CHAPTER 2

ALTERNATIVES CONSIDERED

This chapter discusses the potential concepts and alternatives for improvements in the I-70 Second Tier EIS Study Area and how the Study Team developed, refined, and analyzed the alternatives over the course of the study.

This chapter begins with **Section 2.1 Initial Alternatives Development,** a discussion of the concepts and initial alternatives that were considered during the early part of the study. The next part of this chapter, **Section 2.2 Second Tier Alternatives Development**, discusses the process used to narrow the initial alternatives down to three Second Tier Alternatives and discusses the No-Build and two Build Alternatives carried forward for more detailed analysis. **Section 2.3 Second Tier Alternatives Traffic Modeling** discusses how the traffic model was developed and used for analysis. **Section 2.4 Evaluation Process for Second Tier Alternatives** discusses the more detailed evaluation process of the three Second Tier Alternatives. **Section 2.5 The Preferred Alternative** discusses why the Study Team has identified a Preferred Alternative as the solution.

2.1 Initial Alternative Development

This section discusses how the Missouri Department of Transportation (MoDOT) and the Federal Highway Administration (FHWA) worked with the local agencies, stakeholders, and the public to develop, refine, and evaluate potential initial alternatives to improve I-70. The Study Team presented 12 alternatives for improving I-70 to the local agencies, stakeholders, and the public that fit within the Improve Key Bottlenecks Strategy recommendation from the First Tier EIS. **Chapter 4** identifies the local agency, stakeholder, and public involvement processes used throughout the study.

What is a Strategy?

A strategy is a conceptual proposal for solving transportation issues in a corridor such as construct longer ramp lengths. Several ideas or strategies can be combined together to make an overall improvement strategy.

What is meant by improvement alternatives?

Improvement alternatives are transportation improvement opportunities to address the transportation issues along I-70. Improvement alternatives may include a series of specific transportation improvements concepts such as fixing existing pavement and bridges, improving interchange ramps, and transit improvements.

What is a Second Tier Alternative?

A Second Tier Alternative is one of three alternatives that is carried forward from the 12 initial alternatives for more detailed evaluation.

How were the Initial Alternatives Developed?

The Study Team developed 12 initial alternatives based on initial engineering and environmental analysis, Mid-America Regional Council's (MARC) Congestion Management Process (CMP) toolbox, First Tier EIS outcomes, as well as comments and feedback from local agencies, stakeholders, and the public.

What were the Initial Alternatives Studied?

The following section is a brief summary of the 12 Initial Alternatives. The 12 Initial Alternatives are shown in **Appendix B**.

What is Transportation System Management (TSM)?

TSM is a series of programs and efforts to improve the existing roadway operations. Some examples include Motorist Assist and Kansas City Scout.

Initial Alternative 1: No-Build

The No-Build Alternative originated from the I-70 First Tier EIS and included maintenance activities as needed and projects already committed to in MoDOT's five-year construction program, the Statewide Transportation Improvement Program (STIP). This alternative includes the following activities:

- Repaving I-70 through regular maintenance
- Upgrading the I-70 interchanges and bridges, including replacing the Manchester Bridge as identified in the STIP
- Transportation System Management (TSM) and Transportation Demand Management (TDM) activities
- Maintaining the existing bus service provided by the Kansas City Area Transportation Authority

What is Transportation Demand Management (TDM)?

TDM is a series of programs and efforts to reduce the demand for using the roadway. Examples include carpooling, alternative work hours, and telecommuting.

Initial Alternative 2: Transportation System Management (TSM)

Alternative 2A aimed to apply strategies that improve the efficiency and operation of the existing I-70 facility. This alternative included rebuilding and/or rehabilitating I-70 pavement and bridges, enhancing incident management, Intelligent Transportation Systems (ITS), Kansas City Scout activities, ramp metering, and Operation Green Light. Specific improvements include:

- Rebuild and/or rehabilitate I-70 pavement and bridges over time
- Enhance the Motorist Assist program
- ITS and KC Scout real time information
- Consider ramp metering
- Eliminate merge and diverge conflicts during the peak hours of the day with time of day ramp closures
- Use variable speed limits
- Coordinate with Operation Green Light
- Improve shoulder width to allow bus on shoulder

Alternative 2B applies the strategies of Alternative 2A with the addition of converting an existing lane in each direction to a High Occupancy Vehicle (HOV) lane.

What is Kansas City Scout?

The Kansas City Scout is an Intelligent Transportation System (ITS) designed to monitor and respond to traffic incidents and to provide traffic and roadway information to motorists in the Kansas City Metropolitan Area.

Initial Alternative 3: Transportation Demand Management (TDM)

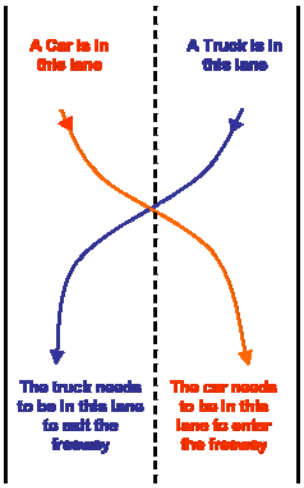
Alternative 3 aimed to apply strategies that reduce the number of vehicles on the road during the peak periods. This alternative included rebuilding and/or rehabilitating I-70 pavement and bridges, flexible work hours, telecommuting, carpooling, and at least one park and ride location. Specific improvements include:

- Rebuild and/or rehabilitate I-70 pavement and bridges over time
- Partner with businesses to encourage alternative work
- Partner with businesses to encourage telecommuting
- Promote ridesharing
- Construct a park and ride in the Study Area
- Improve bicycle and pedestrian access across I-70 as bridges are replaced

Initial Alternative 4A: Other Transportation Modes (Transit, Bike, Pedestrian)

Alternative 4A incorporated strategies that aim to reduce the use of non-passenger vehicles. This alternative included rebuilding and/or rehabilitating I-70 pavement and bridges, expanding transit service, evaluating potential park and ride locations, bus on shoulder, and enhanced bicycle and pedestrian access. Specific improvements include:

What is a weaving area?



The car and truck must cross the other traffic to get to the lane they want to be in.

- Rebuild and/or rehabilitate I-70 pavement and bridges over time
- Expand bus transit service along I-70
- Construct a park and ride in the Study Area
- Improve shoulder width to allow bus on shoulder
- Improve bicycle and pedestrian access across I-70 as bridges are replaced

Another transit enhancement potential is commuter rail transit in Jackson County. In Alternative 4A, it was assumed that commuter rail would NOT move forward from the Jackson County Commuter Corridor Alternatives Analysis. This assumption was made when the transit study was underway.

Alternative 4B assumed the Jackson County Commuter Corridor Alternatives Analysis WILL select the alternative to construct commuter rail with reduced/limited bus service will be the selected alternative from this study.

Initial Alternative 5: Geometric Improvements

Alternative 5 incorporated the No-Build Alternative with improvements to the geometric features of I-70. These improvements would include rebuilding and/or rehabilitating I-70 pavement and bridges, improving horizontal and vertical alignment, increased ramp lengths, extend weave areas, addition of auxiliary lanes, bus on shoulder, improved bicycle/pedestrian access across I-70, and consider aesthetic enhancements. Specific improvements include:

What is a Left Exit?

A left exit or left lane exit occurs when an exit ramp is located in the left lane of a highway instead of on the right lane, which is more common.

- Rebuild and/or rehabilitate I-70 pavement and bridges over time
- Eliminate I-435 left lane exits and eliminate the existing tight loop ramps
- Improve the Benton and Jackson Curves
- Remove Benton Boulevard on-ramp
- Extend merge and diverge ramp lengths at various locations
- Extend weave areas as appropriate
- Replace the low clearance bridge at 27th Street
- Add auxiliary lanes between interchanges as appropriate
- Improve shoulder width to allow buses on shoulder

- Improve bicycle and pedestrian access across I-70 as bridges are replaced
- Consider aesthetic enhancements

Initial Alternative 6: Interchange Consolidations

Alternative 6 incorporated the geometric features improvements in Alternative 5 and consolidated some closely spaced interchanges. These improvements included rebuilding and/or rehabilitating I-70 pavement and bridges, improving horizontal and vertical alignment, interchange consolidations, increased ramp lengths, extend weave areas, addition of auxiliary lanes, bus on shoulder, improved bicycle/pedestrian access across I-70, and consider aesthetic enhancements. Specific improvements include:

- Rebuild and/or rehabilitate I-70 pavement and bridges over time
- Consolidate Brooklyn Avenue and Prospect Avenue interchanges into one interchange
- Consolidate 18th Street and 23rd Street interchanges into one interchange
- Consolidate U.S. 40 and Manchester Trafficway into one interchange
- Improve the Benton and Jackson curves
- Remove Benton Boulevard on-ramp
- Replace the low clearance bridge at 27th Street
- Extend merge and diverge ramp lengths at various locations
- Extend weave areas as appropriate
- Add auxiliary lanes if needed between interchanges
- Eliminate I-435 left lane exits and tight loop ramps
- Improve low clearance bridge on Stadium Drive to allow trucks to safely use this route to access southbound I-435 and eastbound I-70
- Improve shoulder width to allow buses on shoulder
- Improve bicycle and pedestrian access across I-70 as bridges are replaced
- Consider aesthetic enhancements

What is an Auxiliary Lane?

An auxiliary lane is a lane that is added between interchanges to give drivers more room to speed up and slow down when getting on or off a highway.

What is Horizontal and Vertical Alignments?

Horizontal and vertical alignments refer to the curves (horizontal) and hills and valleys (vertical) features of a roadway.

Initial Alternative 7: One Interchange per Zone

Alternative 7 incorporated improvements to the geometric features in Alternative 5 and consolidated interchanges to best

meet the current urban interchange spacing standards of approximately one interchange per mile. This alternative included rebuilding and/or rehabilitating I-70 pavement and bridges, improving horizontal and vertical alignment, interchange consolidations, increased ramp lengths, extend weave areas, bus on shoulder, improved bicycle/pedestrian access across I-70, and consider aesthetic enhancements. Specific improvements include:

- Rebuild and/or rehabilitate I-70 pavement and bridges over time
- Consolidate interchanges to one per zone
- Improve the Benton and Jackson curves
- Consider removing Benton Boulevard on-ramp
- Extend merge and diverge ramp lengths at various locations
- Extend weave areas as appropriate
- Replace the low clearance bridge at 27th Street
- Add auxiliary lanes if needed between interchanges
- Improve shoulder width to allow buses on shoulder
- Eliminate I-435 left lane exits and tight loop ramps
- Improve low clearance bridge on Stadium Drive to allow trucks to safely use this route to access southbound I-435 and eastbound I-70
- Improve bicycle and pedestrian access across I-70 as bridges are replaced
- Consider aesthetic enhancements

What are collector-distributor roads?

Collector-distributor roads are barrier separated lane(s) used to separate mainline traffic and traffic intending to enter/exit at cross streets.

Initial Alternative 8: Collector-Distributor System

Alternative 8 incorporated improvements to the geometric features in Alternative 5 and constructed a collector-distributor roadway network from The Paseo to U.S. 40. This alternative included a collector-distributor roadway between The Paseo and U.S. 40, improving horizontal and vertical alignment, increased ramp lengths, extend weave areas, bus on shoulder, improved bicycle/pedestrian access across I-70, and consider aesthetic enhancements. Specific improvements include:

- Rebuild and/or rehabilitate I-70 pavement and bridges over time
- Construct a collector-distributor roadway from The Paseo to U.S. 40
- Improve the Benton and Jackson curves

- Consider removing Benton Boulevard on-ramp
- Extend merge and diverge ramp lengths at various locations
- Extend weave areas as appropriate
- Replace the low clearance bridge at 27th Street
- Eliminate I-435 left lane exits and tight loop ramps
- Improve shoulder width to allow buses on shoulder
- Improve bicycle and pedestrian access across I-70 as bridges are replaced
- Consider aesthetic enhancements

Initial Alternative 9: Zonal Collector-Distributor System

Alternative 9 was a variation of Alternative 8. Alternative 9 looked at a collector-distributor roadway only between interchanges in specific locations, improving horizontal and vertical alignments, increased ramp lengths, extend weave areas, bus on shoulder, improved bicycle/pedestrian access across I-70, and consider aesthetic enhancements. Specific improvements include:

- Rebuild and/or rehabilitate I-70 pavement and bridges over time
- Construct collector-distributor roads and auxiliary lanes between The Paseo and Prospect Avenue, 18th Street and 23rd Street using Bales Avenue and Askew Avenue, and 27th Street and U.S. 40.
- Improve the Benton and Jackson curves
- Consider removing Benton Boulevard on-ramp
- Extend merge and diverge ramp lengths at various locations
- Extend weave areas as appropriate
- Replace the low clearance bridge at 27th Street
- Eliminate left lane exits and existing tight loop ramps
- Improve shoulder width to allow buses on shoulder
- Improve bicycle and pedestrian access across I-70 as bridges are replaced
- Consider aesthetic enhancements

Initial Alternative 10: Reversible Lanes Using Existing Lanes

Alternative 10 incorporated improvements to the geometric features in Alternative 5 and used the existing lanes as

reversible lanes between The Paseo and U.S. 40. This alternative included a reversible lane using the existing lanes (4 lanes peak direction and 2 lanes off peak direction), improving horizontal and vertical alignments, increased ramp lengths, extend weave areas, bus on shoulder, improved bicycle/pedestrian access across I-70, and consider aesthetic enhancements. Specific improvements include:

- Rebuild and/or rehabilitate I-70 pavement and bridges over time
- Explore the use of an existing lane as a reversible lane
- Add auxiliary lanes if needed between interchanges
- Improve the Benton and Jackson curves
- Consider removing the Benton Boulevard on-ramp
- Extend merge and diverge ramp lengths at various locations
- Extend weave areas as appropriate
- Replace the low clearance bridge at 27th Street
- Eliminate I-435 left lane exits and tight loop ramps
- Improve shoulder width to allow bus on shoulder
- Improve bicycle and pedestrian access across I-70 as bridges are replaced
- Consider aesthetic enhancements

What are Frontage Roads?

Frontage roads are local streets that run parallel to interstates and expressways to provide access to homes, businesses, and property.

What are Arterial Streets?

Arterial streets are streets designed to move large volumes of vehicles with limited direct access to surrounding property.

Initial Alternative 11: Improve Frontage Roads/Arterials and Parallel Streets

Alternative 11 focused on improving the frontage roads and other arterial streets in the vicinity of the corridor in addition to the geometric features in Alternative 5. This alternative included developing a frontage road/arterial system, improving horizontal and vertical alignments, increased ramp lengths, extend weave areas, bus on shoulder, improved bicycle/pedestrian access across I-70, and consider aesthetic enhancements. Specific improvements include:

- Rebuild and/or rehabilitate I-70 pavement and bridges over time
- Develop a frontage road system with new or improved arterial streets with potential locations between Brooklyn Avenue and Prospect Avenue, Askew Avenue between 18th Street and 23rd Street, Jackson Avenue westbound off-ramp to 27th Street, and the

Van Brunt Boulevard westbound on-ramp to the Raytown Road intersection
- Improve the Benton and Jackson curves
- Consider removing Benton Boulevard on-ramp
- Extend merge and diverge ramp lengths at various locations
- Extend weave areas as appropriate
- Replace the low clearance bridge at 27th Street
- Add auxiliary lanes if needed between interchanges
- Eliminate I-435 left lane exits and tight loop ramps
- Improve shoulder width to allow buses on shoulder
- Improve bicycle and pedestrian access across I-70 as bridges are replaced
- Consider aesthetic enhancements

Initial Alternative 12: Interchange Consolidations and Rebuild Truman Road Interchange

Alternative 12 incorporated the geometric features improvements in Alternative 5 and consolidate some closely spaced interchanges. These improvements included a rebuilt Truman Road interchange, interchange consolidation, improving horizontal and vertical alignments, increased ramp lengths, extend weave areas, bus on shoulder, improved bicycle/pedestrian access across I-70, and consider aesthetic enhancements. Specific improvements include:

- Rebuild and/or rehabilitate I-70 pavement and bridges over time
- Rebuild a full access Truman Road interchange
- Consolidate Brooklyn and Prospect interchanges into one interchange
- Consolidate 18th Street and 23rd Street interchanges into one interchange
- Consolidate U.S. 40 and Manchester Trafficway into one interchange
- Improve the Benton and Jackson curves
- Consider removing Benton Boulevard on-ramp
- Extend merge and diverge ramp lengths at various locations
- Extend weave areas as appropriate
- Replace the low clearance bridge at 27th Street
- Add auxiliary lanes if needed between interchanges

- Eliminate I-435 left lane exits and tight loop ramps
- Improve low clearance bridge on Stadium Drive to allow trucks to safely use this route to access southbound I-435 and eastbound I-70
- Improve shoulder width to allow buses on shoulder
- Improve bicycle and pedestrian access across I-70 as bridges are replaced
- Consider aesthetic enhancements

2.2 Second Tier Alternatives Development

What is a screening process?

An evaluation that identifies which strategies best achieve the goals set forth by the project.

This section discusses how well the 12 Initial Alternatives address the overall goals for improvements within the Study Area as discussed in **Chapter 1**. The Study Team also considered engineering issues and impacts to the environment in the evaluation. The Study Team screened the 12 Initial Alternatives down to three Second Tier Alternatives. The complete Initial Alternatives Screening Memorandum is in **Appendix B.**

How were the Initial Alternatives Screened?

The 12 Initial Alternatives were evaluated against the purpose and need for improving I-70:

- Improve Safety
- Reduce Congestion
- Restore and Maintain Existing Infrastructure
- Improve Accessibility
- Improve Goods Movement

More detailed information on the purpose and need for improving I-70 is in **Chapter 1**. The Study Team also considered public input, engineering issues and impacts to the human environment, the natural environment, and the cultural resources within the Study Area. Initial Alternatives were not carried forward if they did not meet the purpose and need, with the exception of the No-Build Alternative. In addition, an alternative was not carried forward if it contained the same basic concepts as another alternative carried forward, was combined with other alternatives that were carried forward, or had engineering issues or cost estimates that were substantially higher than other alternatives.

What Are the Three Second Tier Alternatives?

Originally, the Study Team screened the 12 Initial Alternatives down to four Second Tier Alternatives in September 2012. The alternatives carried forward for further evaluation were:

- Alternative 1 No-Build
- Alternative 5 - Geometric Improvements
- Alternative 9 - Zonal Collector-Distributor System
- Alternative 12 - Interchange Consolidations and Rebuild the Truman Road Interchange

The Study Team performed a concept design refinement process for these four alternatives which resulted in the following conclusions.

Alternative 9 does not allow for the construction C-D systems in two consecutive zones due to interchange spacing issues. The available space between the end of one zone and the beginning of the next is not sufficient to build Alternative 9. As a result, Alternative 9 was not carried forward as a standalone alternative but left the option for C-D road systems in the Interchange Consolidations Alternative as appropriate.

For Alternative 12, it was determined to be impractical to construct the full interchange at Truman Road without substantial Section 4(f) park impacts. To avoid the park the interchange would have been a non-typical interchange in the middle of the Benton Curve requiring several blocks of business relocations.

The Study Team considered public comments, engineering issues, and impacts to the human and natural environments. The Study Team revised the Second Tier Alternatives carried forward to the following three:

- Alternative 1 No-Build - This is a requirement of the National Environmental Policy Act process
- Alternative 5 Geometric Improvements
- Alternative 6 Interchange Consolidations

During an engineering review of the alternatives, the removal of local road connections to on- and off-ramps was added to Alternative 5 Geometric Improvements and Alternative 6 Interchange Consolidations. Engineering considerations resulted in not improving the I-435 left lane exits and the tight loop ramps in Alternative 5 Geometric Improvements. Two other improvement revisions were added to Alternative 6 Interchange Consolidations including:

- Closure of the Truman Road eastbound off-ramp and the westbound on-ramp
- Consolidate 27th Street and Jackson Avenue interchanges into one interchange and close the eastbound ramp to Myrtle Avenue

Figures of each of the Second Tier Alternatives are presented in **Figures 2-1** through **2-3** at the end of this chapter. Even though Alternatives 2, 3, 4, and 11 are not being carried forward as individual standalone alternatives, some elements of these alternatives may be included in the alternatives carried forward listed above. Some of the elements may include:

- Other transit improvements discussed in Alternatives 4A and 4B in coordination with the Jackson County Commuter Corridor Alternatives Analysis
- Improved bicycle and pedestrian access across I-70 as bridges are replaced
- TSM activities such as ramp metering
- TDM activities such as ride sharing, carpooling, and flexible work programs/schedules
- Enhanced ITS and motorist assist
- Improvements to roads adjacent to I-70 between interchanges

The alternatives that were eliminated include:

- Alternative 7 One Interchange per Zone – This alternative is similar to Alternative 6 and 12.
- Alternative 8 Collector-Distributor System – This alternative is similar to Alternative 9. It is anticipated that a collector-distributor road between The Paseo and

U.S. 40 would have more impacts than Alternative 9 and preclude site specific solutions.

- Alternative 9 Zonal Collector-Distributor System – It was determined that this alternative will not function effectively as a standalone alternative.
- Alternative 10 Reversible Lanes Using the Existing Lanes – This alternative has similar benefits as some of the other alternatives; however, the cost would be substantially higher. In order to construct this alternative, the east and westbound lanes would need to be connected to each other to allow the center lane in each direction to be reversible depending on the peak flow. There are areas that would require significant raising or lowering of the I-70 lanes in one direction or the other. The Benton and Jackson Curves also represent areas where this alternative would be an expensive construction challenge.
- Alternative 11 Improve Frontage Roads/Arterials and Parallel Roads - The improvements associated with this alternative can be incorporated into other alternatives being carried forward.
- Alternative 12 - It was determined that a complete/full interchange at Truman Road was not practical. A straight forward interchange design at that location would have resulted in a substantial 4(f) impact to The Grove Park. A hybrid interchange solution to avoid the park would result in the introduction of an unusual interchange configuration in the middle of the Benton curve on I-70 and acquisition of multiple blocks of businesses.

What is a base year?

A base year is a recent year that serves as the starting point for a traffic forecast. It is typically a year in which a lot of traffic counts are available so that the model results can be compared to actual traffic data to ensure accuracy.

2.3 Second Tier Alternatives Traffic Modeling

This section discusses how traffic models were developed and used by MoDOT in making their decision.

How Were the Second Tier Alternatives Effects on Traffic Analyzed?

The Study Team used 2012 as the base year and 2040 as the forecasted future year for assessing traffic levels on I-70. MoDOT provided historic Average Annual Daily Traffic

What is Average Annual Daily Traffic (AADT)?

AADT is the average number of vehicles that use a road segment on an average day. It is an estimate of the number of vehicles that use a section of road during an entire year divided by 365.

(AADT) counts. The Second Tier Alternatives were modeled using a modified 2010 MARC regional travel demand model and Dynameq Model Software. The modified MARC regional travel demand model was used to identify the daily volumes on I-70 while Dynameq was used to evaluate the peak hour congestion for both I-70 and local roads through the corridor for each of the Second Tier Alternatives independently with the improvements described earlier in this chapter.

What is the MARC Travel Demand Model?

The MARC Travel Demand Model is a regional computer model that attempts to predict future traffic based on demographics, land uses, population, and traffic volumes. Future traffic demands are also based on regionally accepted land use and employment projections.

The modified 2010 regional model results were compared to actual 2010 traffic counts along I-70 to determine the reasonableness of the 2010 model prior to modeling for 2012 base year and 2040 future conditions. The Study Team made some localized edits to the regional model to improve where and how traffic would flow through the model's road network for a better representation of the actual traffic patterns. The Study team also manually adjusted the model output at a few locations to better replicate the actual traffic counts that were available. This process provided the Study Team with added confidence that the best available 2040 forecast volumes would be achieved.

What is a Peak Volume?

The peak volume is the hour of the day when traffic volumes on a roadway are at their highest. The peak hour typically occurs during the morning or afternoon rush hour, when people are traveling to and from work.

What are the Anticipated Effects of the Second Tier Alternatives on Future Traffic Levels and Congestion?

The Second Tier Alternative improvements were added to the regional model separately. The Study Team ran the regional model for each alternative which resulted in 2040 traffic volumes for each of the Second Tier Alternatives including the No-Build Alternative.

What is Dynameq?

Dynameq is traffic model that uses internal model travel results to revise the traffic routes, which will allow the Study Team to account for the peak period effects of congestion on I-70 and local streets.

The traffic volumes from the modified 2010 MARC regional model output were compared to the 2040 regional model output volumes for each Second Tier Alternative to determine the percent change in daily traffic. The percent change in traffic identified from the model results for each alternative was applied to the actual 2010 traffic counts to arrive at the 2040 traffic estimates for the Second Tier Alternatives.

On average, the traffic model forecast indicate traffic volumes along I-70 will increase between 1.0 percent and 2.7 percent annually from 2010 and 2040. This is an increase in the traffic growth compared to the level of growth experienced in the

past 20 years. For instance, between 1995 and 2005, traffic volumes increased approximately 0.9 percent annually near 23rd Street.

The model results also estimated future morning and afternoon peak volumes based on actual traffic count and peak hour volume data. The morning and afternoon peak hour volumes for each alternative were analyzed to identify congestion concerns on I-70 road sections. The congestion results are discussed in **Section 2.4** for each of the Second Tier Alternatives.

These regional model results were incorporated into a Dynameq model and analysis which allowed the Study Team to better examine the interaction between the proposed alternatives and existing local conditions as well as better analyze a specific bottleneck.

The Dynameq results indicate improved travel flow through the Study Area for the Build Alternatives. The improved travel flow allows traffic to reach the end points of the Study Area more efficiently instead of traffic being slowed down past existing bottlenecks. The model also suggests the potential for congestion in the downtown loop and east of the Study Area which may result in reduced speeds at both ends of the Study Area.

The Dynameq model will also provide input into the Access Justification Report (AJR) required as a part of this study. The AJR is on a parallel schedule as the Final EIS/Record of Decision. Both documents are on schedule to be completed in mid-2014.

What is a bottleneck?

A bottleneck is a section of a road where movement of traffic is limited by the road design. This is often a section of road with a fewer number of lanes, a sharp curve, or access points where traffic is entering or exiting the road. A bottleneck is the most vulnerable point for congestion in a road network and is also referred to as a chokepoint.

2.4 Evaluation Process for the Second Tier Alternatives

This section discusses how the Study Team screened the three Second Tier Alternatives to decide on a Preferred Alternative. Each alternative is evaluated in terms of purpose and need, traffic, and engineering issues. Public and stakeholder involvement is also a part of the overall evaluation process as discussed in **Chapter 4**. The Second Tier Alternative evaluation matrix, **Table 2-2** is located at the end of this

chapter. The environmental analysis of the alternatives is contained in **Chapter 3**.

How Well Will the Second Tier Alternatives Improve Traffic Conditions and Goods Movement?

The Study Team used the modified MARC travel demand model as a tool to determine the expected change in traffic volumes on I-70. The Study Team also created a Dynameq model to determine how well each alternative would reduce travel congestion and address bottlenecks. A key measure used to analyze congestion was the anticipated travel speed along I-70 at various points. The Study team also considered local road delay measured through the forecasted delay at intersections on the local roads in the Study Area. The Dynameq results showing travel speeds for each alternative are shown in **Appendix C**.

What is Travel Speed?

Travel speed is the distance a vehicle travels within a given time. It is most commonly referred to in miles per hour.

Congestion is increasingly noticeable to travelers as travel speeds are reduced. As a result, speed will be used to describe the congestion along the I-70 Study Area. Travel speeds for each alternative have been produced by the Dynameq model and analyzed based on the following speed ranges. The heaviest congestion is represented by the slowest speed range (0 - 25 mph).

- 0 - 25 mph
- 26 - 35 mph
- 36 - 45 mph
- 46 - 55 mph
- greater than 56 mph

The Dynameq model results are displayed graphically in **Appendix C**. The travel speed results are discussed for each alternative below and shown in **Table 2-1**.

No-Build Alternative: The No-Build Alternative does not improve the traffic congestion conditions or goods movement. The traffic conditions and goods movement are expected to worsen in this alternative. The travel speeds are anticipated to drop to 25 mph or less in the westbound direction between U.S. 40 and 18th Street during the morning peak time as a result of the short merge and weave areas between. In

addition, the merge area between Blue Ridge Cutoff and I-435 is also anticipated to drop to 25 mph or less.

The eastbound afternoon peak is anticipated to experience travel speeds less than 25 mph near the Prospect Avenue interchange as a result of a lane drop west of the interchange and a merge area east of Prospect Avenue. Blue Ridge Cutoff interchange is expected to experience slow travel speeds as slowdowns outside of this Study Area extend all the way back to Blue Ridge Cutoff.

Geometric Improvements Alternative: The westbound morning peak period indicates locations with travel speeds less than 25 mph. The travel speeds are anticipated to drop to 25 mph or less in the westbound direction between U.S. 40 and 18th Street during the westbound morning peak period. In addition, there are 25 mph or less travel speeds as a result of slow travel speeds near Blue Ridge Cutoff in the weaving area with I-435.

The eastbound afternoon peak period is anticipated to experience travel speeds less than 25 mph west of Prospect Avenue at the lane drop and west of Blue Ridge Cutoff.

Interchange Consolidations Alternative: The westbound morning peak period indicates locations with travel speeds less than 25 mph. The travel speeds are anticipated to drop to 25 mph or less in the westbound direction between I-435 and 18th Street during the morning peak period.

The eastbound afternoon peak is anticipated to experience travel speeds less than 25 mph at three short sections near 23rd Street, U.S. 40, and west of Blue Ridge Cutoff.

Table 2-1 Dynameq 2040 Travel Speed Results (MPH)					
	Sections	No-Build	Geometric Improvements	Interchange Consolidations	Preferred
AM Peak/ Westbound	The Paseo to Prospect Ave.	33.47	46.66	58.82	24.59
	Prospect Ave. to Jackson Ave.	17.08	19.87	26.54	39.40
	Jackson Ave. to U.S. 40	14.18	17.17	19.54	36.20
	U.S. 40 to Manchester Tfwy.	39.21	35.91	21.63	20.40
	Manchester Tfwy. to Blue Ridge Cutoff	27.15	27.02	30.91	33.31
PM Peak/ Eastbound	The Paseo to Prospect Ave.	35.95	39.20	51.17	41.08
	Prospect Ave. to Jackson Ave.	50.23	54.94	47.40	56.09
	Jackson Ave. to U.S. 40	54.48	53.38	42.88	59.47
	U.S. 40 to Manchester Tfwy.	27.71	28.51	37.60	32.84
	Manchester Tfwy. to Blue Ridge Cutoff	24.03	29.71	34.98	29.52

How Well Will the Second Tier Alternatives Improve Safety?

The Study Team completed a safety analysis that evaluated crash data covering a five year period (2007 to 2011). The safety analysis identified the six eastbound and three westbound sections in the Study Area that exceeded the statewide average crash rate for urban interstates. The locations with crash rates more than 150 percent of the statewide average crash rate are highlighted in the crash summary shown in **Table 1-1** in **Chapter 1 Purpose and Need**.

The Study Area sections with the highest crash rates include westbound from I-435 to U.S. 40, eastbound from I-435 to the Jackson curve, and eastbound at the Benton Curve. The Study Team then evaluated the alternatives to determine if they provide improvements to address the high crash locations in the Study Area.

No-Build Alternative: The No-Build Alternative identified improvements in four crash sections with higher improvement needs. Overall safety would be expected to decline as the corridor becomes increasingly congested with stop and go

traffic flows. MoDOT has conducted a Highway Safety Manual (HSM) analysis for the No-Build Alternative and Preferred Alternative. The results of this analysis are discussed in **Section 2.5** and **Table 2.3**.

Geometric Improvements Alternative: The Geometric Improvements Alternative identified improvements to enhance safety including: improvements to the Benton Curve, the Jackson Curve, improvements at the I-435 interchange, and ramp improvements at The Paseo, U.S. 40 west, and Manchester Avenue. These are all locations where crash data indicates that future safety improvements could be most beneficial.

Interchange Consolidations Alternative: The Interchange Consolidations Alternative identified improvements to enhance safety including: improvements to the Benton Curve, the Jackson Curve, improvements at the I-435 interchange, and ramp improvements at The Paseo, U.S. 40 west, and Manchester Avenue. These are all locations where crash data indicates that future safety improvements could be most beneficial.

How Well Will the Second Tier Alternatives Enhance Multi-Modal Accessibility?

For each of these alternatives the Study Team evaluated locations that would provide potential for access improvements for local traffic, pedestrians, and bicyclists across corridor, as well as transit along the corridor.

No-Build Alternative: The No-Build Alternative does not have committed improvements that will enhance the accessibility across the corridor via improved sidewalks or bicycle lanes. Transit times would not improve and could increase with increased congestion and decreased travel speeds as a result of the No-Build Alternative.

Geometric Improvements Alternative: The Geometric Improvements Alternative would enhance the accessibility across the corridor through improvements at the overpasses, underpasses, and interchanges as bridge replacements occur. The anticipated improvement in travel speed during

congested times would improve transit by making transit a more reliable mode of transportation.

Interchange Consolidations Alternative: The Interchange Consolidations Alternative would enhance the accessibility across the corridor through improvements at the overpasses, underpasses, and interchanges as bridge replacements occur. The anticipated improvement in travel speed during congested times would improve transit by making transit a more reliable mode of transportation.

Improved travel speeds reduce the need for bus on shoulder operations for the Second Tier Alternatives other than the No-Build Alternative. In addition, the number of access points also limits the use of bus on shoulder operations as buses will merge in to the flow of traffic at the access points.

The Jackson County Commuter Corridors Alternatives Analysis has potential plans for a Park and Ride lot in the vicinity of Stadium Drive. That analysis indicated this area would be as close to downtown as feasible.

How Much Would the Second Tier Alternatives Cost?

The following discussion includes estimated construction and right of way costs for the alternatives. After the Second Tier EIS, more detailed design will be completed on the Selected Alternative that will result in more refined cost estimates and could reduce the right of way requirements and costs. All of the cost estimates are in 2013 dollars.

No-Build Alternative: The No-Build Alternative would cost an estimated $8.1 million dollars a year in on-going maintenance and operational costs over the next 27 years. The Manchester Bridge replacement is estimated at $63.8 million. This represents a total estimated cost of approximately $282.4 million between 2013 and 2040.

Geometric Improvements Alternative: The Geometric Improvements Alternative is estimated to cost $205 million to construct and an additional $11.7 million in right of way acquisition costs. The total estimated cost is $216.7 million.

This estimate is in addition to the No-Build cost for the Manchester Bridge project.

Interchange Consolidations Alternative: The Interchange Consolidations Alternative is estimated to cost $245 million to construct and an additional $16 million in right of way acquisition costs. The total estimated cost is $261.0 million. This estimate is in addition to the No-Build cost for the Manchester Bridge project.

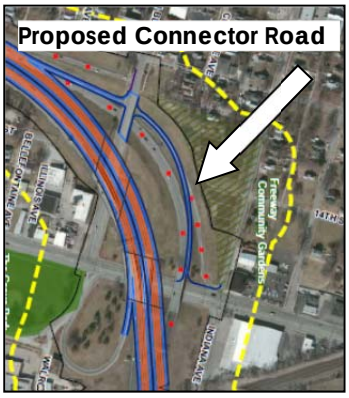
What is meant by Preferred Alternative?

The Preferred Alternative is not the Final Preferred Alternative. Public comments on the Draft EIS and at the public hearing may result in changes to the Preferred Alternative.

2.5 The Preferred Alternative

The I-70 Second Tier EIS Preferred Alternative is a combination of the Geometric Improvements Alternative and the Interchange Consolidations Alternative. **Figure 2-3** at the end of this chapter shows the Preferred Alternative.

MoDOT understands that the proposed Preferred Alternative does not consolidate interchanges to the extent necessary to meet urban interchange spacing guidance. MoDOT will continue to monitor and evaluate the traffic operations on I-70. MoDOT may partially or fully close interchanges in the future when a safety or congestion problem has or is expected to occur on I-70 within a future 5 year period that is influenced by closely spaced interchanges unless an improvement project has already been identified in the MoDOT *Statewide Transportation Improvement Program*.



Proposed Connector Road between Truman Road and Benton Boulevard at the Benton Curve (See Figure 2-3)

Corridor Wide Improvements: The Preferred Alternative would gradually rebuild and/or rehabilitate I-70 with pavement, roadbed, and structure improvements having a potential design life of 50 years. This would likely occur in phases over time and complete reconstruction may not be required. Other corridor wide improvements in the Preferred Alternative include improving non-motorized access over or under I-70, continued coordination with Operation Green Light, and continued coordination with Smart Moves Regional Transit Vision and the Jackson County Commuter Corridors Alternatives Analysis.

The location specific improvements listed below are described starting from The Paseo and moving along I-70 to the east. The identified improvements include:

Proposed Seperated Auxiliary Lane between 18th Street and 23rd Street (see Figure 2-3)

The Paseo interchange – Improve short ramp lengths at The Paseo interchange and replace the diamond interchange in place with lengthened ramps where feasible. Remove 14th Street connections to the ramps. The ramps will connect with The Paseo only. Add westbound and eastbound auxiliary lanes between The Paseo and Prospect Avenue.

Brooklyn Avenue interchange – Remove the westbound I-70 on-ramp from Brooklyn Avenue and the eastbound I-70 off-ramp to Brooklyn Avenue to improve the interchange spacing along I-70. The existing Brooklyn Avenue interchange is a half diamond configuration. Brooklyn Avenue would still cross under I-70.

Prospect Avenue interchange – Improve short ramp lengths at Prospect Avenue and replace the diamond interchange in place with lengthened ramps where feasible. Remove 14th Street connections to the ramps. The ramps will connect with Prospect Avenue only. Add an eastbound auxiliary lane between Prospect Avenue and Truman Road.

Benton Boulevard and Truman Road interchanges – Consolidate the two westbound on-ramps from Benton Boulevard and Truman Road into one on-ramp using a partial split-diamond configuration. Build a connector road from Truman Road to Benton Boulevard resulting in an improved weaving area length with the Prospect Avenue off-ramp.

Benton Curve – Improve the tight curve at Benton Boulevard within the available right of way to the extent possible.

Truman Road interchange – Replace the eastbound off-ramp at Truman Road as is.

18th Street and 23rd Street interchanges – Lengthen the 18th Street westbound on-ramp acceleration lane. Add a westbound separated auxiliary lane between 23rd Street and 18th Street, improve short ramp lengths, and replace the quarter cloverleaf interchange at 18th Street and the diamond interchange at 23rd Street in place. Add westbound and eastbound auxiliary lanes between 23rd Street and 27th Street.

27th Street and Jackson Avenue interchanges – Add an eastbound connector road between 27th Street and Jackson Avenue, improve short ramp lengths, and replace with a split diamond interchange. Remove the ramp connections to Myrtle Avenue and Wenzel Avenue, including the eastbound off-ramp to Myrtle Avenue.

Jackson Curve – Improve the tight curve at Jackson Avenue within the available right of way to the extent possible.

Van Brunt Boulevard interchange – Improve the short ramp lengths at the Van Brunt Boulevard interchange and replace the diamond interchange in place. Remove the ramp connections to Raytown Road and 29th Terrace. Add westbound and eastbound auxiliary lanes between Jackson Avenue and Van Brunt Boulevard.

U.S. 40 interchange – Add an eastbound auxiliary lane between Van Brunt Boulevard and U.S. 40.

Manchester Trafficway interchange – Add westbound and eastbound auxiliary lanes between the U.S. 40 and the Manchester Trafficway interchanges and improve the westbound weaving area between I-435 and Manchester Trafficway as part of the on-going Manchester Bridge replacement project. This on-going Manchester Design/Build project was awarded in 2013.

I-435 interchange – Realign the southbound I-435 to eastbound I-70 off-ramp and replace with a two-lane ramp to eliminate the left lane exit. Replace I-435 bridges over I-70. Improve weave distance from I-435 to westbound I-70 as part of a separate Manchester Bridge replacement project.

Blue Ridge Cutoff interchange – No identified improvements. The diamond interchange will remain in place.

The Preferred Alternative will include local street cul-de-sacs as a result of removing local road connections to on- and off-ramps or other ramp revisions. The following is a list of where cul-de-sacs will be required:

Proposed Split Diamond Interchange between 27th Street and Jackson Avenue at the Jackson Curve (See Figure 2-3)

Proposed I-435 Improvements (See Figure 2-3)

- Wabash Avenue north of I-70
- Wabash Avenue south of I-70
- Askew Avenue north of 23rd Street
- Askew Avenue south of 23rd Street
- Myrtle Avenue north of 27th Street
- Norton Avenue south of 27th Street
- Mersington Avenue south of 27th Street
- Spruce Avenue north of I-70
- Cypress Avenue north of I-70
- Elmwood Avenue north of I-70
- 29th Street Terrace east of Van Brunt Boulevard

How Will the Preferred Alternative Construction be Phased?

The phased construction of the Preferred Alternative will be a key to maintaining regional travel. As a result, shutting down I-70 across the entire Study Area is highly unlikely. A complete closure would force travelers to find alternate routes which will likely include local streets which are less able to handle the traffic volumes on I-70. MoDOT will attempt to provide a minimum of two traffic lanes on I-70 in each direction during construction. In the design phase of the project, MoDOT will determine which segments of I-70 will need full pavement reconstruction. MoDOT will continue on-going maintenance on the portions of I-70 not under construction.

The Study Team has identified improvements at the I-435/I-70 interchange as the first construction project from this EIS. The construction, timing, and phasing beyond this is contingent on available funding.

How Does the Preferred Alternative Improve Traffic Conditions and Goods Movement?

The Preferred Alternative has three locations where travel speeds are reduced to less than 25 mph during the 2040 westbound morning peak period. The three locations are between I-435 and Manchester Trafficway, Truman Road to west of Benton Boulevard, and west of Prospect Avenue. The slow travel speeds are a result of the short weave area between

I-435 and Manchester Trafficway, the weave area between Benton Boulevard and Prospect Avenue, and the downtown loop.

The proposed improvements to I-70 would allow vehicles to travel more efficiently and reach the downtown loop with fewer slowdowns, which results in downtown loop congestion going all the way back to Prospect Avenue.

The 2040 eastbound evening peak period commute would experience some travel speeds below 25 mph. There are two short sections where 25 mph travel speeds are expected in the Study Area. Travel speeds are reduced approaching Prospect Avenue where there is an off-ramp creating a lane reduction. The other location is east of Blue Ridge Cutoff.

The Dynameq model results are shown in **Appendix C** and indicate improved travel flow through the Study Area in the Preferred Alternative. The improved travel flow allows traffic to reach the end points of the Study Area more efficiently instead of traffic being slowed down past existing bottlenecks. The model also suggests the potential for congestion in the downtown loop and east of the Study Area which may result in reduced speeds at both ends of the Study Area.

Increasing the travel speed will benefit goods movement along I-70. Some companies have limited truck deliveries during the morning and afternoon peak periods to avoid congested roadways like I-70, to minimize lost time for drivers, and to achieve more reliable delivery times. The overall proposed improvements for the Preferred Alternative would assist with the movement of freight during all times of the day. **Table 2-1** shows the anticipated travel speeds for each alternative.

How Does the Preferred Alternative Improve Safety?

The Preferred Alternative would provide improvements that increase safety including: improvements to the Benton Curve, the Jackson Curve, improvements at the I-435 interchange, and ramp improvements at The Paseo, Prospect Avenue, Benton Boulevard, Truman Road, 18th Street, 23rd Street, 27th Street, Jackson Avenue, Van Brunt Boulevard,

U.S. 40, and Manchester Avenue. Many of these locations are areas where safety improvements are needed.

MoDOT conducted a Highway Safety Manual (HSM) analysis for the No-Build and Preferred Alternatives. The results cover 20 years and indicate that there are anticipated safety improvements for the Preferred Alternative as shown in **Table 2-3**.

How Well Will the Preferred Alternative Enhance Accessibility Along and Across the Corridor?

The Preferred Alternative would enhance the accessibility across the corridor through pedestrian and bicycle crossing improvements as overpasses, underpasses, and interchanges are improved over time.

Improved travel speeds reduce the need for bus on shoulder operations. In addition, the number of access points also limits the use of bus on shoulder operations as buses will merge in to the flow of traffic at the access points.

Why is the Preferred Alternative Proposed?

This section discusses why the Study Team identified the Preferred Alternative. The Study Team identified the Preferred Alternative for the following reasons:

- It addresses the purpose and need for improving I-70 as identified in **Chapter 1**.
- It improves 2040 peak hour travel speed compared to the No-Build, Geometric Improvements, and Interchange Consolidation Alternatives.
- It considers public comments and concerns.
- It has the fewest number of relocations of homes and businesses in the environmental justice areas as the Geometric Improvements and Interchange Consolidation Alternatives.
- It has comparable human and natural environmental impacts as the Geometric Improvements and Interchange Consolidation Alternatives.

- It has a comparable estimated cost to the Geometric Improvements Alternative and costs less than the Interchange Consolidations Alternative.
- It improves access across the freeway.
- It rebuilds and/or rehabilitates the existing infrastructure.

What will the Preferred Alternative Cost?

The Preferred Alternative is estimated to cost $215 million (2013 dollars) to construct and an additional $12.3 million in right of way acquisition costs. The total estimated cost is $227.3 million. This estimate is in addition to the No-Build cost for the Manchester Bridge project.

What are the Next Steps?

A public comment period of no less than 45 days will follow the publication of this Second Tier Draft EIS document. During the comment period the Study Team will hold a formal public hearing in the Study Area. The Study Team will also hold a series of mobile meetings, host an online town hall meeting and comment opportunity, and attend further speaking engagements to talk about the study. The public and stakeholders can attend any one of these events or send comments on the Second Tier Draft EIS to the addresses listed on the first page of the document.

Following the public hearing and comment period, the Study Team will consider the input from the public, stakeholders, and agencies to potentially refine the Preferred Alternative. The Study Team will produce a Second Tier Final EIS and Record of Decision document that updates the Preferred Alternative and addresses the comments received. MoDOT will provide for a comment period on the Final Second Tier EIS document.

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