Appendix B
I-70 MIS Final Report Text

FINAL

Technical Memorandum No. 5

I-70 MIS FINAL REPORT

AHEAD OF THE CURVE

I-70 MIS JACKSON COUNTY MoDOT

Prepared for:

Missouri Department of Transportation
MoDOT

MARC
Mid-America Regional Council

Kansas City Area Transportation Authority

I-70 MIS Team

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1. INTRODUCTION

Interstate 70 (I-70) was originally envisioned by Dwight D. Eisenhower to be a major asset in the nation's transportation infrastructure. Today, I-70 in the Kansas City region continues to serve this function as a key gateway to national travelers and freight moving east and west throughout the United States. It also a vital corridor for serving regional transportation demands including transit and local freight movements within the Kansas City Metropolitan area.

The Missouri Department of Transportation (MoDOT) has an on-going federal commitment to maintain the past I-70 infrastructure investments to ensure its continued effectiveness as a national and regional transportation corridor. Recognizing this responsibility, in 2000, the Missouri Department of Transportation (MoDOT), the Mid-America Regional Council (MARC), and the Kansas City Area Transportation Authority (KCATA) launched the Interstate I-70 Major Investment Study (I-70 MIS) to evaluate the challenges and opportunities associated with I-70 in Jackson County. The I-70 MIS established a planning horizon from 2003 to 2025, and entailed an incremental, cooperative, and focused planning process to evaluate a defined Study Area and Study Corridor.

A Study Management Team (SMT) was formed to deploy the MIS, consisting of agency staff from MoDOT, MARC, and the KCATA to facilitate the *I-70 MIS* process. A team of consultants led by Burns & McDonnell, as a part of the SMT, conducted the study. The primary function of the SMT was to coordinate data collection, define the corridor's transportation problems, select appropriate evaluation methodologies, and facilitate the identification of feasible strategies for implementation. The SMT facilitated the completion of the scope of work. The SMT regularly met with the public, community and business leaders, public officials and other stakeholders throughout the process to ensure their ongoing input. The SMT further extended this commitment to continue to involve public officials whose jurisdictions may be affected by the outcome of the MIS before making final transportation investment decisions. In addition, Community Roundtables (CR) and Technical Group Roundtables (TGR) were specifically designed to allow local jurisdictions and interested parties to formally review and comment on I-70 MIS draft documents prior to final public review distribution.

The I-70 Study Area is bounded by the Missouri River to the north, and I-435, I-470 and U.S. 50 Highway to the south. Land use types represented in the I-70 Study Area include high and low-density residential, commercial, industrial, parks, regional shopping malls and recreational/ entertainment. Major communities in the Study Area include Kansas City, Independence, Lee's Summit, Raytown, Blue Springs, Grain Valley, and Oak Grove (See Appendix 1 for a map of the I-70 Study Area).

The I-70 Study Corridor is approximately 28 miles in length from Downtown Kansas City's Central Business District (CBD), eastward to the intersection of State Routes F/H located in Oak Grove, Missouri. The I-70 Study Corridor includes the interstate roadways, interchanges, bridges, and other features within the I-70 right-of-way. It also includes Interstates 70, 670, 35 and 29 that all converge and encircle the downtown Kansas City's CBD, referred to as the "Loop," and the interchanges and connections with each of these interstates located at the Loop's four corners.

The I-70 Study Corridor also overlaps with the study limits for the *I-70 First Tier Environmental Impact Statement* (i.e., the I-70 Statewide Study referred to as the *I-70 FTED*) and the second tier environmental assessment for Section of Independent Utility (SIU) No. 1. The overlap occurs east of the I-470 Interchange to a point just east of the Oak Grove Interchange (State Routes F / H). This section is concurrently under evaluation to determine recommended improvements to I-70 in this nine-mile section. The findings of the *I-70 MIS* have been coordinated with this on-going study effort.

2. I-70 MIS OVERVIEW: COORDINATION, CONNECTIONS AND CHOICE

The Study Management Team (SMT) facilitated the I-70 MIS process which linked together five (5) Technical Memorandums (Tech Memos) covering three distinctive milestones: *Purpose and Need* (Tech Memo 1), *Draft Strategy Packages (*Tech Memos 2, 3 and 4*)*, and *MIS Recommendations* (Tech Memo 5*).*

A Public Involvement (PI) Plan was developed and deployed in parallel with the I-70 MIS technical evaluation. The plan included a list of activities structured to establish communication, dialogue, and solicit feedback between the public and the SMT. These activities included the following:

- Pre-plan interviews (Ten interviews with key local officials/stakeholders)
- Printed and multimedia materials (Coordinated with MoDOT's *Road Notes* newsletter)
- Advertisements of public forums
- Project website and other multiple feedback mechanisms

In addition, some additional public involvement activities were included in the PI Plan, which offered significant input early in the MIS process that affected the recommendations of the study . Those included the following efforts:

- Community Roundtable (CR) Meetings – Six (6) Community Roundtables provided a forum for candid discussions between the study team and groups of people with similar concerns. They provided a unique opportunity for individuals with similar concerns or demographic profiles to come together with the SMT, and learn more about the project. More importantly, roundtables gave those individuals an opportunity to provide their input, insights and ideas relative to future transportation investments along I-70. The CRs were selected to be representative of varying interests within the Study Area, and included the following: Urban Neighborhoods, Suburban Neighborhoods, Eastern Jackson County Businesses, Downtown Stakeholders, Mass Transit Interests, and Freight & Shipping Interests.
- Technical Group Roundtables (TGR) – To elicit feedback from those with technical and operational responsibilities adjacent to I-70, representatives of key agencies and planning organizations along the I-70 Study Corridor were convened as a Technical Group Roundtable. The TGR's mission was to gain technical feedback relative to critical MIS findings and recommendations. The individuals making up the TGR represented community development, land use planning and public works agencies at the municipalities adjacent to the Study Corridor. Also, a staff member from MARC and KCATA were included, and interested federal agencies [Federal Highway Administration (FHWA) and Federal Transit Administration (FTA)] were invited to attend. Meetings to review and comment on draft reports were held at three key milestones: Problem Definition / Purpose and Need, Draft Strategy Packages, and MIS Recommendations.
- Public Official Outreach – Inclusion of public officials (elected and appointed) was an important component of this study. It was critical that community leaders understand the depth, breadth and scope of long-term projects, like the I-70 MIS. Many of these public officials are involved in regional planning organizations (e.g.: committee involvement at the Mid-America Regional Council) and benefit from the "in-process" status updates on studies upon which they may later be asked to approve or otherwise take formal action. Efforts to gain input and insight from those officials have included regular mailings, presentations at forums where key officials were in attendance, as well as personal contacts from members of the SMT.

- Public Meetings – Public meetings were held at two key milestones during the I-70 MIS. The first set of meetings was held during the development of the *Problem Definition Report* (Tech Memo 1), and the second during the drafting of the *Conceptual Strategies Report* (Tech Memo 3).

The initial public meetings and the Community Roundtables were influential in the development of the I-70 MIS Purpose and Need Statement (covered in more detail in the following section). Public comments included a number of key issues:

- Congestion was a problem, especially during morning and evening peak periods
- Certain specific locations were commonly recognized as problems in need of solutions (e.g.: Jackson/Benton curves; I-435 Interchange; Noland Road; Downtown Loop)
- Adding more capacity should not just focus on cars (i.e.: single-occupant vehicles)
- Improvements should be sensitive to their impact on existing neighborhoods
- Significant attention was needed on the condition of existing I-70
- Other modes of travel need to be considered
- Safety issues were important, because of the high volumes of truck traffic and median cross-over accidents

Overall, the public involvement efforts provided valuable input into the selection of strategies that were evaluated for use in the Study Area. A related product of the PI process was the concept of “moving cars” versus “moving people.”

2.1 Purpose and Need: Defined Through Enhanced *Coordination*

The first milestone was achieved as stakeholders collected data, assessed available information, and established mutually defined *I-70 MIS* Goals and Objectives. The specific challenges, needs, goals and objectives were then analyzed in the first two technical memorandums to determine all reasonable transportation system improvement concepts. Community Roundtables were conducted to gain input from three distinct sections of the Study Area/Corridor: Urban (Loop to I-435); Suburban (I-435 to Blue Springs / Route 7); and Emerging Suburban (Blue Springs / Route 7 to Oak Grove / Routes F/H).

✓ Tech Memo Number 1 – Problem Definition Report (Tech Memo 1)

Tech Memo 1 identified the regional and corridor-wide transportation challenges, developed a detailed public involvement program, and established the travel challenges to be solved and opportunities for enhancement. Tech Memo 1 developed the initial Statement of Purpose and Need for the I-70 MIS as follows:

> “To advance regional, state, and national transportation goals and objectives by improving safety, accessibility and system efficiency, increasing modal choice, maintaining mobility, restoring and maintaining existing infrastructure and preserving or enhancing the built and natural environment in the I-70 Study Area.”

This initial Statement of Purpose and Need is summarized graphically by the following six Goals and Objectives, which were emphasized as targets of the study that characterized the overall transportation needs throughout the I-70 Study Area:

- ***Improve Safety***
- ***Increase Modal Choice***
- ***Maintain Mobility***
- ***Improve Accessibility to Surrounding Communities***
- ***Restore and Maintain Existing Infrastructure***
- ***Preserve and Enhance the Built and Natural Environment***

✔ **Tech Memo Number 2 – Evaluation Methodology (Tech Memo 2)**

Tech Memo 2 provided performance measures which defined how success or failure of individual improvement concepts were measured as they relate to different travel modes and features (i.e., single occupant cars, buses, ride-sharing, bicycle and pedestrian facilities, commuter rail, land use, freight, energy, safety and the environment). Tech Memo 2 also described the methods used by the SMT to complete an initial screening of individual concepts within the I-70 Study Area and a subsequent evaluation of investment strategies within the I-70 Study Corridor.

2.2 Draft Strategy Packages: Illustrating Better *Connections*

The second milestone was achieved by evaluating proposed major transportation investment concepts to improve the I-70 highway infrastructure in conjunction with transit and other improvement proposals. To aid in the analysis of how to improve I-70 and make better connections to other travel modes, a computer model, the *I-70 MIS Sub-Area Travel Demand Model* (referred to as the *I-70 Model*), was developed to perform detailed analysis and ultimately defined the more sensitive trade-off considerations. The *I-70 Model* also provided the foundation for the detailed evaluation. This was documented in the next two Tech Memos:

✔ **Tech Memo Number 3 – Conceptual Strategies Report (Tech Memo 3)**

Tech Memo 3 identified various concepts to improve transportation within the Study Area. A wide variety of concepts were evaluated as to their ability to fulfill the Goals and Objectives outlined in the Purpose and Need Statement. These individual concepts were assembled into five draft strategy packages. A primary difference between the strategy packages was their comparable ability to move individual cars versus people through the corridor.

✔ **Tech Memo Number 4 – Detailed Analysis Report (Tech Memo 4)**

Tech Memo 4 more fully analyzed the five strategy packages through a process that involved more detailed travel demand forecasting, supplemental modeling and evaluation, and a qualitative assessment of engineering, planning and community-based factors. The evaluation considered both the implementation of the operational and service improvements of I-70 within the Study Corridor described by the strategy packages, as well as the impact to the local parallel roadway network.

2.3 MIS Recommendations: Making Balanced *Choices*

The third milestone was achieved by developing recommendations for a package of investments that best addresses the targeted Goals and Objectives. These non-binding recommendations are intended to inform decisionmakers about the I-70 Study Corridor in the Kansas City Metropolitan Planning Process as the regional Long-Range Transportation Plan is updated. These recommendations, along with the range of reasonable strategies carried forward from Tech Memo 4 - Conceptual Strategies Report comprise the foundation of further analysis that will occur as part of the National Environmental Policy Act of 1969 (NEPA evaluation), which is the next step towards project-level decision-making within the Corridor.

✓ **Tech Memo Number 5 – Final Report (Tech Memo 5)**

The results of the detailed analysis documented in Tech Memo 4 provided a mix of quantitative and qualitative data on the strategy packages and their ability to meet the MIS goals, objectives and performance measures. Other analytical tools applied in the evaluation process besides travel demand forecasting and post-processing programs included basic capacity analysis and traffic operations simulation models. Methodologies for including qualitative measures consisting of public input and environmental effects (including social and community impacts) were established and comparatively addressed. Finally, benefit-cost and financial feasibility of the strategies were studied to support the formulation of a comprehensive comparison of all of the strategies culminating in the development of a final MIS Recommendation

Tech Memo 5 concluded the consideration of the transportation, land-use, environmental, social and fiscal impacts of five strategy packages by defining the pros and cons of each package compared to the I-70 MIS Purpose and Need and to each other. Consideration was also given to the idea that additional strategy packages could exist that combine the best elements of the others. These potential additional packages are anticipated to be developed during the subsequent NEPA process.

3. STRATEGY PACKAGES OVERVIEW

3.1 Draft Strategy Packages

Following an initial screening of alternative strategies, a total of five packages were developed and further refined in Tech Memo 3 – Conceptual Strategies Report. The strategies were analyzed and the results documented in Tech Memo 4 – Detailed Analysis Report. See Appendix 2 for the components and a graphic depiction of each of the five strategy packages.

Generally, the strategy packages are defined as follows:

Package 1 (Base Case):

The Base Case only includes committed projects adopted on the current 2004 to 2007 Transportation Improvement Program (TIP), and projects identified in previously adopted Major Investment Studies conducted in the MARC region. Other transportation systems assumed to continue are existing park-and-ride facilities and bus transit service, including existing commuter express services.

Specifically, this package includes the following:

- Frequent short-term pavement and bridge restoration and maintenance
- Projects identified in the MoDOT Priority Bridge replacement list including the Noland Road interchange, and Truman Road at the southeast corner of the Loop
- Low cost pavement repairs and safety improvements included in the MARC Long Range Transportation Plan (LRTP)
- Projects included in the Northland-Downtown MIS to widen I-29/I-35 to eight lanes between the northeast corner of the Loop
- Projects included in the I-435 MIS to include modifications to the I-435/I-70 interchange
- Continuation of existing transit service levels

Package 2A: Reconstruct I-70 with Increased Transit Commuter Express

Package 2A includes projects identified in the Base Case and totally reconstructs the pavement of I-70 with no additional lane capacity. As part of the total pavement reconstruction, geometric design improvements would be made to meet current standards to the extent possible while minimizing right-of-way impacts. Several interchanges would be upgraded and reconstructed to improve traffic operations. In addition, Intelligent Transportation Systems (ITS) traffic management systems would be expanded to better manage traffic on the parallel arterial street system. Transit strategies include increased commuter express bus service as specified in the MARC *SmartMoves* plan.

Package 2A can be succinctly defined as Package 1, plus the following additional elements:

- Statewide I-70 FTED Preferred Strategy (from Route 7 to Oak Grove)
- Rebuild I-70 (keeping three lanes in each direction) assuming minimal acceptable design standards, although some design exceptions may be necessary
- Rehabilitate all functionally obsolete or structurally deficient bridges to accommodate MoDOT access management policies
- Reconstruct the following interchange / ramps to current design standards:
  - I-470
  - U.S. 40 at Blue Ridge Boulevard
  - Paseo Boulevard
  - 22^{nd}/ 23^{rd} Street Interchange
  - 31^{st} & Van Brunt Boulevard
  - Manchester I-70 Viaduct
- Consolidate the I-70 Ramps along the north leg of the Loop
- Improve Truman Road and new connection to I-70
- Loop re-stripping and signage
- Operation improvements around the loop (i.e., one-way pairs, The Paseo, etc.)
- Increase Commuter Express service with added park and ride lots.
- Advance Operation Green Light
- Advance multimodal operations
- Expand emergency management

This strategy is designed to be the “low end” improvement scenario for I-70. Completing this strategy will provide a newly constructed six-lane I-70 designed to last 30-50 years. This will eliminate the need for costly investments in pavement repair, rehabilitation and reconstruction through 2025 and reduce regular, routine maintenance costs.

Rehabilitating those bridge structures listed as functionally obsolete and structurally deficient will upgrade their physical condition, expand their operational capacity, extend their useful life span and reduce future expenditures for maintenance and replacement.

Package 2B: Reconstruct I-70 to Six Lanes with 'Future Transportation Improvements Corridor" with Deployment of KCATA SmartMoves Bus Plan

The purpose of this strategy package was to incorporate transportation investments that more fully support multi-modal travel options. This strategy package included the *Smart Moves* Transit Plan which incorporates transit hubs to provide improved passenger amenities and connections to transit service. They also increase the convenience of connections to employment sites using comfortable "freeway flyers" – improved commuter express bus service that would operate from Blue Springs to downtown Kansas City, and to other major destinations in the Kansas City area.

A primary feature of Package 2B is the provision of a dedicated future "transportation improvement corridor" within a wider, newly constructed I-70 median from the Loop to Blue Ridge Cutoff. The purpose of the corridor is to accommodate future transportation capacity focused on moving people through the corridor in lieu of general vehicular capacity. Travel time savings for potential corridor users would provide the necessary incentive for single-occupant drivers to shift other modes of transportation. Such uses could include reversible managed High Occupancy Vehicle (HOV) and transit lanes, tolled express lanes, or a parallel fixed guideway system. For the purposes of cost estimates and operational analysis by application of the *I-70 Model*. The corridor was assumed to consist of a pair of reversible lanes dedicated to HOV and transit use. However, subsequent studies would be required to establish the best and most feasible use, if any, for the dedicated corridor.

Package 2B is defined as Package 2A plus the following additional elements:

- Wider I-70 median for provisions for a future "transportation improvement corridor" from the Loop to Blue Ridge Cutoff
- Widened paved median between Blue Ridge Cutoff and Route 7 and deployment of moveable barrier system to accommodate additional roadway directional capacity
- Reconstruct all interchanges and bridges to accommodate the additional mainline lanes
- Improve horizontal alignment of I-70 through the Jackson and Benton curves
- Consider the use of toll options as part of the HOV or reversible lanes
- Implement the Smart Moves Transit Plan
- Construct new transit centers in the I-70 Corridor

Package 2C: Reconstruct I-70 to Six Lanes with "Future Transportation Improvements Corridor", New I-70 Alignment and other Unique Features, and Bus Rapid Transit

Package 2C adds a new alignment and "unique features" to Package 2B. In this package, a new four-lane interstate alignment would be constructed from the $22^{nd}/23^{rd}$ Street interchange to the northeast corner of the Loop. This new alignment would not replace the existing highway, but rather supplement it by providing a secondary connection into the north leg of the Loop. It is envisioned that such a new alignment would be constructed in a tunnel section through the existing limestone geology to make this connection. The new I-70 alignment concept is identified only as an example of a possible long-term improvement options that could potentially improve the traffic functions within the Loop and the section of I-70 immediately to the east. The north leg of the Loop would need to be rebuilt sufficiently to serve the I-70 traffic at an acceptable level of service.

The "unique features" referred to in this package include the concept of constructing wider bridges in four to five locations to implement the Community Bridges concept. These locations are on bridges located on the north side of the Loop, east of Van Brunt Boulevard, at Noland Road, plus possibly two locations across the south leg of the Loop. The additional width provided by these bridges would not be used by vehicles. Rather the additional width would be used to provide improved pedestrian crossings and for streetscape and landscape features to help improve the physical and perceived connections of land use activities located on each side of I-70. Other "unique features" include support for the implementation of commuter rail on one or both of the two rail corridors that operate in the I-70 Corridor and support for the operation of bus rapid transit on the parallel network.

This strategy package contains Package 2B plus the following:

- New I-70 alignment via tunnel providing a second connection to the loop. This connection would extend from the current I-70 alignment at 22nd/23rd Street to the northeast corner of the Loop
- I-70 Community Bridges located along the north side of the Loop, east of Van Brunt and west of Noland Road, and possibly on south side of the Loop
- The implementation of "rapid rider" service using new technology to connect major employment centers and other attractions with fast, convenient service on U.S. 40 or other major arterials parallel to I-70
- Support elements for commuter rail on one or both commuter rail alignments located along the I-70 Corridor

Package 3A: Reconstruct I-70 to Eight Lanes with SmartMoves Bus Plan

This strategy package would include widening I-70 to eight lanes from Paseo Boulevard to Route 7. This strategy also includes increased commuter express service as described in the *Smart Moves* Transit Plan. In addition to the strategies included in Package 1 – Base Case, Package 3-A includes the following transportation strategies:

This package includes Package 1 elements, plus the following:

- Widen/Rebuild I-70 to eight lanes, with four travel lanes in each direction, from the southeast corner of the Loop to Route 7
- New design/rebuild north and east legs of the loop and consolidate Loop access
- Upgrade the I-70 interchanges at Oak Grove, Grain Valley and I-70 / I-470
- Rebuild other interchanges from the Loop to Route 7 to accommodate the added mainline I-70 lanes to meet current design standards
- Widen and re-build I-70 as 6 lanes from Route 7 and Oak Grove Interchange
- New I-35 / I-670 interchange improvement at the Southwest corner of the Loop
- Enhanced Bruce R. Watkins interchange with southeast corner of the Loop
- Upgrade the 22nd/23rd Street Corridor by making intersection and signal timing improvements that would improve traffic flow on these routes making them a more viable alternate route to I-70.
- Straighten Benton Curve alignment to meet 70-mph design speed at current standard
- Support or connect with future commuter rail improvements

Package 3B: Reconstruct I-70 to Eight Lanes with HOV (Toll Optional) Facilities and Bus Rapid Transit

Package 3-B adds to the elements of Package 3-A and identifies the use of HOV markings and signage on the eight-lane I-70 section from the southeast corner of the Loop to I-470. This strategy package also identifies two transit elements; the addition of Bus Rapid Transit (BRT) to the arterial street system, and the support for implementation of commuter rail service and facilities.

Specific elements studied include:

- Integrate High Occupancy Vehicle (HOV) Lanes
- Consider Toll Options (i.e., HOT lanes)
- Add I-70 Community Bridges
- Implement Smart Moves Bus Plan / Transit Centers
- Add BRT on Parallel Network
- Implement Commuter Rail

3.2 Significant Observations

To aid in the analysis of how to improve I-70 and make better connections to other travel modes, MARC's travel demand model was refined to address travel characteristics within the I-70 Study Corridor. The *I-70 Model* and other analytical tools yielded several key observations that supported the recommendations of the MIS and will support the identification of a preferred alternative during the next phase of planning under NEPA.

✓ Corridor Congestion and Capacity

Traffic service levels of basic freeway segments were established by Highway Capacity Manual methodologies and confirmed with observed vehicle density levels by aerial reconnaissance. The analysis identified certain congested sections in the corridor. Specifically between the Loop and I-470, the morning westbound (inbound) direction experiences LOS E or worse conditions. Conversely in the afternoon, eastbound (outbound) experiences LOS E or worse between the Jackson Curve and Noland Road, with several other segments and local interchanges experiencing unacceptable service levels. Appendix 3 taken from Tech Memo 1 graphically depicts current service levels along I-70 throughout the study limits. The predominant sources of congestion result from local deficiencies at several critical locations (e.g., Jackson/Benton curves; interchanges at I-435, I-470, and Noland Road), and non-recurring incidents (e.g., weather-related and accident-related). Traffic growth expected in the twenty-five year horizon is projected to extend westbound LOS E conditions to Adams Dairy Parkway. In other sections of the Study Corridor, particularly in the easternmost reaches, capacity analysis for much of the basic freeway segments indicate LOS D or better in the planning horizon (See Appendix 4). However, service levels and delay are expected to degrade at several of the existing ramp terminal intersections that are currently experiencing congestion during peak periods.

The *I-70 Model* did not provide clear direction on the choice of a Preferred Strategy, although subtle variations were observed in the traffic assignment for each of the strategy packages. The Kansas City metropolitan area continues to show modest levels of congestion, especially in comparison with (other urban areas). In 2001, Kansas City ranked 44th of 75 urban areas of all size for total person-hours of annual delay, 56th for delay per person, 43rd for congestion cost and 55th for congestion cost per person[1]. This observation is based on congestion levels at the regional level. However as congestion increases to levels projected to occur by the 2025 planning horizon, service levels were demonstrated to be improved for people using alternative transportation modes provided in the future "transportation improvement corridor" included in some of the strategy packages.

✓ Effects of the Parallel Network

Specifically, there are five major roadways that provide a parallel network of east-west roads to I-70 that the analysis indicates as providing supplemental capacity to I-70. These routes are U.S. Highway 24; Truman Road / State Route 12; 23rd Street / Route 78; 31st / 39th Streets; and U.S. Highway 40. This street network has numerous stop signs, traffic signals, and transitions from 2-lanes to 4-lanes with on-street parking. Therefore, these roadways offer limited opportunities in their current condition to provide reasonable alternatives to I-70, particularly for trucks and buses.

[1] Texas Transportation Institute, *Annual Urban Mobility Study*, November 3, 2003, Volume 11, Number 11.

However, the *I-70 Model* overstates the potential available capacity provided by the parallel network, diverting significant volumes of traffic from I-70 during high congestion peak periods. Tech Memo 4 concluded that, based on the model results, relative travel-time savings for single occupant vehicles and trucks are low under all of the strategies, due to the available and under-utilized capacity of the network demonstrated in the model. However, there is an uncertainty about the actual diversion of travelers to the parallel network that would take place due to the conditions noted above (frequent traffic control devices, lane transitions, on-street parking). Some commuters are not prone to travel along the parallel network due to these conditions. Substantial improvements to these routes would be required to allow them to truly function as a parallel network that could potentially attract traffic to the extent that would appreciably improve operations on I-70. Physical constraints and potential impacts to right-of-way and the environment call into question the feasibility of such improvements. Therefore, based on observations and engineering judgement, higher traffic volumes and degraded service levels are more realistically expected to occur along I-70 than as currently projected by the current model. Subsequent NEPA studies will comprehensively refine and address the parallel network analysis to more accurately assess the true impacts within the I-70 Study Area.

✓ **Peak Period Travel Characteristics**

Traffic in the Urban (Downtown Loop to I-435) and Emerging Suburban (Route 7 to Oak Grove) sections of I-70 is noticeably heavier in the westbound (inbound) direction in the morning, and eastbound (outbound) in the afternoon. The directional ratio in these areas is approximately 65-percent / 35-percent during both peak periods. This means that the heavier direction carries in excess of 50% more traffic than the opposite, lighter-traveled direction. Interestingly, peak period directional characteristics are less pronounced in the Suburban section between I-435 and Route 7. Furthermore, this section of I-70 carries a relatively higher proportion of traffic during off-peak periods than the other sections along the I-70 Study Corridor. This is due to growing employment centers in the Lee's Summit area and regional traffic circulation patterns within an 'outer loop' network comprised of I-70, I-470 and I-435.

✓ **Operational Characteristics Between Strategy Packages**

The travel time saved for alternative modes (i.e. the "transportation improvements corridor") is the major difference in operations between the strategy packages. In comparison with Strategy Package 1, defining the base condition, travel time savings for the peak period commute between Oak Grove and the Loop varies between three minutes and seven minutes under strategies 2B and 3A. For the purposes of evaluating travel impacts in comparison with other strategies using the *I-70 Model*, the future "transportation improvement corridor" was assumed to consist of a pair of reversible managed lanes designated for high occupancy vehicle (HOV) and transit operations. Under this assumption, the analysis further indicates that as much as nine minutes of travel time savings are realized for the managed and HOV lanes under strategy 2B in comparison with the general-purpose lanes. Table 3.2 duplicated from Tech Memo 4 depicts the estimated travel time savings for commuter travel along I-70 for the alternative strategies evaluated in the detailed strategy analysis.

TABLE 3.2 TRAVEL TIMES FOR SELECTED TRIPS (MINUTES)

Location	Strategy Package 1	Strategy Package 2A	Strategy Package 2B	Strategy Package 2C	Strategy Package 3A/3B
WB Lanes (AM)	**2003/2025**	**2025**	**2025**	**2025**	**2025**
F/H to Loop	30:38/36:52	34:48 (-2:08)	32:47 (-4:05)	32:47 (-4:05)	29:58 (-6:54)
Route 7 to Loop	24:29/30:13	28:07 (-2:06)	26:07 (-4:06)	26:07 (-4:06)	23:13 (-7:00)
I-470 to Loop	19:17/23:59	21:41 (-2:18)	19:58 (-4:01)	19:58 (-4:01)	17:11 (-6:48)
I-435 to Loop	9:10/10:02	8:33 (-1:29)	8:07 (-1:55)	8:07 (-1:55)	7:38 (-2:24)
EB Lanes (PM)	**2003/2025**	**2025**	**2025**	**2025**	**2025**
Loop to I-435	9:10/10:02	8:33 (-1:29)	8:07 (-1:55)	8:07 (-1:55)	7:38 (-2:24)
Loop to I-470	19:17/23:59	21:41 (-2:18)	19:58 (-4:01)	19:58 (-4:01)	17:11 (-6:48)
Loop to Route 7	24:29/30:13	28:07 (-2:06)	26:07 (-4:06)	26:07 (-4:06)	23:13 (-7:00)
Loop to F/H	30:38/36:52	34:48 (-2:08)	32:47 (-4:05)	32:47 (-4:05)	29:58 (-6:54)
WB Managed Lanes (AM)	**2003/2025**	**2025**	**2025**	**2025**	**2025 (3B)**
F/H to Loop	N/A	N/A	N/A	N/A	N/A
Route 7 to Loop	N/A	N/A	17:32 (-12:41)	17:32 (-12:41)	19:09 (-11:04)
I-470 to Loop	N/A	N/A	13:07 (-10:52)	13:07 (-10:52)	13:59 (-10:00)
I-435 to Loop	N/A	N/A	6:29 (-3:33)	6:29 (-3:33)	6:30 (-3:32)
EB Managed Lanes (PM)	**2003/2025**	**2025**	**2025**	**2025**	**2025 (3B)**
Loop to I-435	N/A	N/A	17:32 (-12:41)	17:32 (-12:41)	19:09 (-11:04)
Loop to I-470	N/A	N/A	13:07 (-10:52)	13:07 (-10:52)	13:59 (-10:00)
Loop to Route 7	N/A	N/A	6:29 (-3:33)	6:29 (-3:33)	6:30 (-3:32)
Loop to F/H	N/A	N/A	N/A	N/A	N/A

Source: Burns & McDonnell/HNTB, *Highway Capacity Manual 2000*

✓ **Pavement Condition**

Much of the existing I-70 pavement and bridges requires total replacement because of inferior condition, regardless of capacity and operational considerations. In addition, the original design of the interstate (horizontal and vertical curves, ramp lengths, vertical bridge clearances, shoulder widths) and interchange configurations are obsolete. The system cannot effectively handle the current nor projected future traffic demands without undergoing total reconstruction to current standards. The conditional rating of the I-70 pavement is presented graphically in Appendix 5 taken from Tech Memo 1.

3.3 Order of Magnitude of Costs

Estimated construction costs for each of the strategy packages were developed and presented in Tech Memo 3. Costs were estimated based on historical order of magnitude data and information relating to other regional transportation improvements initiatives included in the current MARC Long Range Transportation Plan (LRTP). The summarized costs in Table 3.3 reflect a range of potential costs considering the level of accuracy that can be expected at the MIS conceptual planning stage.

TABLE 3.3 STRATEGY PACKAGE COST RANGES

Strategy Package	Lower Range	Higher Range
Strategy Package 1	$400,000,000	$665,000,000
Strategy Package 2A	$960,000,000	$1,600,000,000
Strategy Package 2B	$1,250,000,000	$2,100,000,000
Strategy Package 2C	$1,785,000,000	$2,975,000,000
Strategy Package 3A	$1,180,000,000	$1,965,000,000
Strategy Package 3B	$1,400,000,000	$2,325,000,000

It is noted that the estimated costs for strategy packages 2C and 3B include long range transit initiatives relating to Bus Rapid Transit and Commuter Rail as transit enhancements to the overall I-70 corridor. These costs are therefore reflective of the total transportation investment in the corridor, in excess of highway costs. Furthermore, the feasibility of commuter rail is currently under study in an Federal Transit Agency alternatives analysis. The results of that study will be coordinated closely with subsequent NEPA studies for I-70.

3.4 Comparison of Strategies: Meeting the Goals

As strategies were refined and analyzed in the I-70 MIS, it was important to bear in mind the Goals and Objectives developed through data gathering, technical analysis, public input, as outlined in Tech Memo 1. It was therefore paramount that the development of reasonable strategies meet these targets in order to fulfill the purpose of the *I-70 MIS*. Consequently, the most reasonable strategies provide a combination of roadway, transit, bicycle, pedestrian, ITS, and other investments that best serve the I-70 Study Area. Performance measures derived from the *I-70 Model* and other applied post-processing analytical tools were originally presented in Tech Memo 4 and are provided in Appendix 6.

✓ **Safety**

Through reconstructing I-70 according to better and more modern design standards (such as straighter horizontal curves, interchange ramp lengths, auxiliary travel lanes between interchanges, eliminating lane imbalance problems, providing wider inside and outside shoulders) the frequency and severity of accidents can be reduced, positively affecting driving conditions and minimizing economic costs for these incidents.

In those areas of the I-70 Study Corridor known as "high-accident locations" (where the accident rate is significantly above the statewide average), the reduction in accident rates will be even more pronounced with improvements in horizontal and vertical geometry. Existing "high-accident locations" on I-70 in the Study Corridor include the east and north legs of I-70 CBD Loop, the Benton and Jackson curves, the I-435 Interchange and the I-470 Interchange.

✓ **Maintain Mobility**

For I-70, maintaining a traveler's mobility will be dramatically influenced by investing in strategies that restrict the temporal spread of the peak period congestion. By restricting the spread of the peak period congestion, travel times and running speeds can increase, air quality conditions can remain favorable.

✓ **System Preservation**

A majority of the pavement and bridges currently, or will require in the future, total replacement because of their deficient condition. In addition, the original design of interstate (horizontal and vertical curves, ramp lengths, vertical bridge clearances, shoulder widths) and interchange configurations are substandard, and the system cannot effectively handle the current and projected future traffic demands. The recommendations for the I-70 Corridor will substantially reduce the annual operating and maintenance costs for highway investments incurred by MoDOT and, at the same time, require significant increases in funding for highway capital costs, transit capital costs and transit operating and maintenance costs.

✓ **Increase Modal Choice**

The easy accessibility of the automobile has helped to shape the current development patterns present in the I-70 Study Area east of I-435. As a result, development of readily available land using traditional models has continued to expand to the east. These patterns, while economically beneficial, have ignored travel options outside of the personal automobile. The I-70 MIS recommends investing in facilities and services to increase transportation option and the demand for these options while complementing existing development and transportation patterns.

✓ **Improve Accessibility**

A key component of the I-70 MIS Recommendations is the ability to improve accessibility to surrounding communities in or near the I-70 corridor. A key indicator of improved accessibility is the projected regional daily travel time savings of up to 2,380 hours per day in comparison with the base condition. The ramification of this finding is that, as average commute times decrease, the ability to travel greater distances in the same time frame increases.

✓ **Environmental Preservation**

The close proximity of development to existing I-70 and its current right-of-way boundaries create the potential for impacts especially if elements of the strategy packages extend outside existing right-of-way. Table 3.4 provides the results of the initial environmental screening of potential impacts associated with each of the strategy packages. Because of the high potential for social and environmental impacts associated with alignment modifications and interchange reconstruction, the reasonable strategies must be evaluated stringently in conformance with current NEPA process and guidelines before a decision can be made on the final preferred strategy and preferred alternative.

TABLE 3.4: POTENTIAL ENVIRONMENTAL IMPACTS (NEPA)

	Sensitive Habitat Disruption	Hazardous Waste Spill Risk	Air Quality	Section 106 Issues (bridges)	ROW Acquisition	Commercial & Residential Displacements	Park Land Impacts	Environmental Justice Impacts	Wetlands Impacts	Groundwater Contamination	Section 106 (Historic structures)	Safety Issues
Strategy 1		✓	✓									✓
Strategy 2A			✓	✓								✓
Strategy 2B	✓			✓	✓	✓	✓	✓	✓			
Strategy 2C	✓			✓	✓	✓	✓	✓	✓	✓	✓	
Strategy 3A				✓	✓	✓	✓	✓	✓			
Strategy 3B				✓	✓	✓	✓	✓	✓			

3.5 Weighting the Performance Measures

A methodology was established by the SMT to compare the conceptual strategies' abilities to meet the study objectives, and to support a clearer direction for developing recommendations for the I-70 Corridor. First, for each Performance Measure assigned to each MIS Goal (i.e., For "Goal #1 – Improve Safety" there were nine related Performance Measures) there was assigned a maximum point value by dividing the number of Performance Measures for that Goal by 100. Actual points were then assigned to each Performance Measure of the Draft Strategy Packages by pro-rating them against the highest scoring strategy for each Performance Measure. The results of the detailed analysis presented in Tech Memo 4 were used to assign how each strategy package compared with the others. In cases where there was no change in a strategy package from the base condition (i.e., Strategy Package 1), no points were assigned. Once the point ratings were assigned, a series of sensitivity analyses was completed for each of the six MIS Goals. The first sensitivity test considered all Goals equally weighted. In this case, each Goal received equal weight and the strategy package's points calculated to arrive at a weighted score. Each Goal was then subjected to a sensitivity analysis that applied increased weighting of 1/3, with the remaining Goals weighted at 2/15. All six Goals were subjected to this iterative process to demonstrate how dramatically the results might change as the priority of each MIS Goal changed. Using this methodology, Strategy Packages 2B and 3B consistently ranked as the highest scoring packages.

Of importance to note is the difference in the individual components that make up Strategy Packages 2B and 3B. Strategy Package 2B contains transit investments much smaller in scope and cost (Operation Green Light, the Advanced Public Transportation System) than contained in Strategy Package 3B (Bus Rapid Transit and Commuter Rail implementation). Differences in highway features between the two strategy packages are significant across a wide range of components (pavement cross-section, bridge lengths, median treatment, interchange configuration, etc.)

The tabulated results of the completed comparative strategy performance evaluation is provided in Appendix 7.

3.6 Benefit-Cost Analysis

For major public transportation investments, a significant criteria in evaluating the relative effectiveness of proposed improvements is the benefit-cost ratio analysis (BCA). For a major investment study such as the *I-70 MIS*, it is acceptable to apply order-of-magnitude or planning-level estimates for costs and benefits. As a project proceeds from planning to project development to design, the level of detail for the project increases dramatically and reduces the unknown factors. As a result of this design refinement, costs estimates become much more detailed and accurate.

In a typical benefit-cost analysis (BCA), benefits for a proposed improvement are attributed primarily to travel times savings, reduced accidents, and reduction in vehicle operating costs over the life of the project. Travel time savings were applied for morning and evening commute time savings along I-70 as derived and discussed previously. Costs for the alternative strategy improvements consist of initial capital costs, on-going operations and maintenance costs, and replacement costs. For the *I-70 MIS*, the planning horizon time period is from 2003-2025.

If Strategy Package 1 is considered as a true baseline condition which includes certain programmed improvements, then an incremental BCA comparing the benefits and costs of the other strategy packages relative to Package 1 provides a representative indication of their cost-effectiveness relative to the "Base Case" condition (Strategy Package 1).

TABLE 3.6 INCREMENTAL BENEFIT-COST ANALYSIS FOR STRATEGY PACKAGES

Strategy Package (Figure 1.1.3)	Benefits (Travel Time)	Benefits (Accidents)	Benefits (Vehicle Operating Costs)	Capital Costs	O & M Costs	Incremental Benefit/ Cost Ratio
1-2A	$883,000,000	$663,000,000	$1,100,000,000	$750,000,000	**($36,000,000)**	**3.7**
1-2B	$1,917,000,000	$1,323,000,000	$1,136,000,000	$1,140,000,000	$3,000,000	**3.8**
1-2C	$1,623,000,000	$993,000,000	$1,244,000,000	$1,850,000,000	$69,000,000	**2.0**
1-3A	$1,620,000,000	$1,323,000,000	$1,248,000,000	$1,040,000,000	**($121,000,000)**	**4.6**
1-3B	$1,905,000,000	$993,000,000	$1,153,000,000	$1,330,000,000	$304,000,000	**2.5**

In this incremental analysis all "build packages" are economically justified in comparison with the base case (i.e., Benefit/Cost ratio > 1.0). In particular to note is the fact that Strategy Packages 2A and 3A have incremental operations and maintenance costs less than Strategy Package 1 (the "Base Case" scenario) because of the reduced pavement repair costs and an emphasis on total pavement replacement. Furthermore, Strategy Packages 2C and 3B carry the higher operation and maintenance costs related to the higher transit element investment.

4. MIS STRATEGY RECOMMENDATIONS

Following the detailed analysis, including consideration of input solicited through the Public Involvement Plan, recommendations for the most effective strategy for improving transportation in the I-70 Study Corridor were formulated. The recommendations of the I-70 MIS consist of a combination of the two higher scoring strategy packages, plus selected elements from the other strategy packages. The geographic limits of the various highway recommendations approximately follow the Study Corridor sections identified earlier in the *I-70 MIS* process: Urban, Suburban and Emerging Suburban.
It is important to note again that the purpose of these recommendations is to provide guidance about the I-70 Study Corridor as input to the Long-Range Transportation Plan (LRTP) for the Kansas City metropolitan area. While these recommendations are the best current long-range vision for the corridor and will be the foundation for subsequent project development activities, they do not represent any final commitments in terms of funding or implementation details. Further planning may change the scope, cost ranges, schedule or other details of improvements to the corridor.

In the Urban section between the Loop and I-435, the MIS recommends reconstructing I-70 to a six-lane freeway with provisions for a future "transportation improvement corridor" from the Loop to U.S. 40 Highway (Blue Ridge Mall). This clear corridor would be reserved to accommodate additional capacity to serve future peak period travel demands in the urban area. Subsequent planning studies to be undertaken inclusive in the NEPA process will evaluate alternative modes and uses for the corridor along with detailed alternative alignments. Typical applications could include managed, reversible, high occupancy vehicle (HOV) lanes, bus lanes, commuter express lanes, or fixed guideway transit.

In the Suburban section, east of U.S. 40 Highway to Route 7 in Blue Springs, the MIS recommends total reconstruction of I-70 with an additional lane in each direction, resulting in an eight-lane urban freeway.

The Emerging Suburban section, continuing east beyond Route 7 to Oak Grove, the MIS recommends a transition to a rural six-lane facility with a depressed median to east of the Route F/H interchange in Oak Grove.

Along with pavement reconstruction for the entire length of the Study Corridor, the reconstruction of the Jackson and Benton Curves would include alignment improvements to the extent possible within current right-of-way constraints. The Loop is also improved to enhance freeway operations and service levels, and support better access into and out of the downtown CBD. Furthermore, all of the interchanges in the Urban and Suburban sections of I-70 from the Loop to Blue Springs would require reconstruction to accommodate the proposed future "transportation improvement corridor" and the eight-lane freeway section. Several interchanges will require reconfiguration to better accommodate current and escalating traffic demands, such as I-435, I-470, Noland Road, and Route 7. Interchanges in the Emerging Suburban section will also be reconstructed to meet current standards. These interchanges are under further detailed development as part of the Second Tier studies currently ongoing in this section of the overlap section of the Study Corridor.

Furthermore, the I-70 MIS recommends corridor-wide investments that support additional park-and-ride facilities, the implementation of Operation Green Light, advanced public transportation systems, expanded freeway service patrols, and implementation of the Smart Moves transit plan and new transit centers in the corridor. The study also recommends the continued pursuit of potential commuter rail service in existing rail corridors, and Bus Rapid Transit service on selected arterial roadways in the Study Area.

The summary cost range break down of the MIS Recommended Strategy is as follows:

TABLE 4.1 I-70 MIS RECOMMENDED STRATEGY COST RANGE BREAKDOWN

Preferred Strategy Element	Description	Cost Range (in millions)
The Loop	**Major Highway Improvements:** All four legs and re-designed access and interchanges.	**$ 170 to $280**
I-70 Study Corridor from Paseo to 40 Highway / Blue Ridge Blvd (i.e., Blue Ridge Mall)	**Major Highway Improvements**: Three (3) lanes per direction with provisions for a 48-ft "transportation improvement corridor"[2] and upgraded interchanges. This also includes park-and-ride facilities and KC Scout.	**$510 to $850**
I-70 Study Corridor from 40 Highway / Blue Ridge Blvd. (i.e., Blue Ridge Mall) to Route 7 / Blue Springs	**Major Highway Improvements:** Four (4) lanes per direction with a wide inside shoulder providing for a potential future interior managed lane, and upgraded interchanges. This also includes Park-and-Ride lots and KC Scout.	**$330 to $550**
I-70 Study Corridor from Route 7/Blue Spring to Routes F/H / Oak Grove (i.e., Statewide FTED – S.I.U. 1 Overlap)	**Major Highway Improvements:** Three (3) lanes in each direction and upgraded interchanges.	**$ 160 to $260**
I-70 Study Area (i.e., area wide including the Parallel Network)	**Transit and Other Improvements:** Community Bridges, Operation Green Light, Smart Moves Plan, Commuter Rail and all other improvements.	**$ 290 to $480**
	TOTAL I-70 MIS RECOMMENDED STRATEGY ESTIMATE	**$ 1,460 to 2,420**

At the conclusion of this MIS, MoDOT and MARC will initiate NEPA studies in the I-70 corridor to develop the final preferred alternative for the corridor, using the MIS Statement of Purpose and Need and Strategy Packages as their foundation. These studies will include an initiative lead by MoDOT focusing on the highway elements of the MIS recommendations in NEPA and an initiative lead by MARC to conduct an Alternatives Analysis (AA) for fixed guideway transit strategies, including commuter rail, within the corridor as well as other corridor-wide recommendations. MoDOT and MARC will collaborate with KCATA and other stakeholders on these two initiatives

- In the NEPA/AA Scoping process,
- At development of Purpose and Need,
- At development of Reasonable Alternatives, and

[2] For the purposes of impact and cost analysis in comparison with other strategies, the "transportation improvement corridor" was assumed to consist of a pair of reversible managed lanes designated for HOV and transit operations.

- At other points throughout their development, to engage Federal, State, Regional and Local stakeholders, as well as the general public, to arrive at a single comprehensive preferred alternative for this corridor.

MARC will also work with MoDOT, KCATA and other stakeholders to draw from the recommendations of the MIS in the next update of the Kansas City region's LRTP, recognizing that details about the scope, cost or schedule of improvements in the I-70 corridor may change pending the outcome of NEPA and other project development activities. When any refinements to the MIS recommendations are available from the NEPA or AA studies, they will be incorporated into the LRTP. Until then, the I-70 MIS will serve as the foundation for the design concept and scope of I-70 corridor improvements in the MARC LRTP for the purposes of fiscal constraint and air quality conformity.

Appendix C
Tort Liability Statement:
Traffic Accident & Safety Data

Traffic Accident and Safety Data

The National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321-4370f, requires that this analysis of the proposed project must consider and discuss its effects and impacts on mankind, and its effects and impacts on plants, animals, resources, and the natural world in general. One of the key elements to be discussed in any NEPA analysis of a proposed highway project is its effects and impacts on the safety of those who use those highways. However, Congress has recognized that even while this document summarizes and presents traffic accident and safety information for the general information and benefit of the public, pursuant to federal law, some people may attempt to use the information to establish federal, state or local liability in lawsuits arising from highway accidents. Congress has enacted a law, 23 USC Section 409, which prohibits the discovery or use of highway accident and safety data, developed under federal law to make highway safety improvements, in litigation seeking damages for accidents and occurrences on these highways. Congress's rationale is obvious: the safety data was compiled and collected at their request, to help prevent future accidents, injuries and death on our nation's highways. If that information can be used in expensive damage suits, then the millions of dollars that litigation may cost the Missouri Department of Transportation (MoDOT) and local governments will not be available for their use to make Missouri's highways safer.

Traffic accident statistics and safety data are compiled, presented and summarized in portions of this NEPA document. Where noted in an introductory footnote to a segment of this document, the discussion, reports, lists, tables, diagrams and data presented throughout that chapter, unit, section or subsection was compiled or collected for the purpose of identifying, evaluating or planning the safety enhancement of potential accident sites or hazardous roadway conditions pursuant to federal law. Thus, that information and its supporting reports, schedules, lists, tables, diagrams and data are not subject to discovery, and they are prohibited by federal law (23 USC § 409) from being admitted into evidence in a federal or state court proceeding, or from being considered for other purposes, in any action for damages arising from an occurrence on the highways, intersections or interchanges discussed in this document.