Appendix II-A
Design Criteria

APPENDIX II-A
Improve I-70 Program Design Criteria

Design Consideration	Interstate Rural & Bypass	Interstate Urban	U.S. Route Principal Arterial	State Route – Numbered & Principal Arterial	State Route - Lettered & Local Route	Ramp	Frontage Road
Functional Classification	Interstate	Interstate	Principal Arterial	Principal Arterial	Minor Arterial	-	-
Traffic Service Volume (Design Year)	All (over 15,000 ADT)	All (over 15,000 ADT)	All (over 15,000 ADT)	4-Lane > 10,000 ADT 2-Lane < 10,000 ADT	< 5,000 ADT	One Lane < 1500 VPH	All
Number of Lanes (Basic)[2]	6	6	4	4 or 2	2	1	2
Design Speed	75 mph	70 mph	70 mph	60 mph	50 mph	Gore = 50 mph Loop = 30 mph	50 mph Desirable 35 mph Minimum
Lane Width	12’	12’	12’	12’	12’ Desirable 11’ Minimum.	18’	12’ Desirable.
Median Width	124’	26’ w/Barrier	60’[9]	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Outside Shoulder Width	12’	12’	10’	10’	8’	8’	8’
Inside Shoulder Width	12’	12’	4’	4’ (Divided) or Not Applicable	Not Applicable	4’	Not Applicable
Safety Clear Zone	32’	32’	30’	30’	See Note 1	See Note 1	See Note 1
Slopes (H:V): Foreslope In Clear Zone **Foreslope Out of Clear Zone** **Backslope**	6:1 4:1 3:1	6:1 4:1 3:1	6:1 4:1 3:1	6:1 4:1 Des./3:1 Min. 3:1	6:1 4:1 Des./3:1 Min. 3:1	6:1 4:1 3:1	4:1 3:1 3:1
Maximum Horizontal Curve[3] (Based on 0.08'/'SE)	$1^0$30'	$1^0$30'	$3^0$00'	$4^0$45'	$6^0$00'	6^0 at Gore $7^0$30' Max. on Ramp	$6^0$00' Des. $13^0$30' Min.
Vertical Clearance: Over Railroad	23'-6"	23'-6"	23'-6"	23'-6"	23'-6"	23'-6"	23'-6"
Over I-70	19'0"	19'-0"	19'-0"	19'-0"	19'-0"	19'-0"	Not Applicable
Over Crossroad	16'-6"	16'-6"	16'-6"	16'-6"	15'-6"	16'-6"	15'-6"
Grade	3%	3%	4%	4%	5%	5%	7%
Crest Vertical Curve[4]	K = 312	K = 247	K = 247	K = 151	K = 84	K = 84	K = 84 Desirable
Sag Vertical Curve[5]	K = 206	K = 181	K = 181	K = 136	K = 96	K = 96	K = 96 Desirable K = 49 Minimum
Passing Sight Distance[6]	Not Applicable	Not Applicable	2,480’	2,135’	1,835’	-	1,835’ Desirable 1,280’ Minimum
Superelevation[7] (Based on 0.08'/'Maximum)	0.08 Feet/Foot	0.08 Feet/Foot	0.08 Feet/Foot	0.08 Feet/Foot	0.08 Feet/Foot	0.08 Feet/Foot	0.04 Feet/Foot
Pavement Cross Slope	2%	2%	2%	2%	2%	2%	2%
Ditch Depth (Desirable)	4’	4’	4’	4’	2’	2’	2’

Notes:

1. Refer to AASHTO "Roadside Design Guide".
2. Laneage is depended on design year traffic forecasts.
3. Spiral curves required on all curves meeting these conditions: ADT> 400 vpd, Design Speed> 50 MPH and Degree of Curve > $2^0$00'.
4. Exhibit 3-76 - 2001 Policy on Geometric Design - AASHTO.
5. Exhibit 3-79 - 2001 Policy on Geometric Design - AASHTO.
6. Exhibit 3-77 - 2001 Policy on Geometric Design - AASHTO.
7. If superelevation is used on crossroad in Urban Area, use 0.04 '/' as maximum superelevation.
8. Rural standards apply from MO-J/O to U.S. 40, and urban from U.S. 40 to MO-Z.
9. Median Width may be subject to exceptions.

Disclaimer for Improve I-70 Design Criteria: The design criteria presented above is the goal for the Improve I-70 Program. At the time of design, a decision will be made whether the presented design criteria will be followed or the current MoDOT standard will be used. This decision will be based on the available funding at the time of design.

Appendix II-B

Construction Staging and Typical Cross Sections

APPENDIX II-B
Construction Staging

A. Potential Construction Phasing

The focus, goals and priorities for construction of the corridor have yet to be determined. Assuming funding was not an issue, the entire corridor (MO-J/O to MO-Z) might take seven to 10 years, end to end, full buildout. Most of this time would be spent within the City of Columbia and assuming full funding for the Columbia section. However, MoDOT has stated that the construction would be phased in over the next 30 years as the needs arise at particular locations and as funding is available. One approach would be to develop a corridor construction program for delivery over that time by identifying and prioritizing a number of individual projects. If MoDOT receives only partial funding, the highest priority project would proceed. The first priority might be the MO-740 interchange or the US 63/Business 63 interchange, or additional lanes on I-70. The decision would be made based on need at the time the funding becomes available, as well as how much money is available.

A great deal of energy, time and thought go into the development of order of projects in a program, as well as the staging plans (in what order do all of the pieces of an individual project get built). An extremely important consideration in the development of the staging is the impact on the traveling public both during and after construction, including delay and safety. Not all locations, i.e. all interchanges, would be under construction at the same time. Projects would be staggered and sequential. MoDOT is committed to keep four lanes of traffic moving on I-70, and to keep access to businesses open during construction.

B. Construction Staging Approaches

In the development of an EIS, it is too early to determine the exact plan that a contractor would follow during the construction of a project. Plans must be flexible and are determined on a project-by-project basis. Each plan has a focus on safety requiring careful planning and execution. The goal is to construct the project while safely maintaining traffic flow. Impacts to traffic operations must be kept as close to normal while providing positive protection of the drivers from the work area and adequate room for the contractor to perform work safely and efficiently.

A number of methods to manage the traffic flow would be employed during the construction activities. These include temporary pavement, construction of crossroad bridges next to existing bridges, temporary roadway connections between old and new facilities, temporary lane and ramp closures, shifting of traffic lanes, narrow shoulder widths and temporary traffic barriers. In addition, construction contractor working hours may include nights and weekends. Finally, warning signs with appropriate legends and regulatory signs, such as speed reduction signing, changeable message signs, lighting and other warning devices, would be positioned to give the driver sufficient time to respond to the conditions.

C. Potential Staging for the Reconstruction of I-70

The corridor contains five distinct sections with differing conditions of construction, depending on the relationship of the existing median location in relation to the new roadway. In general, construction could be accomplished by one of several methods. In one approach, new construction could take place on the outside of the existing facility, traffic shifted to the new lanes, and the area in between completed. In another method, temporary pavement could be constructed adjoining existing pavement in one direction of travel, and traffic shifted to the temporary lanes. Construction of new lanes would occur after the abandoned pavement is removed. Traffic would be shifted over to the new lanes and the temporary lanes removed and reconstructed. A third possibility would be for temporary pavement to be constructed in the median of the existing facility, and traffic shifted to this location. Construction of the new lanes would occur on the outside of the temporary pavement. Traffic would then be shifted to the new lanes and the area in between completed.

There are many different potential approaches that could be used to sequence the construction staging. The staging approach shown below was chosen because it appears to minimize the number of traffic shifts and amount of temporary pavement. This staging approach may or may not be the approach ultimately used during construction.

1. MO-J/O to U.S. 40

This section of I-70 has an existing 40-foot (12.2-m) median. The proposed median is 124 feet (37.8 m) wide with widening taking place to the south of the existing eastbound (EB) lanes. The approach would be to first build the new EB lanes offset to the south. EB traffic would be shifted to the new EB lanes. Westbound (WB) traffic would be shifted to the existing old EB lanes. The existing WB lanes would be demolished. New WB lanes would be constructed where the existing old WB lanes were. WB traffic would be shifted to the new WB lanes. The remaining pavement would be demolished.

2. U.S. 40 to MO-740, and Paris Road to MO-Z

These two sections of I-70 have an existing 40-foot (12.2-m) median. The proposed median treatment leaves 50 feet (15.2 m) (26 feet [7.92 m], plus two 12-foot [3.7-m] shoulders) between eastbound and westbound lanes, separated by a barrier. Widening takes place symmetrically about the existing centerline. The approach would be to first build temporary pavement in the median between the existing lanes. Traffic would be shifted to the temporary pavement. The new outside EB and WB lanes would be constructed, and traffic shifted to the new lanes. The temporary pavement and existing old lanes would be demolished, and the new lanes constructed and opened to traffic.

3. MO-740 to Business Loop West

This section of I-70 has an existing 12-foot (3.7-m) median. The proposed median treatment leaves 50 feet (15.2 m) (26 feet [7.92 m], plus two 12-foot [3.7-m] shoulders) between eastbound and westbound lanes, separated by a barrier. Widening takes place to the north of the existing freeway. The approach would be to first build the new EB and WB lanes north of the existing lanes. Traffic would be shifted to the new lanes and the existing old pavement removed.

4. Business Loop West to MO-163

This section of I-70 has an existing 12-foot (3.7-m) median. The proposed median treatment leaves 50 feet (15.2 m) (26 feet [7.92 m], plus two 12-foot [3.7-m] shoulders) between eastbound and westbound lanes, separated by a barrier. Widening takes place slightly south of the existing centerline. The approach would be to first build the new outside EB lanes and bridges. EB traffic would be shifted to the new EB lanes. WB traffic would be shifted to the existing old EB lanes. The existing old WB lanes and bridges would be removed. The new WB lanes and bridges would then be built, and WB traffic shifted to the new lanes and bridges. The remaining old pavement and bridges would be removed. The remaining EB and WB lanes and bridges would be constructed and the new lanes opened to traffic.

5. E. MO-163 163 to Paris Road

This section of I-70 has an existing 12-foot (3.7-m) median. The proposed median treatment leaves 50 feet (15.2 m) (26 feet [7.92 m], plus two 12-foot (3.7-m) shoulders) between eastbound and westbound lanes, separated by a barrier. Widening takes place symmetrically about the existing centerline. The approach would be to first build the new outside EB and WB lanes and bridges. Traffic would be shifted to the new EB and WB lanes, and the existing old lanes removed. The remaining new lanes and bridges would be constructed and opened to traffic.

D. Potential Construction Staging for Bridges over I-70

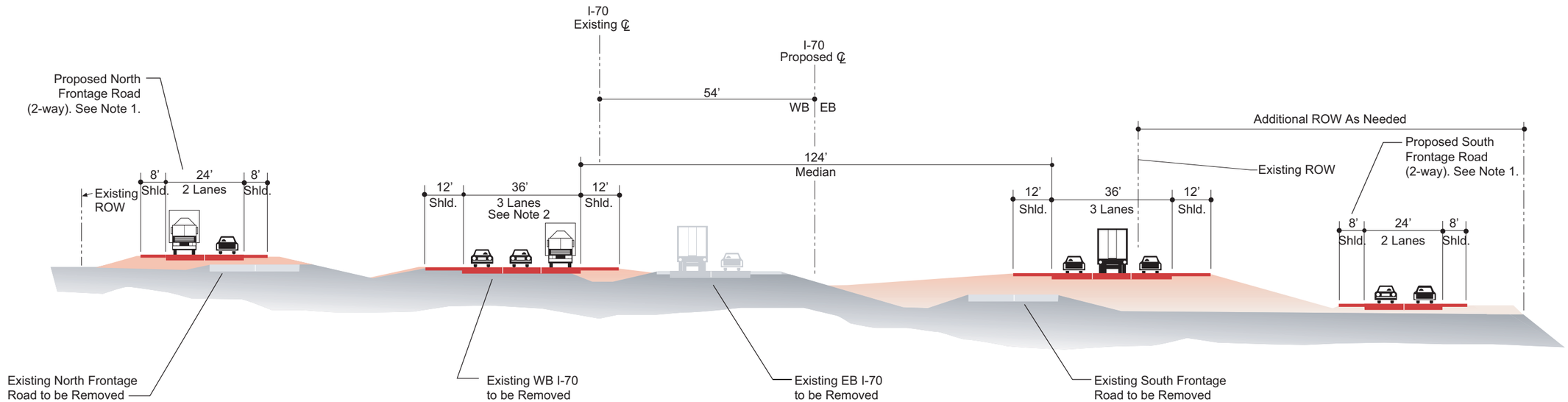
The corridor contains a number of cross road bridges above I-70, and one railroad bridge for the Columbia Terminal Railroad (COLT). Construction of new bridges could occur using two general approaches. First, the bridge could be closed, reconstructed and then opened again to traffic while traffic is diverted to nearby crossings. For example, Paris Road could be connected to Business Loop, the Business Loop East crossing constructed, then MO-163 or MO-763 could be closed and reconstructed one at a time.

Bridges such as MO-740 and Business 63 would need to be constructed under traffic. This would mean building part of the new structure adjacent to the existing, diverting traffic to the partially constructed bridge, demolishing the old bridge and completing the new bridge. This same offset approach could be used on other structures if the decision was to keep traffic open at all times.

The COLT railroad bridge over I-70 must be replaced as part of any widening of the freeway. Vertical clearances do not meet corridor criteria, nor are the spans long enough to accommodate the future lanes. In a September 22, 2003 memo COLT officials noted that a “new bridge just west of the existing bridge would probably be the easiest from a construction and operations point of view. Closing down and replacing the bridge on the existing alignment would be more difficult both in terms in construction and short term railroad operations, however, it would be preferable in the long run in order to keep from adding any reverse curves to the railroad alignment.” This memorandum also notes that the railroad serves only two customers south of I-70, including the Power Plant and Boone County Lumber. The Power Plant suspends coal deliveries from the first week in December to the first week in March, leaving a

three-month window to shut down the railroad and reconstruct the bridge. Review by several structural engineers familiar with the requirements of railroad grade separations determined that this window would be adequate for demolition and reconstruction. The closure option was selected and used in the evaluation of costs, property and environmental impacts.

T0520040111MKE 171382.70.ED Rural Typical Section_rev7 10-19-04 mjl/wjg



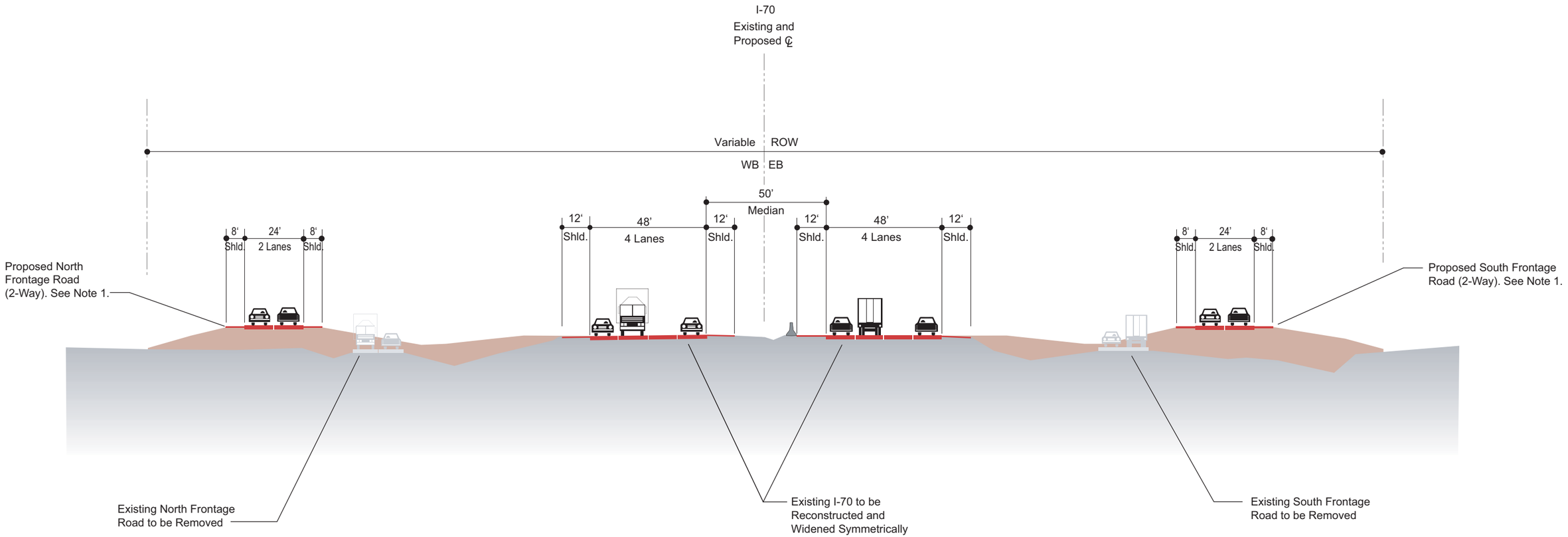
I-70

Looking East

Notes:

1. For location of frontage roads, see Exhibits II-12 to II-26.
2. Proposed WB lanes are coincidental with existing WB lanes.

T052004011MKE 171382.70 ED Urban Typical Section_rev5 7-27-04 mjl/wg



I-70
Looking East

Notes:
1. For location of frontage roads, see Exhibits II-12 to II-26.

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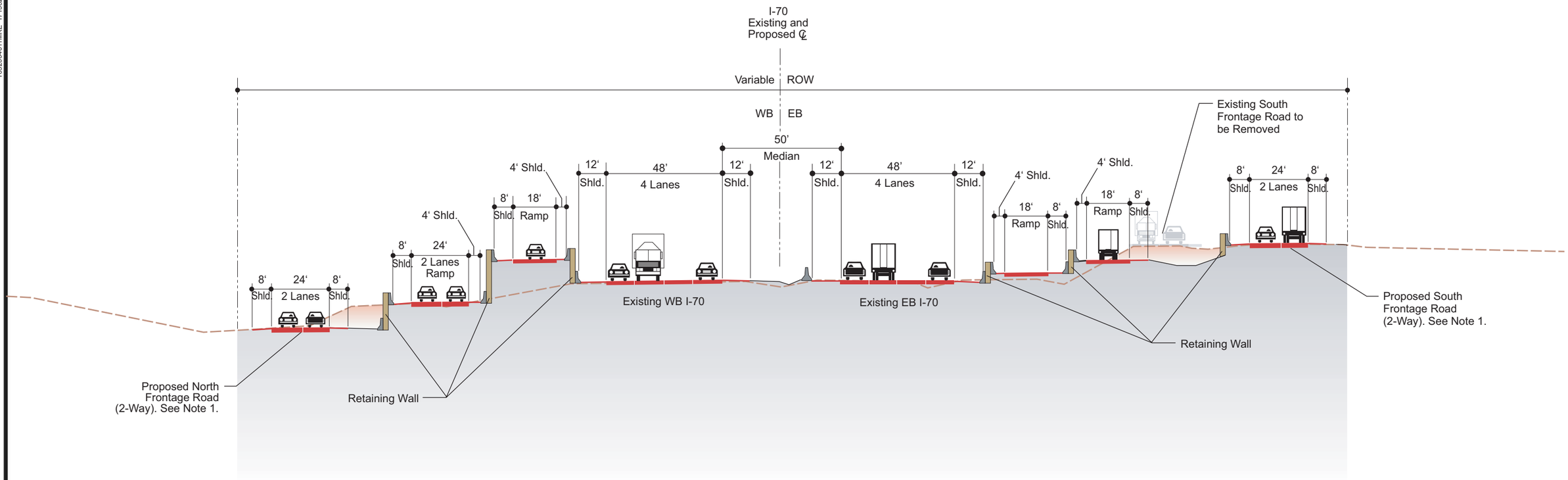


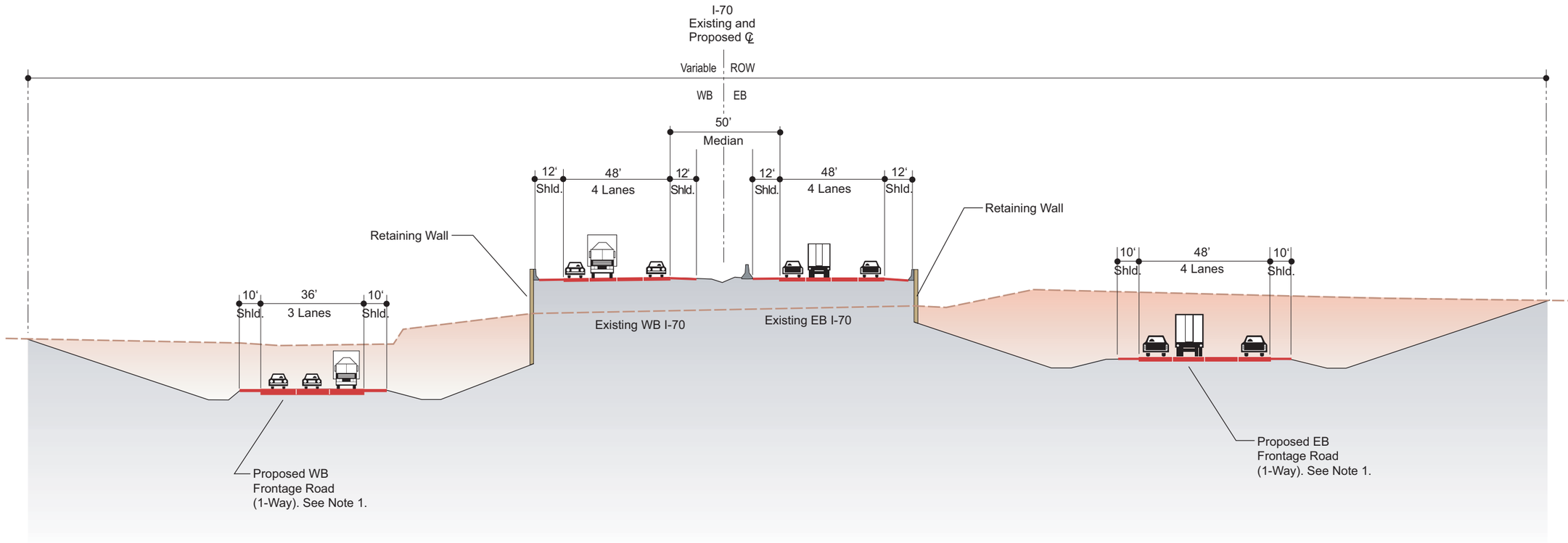
I-70

Looking East

Notes:

1. For location of frontage roads, see Exhibits II-12 to II-26.

T0520040011MKE 171382.70.ED Triplat Special Section rev5 7-27-04 mll/vlg



Notes:
1. For location of frontage roads, see Exhibits II-12 to II-26.

Appendix II-C
Preliminary Concept Evaluation Summary

PRELIMINARY EVALUATION MATRIX SUMMARY

Improve I-70: Columbia Area (SIU #4)

Public Involvement Meeting - December 11, 2003

This table summarizes the benefits, costs, and impacts of the five preliminary concepts considered for widening and reconstructing I-70. Because this evaluation illustrated that the costs far outweighed the benefits of the "Basic Widening" and "Stacked Highway" concepts, they have been eliminated from further evaluation.

	Concept				
	1	2	3	4	5
EVALUATION FACTORS/PRELIMINARY CONCEPTS	Basic Widening	One-Way Frontage Road	Two-Way Frontage Road	Collector-Distributor Road	Stacked Highway
PURPOSE AND NEED					
1. Accommodate existing an future traffic volumes on I-70					
-Increase capacity to 6-lanes in rural/8-lanes in urban areas	+	+	+	+	0
-Meet highway Level of Service guidelines (volume/capacity)	+	+	+	+	+
-Flexibility for future expansion in the corridor	0	0	+	+	-
2. Improve existing I-70 design deficiencies					
-Uncorrectable design elements associated with Concept	0	+	+	+	0
3. Accommodate all users of I-70					
-Make provisions for all major I-70 traffic streams	-	0	+	+	+
-Implement interchange designs with acceptable Level of Service	+	+	+	+	0
-Maintain Columbia-area access points	-	0	+	+	0
4. Improve user safety					
-Comply with MoDOT Access Management guidelines	-	+	+	+	-
-Effectively manage truck traffic	-	0	0	+	0
-Reduce conflicting traffic movements at on/off ramps	0	0	+	+	0
ENVIRONMENTAL IMPACTS					
Avoid Section 4(f) sites like Cosmo Park, other parks, historic sites	-	-	-	-	-
Total expected Phase I Environmental Site Assessments	0	0	0	0	0
Avoid prime farmland parcels	0	0	0	0	0
Avoid impacts to the "waters of the United States"	0	0	0	0	0
Avoid impacts to threatened and endangered species	-	-	-	-	-
Avoid noise impacts	0	0	0	0	-
Avoid cultural resource impacts (e.g. sites on Historic Register)	0	0	0	0	0
LAND USE IMPACTS					
Business displacements	+	+	-	-	0
Access to businesses from I-70	0	+	+	0	-
Access to businesses from local roadways	-	-	+	+	-
Residential displacements	+	+	-	-	0
Residential access impacts	-	0	+	+	-
Secondary impacts	0	0	0	0	0
SOCIO-ECONOMIC/COMMUNITY IMPACTS					
Expected travel pattern disruptions - overall	-	0	+	0	-
Expected travel pattern disruptions - during construction	-	0	0	+	-
Visual impacts	0	0	0	0	-
Potential for Environmental Justice issues	0	+	+	+	0
Potential for community service disruptions (EMS, fire, police)	-	0	+	+	-
ENGINEERING					
Estimated construction cost	+	0	0	0	-
Total estimated Right-of-Way (ROW)	+	+	-	-	0
Constructibility	0	0	0	+	-
Maintenance of traffic	0	0	0	+	-
Other engineering-related constraints	0	0	0	0	-

Legend/Footnotes						
Positive Impact - Important Decision-Making Factor	+	7	10	15	17	2
Neutral/Unclear/Contradictory Impact	0	15	20	13	11	15
Negative Impact - Important Decision-Making Factor	-	11	3	5	5	16

EVALUATION MATRIX

Concept 1 - Basic Widening

Improve I-70: Columbia Area (SIU #4)

Public Involvement Meeting - December 11, 2003

EVALUATION FACTORS	RATING	DECISION-MAKING FACTORS
PURPOSE AND NEED		
1. Accommodate existing and future traffic volumes on I-70		
-Increase capacity to 6-lanes in rural/8-lanes in urban areas	+	Additional lane capacity along existing I-70 incorporated
-Meet highway Level of Service guidelines (volume/capacity)	+	No apparent impediment to meeting threshold Level of Service
-Flexibility for future expansion in the corridor	O	No impediment to I-70 expansion, but maintenance of the existing discontinuous frontage road system is limiting
2. Improve existing I-70 design deficiencies		
-Uncorrectable design elements associated with Concept	O	Basic widening limits ability to correct existing design deficiences
3. Implement a better strategy for accommodating all users of I-70		
-Make provisions for all major I-70 traffic streams	-	No accommodations made to differentiate competing traffic streams
-Implement interchange designs with acceptable Level of Service	+	No apparent impediment to meeting threshold Level of Service
-Maintain Columbia-area access points	-	No improvements to cross I-70 operations proposed
4. Improve user safety		
-Comply with MoDOT Access Management guidelines	-	Basic widening limits ability to implement Access Management guidelines
-Effectively manage truck traffic	-	No accommodations made to differentiate competing traffic streams
-Eliminate identified crash precursors	O	Concept allows some design flexibility to address crash precursors
ENVIRONMENTAL IMPACTS		
Avoid Section 4(f) sites like Cosmo Park, other parks, historic sites	-	Redesign of the Stadium interchange may not be feasible/prudent without minor encroachments to Cosmo Park
Total expected Phase I Environmental Site Assessments	O	Relatively minor encroachments
Avoid prime farmland parcels	O	No apparent impediment to avoiding encroachments
Avoid impacts to the "waters of the United States"	O	Impacts can be characterized as increases to existing encroachments (such as culvert lengthening)
Avoid impacts to threatened and endangered species	-	Likely impact to bristled cyperus located within the existing ROW
Avoid noise impacts	O	Potential for localized noise impacts, but overall concept is benign
Avoid cultural resource impacts (e.g. sites on Historic Register)	O	Strict adherence to engineering standards may result in encroachment on known NRHP resources
LAND USE IMPACTS		
Business displacements	+	Business displacements/partial takes are likely; however, overall concept is benign
Access to businesses from I-70	O	Existing pathways maintained in their sub-optimum condition
Access to businesses from local roadways	-	Discontinuous frontage road system is limiting and will not adequately service expected needs
Residential displacements	+	Minimizes overall project footprint and, therefore, residential displacements
Residential access impacts	-	Discontinuous frontage road system is limiting and will not adequately service expected needs
Secondary impacts	O	Basic widening fails to address many existing land use problems
SOCIO-ECONOMIC/COMMUNITY IMPACTS		
Expected travel pattern disruptions - overall	-	Discontinuous frontage road system is limiting and will not adequately service expected needs
Expected travel pattern disruptions - during construction	-	In-place reconstruction will provide few opportunities to reroute traffic (closure/detour onto local network will be required)
Visual impacts	O	Visual environment encroachments are likely; however, overall concept is benign
Potential for Environmental Justice issues	O	Discontinuous frontage road is limiting and fails to address many issues; however, project footprint is minimized
Potential for community service disruptions (EMS, fire, police)	-	Discontinuous frontage road system will not adequately service access needs
ENGINEERING		
Estimated construction cost	+	Least expensive build alternative
Total estimated Right-of-Way (ROW)	+	Minimizes overall project footprint
Constructibility	O	No extraordinary construction measures necessary
Maintenance of traffic	O	No extraordinary MOT measures necessary
Other engineering-related constraints	O	Standard maintenance procedures apply to this concept

Legend	
Positive Impact - Important Decision-Making Factor	+
Neutral/Unclear/Contradictory Impact	O
Negative Impact - Important Decision-Making Factor	-

EVALUATION MATRIX

Concept 2 - One-Way Frontage Road

Improve I-70: Columbia Area (SIU #4)

Public Involvement Meeting - December 11, 2003

EVALUATION FACTORS	RATING	DECISION-MAKING FACTORS
PURPOSE AND NEED		
1. Accommodate existing and future traffic volumes on I-70		
-Increase capacity to 6-lanes in rural/8-lanes in urban areas	+	Additional lane capacity along existing I-70 incorporated
-Meet highway Level of Service guidelines (volume/capacity)	+	No apparent impediment to meeting threshold Level of Service
-Flexibility for future expansion in the corridor	O	No structural impediment to I-70 expansion, one-way frontage roads may be difficult to expand
2. Improve existing I-70 deficiencies		
-Uncorrectable design elements associated with Concept	+	One way frontage road system allows for correction of most major design deficiencies
3. Implement a better strategy for accommodating all users of I-70		
-Make provisions for all major I-70 traffic streams	O	Continuous one-way system fundementally alters local traffic pattern and is counter to most driver expectations
-Implement interchange designs with acceptable Level of Service	+	No apparent impediment to meeting threshold Level of Service
-Maintain Columbia-area access points	O	Maintains existing interchanges and adds 2-3 over/underpasses. One-way access to frontage road may be controversial
4. Improve user safety		
-Comply with MoDOT Access Management guidelines	+	Concept allows for improving interchanges to achieve many of the MoDOT Access Management Guidelines
-Effectively manage truck traffic	O	Local truck traffic may find the frontage road system to be an attractive alternative to I-70
-Eliminate identified crash precursors	O	Concept allows enough design flexibility to address crash precursors. One-way roads may have negative impacts
ENVIRONMENTAL IMPACTS		
Avoid Section 4(f) sites like Cosmo Park, other parks, historic sites	-	Redesign of the Stadium interchange may not be feasible/prudent without minor encroachments to Cosmo Park
Total expected Phase I Environmental Site Assessments	O	Relatively minor encroachments
Avoid prime farmland parcels	O	No apparent impediment to avoiding encroachments
Avoid impacts to the "waters of the United States"	O	Impacts can be characterized as increases to existing encroachments (such as culvert lengthening)
Avoid impacts to threatened and endangered species	-	Likely impact to bristled cyperus located within the existing ROW
Avoid noise impacts	O	Potential for localized noise impacts, but overall concept is benign
Avoid cultural resource impacts (e.g. sites on Historic Register)	O	Strict adherence to engineering standards may result in encroachment on known NRHP resources
LAND USE IMPACTS		
Business displacements	+	Minimizes overall project footprint and, therefore, business displacements
Access to businesses from I-70	+	Existing I-70 to Columbia pathways maintained
Access to businesses from local roadways	-	One-way frontage road system alters existing access pathways (no right turns)
Residential displacements	+	Minimizes overall project footprint and, therefore, residential displacements
Residential access impacts	O	One-way frontage road system alters existing access pathways
Secondary impacts	O	One-way frontage road system alters existing access pathways
SOCIO-ECONOMIC/COMMUNITY IMPACTS		
Expected travel pattern disruptions - overall	O	One-way frontage road system alters existing access pathways, but the enhanced operations may be a net positive
Expected travel pattern disruptions - during construction	O	Narrow footprint may be limiting, but opportunities for partial implementation may be possible
Visual impacts	O	Visual environment encroachments are likely, however, overall concept is benign
Potential for Environmental Justice issues	+	Positive EJ aspects include new overpasses, incorporation of pedestrian/bike needs and continuous frontage roads
Potential for community service disruptions (EMS, fire, police)	O	Impacts expected, however, overall concept is benign (one-way system will alter existing access pathways)
ENGINEERING		
Estimated construction cost	O	Comparable to other emerging alternatives that utilize a simple continuous parallel roadway system
Total estimated Right-of-Way (ROW)	+	Minimizes overall project footprint
Constructibility	O	No extraordinary construction measures necessary
Maintenance of traffic	O	No extraordinary MOT measures necessary
Other engineering-related constraints	O	Standard maintenance procedures apply to this concept

Legend	
Positive Impact - Important Decision-Making Factor	+
Neutral/Unclear/Contradictory Impact	O
Negative Impact - Important Decision-Making Factor	-

EVALUATION MATRIX

Concept 3 - Two-Way Frontage Road

Improve I-70: Columbia Area (SIU #4)

Public Involvement Meeting - December 11, 2003

EVALUATION FACTORS	RATING	DECISION-MAKING FACTORS
PURPOSE AND NEED		
1. Accommodate existing and future traffic volumes on I-70		
-Increase capacity to 6-lanes in rural/8-lanes in urban areas	+	Additional lane capacity along existing I-70 incorporated
-Meet highway Level of Service guidelines (volume/capacity)	+	No apparent impediment to meeting threshold Level of Service
-Flexibility for future expansion in the corridor	+	No structural impediment to expansion
2. Improve existing I-70 deficiencies		
-Uncorrectable design elements associated with Concept	+	Two way frontage road system allows for correction of most major design deficiencies
3. Implement a better strategy for accommodating all users of I-70		
-Make provisions for all major I-70 traffic streams	+	Continuous two-way system is the most flexible local roadway system and conforms to most driver expectations
-Implement interchange designs with acceptable Level of Service	+	No apparent impediment to meeting threshold Level of Service
-Maintain Columbia-area access points	+	Maintains existing interchanges, adds 2-3 over/underpasses and maintains two-way access to frontage road properties
4. Improve user safety		
-Comply with MoDOT Access Management guidelines	+	Concept allows for improving interchanges to achieve many of the MoDOT Access Management Guidelines
-Effectively manage truck traffic	O	Local truck traffic may find the frontage road system to be an attractive alternative to I-70
-Eliminate identified crash precursors	+	Concept allows enough design flexibility to address crash precursors
ENVIRONMENTAL IMPACTS		
Avoid Section 4(f) sites like Cosmo Park, other parks, historic sites	-	Redesign of the Stadium interchange may not be feasible/prudent without minor encroachments to Cosmo Park
Total expected Phase I Environmental Site Assessments	O	Relatively minor encroachments
Avoid prime farmland parcels	O	No apparent impediment to avoiding encroachments
Avoid impacts to the "waters of the United States"	O	Impacts can be characterized as increases to existing encroachments (such as culvert lengthening)
Avoid impacts to threatened and endangered species	-	Likely impact to bristled cyperus located within the existing ROW
Avoid noise impacts	O	Potential for localized noise impacts, but overall concept is benign
Avoid cultural resource impacts (e.g. sites on Historic Register)	O	Strict adherence to engineering standards may result in encroachment on known NRHP resources
LAND USE IMPACTS		
Business displacements	-	Business displacements/partial takes are likely due to wider footprint for improvements
Access to businesses from I-70	+	Existing I-70 to Columbia pathways maintained
Access to businesses from local roadways	+	Use of existing two-way frontage road system will maintain existing local access pathways
Residential displacements	-	Residential displacements/partial takes are likely due to wider footprint for improvements
Residential access impacts	+	Two-way frontage road system will maintain expected access pathways
Secondary impacts	O	Two-way frontage road system will maintain expected access pathways
SOCIO-ECONOMIC/COMMUNITY IMPACTS		
Expected travel pattern disruptions - overall	+	Two-way frontage road system will maintain expected access pathways
Expected travel pattern disruptions - during construction	O	Larger footprint and maintenance of existing frontage road pathways make construction straight-forward but not necessarily problem-
Visual impacts	O	Visual environment encroachments are likely; however, overall concept is benign
Potential for Environmental Justice issues	+	Positive EJ aspects include new overpasses, incorporation of pedestrian/bike needs and continuous frontage roads
Potential for community service disruptions (EMS, fire, police)	+	Impacts expected; however, overall concept is benign (two-way system will maintain expected access pathways)
ENGINEERING		
Estimated construction cost	O	Comparable to other emerging alternatives that utilize a simple continuous parallel roadway system
Total estimated Right-of-Way (ROW)	-	Encroachments/impacts expected
Constructibility	O	No extraordinary construction measures necessary
Maintenance of traffic	O	No extraordinary MOT measures necessary (two-way system will maintain expected access pathways)
Other engineering-related constraints	O	Standard maintenance procedures apply to this concept

Legend	
Positive Impact - Important Decision-Making Factor	+
Neutral/Unclear/Contradictory Impact	O
Negative Impact - Important Decision-Making Factor	-

EVALUATION MATRIX

Concept 4 - Collector/Distributor System

Improve I-70: Columbia Area (SIU #4)

Public Involvement Meeting - December 11, 2003

EVALUATION FACTORS	RATING	DECISION-MAKING FACTORS
PURPOSE AND NEED		
1. Accommodate existing and future traffic volumes on I-70		
-Increase capacity to 6-lanes in rural/8-lanes in urban areas	+	Additional lane capacity along existing I-70 incorporated
-Meet highway Level of Service guidelines (volume/capacity)	+	No apparent impediment to meeting threshold Level of Service
-Flexibility for future expansion in the corridor	+	No structural impediment to expansion
2. Improve existing I-70 deficiencies		
-Uncorrectable design elements associated with Concept	+	C-D System allows for correction of most major design deficiencies
3. Implement a better strategy for accommodating all users of I-70		
-Make provisions for all major I-70 traffic streams	+	C-D system is the most effective solution to separating the conflicting traffic streams within SIU 4
-Implement interchange designs with acceptable Level of Service	+	No apparent impediment to meeting threshold Level of Service
-Maintain Columbia-area access points	+	Maintains existing interchanges, adds 2-3 over/underpasses and maintains two-way access to frontage road properties
4. Improve user safety		
-Comply with MoDOT Access Management guidelines	+	Concept allows for improving interchanges to achieve many of the MoDOT Access Management Guidelines
-Effectively manage truck traffic	+	C-D roadway represents the most effective solution to separating the conflicting traffic streams within SIU 4
-Eliminate identified crash precursors	+	Concept allows enough design flexibility to address crash precursors
ENVIRONMENTAL IMPACTS		
Avoid Section 4(f) sites like Cosmo Park, other parks, historic sites	-	Redesign of the Stadium interchange may not be feasible/prudent without minor encroachments to Cosmo Park
Total expected Phase I Environmental Site Assessments	O	Relatively minor encroachments
Avoid prime farmland parcels	O	No apparent impediment to avoiding encroachments
Avoid impacts to the "waters of the United States"	O	Impacts can be characterized as increases to existing encroachments (such as culvert lengthening)
Avoid impacts to threatened and endangered species	-	Likely impact to bristled cyperus located within the existing ROW
Avoid noise impacts	O	Potential for localized noise impacts, but overall concept is benign
Avoid cultural resource impacts (e.g. sites on Historic Register)	O	Strict adherence to engineering standards may result in encroachment on known NRHP resources
LAND USE IMPACTS		
Business displacements	-	Business displacements/partial takes are likely due to wider footprint for improvements
Access to businesses from I-70	O	Local/through lane configuration may limit some movement between I-70 and Columbia (signing/engineering will limit this)
Access to businesses from local roadways	+	Two-way frontage road system will be maintained, C-D road will provide additional flexibility
Residential displacements	-	Residential displacements/partial takes are likely due to wider footprint for improvements
Residential access impacts	+	Two-way frontage road system will be maintained, C-D road will provide additional flexibility
Secondary impacts	O	Separation of conflicting traffic streams should have positive ramifications
SOCIO-ECONOMIC/COMMUNITY IMPACTS		
Expected travel pattern disruptions - overall	O	Two-way frontage road system will maintain expected access pathways/CD operations may be confusing
Expected travel pattern disruptions - during construction	+	Larger footprint and construction of CD roadway will provide substantial flexibility
Visual impacts	O	Visual environment encroachments are likely, however, overall concept is benign
Potential for Environmental Justice issues	+	Positive EJ aspects include new overpasses, incorporation of pedestrian/bike needs and continuous frontage roads
Potential for community service disruptions (EMS, fire, police)	+	Impacts expected, however, overall concept is benign (two-way/C-D system will maintain expected access pathways)
ENGINEERING		
Estimated construction cost	O	Comparable to other emerging alternatives that utilize a simple continuous parallel roadway system
Total estimated Right-of-Way (ROW)	-	Encroachments/impacts expected
Constructibility	+	Offers most flexibility in reconstruction of mainline I-70
Maintenance of traffic	+	Offers most flexibility in reconstruction of mainline I-70
Other engineering-related constraints	O	Standard maintenance procedures apply to this concept

Legend	
Positive Impact - Important Decision-Making Factor	+
Neutral/Unclear/Contradictory Impact	O
Negative Impact - Important Decision-Making Factor	-

EVALUATION MATRIX

Concept 5 - Stacked Highway

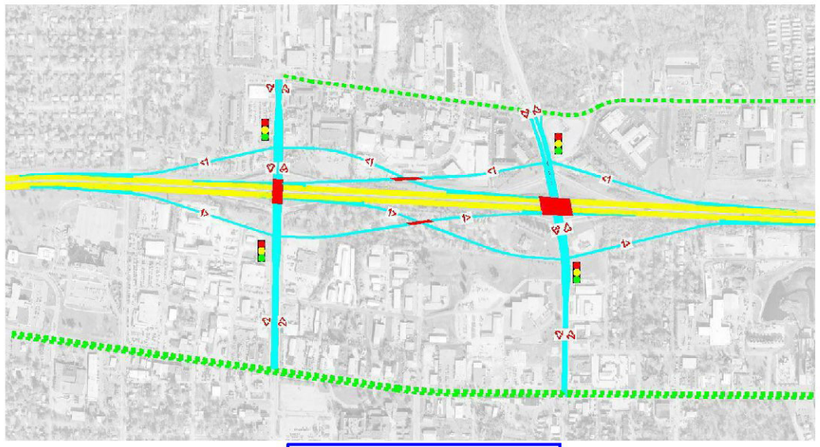
Improve I-70: Columbia Area (SIU #4)

Public Involvement Meeting - December 11, 2003

EVALUATION FACTORS	RATING	DECISION-MAKING FACTORS
PURPOSE AND NEED		
1. Accommodate existing an future traffic volumes on I-70		
-Increase capacity to 6-lanes in rural/8-lanes in urban areas	O	"Stacking" does not reduce the need for additional lane capacity
-Meet highway Level of Service guidelines (volume/capacity)	+	No apparent impediment to meeting threshold Level of Service
-Flexibility for future expansion in the corridor	-	The bridge viaduct columns will inhibit expansion of the mainline I-70 lanes in the future..
2. Improve existing I-70 design deficiencies		
-Uncorrectable design elements associated with Concept	O	Design impacts expected to vary based on configuration of service roads & other improvements
3. Accommodate all users of I-70		
-Make provisions for all major I-70 traffic streams	+	Through traffic can be completely segregated from local traffic by "stacking"
-Implement interchange designs with acceptable Level of Service	O	Engineering requirements of "Stacked" design expected to reduce flexibility of interchange design
-Maintain Columbia-area access points	O	Engineering requirements of "Stacked" may lead to reductions in the number of access points
4. Improve user safety		
-Comply with MoDOT Access Management guidelines	-	Constraints associated with "Stacked" expected to negatively impact compliance
-Effectively manage truck traffic	O	Through traffic completely segregated but not all trucks are on through trips
-Reduce conflicting traffic movements at on/off ramps	O	"Stacked" highways may be counter to driver expectations, thus be a crash precursor itself
ENVIRONMENTAL IMPACTS		
Avoid Section 4(f) sites like Cosmo Park, other parks, historic sites	-	Engineering requirements of "Stacked" design expected to reduce flexibility of interchange design
Total expected Phase I Environmental Site Assessments	O	Footprint under "Stacked" is only lower if no service roads or other improvements are included
Avoid prime farmland parcels	O	No apparent impediment to avoiding encroachment
Avoid impacts to the "waters of the United States"	O	Footprint under "Stacked" is only lower if no service roads or other improvements are included
Avoid impacts to threatened and endangered species	-	Likely impact to bristled cyperus located within the existing ROW
Avoid noise impacts	-	Elevating the roadway will increase the noise profile of the project
Avoid cultural resource impacts (e.g. sites on Historic Register)	O	Strict adherence to engineering standards may result in encroachment on known NRHP resources
LAND USE IMPACTS		
Business displacements	O	Footprint under "Stacked" is only lower if no service roads or other improvements are included
Access to businesses from I-70	-	Travelers on through portion of "Stacked Section" will be unable to access local businesses
Access to businesses from local roadways	-	Design constraints expected to further limit operation of existing frontage road system
Residential displacements	O	Footprint under "Stacked" is only lower if no service roads or other improvements are included
Residential access impacts	-	Engineering requirements of "Stacked" will reduce flexibility in design of local connections
Secondary impacts	O	Potential impacts expected to vary based on configuration of service roads & other improvements
SOCIO-ECONOMIC/COMMUNITY IMPACTS		
Expected travel pattern disruptions - overall	-	Reduced design flexibility expected to reduce ability to accommodate some traffic movements
Expected travel pattern disruptions - during construction	-	Reduced design flexibility expected to reduce ability to accommodate some traffic movements
Visual impacts	-	Elevating the roadway will increase the visual profile of the project
Potential for Environmental Justice issues	O	Impacts expected to vary based on configuration of service roads and other improvements
Potential for community service disruptions (EMS, fire, police)	-	Impacts expected to vary based on configuration of service roads and other improvements
ENGINEERING		
Estimated construction cost	-	Highest construction and maintenance costs
Total estimated Right-of-Way (ROW)	O	ROW acquisition lower under "Stacking" only if no service roads or other improvements included
Constructibility	-	Requires construction of new highway over existing, operating roadways
Maintenance of traffic	-	After completion, no emergency access to "Stacked Sections"
Other engineering-related constraints	-	Because of "Stacking", general maintenance is more difficult/expensive

Legend	
Positive Impact - Important Decision-Making Factor	+
Neutral/Unclear/Contradictory Impact	O
Negative Impact - Important Decision-Making Factor	-

Appendix II-D
Alternatives Investigated and Rejected



MO 163 - MO 763 A

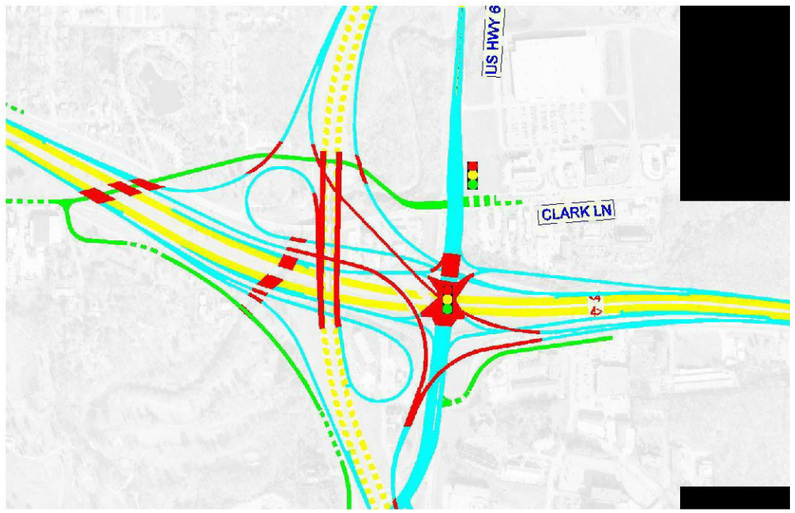
This alternative utilized braided ramps between MO 163 and MO 763. This alternative was eliminated because it created substantial impacts north and south of I-70, and it did not function well with the upstream and downstream interchanges at Business Loop 70 West and Business Loop 70 East.

Business Loop 70E A

This alternative consisted of a loop in the northwest quadrant of the interchange. This alternative was eliminated because it was not necessary for acceptable operations and would have created substantial impacts in the commercial area north of I-70 and to the Bowling property south of I-70.

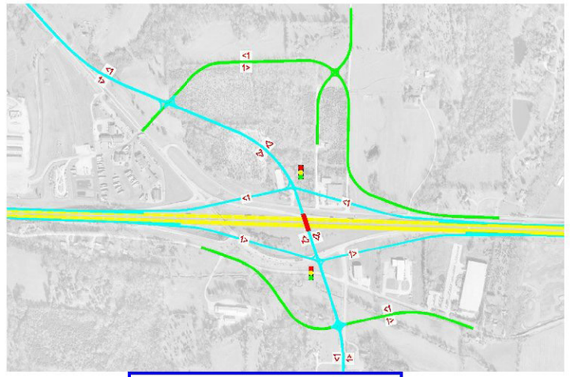
Business Loop 70E B

This alternative consisted of a loop in the northwest quadrant of the interchange. This alternative was eliminated because it was not necessary for acceptable operations and would have created substantial impacts in the commercial area north of I-70 and to the Bowling property south of I-70.



US HWY 63 A

This alternative was the same as the US 63 interchange shown on Exhibit II-8B with the exception that it utilized a Single Point Urban Interchange at Business 63. This alternative was eliminated because the operational benefits of the SPUI were minimal compared with the additional structure costs and increased construction issues.



US HWY 40 A

This alternative consisted of a standard diamond interchange with reconfigured frontage roads. This alternative was eliminated because of the impacts created by the north frontage road configuration.

MoDOT IMPROVE I70

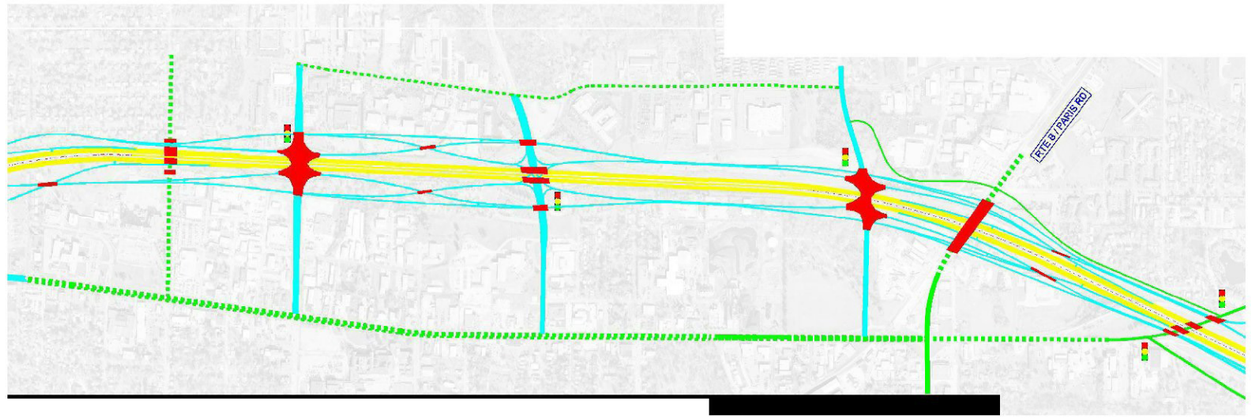
SECTION 4 Rocheport to Route Z

Existing Facilities
Frontage Roads
Interchange Ramps and Cross Roads
Mainline I-70
CD Roads or One Way Frontage Roads
Approximate Impact Boundary
Recently Constructed Buildings (Post-Aerial Mapping)
Potential Signalized Intersection

NOT TO SCALE

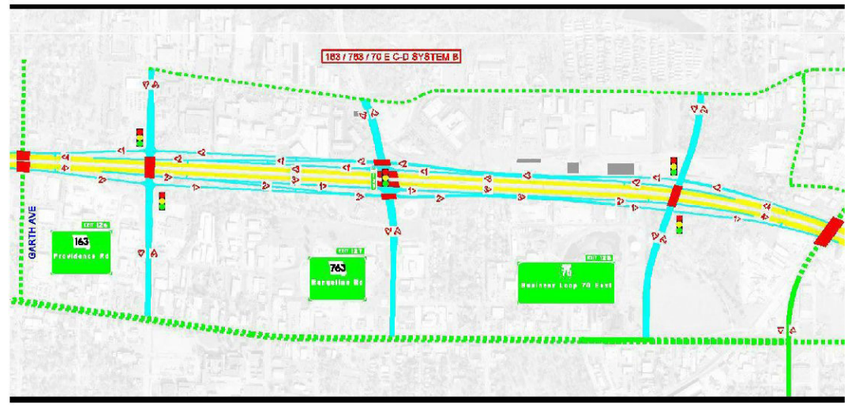
Other Alternatives Investigated and Rejected

APPENDIX II-D



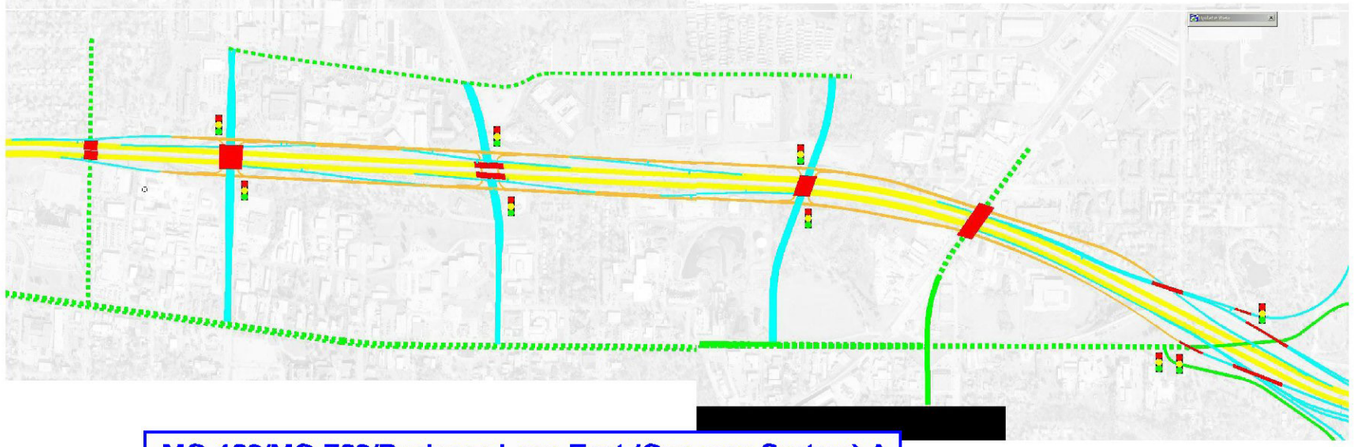
MO-163/MO-763/Business Loop East (C-D System) A

This alternative consisted of a collector-distributor system that runs from MO 163 to US 63. This alternative was eliminated because it was determined that substantial impact and cost could be avoided by terminating the C-D system at Business Loop 70 East.



MO-163/MO-763/Business Loop East (C-D System) B

This alternative consisted of a collector-distributor system that runs from MO 163 to Business Loop 70 East. This alternative was eliminated because of the difficult weaving manuever required between MO 763 and Business Loop 70 E.



MO-163/MO-763/Business Loop East (One-way System) A

This alternative consisted of a one-way frontage road system that ran from MO 163 to US 63. This alternative was eliminated because it was determined that substantial impact and cost could be avoided by terminating the one-way frontage road at Business Loop 70 East.

MO-163/MO-763/Business Loop East (One-way System) B

This alternative consisted of a one-way frontage road system that ran from MO 163 to Business Loop 70 East. This alternative was eliminated because it was determined that a symmetrical ramp configuration would operate at an acceptable level and remove the weaves on the frontage road between entrance and exit ramps to/from the one-way frontage road.