal alignment criteria for 79 mph (127.1 km/h) trains.

MoDOT has been considering a realignment of I-70 in this location and it can be improved to meet the two degree, three minute maximum curvature requirement for 79 mph (127.1 km/h) travel. For 110 mph (177.0 km/h) trains, approximately 33 percent of the horizontal curves on existing I-70 would need to be reconstructed to a curvature of one degree three minutes or less. Therefore, given current technology, considerable alignment upgrades would be required with the I-70 improvements to be compatible with high-speed rail.

For 79 mph (127.1 km/h) trains, 222 vertical curves, or 61 percent of the total curves located within the study corridor, would have to be modified to meet both railroad and highway criteria. Of these deficient vertical curves, 51 of them, or 23 percent, would require changes in grade of over six feet (1.8 m) to meet high-speed rail vertical alignment criteria. Additionally, 117 tangent grades, or 32 percent of the total, have grades in excess of the maximum allowable of two percent. While some improvements to vertical curves could be made during reconstruction of the highway, extensive changes to highway grades would be required for the I-70 improvements to be compatible with high-speed rail design standards. Vertical clearance of at least 23.0 feet (7.0 m) would need to be provided at each of the reconstructed grade crossings.

Other modes of transportation yet to be developed might be capable of operation under less stringent requirements. Given the unknown nature of any future advancements in rail technology, it is recommended that additional, more detailed consideration be given to this issue in the Second Tier Studies. Appropriate horizontal and vertical space provisions should be provided as is reasonably and economically possible for the I-70 improvements to meet the long-term needs of the traveling public.

e. Overton Bottoms

One of the most significant engineering and environmental challenges is the crossing of the Missouri River floodplain area near Overton Bottoms. The Missouri River is perhaps the greatest natural feature within the I-70 corridor. Given the inherent challenges of improving I-70 through this sensitive area, special considerations were given to how I-70 might be widened in this area. Given the environmentally sensitive nature of the Missouri River floodplain, a localized relocation of I-70 was not considered a prudent option. Consequently, the widening of I-70 would occur along the existing highway alignment through the Overton Bottoms area.

The present Missouri River crossing (i.e., Rocheport Bridge) is not capable of being widened to six lanes. The Rocheport Bridge consists of a through-truss bridge superstructure and this type of bridge can not be widened. The existing bridge consists of a single bridge deck configuration with two 12-foot (3.7 m) traffic lanes in each direction separated by a six-foot (1.8 m) median (two, two-foot [0.6 m] inside shoulders plus a two-foot [0.6 m] median barrier), and two three-foot (0.9 m) outside shoulders. The approximate width of 60 feet (18.3 m) would not allow for any additional lanes of travel, but would accommodate three lanes in one direction with full-width (12-foot [3.7 m]) inside/outside shoulders for either the proposed eastbound or westbound travelway. With the conversion of the existing bridge to one-way travel, an adjacent structure would need to be constructed for the opposing travel lanes. The new bridge would need to provide sufficient room for three travel lanes and full-width (12-foot [3.7 m]) shoulders on both the inside and outside. Provisions for future widening beyond 2030 would need to be considered as part of the planning and design of the new bridge. Utilization of the existing I-70 bridge would not provide for a fourth directional lane to be added in the future, unless substandard (six-foot [1.8 m]) shoulders were to be accepted. To conform to the design criteria set forth in this EIS, a new I-70 bridge would need to be built to replace the existing bridge at the time the fourth directional lane is added throughout the project length, sometime after 2030.

The existing terrain adjacent to the eastern approach to the Rocheport Bridge (i.e., north side of I-70) would be more compatible with a widening of the roadway section than the south. The existing terrain to the north consists of a drainage swale that could more easily be impacted. The immediately adjacent area south of the existing I-70 right-of-way consists of the Manitou Bluffs – a bluff complex located along the eastern bank of the Missouri River. Cave structures are common features within and above these bluffs. Though no known caves are immediately adjacent to the I-70 right-of-way, the greater likelihood of encountering unknown caves and voids during construction would further support the northern expansion. The embankment section of the western approach to the Rocheport Bridge could be expanded in either direction – north or south. Space provisions, approximately 300 feet (91.4 m) on either side of the existing I-70 right-of-way, have been provided by the ongoing floodplain reclamation and conservation activities. Consequently, it is recommended that a new bridge be constructed immediately adjacent to the existing bridge for the new westbound lanes. The existing bridge would then be converted to serve the eastbound lanes.

Issues that will need to be further evaluated in the Second Tier Studies include:

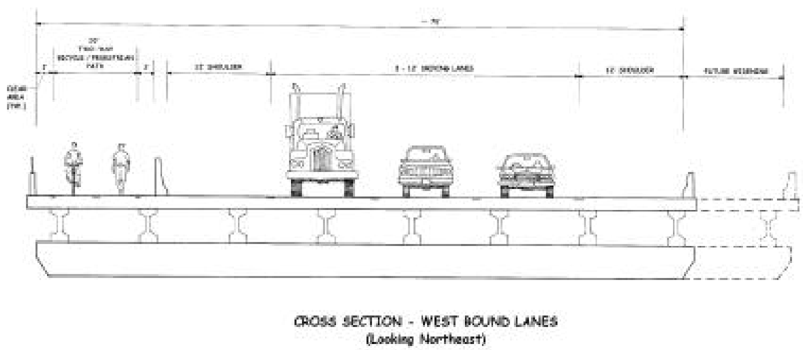
- ***Length of Bridge Opening –*** The required length of the new bridge will need to be determined as per the floodplain hydraulic requirements as established by the National Flood Insurance Program. At a minimum, the new bridge structure should be as long as the existing Rocheport Bridge. Considerations should also be given to expanding the bridge opening to facilitate the established goals of the ongoing reclamation and conservation activities of the adjacent floodplain areas. The Second Tier Studies for the Overton Bottoms Area would need to further consider these issues, including the hydrologic impacts of the improvements on the new land uses of this reach of the Missouri River.

- ***Joint Development –*** Opportunities may exist to coordinate the goals of the ongoing floodplain conservation activities with the expansion of the I-70 right-of-way. These opportunities are described in further detail in Chapter IV – Environmental Consequences and would need to be further investigated as part of the Second Tier Studies. These opportunities include:

  ✓ KATY Trail connection including a crossing of the Missouri River.
  ✓ Visitor's center.
  ✓ Coordination of construction earthwork.

Appendix D presents a conceptual layout of the Widen I-70 Strategy through the Overton Bottoms area. Figure II-18 shows an illustration of the bridge deck section concept for the new bridge, showing the possible provisions for the KATY Trail.

Figure II-18: New Rocheport Bridge (Westbound) Typical Section



f. Mineola Hill

The Mineola Hill Area in Montgomery County is located where I-70 crosses the Loutre River valley. Grades on each side of the valley are five-six percent. These grades create a safety hazard as large trucks accelerate beyond the speed limit on the downhill grades, and slow to a crawl on the uphill grades. This location already has an extra-wide median.

Improving existing I-70 along the existing alignment can, in most locations, be done within the existing right of way due to the extremely wide median currently existing through the Loutre Valley. However, just east of the Loutre River are three constraints that have implications on the roadway design at that location.

- ***Graham Cave State Park -*** To the north of the highway is Graham Cave State Park. The main feature of the park, Graham Cave, is located relatively close to the existing highway. Expanding northward towards the park would require additional right-of-way and would impact the park. (See Chapter III – Affected Environment, B. Natural Environment, 3. Parklands.)
- ***Graham Family Farmstead -*** To the south of the highway is the Graham Family Farmstead, which is listed on the National Register of Historic Places. Expanding the right-of-way southward towards the farm would require additional right-of-way and would impact the property in which the farmstead is located. (See Chapter III – Affected Environment, B. Natural Environment, 8. Historic and Archeological Resources.)
- ***"Slave" Rock -*** In the median of the existing highway, and directly between Graham Cave State Park and the Graham Family Farmstead, is a large rock that is commonly referred to as "Slave" Rock. Though its historical significance is undocumented, direct impacts to the rock should be evaluated. (See Chapter III – Affected Environment, B. Natural Environment, 8. Historic and Archeological Resources.)

In order to avoid and/or minimize impacts to all three of these features, and improve the grades through this section of roadway, several options have been evaluated.

Existing Conceptual Corridor

Given these constraints, a concept for improving the existing I-70 roadway at this location was developed and is illustrated in Appendix E. The westbound lanes of I-70 can be improved to an ultimate width of four lanes in each direction by widening in the median towards "Slave" Rock. This would require the use of guard fence or concrete barrier in the vicinity of "Slave" Rock since an adequate clear zone could not be provided. The eastbound lanes of I-70 can be improved to an ultimate width of four lanes by adding one lane to each side of the existing two lanes. This again would require the use of guard fence or concrete barrier in the vicinity of "Slave" Rock since an adequate clear zone could not be provided. On the south side, retaining walls would likely be required to avoid encroaching on the Graham Family Farmstead. Figure II-19 illustrates a representation of the I-70 roadway widening in the immediate vicinity of "Slave" Rock.

Figure II-19: Representative Cross Section at "Slave" Rock

The vertical alignment of I-70 at “Slave” Rock would need to be maintained in order to minimize the impacts and the need for extensive use of retaining walls. Raising the grade downhill from the rock, and lowering the grade uphill from the rock will need to be explored in more detail to determine if more than very slight improvements to grades on the east side of the valley can be made. Reductions to the roadway grade in the vicinity of “Slave” Rock, for improved roadway safety, would likely require either a greater extent of retaining wall, or right-of-way on one or both sides of the highway. Any additional right-of-way necessary to improve the vertical grade of the highway would likely incur well east of the “Slave” Rock area.

North Conceptual Corridor

A second option is to relocate I-70 to the north of the existing roadway as illustrated in the drawings in Appendix E. Under this option, a new six-lane relocation with a 124-foot (37.8 m) median would be constructed to bypass the existing alignment, and would include an outer roadway on the north side. The option provides the opportunity for improving grades to meet the four percent maximum criteria. The possible alignment shown north of Graham Cave State Park has been located on the other side of a ridgeline to reduce the noise impacts at the park.

The existing I-70 would be partially used to provide an improved outer roadway system on the south side of the highway, and would provide the opportunity for joint development of the “Slave” Rock location.

The existing rest areas would be closed under this option. The location of replacement rest areas would require further investigation to determine an appropriate location, which may be outside of the Mineola Hill Area.

Split Alignment Conceptual Corridor

The third option provides for westbound I-70 and one service road to be constructed along the same alignment as the North Conceptual Corridor, and the westbound lanes of existing I-70 to be converted for use as the eastbound lanes. The old eastbound lanes would be used as an outer roadway. This option is illustrated on the drawings in Appendix E.

The existing eastbound rest area could be reconstructed and expanded at its current location or moved to a new location. The existing westbound rest area would be removed and rebuilt at an alternate location.

Maintenance of Traffic

Steep grades, an extra-wide existing median and the constraints at “Slave” Rock would make reconstruction of I-70 along the existing alignment difficult. Though the overriding goal of the I-70 improvements is to maintain two lanes of traffic in each direction during construction and to limit detours during construction, given the tight constraints of the Mineola Hill area, it is likely that special construction and detour staging would be necessary in this area.

West of the Loutre River, new eastbound lanes could be constructed in the median while traffic utilizes the existing eastbound lanes. Westbound traffic could then be routed onto the new eastbound lanes to allow for reconstruction of the westbound lanes. In the last phase, traffic could be placed in its final location and the existing eastbound lanes removed. At “Slave” Rock, a temporary widening of the westbound lanes could be constructed to provide for all traffic to shift to the north side of the rock, allowing the eastbound lanes to be constructed. Traffic could then be shifted to the new eastbound lanes to allow for reconstruction of the westbound lanes.

The North Conceptual Corridor would allow for almost all construction to proceed away from existing traffic. Temporary detours would be required at the tie-in points to existing I-70.

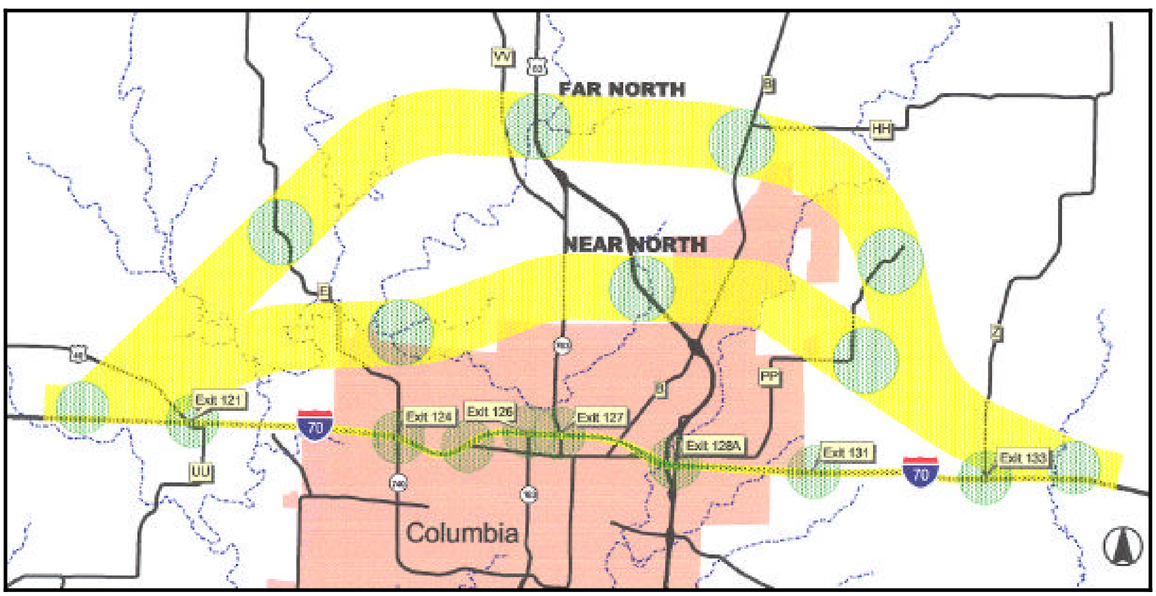
A split alignment concept would be similar to the north relocation, with the new westbound alignment being constructed away from existing traffic. After it was complete, westbound traffic would be routed to the new alignment, and the existing westbound alignment would be rebuilt to accommodate future eastbound traffic.

6. COLUMBIA AREA

Conceptual options considered for the Columbia area of the study corridor include the reconstruction of the existing alignment or the local relocation of I-70 on new alignment. These conceptual options were coordinated with the Columbia Area Transportation Study Organization – The Columbia Metropolitan Planning Organization. Coordination with CATSO would need to continue in the second tier study for this area. For the relocation options, one-mile wide corridors were defined and studied. Based on the findings of the evaluation of the reasonable strategies, a relocation of I-70 to the south of Columbia was not considered due to its unacceptable impacts to the environment and due to its excessive distance. Figure II-20 and a series of plan plates in Appendix F show the conceptual layouts for the various options in and around Columbia. Three conceptual corridors were identified and evaluated:

- Existing conceptual corridor
- Far North conceptual corridor
- Near North conceptual corridor

Figure II-20: Columbia Area Conceptual Corridors



a. Existing Conceptual Corridor

Two urban widening options were considered in the Columbia area for the existing conceptual corridor – elevated structure and urban widening. (See Chapter II – Strategies and Conceptual Corridors, H. Recommended Preferred Strategy, 3. Design Standards for illustrations of these two widening options.)

Elevated Structure

One of the conceptual options considered for the existing conceptual corridor was constructing an elevated structure, either in the median or on the outside of existing I-70, that would serve only through traffic. This concept would be similar in theory to the relocation concepts in that each concept would separate the through traffic from the local traffic. With the elevated structure concept, no opportunities to interchange with existing crossroads would be allowed from the bridge viaduct. The motorist would make a route choice east of Business US 63 for westbound traffic and west of Stadium Drive for eastbound traffic, and then would pass through Columbia on either the elevated structure or the surface freeway. Existing I-70 would remain as an access controlled freeway to serve motorists with destinations in Columbia. It is assumed that only minor improvements to the existing I-70 roadway would be constructed with the elevated structure.

Several options exist for the location and configuration of the elevated structure. The elevated structure could be placed in the median or on the outside of the existing I-70 roadway, though within the existing right-of-way. Subsequent engineering evaluations would need to identify the most advantageous position, but it is likely that if a median location for the elevated structure was chosen, the existing I-70 roadway would need to be completely rebuilt. Initial observations indicate that the elevated structure could for the most part be constructed within existing right-of-way. The major right-of-way impacts would occur as a result of the needed improvements to existing I-70 to serve local traffic. These impacts would be similar to those that would be incurred along I-70 with either bypass concept.

With the elevated structure concept, the existing I-70 roadway would need to be improved in a manner similar to the improvements associated with the bypass concepts in order to serve I-70 local traffic more effectively. Laneage for the elevated roadway would consist of four lanes, two in both directions. The existing four-lane freeway would then be utilized for local traffic service. With this arrangement, a total of eight lanes would be provided – four elevated lanes for through traffic and four existing I-70 lanes with auxiliary lanes as necessary for local traffic.

The elevated structure would begin some point west of Stadium Drive and end east of US 63, a distance of approximately 5.7 miles (9.2 km). Existing I-70 would be updated in a manner similar to that proposed for the bypass options. Using an assumed unit cost of around $75 per square foot (0.1 m^2) for the elevated bridge structure, the elevated structure would cost approximately $191 million. The cost of the minimum I-70 improvements necessary to address local traffic with a relocation or bypass, as described in the following sections, is estimated at no less than approximately $45 million. The total cost of the elevated structure option, including the additional 11 miles (17.7 km) of rural widening to the west and east of the elevated structure, for a total length of 16.7 miles (26.9 km), would be approximately $375 million, or $22.4 million per mile (1.6 km). As compared to a typical four-lane relocation, a localized bypass around Columbia would likely cost around $9 to $12 million per mile (1.6 km), depending on the nature of the improvements (i.e., number of interchanges, number of bridge crossings, amount of frontage roads, etc.). The additional length of construction introduced by a bypass would be relatively small such that a bypass would be measurably less expensive than an elevated structure along the existing alignment.

Given the higher construction costs associated with an elevated structure, and given the inability to easily expand the corridor's capacity in the future, beyond 2030, the elevated freeway through Columbia would not be a cost-effective solution to the improvement of I-70 through the Columbia area. The elevated structure concept would be approximately 35 percent more expensive than the relocation concepts and 43 percent to 70 percent more expensive if expressed on a per-mile basis. The cost differential between the elevated and relocation concepts (approximately $100 million) would be equivalent to constructing eight to ten additional rural freeway miles using the project developed average rural cost per mile (1.6 km).

The elevated structure option to serve through traffic in Columbia is not a reasonable or financially prudent concept for improving I-70 and was not considered further in this study.

Urban Widening

For the urban widening option of the existing conceptual corridor, a continuous one-way frontage road concept was developed. This concept would entail constructing six through-travel lanes for through traffic, centered on the existing I-70 roadway, with two-lane, one-way frontage roads on both sides of the highway. Space would be provided for the future seventh and eighth lanes, needed sometime after 2030. The space between the six freeway lanes and the frontage roads would provide the necessary clear zone buffer and could include retaining walls or barriers as necessary depending on elevation differences between the frontage road and the freeway lanes. With an additional auxiliary lane along the frontage road, this concept would provide a total of 10-12 lanes for interstate and local traffic. The concept would provide functional separation of the through interstate traveler from the local traffic. Local traffic would be encouraged to utilize the continuous frontage roads, and the introduction of the frontage roads would provide improved service to local east-west traffic. The frontage road system would be continuous between Stadium Drive and Range Line Road (Route 763), and would be continuous between Route B and Route 63.

One distinctive advantage of the frontage road concept is the separation of through traffic and local traffic. With this concept, no weaving movements for entering and exiting traffic would be required along the I-70 mainline. Multiple interchange movements would be consolidated at the various slip ramps. Advance signing would be necessary with this concept. Though the through I-70 operations would be greatly enhanced with this system concept, local traffic maneuvers would require some out-of-distance travel or drivers may have to traverse several crossroad intersections. This concept is illustrated in Appendix F. A summary of the interchange improvements is presented in Table II-38. As shown, the degree of improved access management resulting from the interchange improvements is shown with a rating – high, medium or low.

Table II-38: Interchange Summary I-70 Columbia Existing Conceptual Corridor

No.	Interchange Name	Type	Access Mgmt.	Comment
124	Stadium Drive	Diamond	Med.	Improved access management can be accomplished on the north side. To improve the access control on the south side, the existing service road west of the interchange would need to be relocated to the south. The ramp terminals would serve as the termini for the one-way frontage roads to and from the east. A special turnaround bridge could be included (Texas Turnaround) between the frontage roads.
125	Business Loop 70 (West)	Diamond with Slip Ramps along Frontage Roads	Low	The existing interchange has insufficient control of access with tight physical constraints. The existing westbound ramp terminal consists of a shallow round-about with five legs. This configuration would be eliminated with closure of either Creasy Springs Road or the westerly extension of Business Loop 70. Better access control should be provided in the immediate vicinity of the frontage road intersections.
126	Providence Road	Diamond with Slip Ramps along Frontage Roads	Low	Existing ramp terminals (i.e., frontage road intersections) would be relocated north and south to provide better separation. Better access management outside of the ramp terminals would need to be investigated during the 2nd Tier Study.

127	Range Line Road (Route 763)	Diamond with Slip Ramps along Frontage Roads	Low	Existing ramp terminals (i.e., frontage road intersections) would be relocated north and south to provide better separation. Better access management outside of the ramp terminals would need to be investigated during the 2nd Tier Study. The ramp terminals would serve as termini for the one-way frontage roads to and from the west. The interchange may be shifted slightly to the south to avoid impacts to adjacent development.
NA	Paris Road (Route B)	Half Single-Point Urban Diamond from the East	Low	Due to the proximity of this interchange to the US 63 Interchange to the east, new ramps to and from the east would be introduced at this location to replace the existing Business Loop 70 (East) ramps. Due to the close proximity of the Business Loop 70 (East) ramps to the US 63 Interchange, these ramps would be eliminated and moved to this location. A frontage road system would be introduced between this location and US 63 to serve local traffic. Slip ramps would be included between this location and US 63 for local traffic. These improvements would include a reconfiguration of the Old US 63 and Business Loop 70 intersection. Paris Road would be realigned to tie directly into Old US 63. Business Loop 70 would then be redirected to function as a two-way frontage road on the south side of I-70.
128A	Route 63	Directional Ramps to and from the West with a Single-Point Urban Diamond	Med.	Based on the findings of the recently completed Major Investment Study at this location, new directional ramps to and from the west would be added to this interchange, thereby bypassing the existing US 63 interchange. The movements to and from South US 63 would be served with directional fly-over ramps. The eastbound to northbound movement would utilize a new loop ramp. The reconstruction of I-70 through this area would not affect the need for these improvements. However, this reconstruction would necessitate the reconstruction of the existing US 63 interchange as a single-point urban diamond, thereby consolidating the existing two ramp terminals into one. This reconstruction would improve the degree of access control at this location along US 63. Additional study of this configuration would be necessary as part of the 2nd Tier Study. As an initial 1st phase of construction, the single-point urban diamond interchange could be constructed with the completion of the directional connections sometime in the future. The directional ramps would displace the southwest quadrant of the US 63 interchange.
131	Lake of the Woods	Diamond	Med.	This interchange improvement would be shifted to the south to accomplish improved access management. The southern frontage road would be relocated to improve the access control on the south side of I-70.
133	Route Z	Diamond	High	This interchange improvement would be shifted to the south to accomplish improved access management. Some degree of improved access management already exists to the north. The southern frontage road would be relocated to improve the degree of access control south of I-70.

b. Far North Conceptual Corridor

The far north conceptual corridor would be located, as conceptualized on exhibits shown in Appendix F, north of Columbia. This conceptual option would consist of four new highway lanes with 12-foot (3.7 m) inside and outside shoulders and a 124-foot (37.8 m) median (see Figure II-14 for a typical section). With this option, a total of eight lanes would be provided through or around Columbia – four existing lanes and four new lanes. Existing I-70 would continue to exist and would be maintained by MoDOT.

The one-mile (1.6 km) wide corridor for this option starts just west of the existing US 40 interchange, jogs to the northeast, then runs due east, running well north of the city limits. After crossing US 63 north of the US 63/Route 763 interchange and crossing Route B, the corridor turns to the south, reconnecting with I-70 east of the Route Z interchange. Candidate interchange locations include: Route E, US 63, Route B and an interchange to the northeast of Columbia to serve this area. Grade separations would be provided as needed to provide access for local traffic across the bypass. The interchange with US 63 and the connections to I-70 would most likely be fully-directional interchanges. Final decisions on interchange locations and configurations would need to be made as part of the Second Tier Studies in the Columbia Area.

Construction of this bypass alignment option would not eliminate the need to make improvements to existing I-70. The following items of work to existing I-70 would also need to be completed, as shown in Appendix F:

- Improved access management at the Stadium Boulevard interchange including possibly a raised median.
- Auxiliary lanes along the mainline I-70 between Stadium Boulevard and Business Loop 70 (west).
- Auxiliary lanes along the mainline I-70 between Business Loop 70 (west) and Providence Road.
- Frontage road pairs between Providence Road and Range Line Road and the elimination of the associated on and off ramps. (These interchanges are too closely spaced creating unacceptable weaving conditions along the I-70 mainline.)
- Auxiliary lanes between Range Line Road and US 63, necessitating the reconstruction of the Paris Road overpass and the adjacent railroad bridge.
- Improvements at the US 63 interchange would be necessary. As an option to the configuration described at this location for the existing conceptual corridor, collector-distributor ramps between Business Loop 70 (east) and US 63 could be introduced to eliminate the westbound left-hand exit. The existing US 63 interchange would then be reconstructed as a single-point urban diamond to improve the traffic flow along US 63.

c. Near North Conceptual Corridor

The near north conceptual corridor would be located, as conceptualized on exhibits shown in Appendix F, north of Columbia, but not as far north as the far north conceptual corridor. This conceptual option would consist of four new highway lanes with 12-foot (3.7 m) inside and outside shoulders and a 124-foot (37.8 m) median (see Figure II-14 for a typical section). With this option, a total of eight lanes would be provided through or around Columbia – four existing lanes and four new lanes. Existing I-70 would continue to exist and would be maintained by MoDOT.

The one-mile (1.6 km) wide corridor for this option starts just west of the existing US 40 interchange, jogs to the northeast, then runs in a easterly direction just north of the city limits. After crossing US 63 south of the US 63/Route 763 interchange, the corridor turns to the southwest, reconnecting with I-70 east of the Route Z interchange. Candidate interchange locations include: a local interchange northwest of the City, US 63, and an interchange to the northeast of Columbia to serve this area. Due to the close proximity of Route B to US 63, an interchange with Route B would be difficult. Grade separations would be provided as needed to provide access for local traffic across the bypass. The interchange with US 63 and the connections to I-70 would most likely be fully-directional interchanges. Final decisions on interchange locations and configurations would need to be made as part of the Second Tier Studies in the Columbia Area.

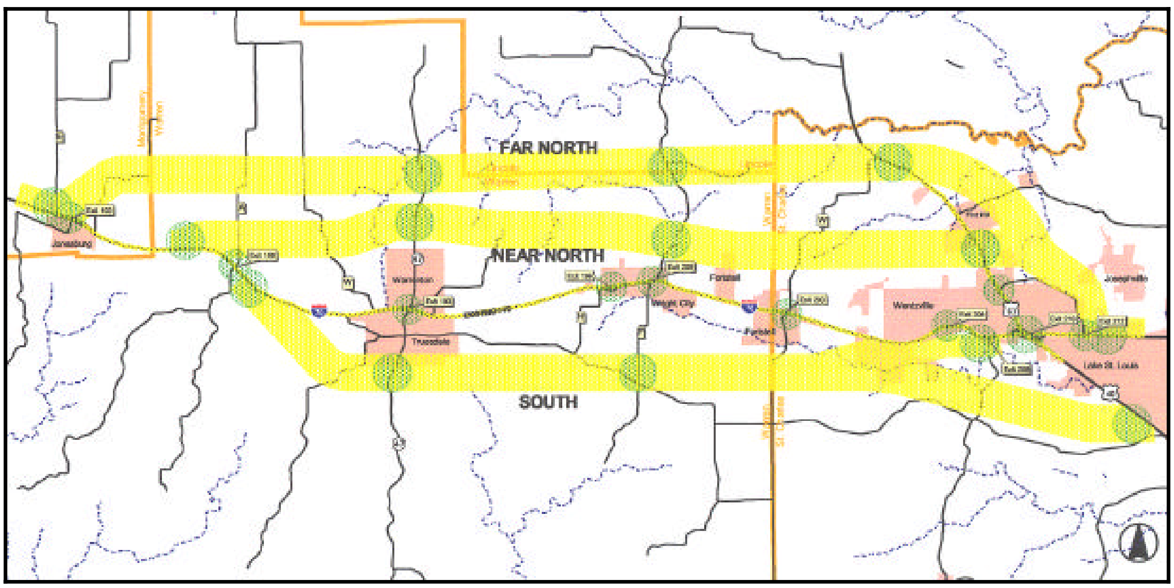
Construction of this bypass alignment option would not eliminate the need to make improvements to existing I-70. The improvements to existing I-70 described for the far north conceptual corridor would be needed with this option.

7. WARRENTON/WRIGHT CITY/WENTZVILLE AREA

Options in the Warrenton/Wright City/Wentzville segment of the study corridor include reconstruction and widening of the highway along the existing corridor and construction of a bypass highway along one of three possible one-mile wide conceptual corridors. Figure II-21 and a series of plan plates in Appendix G show the conceptual layouts for the various options in and around the Warrenton/Wright City/Wentzville Area. The four conceptual corridors were identified and evaluated as follows:

- Existing conceptual corridor
- Far North conceptual corridor
- Near North conceptual corridor
- South conceptual corridor

Figure II-21: Warrenton/Wright City/Wentzville Area Conceptual Corridors



As shown in Figure II-21, unlike the relocation concepts in Columbia with common tie-in locations for the relocation termini, there is considerable variability with the terminal locations for the relocation concepts around the Warrenton/Wright City/Wentzville Area. For the western terminus, the relocation conceptual corridors all tie into I-70, but at various locations. However, the connection options for the eastern terminus are conceptually different with potentially differing implications on the St. Louis metropolitan area's highway network. For the northern relocation options (i.e., the Far North and Near North Conceptual Corridors), the optional connection concepts include tying into: 1) the US 61/US 40 Corridor, 2) the I-70 Corridor just east of the Lake St. Louis interchange, or 3) the Route 370 Corridor located east of the I-70 Study Corridor and north of I-70. Similarly, the South Conceptual Corridor has the option of connecting to I-70 just east of the US 61/US 40 Interchange or connecting to the planned Page

Avenue at the planned I-64/Page Avenue interchange. For both the potential Route 370 and Page Avenue connection options, the relocation of I-70 could effectively function as extensions of the respective connection routes. In each case, these connections could potentially divert travel away from I-70, thereby indirectly benefiting operations along I-70. These optional connection concepts could have an impact on the daily commute travel patterns within the St. Louis metropolitan area.

For the purposes of defining the general location and nature of the conceptual corridors for this First Tier EIS, the following connections for each of the conceptual corridors were assumed:

- Far North Conceptual Corridor – I-70 east of the Lake St. Louis Interchange.
- Near North Conceptual Corridor – I-70 east of the Lake St. Louis Interchange
- South Conceptual Corridor – Planned I-64/Page Avenue Interchange.

Though these connections were assumed for the purposes of defining and characterizing the impacts and costs of the various relocation concepts, the operational analyses and travel forecasts were performed for the full range of optional connection concepts. The operational analyses were performed to determine the operational viability of the various connection options. It is the Second Tier Environmental Studies for this area of the study corridor that will need to define and evaluate more thoroughly those concepts that are carried forward into the Second Tier Study.

Ongoing coordination with the East-West Gateway Coordinating Council would need to continue as part of the second tier study for this area.

a. Existing Conceptual Corridor

From Jonesburg to approximately two miles west of Warrenton, the existing I-70 alignment would be reconstructed and widened according to the rural cross section discussed earlier. Starting two miles west of Warrenton, the highway would transition to an urban section, as illustrated in Figure II-16. This section would provide eight total lanes for traffic, 12-foot (3.7 m) outside shoulders, and 12-foot (3.7 m) inside shoulders separated by a concrete median barrier. Where possible, the extra width of the widened highway would be constructed entirely to one side so as to eliminate the need to buy right of way and reconstruct outer roadways on one side. (An elevated structure in this corridor was not considered an economically feasible option and was not evaluated.)

Outer roadways are provided on both sides of the roadway to Wentzville. From that point to Lake St. Louis, a combination of outer roadways and city arterial routes provide alternative east-west movement along the corridor. The south outer roadway at the west Wright City interchange and the Foristell interchange would pass under the cross roads, eliminating at-grade intersections that would otherwise be too close to the interchange ramps. In places, the typical separation between the highway and outer roadway would need to be eliminated and replaced with a concrete median barrier in order to minimize impacts to adjacent properties.

Collector-distributor roads might be provided in two locations. On westbound I-70 a CD road would serve the exit and entrance needs of the west Wright City interchange and the westbound rest area. On eastbound I-70, a CD road would serve the exit and entrance needs of the Foristell interchange and the eastbound truck weigh station.

Major alignment changes should only be necessary at the railroad grade separation between Pearce Blvd. and Route Z at Wentzville, where the alignment should be modified to reduce horizontal curvature to a maximum of two degrees. To do this, the highway should be relocated to the south and west, crossing over the railroad just west of the current crossing. The current railroad bridge over I-70 could be removed. See Table II-39.

See Appendix G for drawings that illustrate a possible configuration for these improvements. Additional study of specific alternatives would be required in the 2nd Tier Study to determine specific improvement plans. The conceptual interchange layouts included in Appendix G are intended to represent examples of the potential implications of implementing the access management guidelines with the Widen I-70 Strategy. These layouts are in concept only and are subject to change and further refinement though the second tier studies and subsequent design development. Table II-40 presents a summary of the interchanges within the Warrenton/Wright City/Wentzville Area. As shown, the degree of improved access management resulting from the interchange improvements is shown with a rating – high, medium or low.

Table II-39: Summary of Warrenton/Wright City/Wentzville I-70 Alignment Adjustments

Location	County	Deficiency	Correction
High Hill RR Crossing	Montgomery	3 degree Horizontal Curves	Reconstruct to west of existing grade separation. Reduce curves to 2 degrees or less and go over railroad.
East of Wright City	Warren	Reverse Curves	Add tangent between curves resulting in a shift to the north.
Wentzville RR Crossing	St. Charles	3 degree Horizontal Curves	Reconstruct to west of existing grade separation. Reduce curves to 2 degrees or less and go over railroad.

Table II-40: Interchange Summary Warrenton/Wright City/Wentzville Existing Conceptual Corridor

Interchange			Access Mgmt.	Comment
No.	Name	Type		
193	Warrenton	Diamond	High	Relocate interchange 1000' west of current location. Relocate MO-47 north and south of I-70.
199	Wright City - West	Diamond	Med.	Complete new bridge just west of existing bridge. Provide new grade separation with railroad and outer road. Connect cross-road to south. Provide CD road for westbound traffic. Development to north prohibits full access management implementation.
200	Wright City - East	Directional	Med.	Relocate interchange 2800' east. Provide directional ramp access to/from "old" US-40 (2nd Street). Tie in of outer roadway closer than desired under access management guidelines.
203	Foristell	Diamond	High	Relocate interchange 200' east. Provide new grade separation with railroad and outer road. Relocate Highway T south of I-70.
209	Route Z	Partial Folded Diamond	Low	Existing development prohibits substantial improvements in access management. Reconfigure to provide folded diamond on south side. Only I-70 traffic will be able to exit. US-40/61 traffic entering WB I-70 will not be able to exit here.
210	US 40/61	Directional	High	Reconfigure the interchange to eliminate left exits and unusual weaves. Provide multilane ramps (or ability to add) as required by traffic projections.

b. Far North Conceptual Corridor

A Far North Bypass Alignment option provides for the construction of four total lanes of highway, with 12-foot (3.7 m) inside and outside shoulders, a 124-foot (37.8 m) median, and two-way frontage roads on both the north and south sides. See Figure II-14 for a typical section.

The one-mile wide corridor for this option starts just west of the Jonesburg interchange in Montgomery County, jogs to the northeast, then runs due east following the Warren/Lincoln county line, running north of Incline Village. After crossing US 61 in St. Charles County, the corridor turns to the south-southeast, passing east of the GM auto assembly plant in Wentzville and reconnecting with I-70 between exit 212 (Route A) and exit 214 (Lake St. Louis Blvd.). See Appendix G for a map locating the corridor.

Full interchanges for this alignment would be limited to Route 47 north of Warrenton, Route J north of Wright City and US 61 north of Wentzville. Grade separations would be provided as needed to provide access for local traffic across the bypass.

Construction of this bypass alignment option would not eliminate the need to make improvements to existing I-70. The following items of work to existing I-70 would also need to be completed:

- Reconstruction/reconfiguration of interchanges at Warrenton, West Wright City, East Wright City, Foristell, Route Z, US 40/61 and Route A.
- Realignment of I-70 through Wright City to eliminate narrow inside shoulders and to change the reverse curves to flatten them and provide a tangent segment between them.
- Realignment of I-70 at the railroad just east of Pearce Blvd. to move the highway west of the current location, go over the railroad, and to flatten the existing curves.

c. Near North Conceptual Corridor

A Near North Bypass Alignment option provides for the construction of four total lanes of highway, with 12-foot (3.7 m) inside and outside shoulders, a 124-foot (37.8 m) median, and two-way frontage roads on both the north and south sides. The same typical section as the Far North Bypass Alignment option (See Figure II-14) would be used.

The one-mile wide corridor for this option starts just west of the Route A/B (Truxton) interchange in Warren County, jogs to the northeast, then runs easterly, cutting just along the north side of Warrenton and Wentzville. After crossing US 61 in St. Charles County, the corridor turns to the south-southeast, passing east of the GM auto assembly plant in Wentzville and reconnecting with I-70 between exit 212 (Route A) and exit 214 (Lake St. Louis Blvd.). See Appendix G for a map locating the corridor.

Full interchanges for this alignment would be limited to Route 47 north of Warrenton, Route J north of Wright City and US 61 north of Wentzville. Grade separations would be provided as needed to provide access for local traffic across the bypass.

The same improvements to existing I-70 mentioned in the Far North Conceptual Corridor would also need to be completed under this option.

d. South Conceptual Corridor

A South Bypass Alignment option provides for the construction of four total lanes of highway, with 12-foot (3.7 m) inside and outside shoulders, a 124-foot (37.8 m) median, and two-way frontage roads on both the north and south sides. The same typical section as the Far North Bypass Alignment option (See Figure II-13) would be used.

The one-mile (1.6 km) wide corridor for this option starts about four miles (6.4 km) west of the Route 47 interchange in Warren County, runs southeasterly for about three miles (4.8 km) where it turns to the east, cutting just along the south side of Warrenton, and ties into the Page Avenue Extension at US 40/61 in St. Charles County. See Appendix G for a map locating the corridor.

Full interchanges for this alignment would be limited to Route 47 south of Warrenton, Route F south of Wright City and US 40/61 south of Wentzville. Grade separations would be provided as needed to provide access for local traffic across the bypass.

The same improvements to existing I-70 mentioned in the Far North Conceptual Corridor option would also need to be completed under this option.

8. ITS IMPROVEMENTS

Even though Intelligent Transportation System improvements to the I-70 Study Corridor were not considered as reasonable stand-alone improvements to serve the purpose and need for the corridor, these improvements, when added to other investments, would provide additional benefits to congestion relief and travel conditions within the corridor. Regardless of the selected strategy for the corridor, ITS improvements would complement the benefits of other capacity improvements and should be included as part of the overall improvement strategy for the corridor. These improvements would need to be coordinated with other ITS improvements statewide.

ITS improvements recommended for deployment along the I-70 corridor includes: ITS-CVO, R/WIS, Incident Detection and Management System and Traffic and Travel Information System Communications Network. The following section provides a brief description of these ITS improvement measures.

a. ITS-CVO

Missouri currently has two permanent weigh stations located on the I-70 corridor. One of these stations is located in Odessa, west of Route 131 while the other is located in Foristell, east of Exit 203. Both of these stations have recently been built and include in-station equipment and processing technologies that enhance the processing of commercial vehicles at the weigh station.

However, the processing of commercial vehicles would be greatly enhanced through the deployment of a Commercial Vehicle Electronic Clearance System. This system would be part of a statewide deployment of the national Commercial Vehicle Information Systems Network program. The CVISN program provides coordination of commercial vehicle registration, safety, credentials and other information in and between states. The Commercial Vehicle Electronic Clearance System deployed at the I-70 weigh stations would include high-speed weigh-in-motion equipment, AVI, vehicle classification equipment, a local database and integration into the statewide and national systems for accessing vehicle records. The system, which would be deployed on the interstate prior to a weigh station, would weigh commercial vehicles and inspect the credentials of transponder-equipped trucks while the truck travels on the highway. Transponder-equipped vehicles that meet pre-defined weight and credentials criteria would be allowed to bypass the weigh station. These vehicles would be notified of the provision to bypass the weigh-station via communications from the roadside equipment to the in-vehicle transponder. Non-compliant vehicles would be required to pull into the weigh station.

The estimated capital cost per weigh station for the Commercial Vehicle Electronic Clearance System is $2,000,000. Additional costs outside of the I-70 project would be born by the State for the development of the statewide CVISN database.

b. R/WIS

The preferred strategy incorporates a coordinated deployment of R/WIS stations along the I-70 corridor. R/WIS stations would be deployed near Lake Saint Louis, Mineola Hill, the Missouri River crossing at Overton Bottoms and at other bridge crossings and areas along the corridor prone to fog or with the potential for high water problems. An estimate of ten R/WIS stations would be deployed along the Corridor. Each station would include the following types of sensors, as a minimum:

- Road/bridge surface temperature
- Subsurface temperature
- Ambient (air) temperature
- Precipitation
- Dew point
- Relative humidity
- Surface condition (dry, wet, frozen)
- Presence and amount of de-icing materials
- Atmospheric pressure
- Wind speed and direction
- Visibility (fog or other atmospheric conditions leading to low visibility)

The data collected at these weather stations will be integrated into the statewide R/WIS system. This information is used to improve weather and road condition monitoring and forecasting on a statewide basis. Operations benefits along the I-70 corridor include improved snow and ice control as well as improved management of other weather sensitive maintenance and construction operations. This information is also part of the traveler information provided to the public to aid in pre-trip and en-route travel decisions. In locations prone to fog or flooding, the R/WIS equipment can be used to activate advanced warning devices and special traveler information messages.

The estimated cost per R/WIS station is $60,000, which includes system sensors, local data processing and communications equipment. Special advanced warning devices or other interfaces will increase costs of weather stations.

c. Incident Detection and Management System

The preferred strategy's Incident Detection and Management System deployment would be different from traditional metropolitan area strategies. In large urban areas, incident detection and management usually encompasses the deployment of corridor-wide vehicle detection and system control from a central traffic operations center. Traffic detectors in the urban deployments, which provide traffic flow characteristics and identify potential incident locations through the use of system algorithms, are usually deployed at half-mile (0.8 km) spacing. The system operators at the TOC often work very closely on a daily basis with emergency service providers stationed at the TOC, such as the state or local police department.

With a rural corridor the size of the I-70, the deployment strategy for incident detection and management must diverge from traditional deployments. It is simply not cost effective or practical to deploy traffic detection along the entire corridor or construct and staff a new TOC with personnel from each of the various jurisdictions along the corridor. The preferred strategy's approach to incident detection and management is a mix of "high-tech" and "low-tech" solutions to improve incident detection and response. The low-tech part of approach includes the installation of informational signs such as reference markers to aid drivers in determining their location and signs with the emergency call-in cellular number (*55). The *55 service can coordinate with the appropriate emergency service provider and/or traffic operations center. Major incidents would be managed as a cooperative effort between MoDOT field staff, emergency service providers and the appropriate traffic operations center. Incident information can be provided to drivers through a statewide traveler information system.

The "high-tech" application for incident management and response along the corridor focuses deployment around existing high-incident locations and the most congested segments within the corridor. These locations include the 30-mile (48.3 km) section of I-70 from I-470 to Route 13, the 40-mile (64.4 km) section of I-70 from Columbia to approximately 10 miles (16.1 km) east of the US 54 interchange and the 25-mile (40.2 km) section of I-70 from Lake St. Louis to Route 47. Along these sections of the interstate, more traditional ITS traffic detection and surveillance equipment would be deployed. Traffic detection equipment would include permanent detection stations installed to provide full coverage of the segments. Using the data from these stations, incidents can be detected. Video surveillance equipment would be installed to provide full coverage of the segments. The video surveillance would be used to verify and manage incidents. Incident detection and management would occur at the appropriate operations center.

The most important aspect of incident management is inter-agency coordination and agreement on the process of managing incidents. This coordination would be developed as part of regional and statewide incident management programs. It is important that the construction of the I-70 corridor and the permanent changes to the corridor be addressed as part of this coordination effort.

The estimated capital cost for the I-70 Incident Detection and Management System is $6,000 per mile (1.6 km) for the low-tech deployment and $40,000 per mile (1.6 km) for the high-tech deployment.

d. Traffic and Travel Information System

The I-70 Traffic and Travel Information System would concentrate on providing information to a broad number of system users at minimum cost. The system would include the deployment of variable message signs (VMS) and highway advisory radio (HAR) at strategic route diversionary points along I-70, in addition to integrating into a statewide traveler information system. Traffic and travel data inputs would be obtained from the R/WIS and Incident Detection and Management Systems described in the previous sections, road construction information provided by MoDOT district and field offices, special event information provided by the University of Missouri (and other institutions) and other event coordinators and local media.

The statewide traveler information system will provide traffic and traveler information through a web site and a traveler information phone number. This information may also be provided by radio stations and other news media. Traffic and traveler information can provide information to drivers on traffic conditions, estimated travel times, incident notification, road and weather conditions, construction and maintenance activities, and locations of public amenities and services (i.e. rest areas, hospitals, etc.). Through public-private partnerships, information on other appropriate private amenities and services could be provided. Internet based kiosks could also be provided at key publicly and privately owned facilities.

The Traffic and Travel Information System would also include a total of ten VMS and HAR stations located along the I-70 corridor. These deployments would be coordinated with the Incident Detection and Management System, with VMS and HAR being deployed at key route diversionary points. The route diversionary points are locations where travelers can choose to take an alternative route to their destination if weather or incidents on I-70 preclude the use of the interstate. Proposed route diversionary points for eastbound traffic include Route 13, US 65 and Route 5 to either US 50 or US 24; while diversionary points for westbound traffic include Route 47, Route 19 and US 54 to US 50 or I-44. The actual location of VMS and HAR transmitters would be developed in coordination with local jurisdictions to ensure an approach acceptable to all agencies. The incident management plan would identify roles, responsibilities and methods of coordination for all emergency service providers along the I-70 Corridor.

The estimated capital cost for the Traffic and Travel Information System is $2.5 million.

e. Communications Network

A few years ago, Missouri entered into a resource sharing agreement with Digital Teleport, Inc., a private company involved in the deployment and brokering of fiber optic cable. The agreement provided MoDOT with fiber optic cable in exchange for the use of the DOT's right-of-way. Approximately 1,700 miles (2,735.9 km) of fiber optic cable have now been installed as a result of the agreement, including cable installed along the I-70 right-of-way. MoDOT has used the six fibers provided through this agreement for a number of purposes including a high-speed wide-area network to connect each of the district offices.

With the future deployment and expansion of ITS along the I-70 corridor, as well as anticipated need for high-speed data communications for other future applications, the preferred strategy incorporates the installation of fiber optic cable and conduit into the I-70 reconstruction. The fiber optic cable would provide communications to the ITS systems and components described in the preferred strategy as well as provide for future expansion and new deployments.

The preferred strategy incorporates the installation of fiber optic cables installed in multi-duct conduit, with several spare conduits provided for future expansion of the network. Because the I-70 reconstruction costs already include mobilization, traffic control and earthwork, the cost of cable and conduit installation can be reduced from one-fourth to one-third when compared to the installation of cable and conduit as a separate project. The estimated capital cost for the communications network along the Corridor is $30,000 per mile (1.6 km) while the conduit cost is estimated to be $60,000 per mile (1.6 km). An additional $1,000,000 is estimated for network communication hubs, transceivers and other communications hardware.

A wireless communications network would be provided for voice and data to mobile units and field equipment. Voice and data communications would be used by MoDOT units and emergency services providers to manage incidents. Data communications would be used by construction and maintenance crews to automate certain business processes, track operations and automatically provide related traveler information. Data communications can also be used for field devices and remote facilities such as portable message signs, portable HAR, portable video monitoring, MoDOT maintenance buildings, etc.

A full coverage wireless network would require approximately 16 radio tower sites at $70,000 per site. This includes the towers, antennas, radio equipment and interfaces required to connect to the fiber optic system.

f. System Integration

A significant part of the development of an ITS system is system integration. Integration includes development of needed software and hardware systems to interface the field equipment and field operations with operations centers, system operators and other related systems. As Missouri develops a statewide ITS system, it will be paramount to integrate the I-70 system into the statewide system. Using an estimate for integration of 10 percent of capitol cost, the approximate integration cost would be $3,000,000.

g. Operations and Maintenance Cost

It is important to recognize the ongoing operations and maintenance of the system. Using an estimate of 10 percent of total capitol cost per year, the approximate operations and maintenance costs would be $3,000,000 annually.

9. OTHER IMPROVEMENTS

a. Rest Areas

Rest areas are located at four locations through the study corridor -- in Lafayette, Cooper, Montgomery and Warren Counties. Each of these locations is served by separate facilities on opposite sides of the highway.

Widening of the existing highway would impact the facility on the side where the highway is being widened, likely resulting in the reconstruction of one facility at each location. In addition, expansion of the existing and reconstructed facilities to accommodate existing and future truck parking demand may be necessary. A report titled “Analysis of Commercial Vehicle Parking Supply and Demand, State of Missouri, Draft Version 2” was published on January 21, 2001 in response to Section 4027 of the Transportation Equity Act for the 21st Century. TEA-21 required a study to determine the location and quantity of parking facilities at commercial truck stops and travel plazas and public rest areas that could be used by motor carriers to comply with federal hours of service rules. This study predicts a shortfall of parking for commercial vehicles along I-70.

The rest areas in Montgomery and Warren County both fall within areas where relocations of I-70 are under consideration, and would have to be reconstructed in their entirety if bypasses or relocations are constructed.

The rest areas along I-70 were originally located when there were little or no services available at interchanges along the existing route, and are spaced too close together, particularly in Montgomery and Warren Counties. On the west side of the state, it may prove desirable to combine the Lafayette and Cooper County rest areas with a single rest area, somewhere half way between Kansas City and Columbia. On the east side of the state, it may also prove to be desirable to combine the Montgomery and Warren County rest areas into a single location somewhere half way between Columbia and St. Louis. Doing this could provide several benefits including the following:

- Reduction in operating costs by reducing the number of rest areas facilities from eight to four (a total of four sites with facilities on each side of the highway).
- Provide up-to-date, modern facilities designed with the latest safety features.

- Provide additional tourism information and promotion in cooperation with other state agencies.
- New redundant restroom facilities such as those completed recently at other locations in the state.
- Provide adequate parking for all vehicles that could help reduce the unsafe practice of parking on ramp shoulders.

MoDOT is working on a study report entitled "Missouri Interstate Rest Area Plan" which will provide recommendations for the future of Missouri's rest areas in order to meet the needs of Missouri's travels. Additional studies and design work on the I-70 corridor should take into account the recommendations of that plan.

b. Weigh Stations

Widening of the highway would require the reconstruction of the weigh station on the widened side in both Lafayette and St. Charles counties. If a bypass option is chosen for the Jonesburg to Lake St. Louis segment, additional weigh stations would need to be constructed along the bypass alignment.

c. Visitor Center

Through inter-agency coordination and discussions associated with this EIS, particularly pertaining to the Overton Bottoms area, the opportunity to incorporate a new visitor center with the I-70 improvements was identified. The Missouri Department of Tourism is interested in the further exploration of a new visitor center in conjunction with the I-70 improvements within the central part of the state to introduce interstate travelers to recreational and entertainment assets within this region. As a joint development deployment, a visitor center could be jointly developed with MoDOT, the Missouri Department of Natural Resources, the Missouri Department of Conservation and other interested agencies to expose Missouri's visitors to the area's natural beauty, its natural resources and its history. As a significant natural resource with major conservation activities already in place, the Overton Bottoms would be an ideal location for this new visitor center. In addition to providing a rest area and visitor information, this site could expose travelers to the history of the Missouri River, including the explorations by Lewis and Clark. Several notable landmarks documented by the Lewis and Clark Expedition are within eyesight of the Overton Bottoms area. Additional educational elements of the visitor center could include nature trails and information about the ecology and benefits of floodplain areas. Other educational ideas could include information on the history of MoDOT and the interstate system.

Though no commitments have been made at this point regarding a new visitor center, this joint development opportunity should be further explored and discussed as part of the I-70 improvements. Site feasibility and planning for the center would need to be conducted as part of the second tier studies. Possible sites for the center are included either within the immediate floodplain area or on either side of the Missouri River valley. Site criteria would include safe and efficient access from I-70 and good visibility, both from I-70 and the Overton Bottoms area.

d. Billboards

All billboards located within the proposed right-of-way for the construction of the highway would be removed as part of the construction and right-of-way acquisition process. Though no corridor-wide measures to prohibit the proliferation of outdoor advertising is proposed with the I-70 improvements, there are several visually sensitive areas where measures to control the use of billboards are warranted to preserve the unique qualities of those areas.

The Overton Bottoms and Mineola Hill areas are the last remaining "billboard free" areas of any length along the corridor. Purchasing scenic easements or implementing other billboard control measures through these areas would help maintain the scenic beauty of these locations. Depending on the nature of these control measures, billboard control could have additional preservation benefits to wildlife and water quality.

10. MAINTENANCE OF TRAFFIC

Maintenance of traffic during construction is a significant issue for the I-70 Study Corridor. This issue has been one of the more influential considerations in the recommended typical section for the roadway widening as part of the Widen Existing I-70 Strategy. Considering the programmatic aspects of a 200-mile (321.9 km) long improvement to the study corridor, the issue of traffic delays during construction is of particular concern to MoDOT. Given the magnitude of the construction costs for the I-70 improvements and the other competing priorities within the state, the potential exists for construction to extend through a number of years along the corridor. It was therefore essential that this issue be considered appropriately in the determination of the best type and location of the I-70 improvements.

It is the goal of MoDOT to maintain the existing four lanes along I-70 during the construction of the improvements. These existing lanes should be maintained with limited interference from adjacent construction zones.

a. Rural Areas

The selected roadway standard for the Widen Existing I-70 Strategy in the rural areas was developed based on MoDOT's maintenance of traffic goals. The improvements would be staged or phased to limit the amount of detouring of through I-70 traffic. The shifting of the existing I-70 centerline a sufficient distance to either the north or south would provide the ability to construct three of the six new lanes without impacting the existing I-70 roadway. The limited extent of alignment adjustments would also promote the avoidance of the existing lanes during construction. Therefore, for the most part, the I-70 mainline improvements would be constructed without interfering with the existing travel lanes.

Within the rural areas of the study corridor, there would be some exceptions where additional staging or phasing would be necessary. These exceptions include:

- ***Interchanges*** **–** Detouring of crossroad and turning traffic would be necessary at each interchange during construction. Temporary ramp connections to the I-70 mainline would be necessary during each of the mainline construction phases. As an option, depending on unique circumstances of the individual interchange, it may be advantageous to close the interchange during construction to accelerate the construction process.

- ***Mineola Hill*** **–** Due to the tight physical constraints of this area, special staging of construction would likely be required through this area to avoid the adjacent resources. Mainline detouring would likely be necessary. Additional construction staging investigations need to be performed through this area during the second tier studies.

With the recommended preferred strategy, construction can be staged to easily provide four lanes of traffic at all times through construction, usually at existing speeds. This staging or phasing plan is illustrated in Figure II-22 through Figure II-26. Construction at interchange bridges crossing I-70 would likely require reduced speeds through the immediate construction zone surrounding the interchange area. Removal of existing structures may also require the detouring of interchange traffic, which would cause traffic delays for a short period of time. The following summarizes the phasing plan for the I-70 mainline construction:

- ***Phase I (Figure II-23)* –** Construct new outer roads, interchange ramps and crossroad bridge.
- ***Phase II (Figure II-24)* –** Move crossroad traffic to new bridge and construct three new lanes in eastbound or westbound direction, depending on the orientation of the widening.
- ***Phase III (Figure II-25)* –** Move traffic to new mainline lanes and vacated lanes and begin construction of the opposing new mainline travel lanes.
- ***Phase IV (Figure II-26)* –** Move traffic to new mainline lanes in opposing direction and demolish the old pavement and regrade the median.

Figure II-22: Existing Condition Maintenance of Traffic Plan

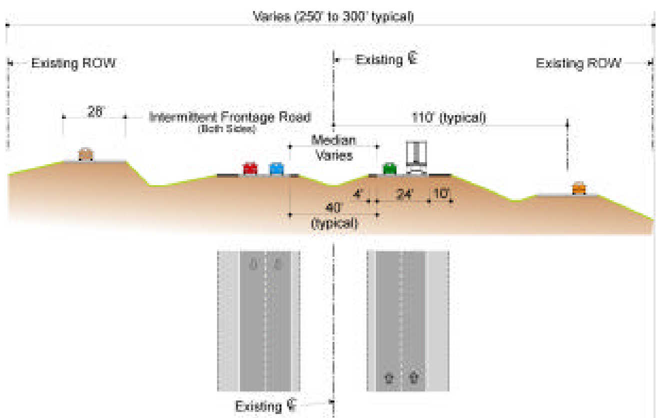


Figure II-23: Phase I Maintenance of Traffic Plan

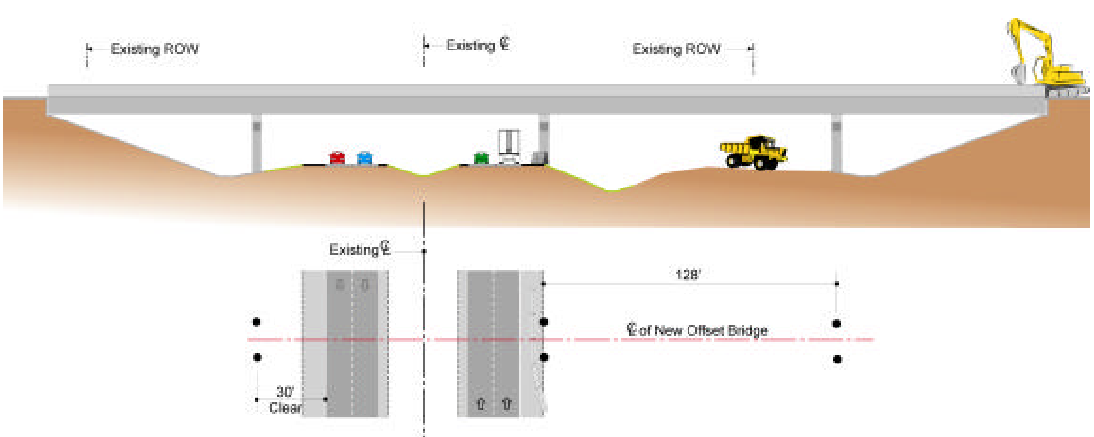


Figure II-24: Phase II Maintenance of Traffic Plan

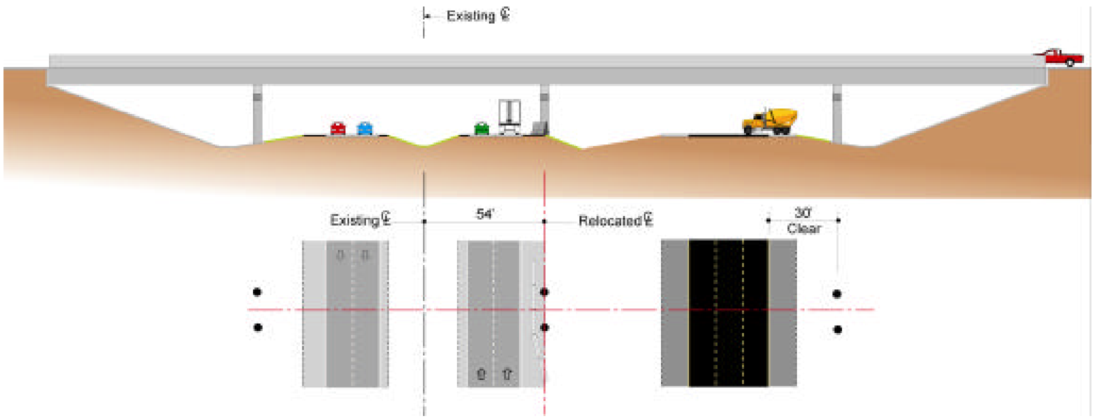


Figure II-25: Phase III Maintenance of Traffic Plan

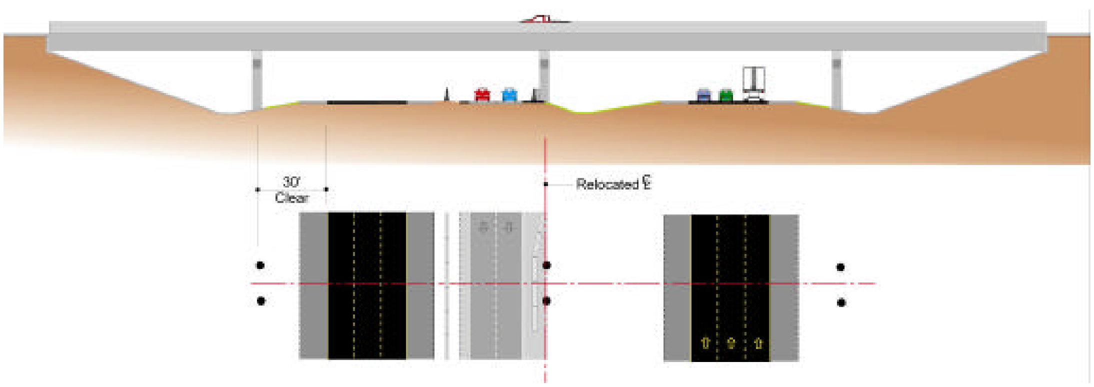
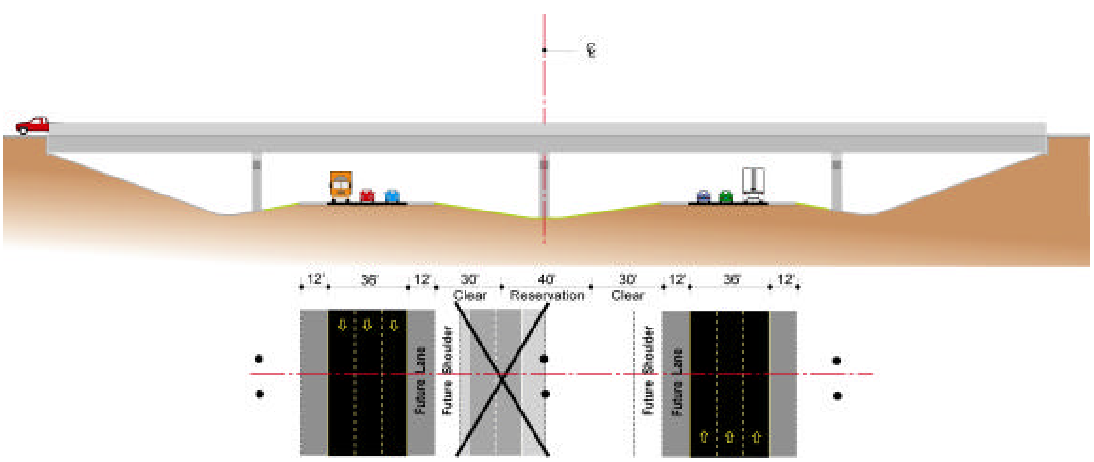


Figure II-26: Phase IV Maintenance of Traffic Plan



b. Urban Areas

In the urban areas of the study corridor, the maintenance of traffic during construction would be measurably more difficult. The separation of the construction areas from the existing travelway would not be possible. Consequently, the construction would need to be staged with possible detouring and temporary construction provisions. One likely option would entail constructing temporary widening on one side or the other, moving both directions of travel to that side, constructing the new lanes in the other direction, moving both directions of traffic to the new pavement, and then constructing the new lanes in the opposite direction. This approach would require temporary construction and possibly wider pavement and thicker shoulders to accommodate the detouring. Additional investigations of this issue would need to be performed in the second tier studies in the urban areas.

c. Workzone Management

Advanced workzone strategies should be used for traffic management throughout the course of the I-70 construction activities. The portable/temporary ITS technologies would aid in the interactive and advanced warning and monitoring of work zone conditions. Potential technologies for the workzone ITS system include portable variable message signs (VMS), portable non-intrusive traffic detectors, workzone speed warning systems (to alert construction crews to potentially hazardous conditions resulting from high vehicle speeds) and wireless communications. Components of the permanent ITS system, including traffic and traveler information systems not impacted by the construction activities, could also be an integral part of the work zone traffic management system.

11. TRANSPORTATION IMPACTS

This section describes the evaluation of the transportation impacts and travel efficiencies of the various options within the Recommended Preferred Strategy. These options include the conceptual corridors in and around the Columbia and the Warrenton/Wright City/Wentzville Areas. The travel characteristics of the “No-Build” Strategy provide a basis of comparison for the evaluation of the travel efficiency performance of each option through the urban areas.

a. Travel Demand Forecasts

Travel demand forecasts were prepared to assess the impact of the conceptual corridors on addressing traffic level of service and safety considerations. The methodology used to analyze travel impacts, the forecasted daily traffic volumes, the associated level-of-service and projected impacts to safety is similar to the methods used in the evaluation of the various Reasonable Strategies (i.e., Chapter II – Strategies and Conceptual Corridors, F. Transportation Impact of Reasonable Strategies).

The Missouri Statewide Travel Demand Model was applied, as in the previous assessments, to forecast future traffic volumes. Improvements were made to the model to reflect refined demographic data projections and allocations. Changes and corrections to the state GIS data resulted in improvements to the statewide network. The result of these refinements include differences in the traffic forecasts prepared over the duration of this study, particularly in the urban areas through which I-70 passes at each end of the study corridor. As a direct result of these further refinements and embellishments of the statewide model, the daily travel forecasts for 2030 along I-70 are lower than previously estimated as part of the analyses of the Reasonable Strategies.

Refined travel demand forecasts were developed for the following Conceptual Corridor options:

- **"No-Build" Strategy**

- **Widen Existing I-70 Strategy - Columbia Area**

  - ✓ Existing Conceptual Corridor - Widen existing I-70 to an effective eight-lane section.

  - ✓ Near North Conceptual Corridor – Construct a near north four-lane relocation of I-70 with connections at Mexico Gravel Road (just east of Route PP), US-63, and Route 740 (North of I-70).

  - ✓ Far North Conceptual Corridor – Construct a far north four-lane relocation of I-70 with connections at Route PP, Route B, US 63 and Route E.

- **Widen Existing I-70 Strategy - Warrenton/Wright City/Wentzville Area**

  - ✓ Existing Conceptual Corridor – Widen existing I-70 to eight-lane section.

  - ✓ Far North Conceptual Corridor – Construct four-lane relocation along a far north alignment beginning west of Exit 183 (Jonesburg) with connections at Route 47 and Route J. Three east termini were examined – US 61, reconnect to I-70 near mile post 213, and Route 370.

  - ✓ Near North Conceptual Corridor – Construct a four-lane relocation along near north alignment beginning west of Exit 188 (Route A) with connections at Route 47 and Route J. Two east termini were examined – US 61 and reconnect to I-70 near mile post 213.

  - ✓ South Conceptual Corridor – Construct a four-lane relocation along south alignment beginning east of Exit 188 (Route A) with connections at Route 47, Route F, Route T and County Road Z. The eastern terminus was assumed as a connection into the Page Avenue extension.

b. Connections to St. Louis Highway System

The relocation or bypass conceptual corridors in the Warrenton/Wright City/Wentzville Area have a variety of ways to interconnect with the highway network in the St. Louis metropolitan area. These corridors include the Far North Conceptual Corridor, the Near North Conceptual Corridor, and South Conceptual Corridor.

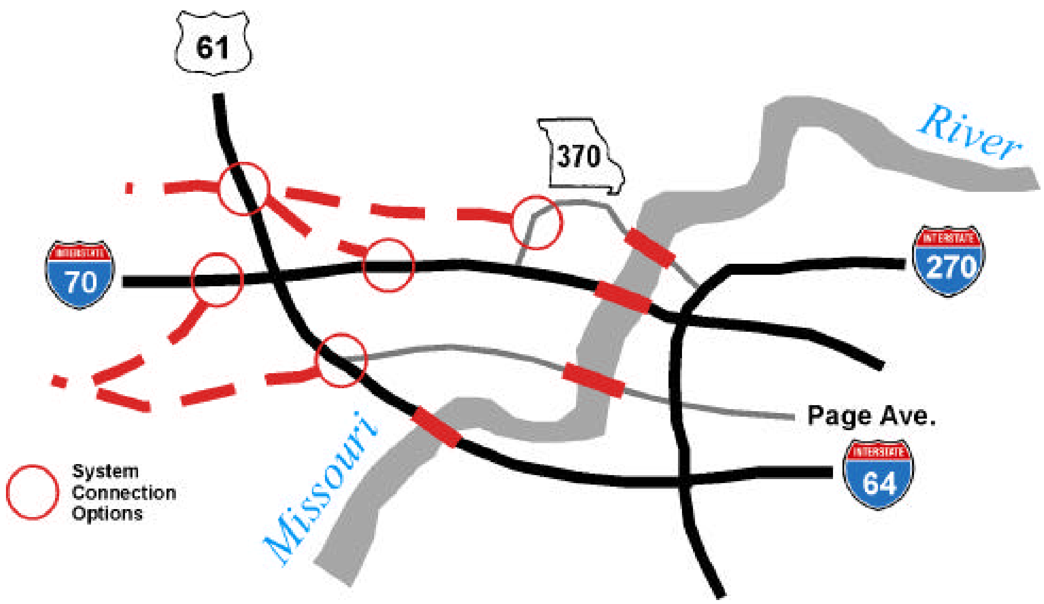
For the Far North Conceptual Corridor, three possible eastern termini connections were examined from a travel demand perspective. The first option would consist of a connection at US 61, north of Flint Hill. The existing US 61 corridor would then be utilized as a connection to I-70. The second connection option would consist of a continuation of the Far North Corridor through US 61, providing US 61 access, and reconnecting to I-70 near milepost 213 just west of the Lake St. Louis exit. The third connection option would entail continuing the Far North Corridor through US 61 and connecting to Route 370 located farther east of the study corridor and north of I-70. Route 370 is a four-lane freeway located north of and generally parallel to I-70. Route 370 crosses the Missouri River and provides an alternative route for I-70 traffic traveling to or from the northern areas of the St. Louis metropolitan area.

For the Near North Conceptual Corridor, two eastern termini options were examined, both of these variations being similar to the Far North Conceptual Corridor's options. These connection options include a connection to US 61, south of Flint Hill, and reconnecting back to I-70 near milepost 213. A continuation of the Near North Conceptual Corridor to Route 370 was not considered due to likely high impacts the improvement's would have on existing land use and development.

Only one connection option was examined for the South Conceptual Corridor. This option would entail a connection into the Page Avenue corridor at the future I-64 (currently US-40/61) interchange with Page Avenue. With this connection, the South Conceptual Corridor would effectively function as a westerly extension of the Page Avenue corridor, thereby possibly diverting I-70 traffic destined to or from the central or southern parts of the St. Louis metropolitan area. The planned Page Avenue project, currently under construction, includes the construction of a new bridge crossing over the Missouri River located between I-70 and I-64 to the south. (The existing US 40/US 61 corridor at the Missouri River is being improved and will be designated as I-64.) A connection of the South Conceptual Corridor to I-70 immediately west of the US 40/US 61 interchange was not evaluated due to the likely unfeasibility of constructing a new interchange that close to the existing US 40/US 61 interchange.

Figure II-27 presents in concept the various eastern connection options for the three relocation conceptual corridors in the St. Louis area.

Figure II-27: I-70 Relocation System Connection Options in St. Louis Area



To assess the implications of the various connection options, a screen line analysis was performed. This analysis was conducted to show how the daily traffic patterns in the western St. Louis area may shift or change with the connection options of the various conceptual corridors. Given its natural barrier effect, the Missouri River was chosen as the screen line location. As shown in Table II-41, the four existing/planned Missouri River bridges that serve the western St. Louis Area travel market include: Route 370, I-70, Page Avenue, and I-64 (currently US 40/US 61). Page Avenue is a planned new Missouri River crossing located south of I-70. The existing I-64 crossing, currently designated US 40/US 61, is in the process of being improved and expanded.

Table II-41: Forecast Traffic Volumes across the Missouri River (2030)

Strategy/ Conceptual Corridor	Route 370		I-70		Page Avenue		I-64 (US 40/61)		Total Crossing	
	Volume	% Diff.	Volume	% Diff.	Volume	% Diff.	Volume	% Diff.	Volume	% Diff.
"No-Build"	52,600	- -	190,700	- -	163,500	- -	89,700	- -	496,500	- -
Existing	53,400	1.5%	194,200	1.8%	163,900	0.2%	86,500	-3.6%	498,000	0.3%
Far North Corridor										
Far North US-61	53,300	1.3%	193,800	1.6%	163,800	0.2%	87,000	-3.0%	497,900	0.3%
Far North I-70	53,200	1.1%	194,300	1.9%	164,100	0.4%	86,700	-3.3%	498,300	0.4%
Far North MO370	60,800	15.6%	184,800	-3.1%	163,200	-0.2%	87,200	-2.8%	496,000	-0.1%
Near North Corridor										
Near North US61	53,500	1.7%	194,200	1.8%	163,400	-0.1%	87,300	-2.7%	498,400	0.4%
Near North I-70	53,300	1.3%	193,300	1.4%	165,000	0.9%	86,800	-3.2%	498,400	0.4%
South Corridor										
South	52,600	0.0%	187,000	-1.9%	165,700	1.3%	93,100	3.8%	498,400	0.4%

As shown in Table II-41, there is little relative difference in daily traffic volumes crossing the Missouri River for the various system connection options for each of the conceptual corridors. Furthermore, regardless of the connection option, there is little difference in the daily volumes between the various corridors. For each system connection option, the volume of projected daily traffic (2030) at each bridge crossing is relatively unchanged, with the only possible exceptions being the Far North Corridor with the connection to Route 370 and the South Conceptual Corridor which would connect with Page Avenue. With the Far North Conceptual Corridor's connection to Route 370, the higher volumes on the Route 370 bridge would be expected due to the direct connection of the bypass to Route 370. Similarly, the slightly higher Page Avenue volumes would be expected due to the direct connection of the I-70 relocation to this facility. In each case, the relocation would function as a westerly extension of a parallel bridge crossing facility, thereby diverting some traffic away from I-70. However, even with a 15.6 percent increase in volume on the Route 370 bridge, or a 5.9 percent increase on the Page Avenue bridge, depending on the conceptual corridor, the shifting of the cross-river travel would amount to only 8,200 to 9,700 vehicles per day out of approximately 500,000 river crossings.

The screen line analysis suggests that the various connection options for the Conceptual Corridors would not measurably change or shift the current traffic patterns of the west St. Louis Area. Another possible explanation for the lack of travel pattern shifting is that any shift in traffic caused by the I-70 improvements would result in an equal shift of other traffic to maintain the equilibrium of the system. Evidence of possible changes of travel patterns would be apparent if there are projected improvements in the region's travel efficiencies – measured by decreased daily hours of travel. At a minimum, the analysis of the bridge crossings shows that the various I-70 improvements would not adversely affect the region's travel patterns such that an existing corridor is burdened beyond what would occur with the "No-Build" Strategy. To further investigate the possibility of shifting travel patterns without increased travel demands on each link, a select link analysis was performed for each of the four river crossings. A select link analysis entails determining at a particular point on a highway what the trip origination and destination zones are for all traffic crossing that point. This analysis showed that measurable shifts in the region's travel patterns would not be anticipated with any of the conceptual corridor improvements, or their respective connection options.

Based on the general findings of these analyses and a review of the travel demand forecasts, a single connection option was selected and assumed for each of the conceptual corridors. This assumed connection concept for each conceptual corridor is intended to be a representation of the connection into the St. Louis highway system. Additional options and considerations would need to be considered as part of the Second Tier Studies for this area. Assumed connections for each conceptual corridor are as follows:

- **Far North Conceptual Corridor** – I-70 near Lake St. Louis.
- **Near North Conceptual Corridor** – I-70 near Lake St. Louis.
- **South Conceptual Corridor** – Page Avenue at I-64/Page Avenue interchange.

c. Travel Demand Forecast Volumes

Utilizing the updated land use and demographic information, daily traffic volumes were estimated along the I-70 Study Corridor for 1997 and 2030. Table II-42 presents the updated traffic volume forecasts for the "No-Build" Strategy and the Widen Existing I-70 Strategy for each of the conceptual corridors. For each of the relocation conceptual corridors in the Columbia and Warrenton/Wright City/Wentzville areas, the assumed improvements for the other urbanized area consisted of the widening of the existing I-70. Traffic volumes are presented and organized in accordance with the definitions of the various analysis areas identified for the study corridor.

Table II-42: Conceptual Corridor Forecast Traffic Volumes (2030)

Section	Location	Exit		No Build	Widen Existing Corridor	Columbia Conceptual Corridors				Warrenton/Wright City/Wentzville Conceptual Corridors					
						Near North		Far North		Far North		Near North		South	
		From	To			I-70	Bypass	I-70	Bypass	I-70	Bypass	I-70	Bypass	I-70	Bypass
1	West of I-470	- -	15	111,600	117,300	117,100		117,000		117,300		117,400		117,100	
2	I-470 to Woods Chapel	15	18	108,600	112,100	111,400		111,400		112,100		112,000		111,300	
3	Woods Chapel to MO-7	18	20	100,500	104,100	103,400		103,400		104,100		104,300		103,200	
4	MO-7 to Adams Dairy	20	21	89,900	93,400	93,100		93,100		93,400		93,300		93,100	
5	Adams Dairy to MO-AA/MO-BB	21	24	78,400	82,100	81,800		81,700		82,100		82,000		81,800	
6	MO-AA/MO-BB to MO-H/MO-F	24	28	67,200	68,700	68,400		68,400		68,700		68,800		68,600	
7	MO-H/MO-F to MO-D/MO-Z	28	31	63,100	64,100	63,800		63,800		64,100		64,200		64,300	
8	MO-D/MO-Z to MO-131	31	37	56,500	57,700	57,400		57,400		57,700		57,700		57,700	
9	MO-131 to MO-O/MO-M	37	41	50,300	51,400	51,100		51,000		51,400		51,400		51,400	
10	MO-O/MO-M to MO-E/MO-H	41	45	50,400	51,500	51,200		51,100		51,500		51,600		51,700	
11	MO-E/MO-H to MO-13	45	49	49,800	51,000	50,600		50,500		50,900		51,000		51,100	
12	MO -13 to MO-T	49	52	49,900	51,200	50,700		50,600		51,100		51,200		51,300	
13	MO-T to MO-23	52	58	51,400	52,700	52,100		52,000		52,500		52,700		52,800	
14	MO-23 to MO-Y/MO-VV	58	62	49,900	51,200	50,700		50,600		51,100		51,200		51,300	
15	MO-Y/MO-VV to MO-127	62	66	48,800	50,100	49,600		49,500		50,000		50,100		50,200	
16	MO-127 to MO-EE/MO-K	66	71	48,700	50,000	49,400		49,300		49,800		50,000		50,100	
17	MO-EE/MO-K to MO-YY	71	74	48,700	50,000	49,400		49,300		49,800		50,000		50,100	
18	MO-YY to US-65	74	76	48,400	49,700	49,100		49,000		49,500		49,700		49,700	
19	US-65 to MO-J	76	84	47,600	48,900	48,400		48,300		48,800		48,900		49,000	
20	MO-J to MO-K	84	89	47,700	49,000	48,400		48,300		48,800		49,000		49,100	
21	MO-K to MO-41/MO-135	89	98	47,500	48,800	48,300		48,200		48,700		48,800		48,900	
22	MO-42/MO-135 to MO-5	98	101	49,200	50,500	49,900		49,900		50,300		50,500		50,600	
23	MO-5 to MO-B	101	103	51,400	52,900	52,400		52,300		52,600		52,800		52,900	
24	MO-B to MO-87	103	106	51,900	53,200	52,800		52,700		53,100		53,200		53,300	
25	MO-87 to MO-179	106	111	55,200	56,500	56,100		56,000		56,400		56,500		56,600	
26	MO-179 to MO-BB	111	115	57,300	58,600	58,200		58,100		58,500		58,600		58,700	
Columbia Area															
27	MO-BB to MO-J/MO-O	115	117	58,300	59,600	59,100		58,800		59,500		59,600		59,700	
28	MO-J/MO-O to US-40/MO-UU	117	121	62,600	64,200	62,700		62,500		64,000		64,200		64,300	
29	US-40/MO-UU to/MO-740	121	124	80,100	81,600	34,100	46,700	74,200	6,200	81,400		81,600		81,700	
30	MO-E/MO-740 to Loop 70	124	125	93,700	97,200	47,400		86,600		97,100		97,200		97,500	
31	Loop 70 to MO-163	125	126	91,400	99,300	48,000		86,600	6,100	99,100		99,300		99,400	
32	MO-163 to MO-763	126	127	107,700	115,500	63,100	47,500	99,900		115,300		115,500		115,600	
33	MO-763 to Loop 70	127	128	95,100	100,900	48,300		86,800		100,700		100,800		100,900	
34	Loop 70 to US-63	128	128A	87,900	100,900	48,300		86,800	8,400	100,700		100,800		92,600	
35	US-63 to St. Charles	128A	131	78,200	92,600	37,300	49,400	76,700	9,000	92,200		92,600		82,500	
36	St. Charles to MO-Z	131	133	70,600	72,200	20,000	48,500	60,800	6,900	71,800		72,700		72,400	
37	MO-Z to MO-DD/MO-J	133	137	57,800	59,400	10,400		51,400		59,000		59,400		59,700	
38	MO-DD/MO-J to MO-M/MO-HH	137	144	53,100	54,400	54,300		54,100		54,000		54,500		54,800	
39	MO-M/MO-HH to US-54	144	148	54,300	55,700	55,600		55,300		55,300		55,700		56,000	

40	US-54 to MO-A/MO-Z	148	155	51,400	52,700	52,700		52,700		52,300		52,800		53,200	
41	MO-A/MO-Z to MO-D/MO-YY	155	161	52,100	53,400	53,400		53,400		53,000		53,500		53,800	
42	MO-D/MO-YY to MO-161/MO-J	161	170	51,900	53,300	53,300		53,200		52,900		53,300		53,700	
43	MO-161/MO-J to MO-19	170	175	52,100	53,500	53,500		53,400		53,100		53,500		53,900	
Warrenton/Wright City/Wentzville Area															
44	MO-19 to MO-F	175	179	54,100	55,400	55,400		55,400		55,100		55,500		55,900	
45	MO-F to MO-E/MO-Y	179	183	54,200	55,500	55,500		55,400		55,100		55,500		55,900	
46	MO-E/MO-Y to MO-A/MO-B	183	188	54,800	56,000	56,100		56,000		37,500	18,200	56,200		58,800	
47	MO-A/MO-B to MO 47	188	193	55,600	57,100	57,100		57,100		38,700		21,700	36,300	31,900	26,900
48	MO-47 to Exit 199	193	199	63,000	64,400	64,500		64,400		43,100	22,300	26,000	39,200	37,500	28,800
49	Exit 199 to MO-J/MO-F	199	200	63,000	64,400	64,500		64,400		43,100		26,000		37,500	
50	MO-J/MO-F to MO-W/MO-TT	200	203	75,200	77,000	77,300		77,300		56,200		38,700		48,300	31,300
51	MO-W/MO-TT to Exit 208	203	208	86,400	90,500	89,100		89,100		67,900	22,200	50,100	39,300	57,500	36,700
52	Exit 208 to MO-Z	208	209	97,000	98,400	98,500		98,500		78,900		61,400		69,700	
53	MO-Z to US-61	209	210	114,300	119,500	119,000		118,900		98,000		81,000		84,400	42,400
54	East of US-61	210	212	109,500	125,900	127,400		127,400		101,600	25,600	93,700	33,800	117,100	
55	MO-A to Lake St. Louis	212	213	128,600	155,900	155,000		155,000		131,800		122,100		149,500	
56	Lake St. Louis to Bryan Rd.	213	214	136,300	163,800	161,900		161,900		164,700		162,100		156,900	
57	Bryan Rd. to MO-K	214	217	157,100	183,200	182,700		182,700		183,500		183,500		176,400	

d. Operational Analysis of Conceptual Corridors

Level of service (LOS) calculations were performed using the Freeways module of the Highway Capacity Software. This program estimates the LOS for freeway sections based upon hourly volumes, percent heavy vehicles in the vehicle mix, and the freeway segments attributes.

The hourly volumes used in the level of service analysis were derived from the model volumes listed in the previous table. The model generates volumes for a 24-hour period, but hourly volumes are required for level of service analysis. Peak hour traffic percentages were derived from traffic counts along I-70 and applied to the 24-hour counts to adjust them. The peak hour adjustment percentages ranged from a high of 13 percent in Jackson County near Kansas City, to a low of seven percent in some of the more rural areas of I-70.

A directional split in the traffic was assumed to be 60/40. The American Association of State Highway and Transportation Officials (AASHTO) suggests the directional distribution varies between 55 and 70 percent, with the percentage being towards the lower end of this range for rural areas.

Table II-43 contains 2030 level of service forecasts for segments of I-70 through the Columbia and Warrenton/Wright City/Wentzville Areas. The levels of service listed in this table correspond to the forecast volumes listed in Table II-42.

Acceptable levels of service are defined as LOS D or better in urban areas (i.e., Columbia and Warrenton/Wright City/Wentzville Areas) and LOS C or better in rural areas (i.e., Rural (West) and Rural (East) Areas). In general, sections of I-70 listed in the preceding table that are anticipated to be urban like by 2030, in terms of travel characteristics, include:

- **Kansas City Area** – Western Study Corridor Terminus to Section 5.
- **Columbia Area** – Section 29 to Section 36.
- **Warrenton/Wright City/Wentzville Area** – Section 48 to Eastern Study Corridor Terminus.

Those sections not meeting the level of service standards in 2030 have been highlighted in Table II-43.

Assumed laneage for the various strategies and conceptual corridors, as described in the earlier sections of this chapter, is presented in Table II-44.

Table II-43: Forecast Level of Service for the Year 2030

	Section	Location	Exit		No Build	Widen Existing Corridor	Columbia Conceptual Corridors				Warrenton/Wright City/Wentzville Conceptual Corridors					
							Near North		Far North		Far North		Near North		South	
			From	To			I-70	Bypass	I-70	Bypass	I-70	Bypass	I-70	Bypass	I-70	Bypass
URBAN	1	West of I-470	- -	15	F	E	E		E		E		E		E	
	2	I-470 to Woods Chapel	15	18	F	E	E		E		E		E		E	
	3	Woods Chapel to MO-7	18	20	F	D	D		D		D		D		D	
	4	MO-7 to Adams Dairy	20	21	F	D	D		D		D		D		D	
	5	Adams Dairy to MO-AA/MO-BB	21	24	F	D	D		D		D		D		D	
RURAL	6	MO-AA/MO-BB to MO-H/MO-F	24	28	F	C	C		C		C		C		C	
	7	MO-H/MO-F to MO-D/MO-Z	28	31	F	C	C		C		C		C		C	
	8	MO-D/MO-Z to MO-131	31	37	F	C	C		C		C		C		C	
	9	MO-131 to MO-O/MO-M	37	41	E	C	C		C		C		C		C	
	10	MO-O/MO-M to MO-E/MO-H	41	45	E	C	C		C		C		C		C	
	11	MO-E/MO-H to MO-13	45	49	E	C	C		C		C		C		C	
	12	MO -13 to MO-T	49	52	E	C	C		C		C		C		C	
	13	MO-T to MO-23	52	58	E	C	C		C		C		C		C	
	14	MO-23 to MO-Y/MO-VV	58	62	D	C	C		C		C		C		C	
	15	MO-Y/MO-VV to MO-127	62	66	D	C	C		C		C		C		C	
	16	MO-127 to MO-EE/MO-K	66	71	D	C	C		C		C		C		C	
	17	MO-EE/MO-K to MO-YY	71	74	D	C	C		C		C		C		C	
	18	MO-YY to US-65	74	76	D	C	C		C		C		C		C	
	19	US-65 to MO-J	76	84	D	C	C		C		C		C		C	
	20	MO-J to MO-K	84	89	D	C	C		C		C		C		C	
	21	MO-K to MO-41/MO-135	89	98	D	C	C		C		C		C		C	
	22	MO-42/MO-135 to MO-5	98	101	D	C	C		C		C		C		C	
	23	MO-5 to MO-B	101	103	E	C	C		C		C		C		C	
	24	MO-B to MO-87	103	106	E	C	C		C		C		C		C	
	25	MO-87 to MO-179	106	111	E	C	C		C		C		C		C	
	26	MO-179 to MO-BB	111	115	D	C	C		C		C		C		C	
	Columbia Area															
	27	MO-BB to MO-J/MO-O	115	117	D	C	C		C		C		C		C	
	28	MO-J/MO-O to US-40/MO-UU	117	121	E	C	C		C		C		C		C	
URBAN	29	US-40/MO-UU toMO-740	121	124	F	C	B	C	D	A	C		C		C	
	30	MO-E/MO-740 to Loop 70	124	125	F	D	B		D		C		D		D	
	31	Loop 70 to MO-163	125	126	F	D	C		E	A	D		D		D	
	32	MO-163 to MO-763	126	127	F	D	C	C	F		D		D		D	
	33	MO-763 to Loop 70	127	128	F	D	B		D		D		D		D	
	34	Loop 70 to US-63	128	128A	F	D	B		D	A	D		D		C	
	35	US-63 to St. Charles	128A	131	F	C	B	C	D	A	C		C		C	
	36	St. Charles to MO-Z	131	133	F	D	A	C	C	A	D		D		D	
RURAL	37	MO-Z to MO-DD/MO-J	133	137	D	C	A		C		C		C		C	
	38	MO-DD/MO-J to MO-M/MO-HH	137	144	D	C	C		C		C		C		C	
	39	MO-M/MO-HH to US-54	144	148	D	C	C		C		C		C		C	
	40	US-54 to MO-A/MO-Z	148	155	D	C	C		C		C		C		C	
	41	MO-A/MO-Z to MO-D/MO-YY	155	161	D	C	C		C		C		C		C	
	42	MO-D/MO-YY to MO-161/MO-J	161	170	D	C	C		C		C		C		C	
	43	MO-161/MO-J to MO-19	170	175	D	C	C		C		C		C		C	
	Warrenton/Wright City/Wentzville Area															
	44	MO-19 to MO-F	175	179	D	C	C		C		C		C		C	
	45	MO-F to MO-E/MO-Y	179	183	D	C	C		C		C		C		C	
	46	MO-E/MO-Y to MO-A/MO-B	183	188	D	C	C		C		C	A	C		C	
	47	MO-A/MO-B to MO 47	188	193	E	C	C		C		C		B	C	C	
URBAN	48	MO-47 to Exit 199	193	199	E	C	C		C		C	B	B	C	C	B
	49	Exit 199 to MO-J/MO-F	199	200	E	C	C		C		C		B		C	B
	50	MO-J/MO-F to MO-W/MO-TT	200	203	F	C	C		C		E		C		D	C
	51	MO-W/MO-TT to Exit 208	203	208	F	C	C		C		E	B	D	C	D	D
	52	Exit 208 to MO-Z	208	209	F	D	D		D		D		C		C	
	53	MO-Z to US-61	209	210	F	D	D		D		F		E		E	
	54	US-61 to MO-A	210	212	F	E	E		E		F	B	F	C	F	
	55	MO-A to Lake St. Louis	212	213	F	F	F		F		F		F		F	
	56	East of Lake St. Louis	213	214	F	F	F		F		F		F		F	

Table II-44: Number of I-70 Through Travel Lanes

<table>
<tr><th rowspan="3">Section</th><th rowspan="3">Location</th><th colspan="2">Exit</th><th rowspan="3">No Build</th><th rowspan="3">Widen Existing Corridor</th><th colspan="4">Columbia Conceptual Corridors</th><th colspan="6">Warrenton/Wright City/Wentzville Conceptual Corridors</th></tr>
<tr><th rowspan="2">From</th><th rowspan="2">To</th><th colspan="2">Near North</th><th colspan="2">Far North</th><th colspan="2">Far North</th><th colspan="2">Near North</th><th colspan="2">South</th></tr>
<tr><th>I-70</th><th>Bypass</th><th>I-70</th><th>Bypass</th><th>I-70</th><th>Bypass</th><th>I-70</th><th>Bypass</th><th>I-70</th><th>Bypass</th></tr>
<tr><td colspan="16">Kansas City Area</td></tr>
<tr><td>1</td><td>West of I-470</td><td>- -</td><td>15</td><td>6</td><td>8</td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td></tr>
<tr><td>2</td><td>I-470 to Woods Chapel</td><td>15</td><td>18</td><td>6</td><td>8</td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td></tr>
<tr><td>3</td><td>Woods Chapel to MO-7</td><td>18</td><td>20</td><td>6</td><td>8</td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td></tr>
<tr><td>4</td><td>MO-7 to Adams Dairy</td><td>20</td><td>21</td><td>4</td><td>8</td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td></tr>
<tr><td>5</td><td>Adams Dairy to MO-AA/MO-BB</td><td>21</td><td>24</td><td>4</td><td>8</td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td></tr>
<tr><td colspan="16">Rural (West) Area</td></tr>
<tr><td>6</td><td>MO-AA/MO-BB to MO-H/MO-F</td><td>24</td><td>28</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>7</td><td>MO-H/MO-F to MO-D/MO-Z</td><td>28</td><td>31</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>8</td><td>MO-D/MO-Z to MO-131</td><td>31</td><td>37</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>9</td><td>MO-131 to MO-O/MO-M</td><td>37</td><td>41</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>10</td><td>MO-O/MO-M to MO-E/MO-H</td><td>41</td><td>45</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>11</td><td>MO-E/MO-H to MO-13</td><td>45</td><td>49</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>12</td><td>MO -13 to MO-T</td><td>49</td><td>52</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>13</td><td>MO-T to MO-23</td><td>52</td><td>58</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>14</td><td>MO-23 to MO-Y/MO-VV</td><td>58</td><td>62</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>15</td><td>MO-Y/MO-VV to MO-127</td><td>62</td><td>66</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>16</td><td>MO-127 to MO-EE/MO-K</td><td>66</td><td>71</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>17</td><td>MO-EE/MO-K to MO-YY</td><td>71</td><td>74</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>18</td><td>MO-YY to US-65</td><td>74</td><td>76</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>19</td><td>US-65 to MO-J</td><td>76</td><td>84</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>20</td><td>MO-J to MO-K</td><td>84</td><td>89</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>21</td><td>MO-K to MO-41/MO-135</td><td>89</td><td>98</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>22</td><td>MO-42/MO-135 to MO-5</td><td>98</td><td>101</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>23</td><td>MO-5 to MO-B</td><td>101</td><td>103</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>24</td><td>MO-B to MO-87</td><td>103</td><td>106</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>25</td><td>MO-87 to MO-179</td><td>106</td><td>111</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>26</td><td>MO-179 to MO-BB</td><td>111</td><td>115</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td colspan="16">Columbia Area</td></tr>
<tr><td>27</td><td>MO-BB to MO-J/MO-O</td><td>115</td><td>117</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>28</td><td>MO-J/MO-O to US-40/MO-UU</td><td>117</td><td>121</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>29</td><td>US-40/MO-UU toMO-740</td><td>121</td><td>124</td><td>4</td><td>6</td><td>4</td><td>4</td><td>4</td><td>4</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>30</td><td>MO-E/MO-740 to Loop 70</td><td>124</td><td>125</td><td>4</td><td>8</td><td>4</td><td rowspan="5">4</td><td>4</td><td rowspan="4">4</td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td></tr>
<tr><td>31</td><td>Loop 70 to MO-163</td><td>125</td><td>126</td><td>4</td><td>8</td><td>4</td><td>4</td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td></tr>
<tr><td>32</td><td>MO-163 to MO-763</td><td>126</td><td>127</td><td>4</td><td>8</td><td>4+</td><td>4+</td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td></tr>
<tr><td>33</td><td>MO-763 to Loop 70</td><td>127</td><td>128</td><td>4</td><td>8</td><td>4+</td><td>4+</td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td></tr>
<tr><td>34</td><td>Loop 70 to US-63</td><td>128</td><td>128A</td><td>4</td><td>8</td><td>4</td><td>4</td><td>4</td><td>8</td><td></td><td>8</td><td></td><td>8</td><td></td></tr>
<tr><td>35</td><td>US-63 to St. Charles</td><td>128A</td><td>131</td><td>4</td><td>6</td><td>4</td><td>4</td><td>4</td><td>4</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>36</td><td>St. Charles to MO-Z</td><td>131</td><td>133</td><td>4</td><td>6</td><td>4</td><td>4</td><td>4</td><td>4</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td colspan="16">Rural (East) Area</td></tr>
<tr><td>37</td><td>MO-Z to MO-DD/MO-J</td><td>133</td><td>137</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>38</td><td>MO-DD/MO-J to MO-M/MO-HH</td><td>137</td><td>144</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>39</td><td>MO-M/MO-HH to US-54</td><td>144</td><td>148</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>40</td><td>US-54 to MO-A/MO-Z</td><td>148</td><td>155</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>41</td><td>MO-A/MO-Z to MO-D/MO-YY</td><td>155</td><td>161</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>42</td><td>MO-D/MO-YY to MO-161/MO-J</td><td>161</td><td>170</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>43</td><td>MO-161/MO-J to MO-19</td><td>170</td><td>175</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>44</td><td>MO-19 to MO-F</td><td>175</td><td>179</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td colspan="16">Warrenton/Wright City/Wentzville Area</td></tr>
<tr><td>45</td><td>MO-F to MO-E/MO-Y</td><td>179</td><td>183</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td><td>6</td><td></td></tr>
<tr><td>46</td><td>MO-E/MO-Y to MO-A/MO-B</td><td>183</td><td>188</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>4</td><td rowspan="2">4</td><td>4</td><td></td><td>4</td><td></td></tr>
<tr><td>47</td><td>MO-A/MO-B to MO 47</td><td>188</td><td>193</td><td>4</td><td>6</td><td>6</td><td></td><td>6</td><td></td><td>4</td><td>4</td><td></td><td>4</td><td></td></tr>
<tr><td>48</td><td>MO-47 to Exit 199</td><td>193</td><td>199</td><td>4</td><td>8</td><td>8</td><td></td><td>8</td><td></td><td>4</td><td rowspan="2">4</td><td>4</td><td rowspan="2">4</td><td>4</td><td rowspan="3">4</td></tr>
<tr><td>49</td><td>Exit 199 to MO-J/MO-F</td><td>199</td><td>200</td><td>4</td><td>8</td><td>8</td><td></td><td>8</td><td></td><td>4</td><td>4</td><td>4</td></tr>
<tr><td>50</td><td>MO-J/MO-F to MO-W/MO-TT</td><td>200</td><td>203</td><td>4</td><td>8</td><td>8</td><td></td><td>8</td><td></td><td>4</td><td rowspan="4">4</td><td>4</td><td rowspan="4">4</td><td>4</td></tr>
<tr><td>51</td><td>MO-W/MO-TT to Exit 208</td><td>203</td><td>208</td><td>4</td><td>8</td><td>8</td><td></td><td>8</td><td></td><td>4</td><td>4</td><td>4</td><td rowspan="2">4</td></tr>
<tr><td>52</td><td>Exit 208 to MO-Z</td><td>208</td><td>209</td><td>4</td><td>8</td><td>8</td><td></td><td>8</td><td></td><td>4</td><td>4</td><td>4</td></tr>
<tr><td>53</td><td>MO-Z to US-61</td><td>209</td><td>210</td><td>4</td><td>10</td><td>10</td><td></td><td>10</td><td></td><td>6</td><td>6</td><td>6</td><td></td></tr>
<tr><td>54</td><td>East of US-61</td><td>210</td><td>212</td><td>4</td><td>10</td><td>10</td><td></td><td>10</td><td></td><td>6</td><td rowspan="2">4</td><td>6</td><td rowspan="2">4</td><td>6</td><td rowspan="2">4</td></tr>
<tr><td>55</td><td>MO-A to Lake St. Louis</td><td>212</td><td>213</td><td>4</td><td>10</td><td>10</td><td></td><td>10</td><td></td><td>6</td><td>6</td><td>6</td></tr>
<tr><td>56</td><td>Lake St. Louis to Bryan Rd.</td><td>213</td><td>214</td><td>6</td><td>10</td><td>10</td><td></td><td>10</td><td></td><td>10</td><td></td><td>10</td><td></td><td>10</td><td></td></tr>
<tr><td>57</td><td>Bryan Rd. to MO-K</td><td>214</td><td>217</td><td>6</td><td>10</td><td>10</td><td></td><td>10</td><td></td><td>10</td><td></td><td>10</td><td></td><td>10</td><td></td></tr>
</table>

Note: 1. The Existing Conceptual Corridor improvements through Columbia consist of a six-lane freeway section with continuous two-lane one way frontage roads on each side for an effective capacity of eight freeway lanes.
2. “+” sign means auxiliary lane.

In the Columbia Area, the operational analysis shows that the Far North Conceptual Corridor would not improve the operations of the existing I-70 roadway. Due to the greater travel distance of the Far North Conceptual Corridor, not enough traffic would be diverted to the relocation to relieve the operations of the existing I-70 freeway. Consequently, existing I-70 would have unacceptable operations for the Far North Conceptual Corridor.

Also in Columbia, both the Existing and Near North Conceptual Corridors would improve the operations of I-70 and would exceed the study's operational standards. Along the existing I-70 with the Near North Conceptual Corridor, additional (auxiliary) lanes would be necessary between Route 163 and Route 763 (Section 32) to provide LOS D.

In the Warrenton/Wright City/Wentzville Area, of the three relocation options, the South and Near North Conceptual Corridors attract the most traffic and would consequently provide the greatest operational relief to existing I-70. Projected traffic volumes on the South Corridor would get increasingly higher moving to the east such that near the connection to I-64, the Corridor would be fully loaded within the acceptable targeted level-of-service.

All of the improvement corridors examined would require additional through or auxiliary lanes in Sections 1 and 2 at the western end of the project limits. On the eastern end of the project, additional through our auxiliary lanes would be required to the east of I-64 (Section 55).

e. Regional Travel Efficiency Measures

Each of the I-70 improvement options would impact the daily vehicle miles of travel (VMT) and the daily vehicle hours of travel (VHT) of not just I-70, but the State as a whole. Table II-45 illustrates the projected daily changes in 2030 VMT and VHT for the State.

Table II-45: Regional Travel Efficiency Measures for State (2030)

Statewide	Daily VMT	Difference	Daily VHT	Difference
"No Build" Strategy	201,220,400	- -	12,805,300	- -
Columbia				
Existing Corridor	201,877,800	657,400	12,724,400	-80,900
Near North Corridor	201,616,300	395,900	12,695,300	-110,000
Far North Corridor	201,897,200	676,800	12,804,000	-1,300
Warrenton/Wright City/Wentzville				
Existing Corridor	201,877,800	657,400	12,724,400	-80,900
Far North Corridor	201,705,300	484,900	12,733,800	-71,500
Near North Corridor	201,686,000	465,600	12,725,100	-80,200
South Corridor	201,291,000	70,600	12,588,800	-216,500

The differences in VMT and VHT are consistent with highway improvement expectations. In general, highway improvements would increase the amount of daily VMT. This is due to the improved highway system providing better access and mobility creating longer distance travel. This effect is demonstrated in the above table. In the Warrenton/Wright City/Wentzville Area, the South Conceptual Corridor has the smallest increase in VMT indicating that the bypass may shorten some trip lengths by providing a more direct route for trips that are currently using I-70 to get to destinations that are south of I-70.

The projected daily VHT in all of the corridors would decrease when compared to the "No-Build" Strategy. This indicates that highway improvements would reduce projected congestion and would improve the travel efficiencies of both the study corridor and the State as a whole.

In the Columbia Area, the Near North Conceptual Corridor would provide the greatest reduction in VHT. This indicates that, of the Columbia corridors, the largest number of trips would be diverted from the existing I-70 with the Near North Corridor. Conversely, the Far North Corridor has a minor impact on the VHT, indicating that the corridor does not divert traffic from the existing I-70.

In the Warrenton/Wright City/Wentzville Area, the South Conceptual Corridor provides the greatest reduction in VHT. The South Corridor's relatively minor increase in VMT is partly responsible for the large reduction in VHT. The combination of capacity improvements that carry large volumes with only a minor increase in VMT causes a larger number of trips to have shorter travel times.

f. Traffic Accident Analysis

Accident data obtained from MoDOT for 1999 was used to update the accident rates used in the Reasonable Strategy accident analysis. Table II-46 lists the updated accident rates for the existing I-70 Study Corridor and the rates for improved sections of I-70 with a wider median, wider shoulders, gentler curves and improved interchanges.

These rates and rate reductions take into consideration the 26 types of recorded accidents in the MoDOT reporting system. While some types of accidents reported are not consistent with the kind expected on I-70, the accident data for I-70 does include crashes on ramps and at the ramp intersections with local streets.

Table II-46: Accident Rates Along I-70 Study Corridor

Accident Type	I-70 Rate (Acc./100MVMT)	Improved I-70 Rate (Acc./100MVMT)
Property Damage Only	101.8	80.6
Injury	41.8	33.2
Fatal	1.2	0.7

A difference from the Reasonable Strategy rates is that the newer rates have a slightly lower unimproved I-70 crash rate. Also, the improved I-70 crash rate does not take as much credit for the reduction of accidents as previously estimated.

Table II-47: 2030 Accidents for Study Corridor – Widen Existing I-70 Strategy

Strategy/Severity	PDO	Injury	Fatal	Cost
"No-Build" Strategy	4,885	2,006	58	$244,613,061
Columbia				
Existing Conceptual Corridor	4,033	1,660	35	$201,007,990
Near North Conceptual Corridor	3,913	1,611	34	$195,046,659
Far North Conceptual Corridor	3,910	1,609	34	$194,906,791
Warrenton/Wright City/Wentzville				
Existing Conceptual Corridor	4,033	1,660	35	$201,007,990
Far North Conceptual Corridor	3,944	1,644	34	$196,609,990
Near North Conceptual Corridor	3,934	1,619	34	$196,117,049
South Conceptual Corridor	3,949	1,625	34	$196,850,298

The number of accidents estimated for each of the conceptual corridors is a function of the strategy's accident rate and the VMT. The accident costs associated with each of the conceptual corridors are a function of the number of accidents by type and the average cost associated with each type of accident.

g. Summary of User Cost and Benefits

The user costs and benefits were calculated by first determining the total user cost of each conceptual corridor. This user cost is determined by combining the annual accident costs, travel time costs, and vehicle operation costs of each conceptual corridor into a total user cost. The cost associated with each conceptual corridor is not an exact cost, it is a relative cost. The values for the cost of each alternative are for comparison purposes to determine which conceptual corridor would have the best cost savings, as compared to the "No-Build" Strategy. The total cost is then used to find the net present value (NPV) of the project's user cost savings for each conceptual corridor.

The NPV is the present value or worth of a series of future payments based on a discount rate. The discount rate is assumed to be six percent for all of the conceptual corridors. Using the 1997 and 2030 user cost savings for each conceptual corridor, and creating a linear forecast between the annual savings of these two dates to determine the series of "payments" or savings for each corridor, the NPV was estimated. This series of future benefits or savings assumes instantaneous implementation of the improvements to fully realize the improved travel efficiencies. The NPV is compared to the "No Build" Strategy to determine if there would be an overall user cost savings as a result of the improvements. Any cost savings compared to the "No Build" Strategy is considered a benefit resulting from the investment of the I-70 improvements.

Accident Cost

Table II-48 presents the estimate of 2030 accident costs for the various conceptual corridors within the Widen Existing I-70 Strategy. Each accident type, as listed in Table II-47, has a cost associated with it. The average cost of a property damage accident is $5,688, while the average cost of an injury or fatal accident is $105,093.

Table II-48: 2030 Accident Costs for Widen Existing I-70 Strategy

Strategy/Conceptual Corridor	Total	Change	Cost	Difference
"No-Build" Strategy	6,948		$244,613,061	
Columbia				
Existing Conceptual Corridor	5,727	-1,221	$201,007,990	-$43,605,071
Near North Conceptual Corridor	5,557	-1,391	$195,046,659	-$49,566,402
Far North Conceptual Corridor	5,553	-1,395	$194,906,791	-$49,706,270
Warrenton/Wright City/Wentzville				
Existing Conceptual Corridor	5,727	-1,221	$201,007,990	-$43,605,071
Far North Conceptual Corridor	5,602	-1,346	$196,609,990	-$48,003,071
Near North Conceptual Corridor	5,588	-1,360	$196,117,049	-$48,496,012
South Conceptual Corridor	5,609	-1,339	$196,850,298	-$47,762,763

Each conceptual corridor would have an accident cost savings as compared to the "No Build" Strategy due to the reduced overall accident rate of each corridor. Improvements in safety would result from the upgraded roadway standard with wider shoulders, wider median and improved alignment. Accident costs were only estimated for the I-70 Study Corridor – indirect accident reduction savings were not considered.

Vehicle Operating Cost Savings

The vehicle operating cost estimates assume a 75/25 auto to truck split in the traffic for the entire length of the study corridor. Autos were assigned an operating cost of 30 cents per mile (1.6 km) while trucks were assigned an operating cost of 60 cents per mile (1.6 km). Since each of the conceptual corridors would increase the VMT relative to the “No Build” Strategy, the vehicle operating costs associated with each conceptual corridor is greater than the “No Build”. Changes in annual vehicles operations caused by the I-70 improvements would result in an increase in the state’s vehicle operating costs.

Table II-49 presents a summary of the statewide vehicle operating costs for the various conceptual corridors of the Widen Existing I-70 Strategy.

Table II-49: 2030 Vehicle Operating Cost for Widen Existing I-70 Strategy

Statewide	Costs Operating	Difference
“No-Build” Strategy	$ 27,542,046,501	
Columbia		
Existing Conceptual Corridor	$ 27,632,021,830	$ 89,975,329
Near North Conceptual Corridor	$ 27,596,224,399	$ 54,177,898
Far North Conceptual Corridor	$ 27,634,680,203	$ 92,633,701
Warrenton/Wright City/Wentzville		
Existing Conceptual Corridor	$ 27,632,021,830	$ 89,975,329
Far North Conceptual Corridor	$ 27,608,416,721	$ 66,370,219
Near North Conceptual Corridor	$ 27,605,767,894	$ 63,721,392
South Conceptual Corridor	$ 27,551,702,801	$ 9,656,300

In the Columbia Area, the Near North Conceptual Corridor would have the least additional cost due to its lower statewide VMT. Similarly, in the Warrenton/Wright City/Wentzville Area, the South Conceptual Corridor would have the lowest additional cost associated with it because of its small increase in Statewide VMT. Of all the conceptual corridors, the South Conceptual Corridor is most note worthy due to its relatively small increase in operating costs as compared to the other conceptual corridors. This relatively small increase is due to the South Conceptual Corridor’s ability to efficiently serve a predominate travel pattern to or from the southern areas of the study corridor that is currently served by I-70 or other less efficient means.

Travel Time Cost Savings

The travel time cost estimates assumed the same 75/25 auto to truck split that was used in the operating cost calculations. Autos were assigned a travel time cost of $10 per hour while trucks were assigned an operating cost of $23 per hour.

Table II-50 presents a summary of the statewide travel time benefits for the various conceptual corridors of the Widen Existing I-70 Strategy.

The Columbia Area’s Near North Conceptual Corridor and the South Conceptual Corridor in the Warrenton/Wright City/Wentzville Area would have the greatest annual travel time cost savings. The improved travel operations offered by these conceptual corridors and the overall reduction in statewide VHT is the reason for these cost savings.

Table II-50: 2030 Travel Time Cost Savings for Widen Existing I-70 Strategy

Statewide	Costs Operating	Difference
"No-Build" Strategy	$ 61,929,743,295	
Columbia		
Existing Conceptual Corridor	$ 61,538,291,903	- $391,451,392
Near North Conceptual Corridor	$ 61,397,601,415	- $532,141,880
Far North Conceptual Corridor	$ 61,923,556,224	- $6,187,071
Warrenton/Wright City/Wentzville		
Existing Conceptual Corridor	$ 61,538,291,903	- $391,451,392
Far North Conceptual Corridor	$ 61,583,787,334	- $345,955,961
Near North Conceptual Corridor	$ 61,541,838,710	- $387,904,585
South Conceptual Corridor	$ 60,882,353,774	- $1,047,389,522

Summary of User Cost Savings

Table II-51 is a summary of the three user cost components calculated for each corridor.

Table II-51: 2030 Cost Summary for Widen Existing I-70 Strategy

	Travel Time	Operating	Accident	Total
"No Build"	$61,929,743,295	$27,542,046,501	$244,613,061	$89,716,402,857
Columbia				
Existing	$61,538,291,903	$27,632,021,830	$201,007,990	$89,371,321,724
Near North	$61,397,601,415	$27,596,224,399	$195,046,659	$89,188,872,473
Far North	$61,923,556,224	$27,634,680,203	$194,906,791	$89,753,143,218
Warrenton/Wright City/Wentzville				
Existing	$61,538,291,903	$27,632,021,830	$201,007,990	$89,371,321,724
Far North	$61,583,787,334	$27,608,416,721	$196,609,990	$89,388,814,044
Near North	$61,541,838,710	$27,605,767,894	$196,117,049	$89,343,723,653
South	$60,882,353,774	$27,551,702,801	$196,850,298	$88,630,906,873

Table II-52 presents the cost savings of the various conceptual corridors for the Widen Existing I-70 Strategy.

Table II-52: 2030 Cost Savings for Widen Existing I-70 Strategy

Statewide	Total Costs	Difference
"No-Build" Strategy	$89,716,402,857	
Columbia		
Existing Conceptual Corridor	$89,371,321,724	-$ 345,081,134
Near North Conceptual Corridor	$89,188,872,473	-$ 527,530,384
Far North Conceptual Corridor	$89,753,143,218	$ 36,740,360
Warrenton/Wright City/Wentzville		
Existing Conceptual Corridor	$89,371,321,724	-$ 345,081,134
Far North Conceptual Corridor	$89,388,814,044	-$ 327,588,813
Near North Conceptual Corridor	$89,343,723,653	-$ 372,679,205
South Conceptual Corridor	$88,630,906,873	-$1,085,495,985

Table II-52 indicates that all of the conceptual corridors would have a user cost savings with the only exception being the Columbia Area Far North Conceptual Corridor. This corridor shows a cost increase due to its inability to attract traffic away from I-70. This concept would not reduce the VHT enough to offset the cost associated with the increased VMT.

Summary of User Benefits

The benefit of each of the corridors is the Net Present Value (NPV) of the annual user cost savings between 2001 and 2030, as compared to the NPV of the "No Build" Strategy's savings. Table II-53 displays the total user benefits, expressed in NPV terms, for each of the conceptual corridors.

Table II-53: Benefits for Widen Existing I-70 Strategy

Improvement	Net Present Value	Difference
"No-Build" Strategy	$890,092,358,179	
Columbia Area		
Existing Conceptual Corridor	$888,247,334,782	($1,845,023,397)
Near North Conceptual Corridor	$887,466,336,152	($2,626,022,027)
Far North Conceptual Corridor	$890,047,761,319	($44,596,861)
Warrenton/Wright City/Wentzville		
Existing Conceptual Corridor	$888,247,334,782	($1,845,023,397)
Far North Conceptual Corridor	$888,252,669,243	($1,839,688,937)
Near North Conceptual Corridor	$888,094,729,423	($1,997,628,756)
South Conceptual Corridor	$886,391,758,118	($3,700,600,062)

12. CAPITAL COST

Construction costs for the Widen Existing I-70 Strategy include costs for constructing all roadway and bridge improvements. Construction costs are based on current construction costs and do not reflect inflation. These costs include design and construction administration costs and the costs of the I-70 improvements, including continuous frontage roads and access management enhancements at the interchange areas. Construction cost estimates are provided in Table II-54 for widening along the existing alignment through the urban areas, as well as for the relocation conceptual corridors defined for the recommended preferred strategy (i.e., Strategy No. 3) in the Columbia and the Warrenton/Wright City/Wentzville areas. Relocation corridor costs include both construction of the bypass and reconstruction of portions of the existing I-70 facility.

Table II-54: Construction Cost Estimates for Strategy No. 3 (Widen Existing I-70) Urban Areas

<table>
<tr><th rowspan="2">Cost Item</th><th colspan="3">Columbia Area ($ Millions)</th><th colspan="4">Warrenton/Wright City /Wentzville Area ($ Millions)</th></tr>
<tr><th>Existing</th><th>Near North</th><th>Far North</th><th>Existing</th><th>Far North</th><th>Near North</th><th>South</th></tr>
<tr><td>Right-of-Way Acquisition</td><td>$48</td><td>$26</td><td>$17</td><td>$60</td><td>$73</td><td>$79</td><td>$75</td></tr>
<tr><td>Construction (Bypass)</td><td>$0</td><td>$209</td><td>$217</td><td>$0</td><td rowspan="2">$530</td><td rowspan="2">$534</td><td rowspan="2">$521</td></tr>
<tr><td>Construction (Existing I-70)</td><td>$281</td><td>$41</td><td>$41</td><td>$436</td></tr>
<tr><td>TOTAL</td><td>$329</td><td>$276</td><td>$275</td><td>$496</td><td>$603</td><td>$613</td><td>$596</td></tr>
</table>

a. Rehabilitation and Operations and Maintenance Costs

Table II-55 presents the major rehabilitation and operations and maintenance costs for the various conceptual corridors of Strategy No. 3 (Widen Existing I-70). Costs are presented in both equivalent uniform costs and present worth terms. These estimates include the costs of maintaining and rehabilitating the existing I-70 pavement and bridges, with or without the relocation option. For the Existing Conceptual Corridor in each urban area, milling and inlaying of the existing pavement would need to occur for portions of the roadway during the design and construction of the improvements. Upon the completion of the improvements, general operations and maintenance would continue for the improved facility on an annual, ongoing basis. For the relocation concepts in each urban area, it is assumed that the ongoing rehabilitation of the existing I-70 facility would include the replacement of portions of the existing pavement, the milling and inlaying of pavement, and the replacement of appropriate bridge decks on an annual basis. In addition, rehabilitation work later in the study period is assumed to address the future rehabilitation of the new pavement along the relocation facility. Rehabilitation costs are the present value of costs to be incurred over the 30-year study period

Using a MoDOT historical average of $24,500 per annual lane mile (1.6 km) (four-lane) and $28,500 per annual lane mile (1.6 km) (six-lane) to operate and maintain an interstate highway, and allowing for a two percent increase each year in these costs, cost estimates for 30 years of operations and maintenance were estimated.

Table II-55: Rehabilitation and O&M Costs for Strategy No. 3 (Widen Existing I-70)

Rehabilitation and O&M Cost	Columbia Area ($ Millions)			Warrenton/Wright City /Wentzville Area ($ Millions)			
	Existing	Near North	Far North	Existing	Far North	Near North	South
Rehab and O&M (EUAC)	$0.7	$2.6	$2.9	$1.4	$4.8	$4.3	$4.2
Rehab and O&M (PW)	$9.6	$35.8	$39.9	$19.3	$66.1	$59.2	$57.8

I. Overall Evaluation of Columbia Area Conceptual Corridors

1. OVERALL COMPARISON OF CONCEPTUAL CORRIDORS

Based on the more detailed definition and assessment of the transportation impacts of the conceptual corridors in the Columbia area, as presented in the preceding sections, an overall comparison of the engineering and traffic characteristics of each conceptual corridor was performed. This evaluation was performed in concert with a general assessment of the environmental and socio-economic impacts of each conceptual corridor as presented in Chapter IV – Environmental Consequences.

As shown in the following summary table (Table II-56), evaluation factors reflecting engineering, traffic, environmental and social and economic issues were assessed and quantified for each of the corridors. Wherever these performance measures could not be quantified, subjective ratings were utilized, as per the scaling system shown in the table's corresponding legend.

Table II-56: Overall Comparison of Columbia Conceptual Corridors (Summary of Impacts)

EVALUATION FACTOR	UNIT	CONCEPTUAL CORRIDORS			
		No-Build	Near North	Far North	Widen Existing
ENGINEERING					
Length	miles	16.7	17.6	20.9	16.7
Capital Cost (Order of Magnitude):					
- New Construction	$ million	$0	$250	$258	$281
- Right-of-Way	$ million	$0	$26	$17	$48
Total	$ million	**$0**	**$276**	**$275**	**$329**

Annual O&M and Preservation Cost	$ million	$2.2	$2.6	$2.9	$0.7
Present Worth O&M and Preservation	$ million	$30.3	$35.8	$39.9	$9.6
Constructability:					
- Construction Staging	Rating	N/A			
- Maintenance of Traffic (Delay)	Rating	N/A			
Implementation	Rating	N/A			
TRAFFIC					
2030 Daily Traffic Volumes (Mainline)	vpd	107,700	63,100	99,900	115,500
2030 Daily Traffic Volumes (By-Pass)	vpd	N/A	47,500	6,100	N/A
Long-Term Corridor Capacity (2030):					
- Vehicle Capacity (Directional)	vph	4,200	8,400	8,400	8,400
- V/C Ratio	V/C	1.42	0.75 / 0.78	0.19 / 1.27	0.80
Traffic Operations (2030):					
- % at Target LOS	%	0%	100%	52%	100%
- Change in Travel Time	Minutes	N/A	- 2.1	0.6	- 3.4
Travel Efficiencies (2030):					
- Change in Daily VHT (Statewide)	Hours/Day	N/A	-110,000	-1,300	-80,900
- Change in Daily VMT (Statewide)	Miles/Day	N/A	395,900	676,800	657,400
- Service to Trucks	Rating				
Traffic Delay During Maintenance	Rating				
Change in 2030 Accidents:					
- Annual Accidents (Study Corridor)	Number	N/A	-1,391	-1,396	-1,221
- Construction Work Zone Accidents	Number	N/A			
Incident Management	Rating				
SOCIAL AND ECONOMIC					
Land Use:					
- Compatibility with Current Plans/Trends	Rating				
Displacements:					
- Residences	Number	0	289	279	254
- Businesses	Number	0	19	17	70
Impacts to Existing I-70 Businesses:					
- During Construction	Rating	N/A			
- Long-Term	Rating				
Environmental Justice	Rating	N/A			
ENVIRONMENTAL					
Air Quality	Rating				
Noise	Rating				
Parklands					
-Refuges/Parks	Number	0	1	0	1
-Other Public Lands	Number	0	1	0	0
Prime Farmland	Acres	0	174	224	27
Floodplains	Acres	0	1,452	1,008	0
Wetlands	Acres	0	12	20	2
Threatened & Endangered	Number	0	0	0	0
Cultural Resources:					
- Cemeteries	Number	0	2	7	1
- National Register Sites	Number	0	0	0	0

- Historic Bridges	Number	0	0	0	0
- Archeological Sites	Number	0	33	43	17
Hazardous Waste Sites	Number	0	0	0	0
Visual Quality	Rating	<	<	<	>
Secondary Impacts	Rating	=	<	<	=
Joint Development Opportunities	Rating	<<	>	>	=

Benefits >> Adverse Impacts
Benefits > Adverse Impacts
Benefits = Adverse Impacts
Benefits < Adverse Impacts
Benefits << Adverse Impacts

2. SUMMARY OF CONCEPTUAL CORRIDORS

Though it is not necessarily the intent of this First Tier EIS to select the best concept for the Columbia Area, some conclusions may be reached by this study regarding the reasonableness and feasibility of the conceptual corridors to further narrow the scope of the second tier study for the Columbia Area. The conclusions or findings of this study may reduce the range of concepts or issues that would need to be considered in the subsequent study. The findings of this study would be the starting point for the next study.

Summary conclusions of the conceptual corridor evaluation in the Columbia Area include the following:

- The Existing Conceptual Corridor would have the greatest construction cost, though the construction costs of all the corridors are relatively similar.
- The Far North Conceptual Corridor would not attract sufficient traffic to relieve the operational problems along the existing I-70 alignment through Columbia. Consequently, this finding suggests that the Far North Conceptual Corridor should not be considered further by the second tier study.
- No known environmental constraints or issues would preclude the implementation of the Near North, Far North, or Existing Conceptual Corridors.
- The Existing and Near North Conceptual Corridors would accomplish the goals of this study.

J. Overall Evaluation of Warrenton/Wright City/Wentzville Area Conceptual Corridors

1. OVERALL COMPARISON OF CONCEPTUAL CORRIDORS

Based on the more detailed definition and assessment of the transportation impacts of the conceptual corridors in the Warrenton/Wright City/Wentzville Area, as presented in the earlier in this chapter, an overall comparison of the engineering and traffic characteristics of each conceptual corridor was performed. This evaluation was performed in concert with a general assessment of the environmental and socio-economic impacts of each conceptual corridor as presented in Chapter IV – Environmental Consequences.

As shown in the following summary table (Table II-57), evaluation factors reflecting engineering, traffic, environmental and social and economic issues were assessed and quantified for each of the corridors. Wherever these performance measures could not be quantified, subjective ratings were utilized, as per the scaling system shown in the table's corresponding legend.

Table II-57: Overall Comparison of Warrenton/Wright City/Wentzville Conceptual Corridors (Summary of Impacts)

EVALUATION FACTOR	UNIT	CONCEPTUAL CORRIDORS				
		No-Build	Near North	Far North	South	Widen Existing
ENGINEERING						
Capital Cost (Order of Magnitude):						
- New Construction	$ million	$0	$534	$530	$521	$436
- Right-of-Way	$ million	$0	$79	$73	$75	$60
Total	$ million	**$0**	**$613**	**$603**	**$596**	**$496**
Annual O&M and Preservation Cost	$ million	$4.0	$4.3	$4.8	$4.2	$1.4
Present Worth O&M & Preservation	$ million	$55.1	$59.2	$66.1	$57.8	$19.3
Constructability:						
- Construction Staging	Rating	N/A				
- Maintenance of Traffic (Delay)	Rating	N/A				
Implementation	Rating	N/A				
TRAFFIC						
2030 Daily Traffic Volumes (Mainline)	vpd	109,200	101,100	92,600	90,500	120,500
2030 Daily Traffic Volumes (By-Pass)	vpd	N/A	18,200	27,900	43,400	N/A
Long-Term Corridor Capacity (2030):						
- Vehicle Capacity (Directional)	vph	4,200	8,400	8,400	8,400	8,400
- V/C Ratio	V/C	1.17	0.20 / 1.08	0.30 / 0.99	0.46 / 0.97	0.65
Traffic Operations (2030):						
- % at Target LOS	%	0%	29%	68%	32%	100%
Travel Efficiencies (2030):						
- Change in Daily VHT	Hours/Day	N/A	-80,200	-71,500	-216,500	-80,900
- Change in Daily VMT (Statewide)	Miles/Day	N/A	465,600	484,900	70,600	657,400
- Service to Trucks	Rating					
Traffic Delay During Maintenance	Rating					
Change in 2030 Accidents:						
- Annual Accidents (Study Corridor)	Number	N/A	-1,362	-1,327	-1,341	-1,221
- Construction Work Zone Accidents	Number	N/A				
Incident Management	Rating					
SOCIAL AND ECONOMIC						
Land Use:						
- Compatibility with Current Trends	Rating					
Displacements:						
- Residences	Number	0	141	67	69	20
- Businesses	Number	0	9	20	10	9

Impacts to Existing I-70 Businesses:						
- During Construction	Rating	N/A	=	=	=	<<
- Long-Term	Rating	<	=	=	>	>
Environmental Justice	Rating	N/A	>	>	>	=
ENVIRONMENTAL						
Air Quality	Rating	>	>>	>>	>>	>
Noise	Rating	<	<<	<<	<<	<
Parklands						
-Refuges/Parks	Number	0	0	0	0	3
-Other Public Lands	Number	0	0	0	0	0
Prime Farmland	Acres	0	420	399	624	130
Floodplains	Acres	0	136	144	157	8
Wetlands	Acres	0	6	5	41	2
Threatened & Endangered	Number	0	0	0	0	0
Cultural Resources:						
- Cemeteries	Number	0	8	4	3	4
- National Register Sites	Number	0	0	0	0	0
- Historic Bridges	Number	0	0	0	0	0
- Archeological Sites	Number	0	6	6	12	3
Hazardous Waste Sites	Number	0	0	0	1	0
Visual Quality	Rating	<	<	<	<	=
Secondary Impacts	Rating	<	<<	<<	<<	<
Joint Development Opportunities	Rating	<	=	=	=	>

Benefits >> Adverse Impacts
Benefits > Adverse Impacts
Benefits = Adverse Impacts
Benefits < Adverse Impacts
Benefits << Adverse Impacts
Avoidance Recommended

2. SUMMARY OF CONCEPTUAL CORRIDORS

Though it is not necessarily the intent of this First Tier EIS to select the best concept for the Warrenton/Wright City/Wentzville Area, some conclusions may be reached by this study regarding the reasonableness and feasibility of the conceptual corridors to further narrow the scope of the second tier study for this area. The conclusions or findings of this study may reduce the range of concepts or issues that would need to be considered in the subsequent study. The findings of this study would be the starting point for the next study.

Summary conclusions of the conceptual corridor evaluation in the Warrenton/Wright City/Wentzville Area include the following:

- The Existing Conceptual Corridor would have measurably lower construction costs.

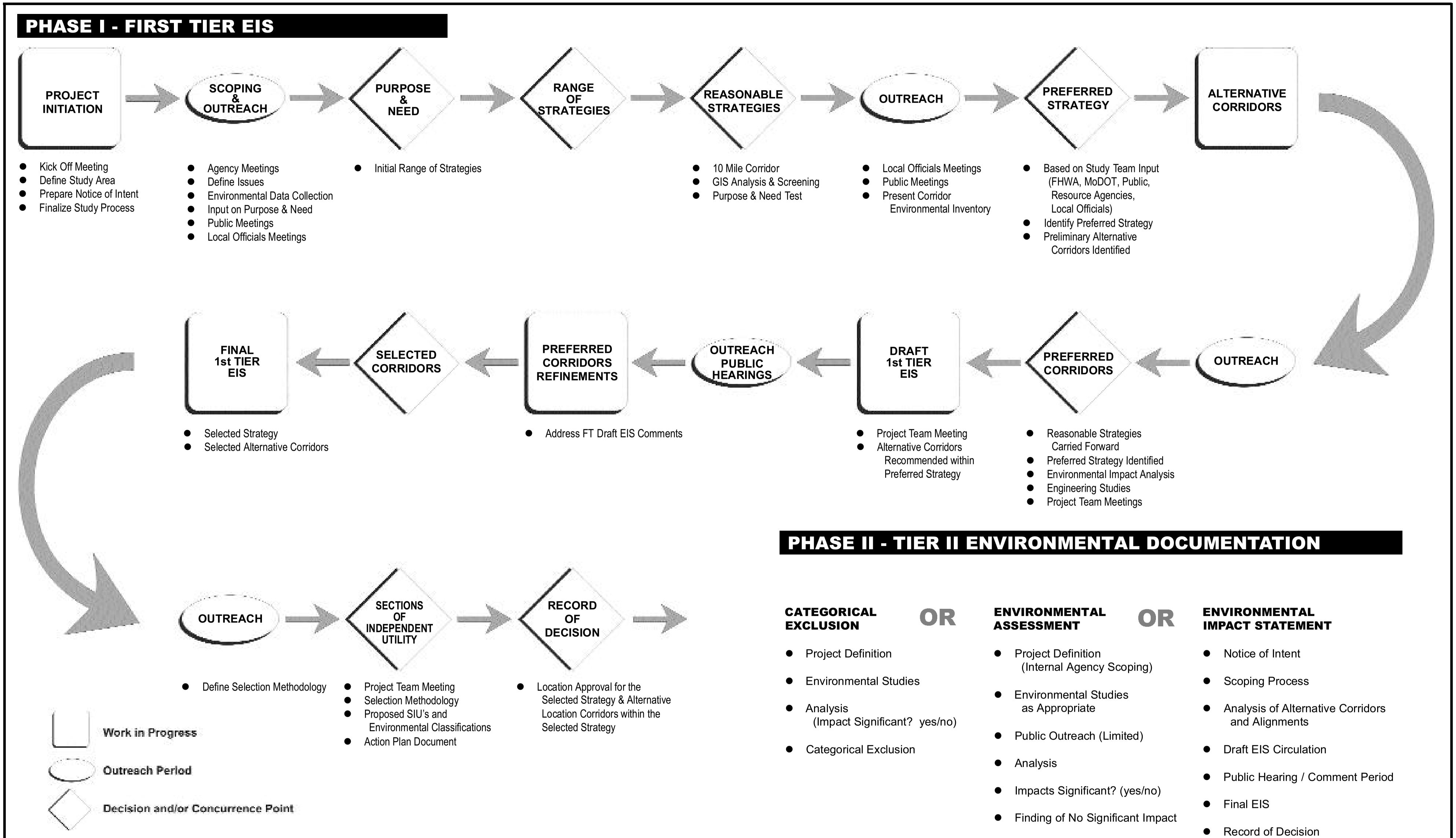
- The South Conceptual Corridor would have measurably superior travel efficiency benefits as compared to the other relocation concepts. This corridor better serves the apparent travel desires of the St. Louis metropolitan area. This conceptual corridor should be considered further.

- Connecting the Far North of Near North Conceptual Corridors to Route 370 would not measurably enhance the travel benefits offered by these concepts.

- No known environmental constraints or issues would preclude the further study of all four conceptual corridors.

- The Near North Conceptual Corridor would likely directly impact the highest number of residences. The Existing Conceptual Corridor would likely have the fewest direct impacts to existing structures.

- All four conceptual corridors would accomplish the goals of this study.



MoDOT IMPROVEMENT STUDY

EXHIBIT II-1
Tiered Process Work Flow Chart