

Appendix E

Analysis of Interchanges: Engineering and Environmental Review

Appendix E

Interstate 70 SIU 3 – J4I1341F Development and Evaluation of Conceptual Interchange Alternatives



**Prepared for:
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List of Abbreviations and Acronyms

EA	Environmental Assessment
EIS	Environmental Impact Statement
GEC	General Engineering Consultant
GIS	geographical information system
MoDOT	Missouri Department of Transportation
SIU	Section of Independent Utility

CHAPTER 1

Introduction

All data represented within this analysis are based on the review of information of record including topographical, aerial and First Tier Environmental Impact Statement (EIS) for Section of Independent Utility (SIU) 3 geographical information system (GIS) data. The purpose of this review is to expand upon the “critical flaw” level of analysis provided in the First Tier Study regarding the potential improvement of the Interstate 70 (I-70) interchanges within SIU 3. These interchanges are:

- Route 5, Cooper County, near mile marker 101 in Boonville;
- Route B, Cooper County, near mile marker 103 in Boonville;
- Route 87, Cooper County, near mile marker 106 in Boonville;
- Route 179, Cooper County, near mile marker 111 east of Boonville; and
- Route BB, Boone County, near mile marker 115 at Rocheport.

This analysis is broken into two parts. The first part deals with the development of conceptual interchange layouts at each interchange. Detailed profiles were not developed for these layouts, only plan view concepts. This was done to provide the study team and the public with an idea of the possibilities for interchange improvements. These conceptual layouts were eliminated, modified or left as-is and carried over into the second phase of analysis. The elimination of those conceptual alternatives that were removed from further consideration was made using a broad range of criteria and evaluation factors. This is discussed later in this analysis.

The second part takes into account more detailed environmental and engineering information based on field reconnaissance and includes a detailed consideration of potential interchange improvements that incorporate access management features. However, it does not entail a detailed impact analysis that incorporates the results of more intensive environmental investigation (i.e. wetland delineation, Phase I cultural studies, noise modeling, etc.) as would be appropriate for the analysis of final study alternatives.

This report summarizes all features, natural and man-made, contained within the I-70 SIU 3 study area defined by the proposed concept layouts and subsequent detailed layouts at each of the interchanges listed above.

CHAPTER 2

Development of Conceptual Alternatives

As discussed in the previous chapter, conceptual interchange layouts were developed at each of the interchanges within Section of Independent Utility 3 (SIU 3). These were developed based on existing information of record and aerial photography and from the proposed conceptual layouts from the First Tier EIS.

Access Management

These alternatives were developed under the guidance of the access management policy as set forth by the General Engineering Consultant (GEC). This policy set guidance in the location of driveways at each interchange cross-road. Under this guidance, left turns from the crossroad to the first driveway or intersection are to be 1,320 feet (402 meters) from the ramp terminals at the interchange. Right turns are to be 750 feet (229 meters) from the ramp terminals. The First Tier EIS established interchange concepts at each of the interchanges in SIU 3 using these access management guidelines. These concepts were used as the basis for establishing the interchange concepts listed below. Where practicable, these guidelines were maintained. However, where high environmental or social impacts would occur, consideration was given to the development of alternatives that partially implemented the access management criteria in order to avoid and minimize impacts. This was done only where traffic operations or safety was not compromised. The following discussion presents the conceptual alternatives developed at each of the five interchanges in SIU 3.

2.1 Route 5

Initially, three conceptual alternatives were developed at Route 5. The basic configuration of each of these proposes the location of a new bridge east of the existing bridge. This was done to minimize impacts to the businesses (commercial and industrial) west of Route 5. Some small variations in the frontage road layouts were developed as part of these concepts. These are described in more detailed below.

Option 1

This option proposes a diamond interchange with a new bridge over I-70 approximately 180 feet (55 meters) east of the existing bridge (Figure 1). Route 5 is realigned to the east from approximately 900 feet (274 meters) north of I-70 to 2,040 feet (622 meters) south. The realigned Route 5 passes approximately 280 feet (85 meters) east of existing Route 5 near Frontier Motors. The north frontage road intersects Route 5 near the entrance to Boonville High School approximately 1,400 feet (427 meters) north of the westbound I-70 ramps. The south frontage road intersects Route 5 near the Missouri Department of Transportation (MoDOT) maintenance building approximately 1,200 feet (366 meters) south of the eastbound I-70 ramps. There are minor variations in the frontage road alignments on the north side. In the northeast

quadrant there are two variations of Option 1, labeled 1a and 1b. In the northwest quadrant there are also two variations of Option 1, labeled 1a and 1b.

Option 2

This option proposes a partial diamond interchange with a new bridge over I-70 approximately 180 feet (55 meters) east of the existing bridge (Figure 2). Route 5 is realigned to the east from approximately 900 feet (274 meters) north of I-70 to 2,040 feet (622 meters) south. The realigned Route 5 passes approximately 280 feet (85 meters) east of existing Route 5 near Frontier Motors. Instead of a diamond configuration, the westbound on-ramp is in a loop configuration. This allows for the placement of the north frontage road in the northwest quadrant directly in line with the westbound ramps. The north frontage road in the northeast quadrant intersects Route 5 near the entrance to Boonville High School approximately 1,080 feet (329 meters) north of the westbound I-70 ramps. The south frontage road intersects Route 5 near the MoDOT maintenance building approximately 1,200 feet (366 meters) south of the eastbound I-70 ramps. As with Option 1, there are minor variations in the frontage road alignments in the northwest quadrant and are labeled 1a and 1b.

Option 3

This option is identical to Option 1 except for the north frontage road alignment. It proposes a diamond interchange with a new bridge over I-70 approximately 180 feet (55 meters) east of the existing bridge (Figure 3). Route 5 is realigned to the east from approximately 900 feet (274 meters) north of I-70 to 2,040 feet (622 meters) south. The south frontage road intersects Route 5 approximately 1,200 feet (366 meters) south of the eastbound I-70 ramps. The north frontage road intersects Route 5 approximately 780 feet (238 meters) north of the westbound I-70 ramps and 250 feet (76 meters) south of the Pilot Truck Stop entrance.

2.2 Route B

Initially, three conceptual alternatives were developed at Route B ranging from loop ramps to a diamond. The basic configuration of each of these options proposes the location of a new bridge west of the existing bridge. This was done to minimize impacts to the businesses east of Route B. The bridge for this interchange is located relatively close to the existing bridge due to the dense nature of the commercial property at the interchange. The concept alternatives are described in more detailed below.

Option 1

This option proposes a partial diamond interchange with a new bridge over I-70 approximately 65 feet (20 meters) west of the existing bridge (Figure 4). Route B is realigned to the west from approximately 640 feet (195 meters) north of I-70 to 900 feet (274 feet) south. Instead of a diamond configuration, the westbound on-ramp is in a loop configuration. This allows for the placement of the north frontage road in the northwest quadrant directly in line with the westbound ramps. The north frontage road in the northeast quadrant intersects Route B approximately 1,140 feet (347 meters) north of the westbound I-70 ramps. The south frontage

road intersects Route B approximately 1,120 feet (341 meters) south of the eastbound I-70 ramps.

Option 2

This option proposes two loop ramps with a new bridge over I-70 approximately 65 feet (20 meters) west of the existing bridge (Figure 5). Route B is realigned to the west from approximately 640 feet (195 meters) north of I-70 to 900 feet (274 meters) south. Instead of a diamond configuration, the westbound on-ramp is in a loop configuration. This allows for the placement of the north frontage road in the northwest quadrant directly in line with the westbound ramps. The north frontage road in the northeast quadrant intersects Route B approximately 1,140 feet (347 meters) north of the westbound I-70 ramps. The eastbound on-ramp is in a loop configuration as well. This allows for the placement of the south frontage road in the southeast quadrant directly in line with the eastbound ramps. The south frontage road in the southwest quadrant intersects Route B approximately 500 feet (152 meters) south of the eastbound I-70 ramps.

Option 3

This option proposes a diamond interchange with a new bridge over I-70 approximately 65 feet (20 meters) west of the existing bridge (Figure 6). Route B is realigned to the west from approximately 640 feet (195 meters) north of I-70 to 900 feet (274 meters) south. The north frontage road intersects Route B approximately 1,060 feet (323 meters) north of the westbound I-70 ramps. The south frontage road intersects Route B approximately 830 feet (253 meters) south of the eastbound I-70 ramps.

2.3 Route 87

Initially, three conceptual alternatives were developed at Route 87. All three of the initial concepts propose the location of a new Route 87 bridge west of the existing bridge. This was done primarily to take advantage of the existing roadway geometry by providing the improvements to the inside of the existing curve rather than swinging to the outside. The concepts are described in more detailed below.

Option 1

This option proposes a diamond interchange with a new bridge crossing approximately 130 feet (40 meters) west of the existing bridge (Figure 7). Route 87 is realigned from approximately 1,420 feet (433 meters) north of I-70 to 1,080 feet (329 meters) south. The north frontage road intersects Route 87 near the entrance to Columbia Ready-Mix approximately 1,800 feet (549 meters) north of the westbound I-70 ramps. The south frontage road is not continuous across Route 87. In the southeast quadrant, it intersects Route 87 approximately 1,370 feet (418 meters) south of the eastbound I-70 ramps. However, in the southwest quadrant, it is only 250 feet (76 meters) south of the eastbound ramps in order to avoid impacts to several commercial properties and a residential subdivision.

Option 2

This option proposes two loop ramps: one in the northwest quadrant and one in the southeast (Figure 8). These loop ramps carry the westbound exiting traffic and eastbound exiting traffic, respectively. A new bridge crossing is proposed approximately 130 feet (40 meters) west of the existing bridge. Route 87 is realigned from approximately 1,420 feet (433 meters) north of I-70 to 1,080 feet (329 meters) south. Neither the north nor south frontage roads are continuous across Route 87. In the northwest quadrant, the north frontage road intersects Route 87 near the entrance to Columbia Ready-Mix, approximately 1,250 feet (381 meters) north of the westbound I-70 ramps. The north frontage road in the northeast quadrant is aligned directly with the westbound ramps. The south frontage road is the same as in Option 1.

Option 3

This option is nearly identical to Option 1 (Figure 9). The only difference is in the layout of the south frontage road. In this option, the south frontage road is continuous across Route 87 and lies approximately 680 feet (207 meters) south of the eastbound ramps at I-70. This spacing minimizes impacts to several commercial businesses and a residential subdivision.

2.4 Route 179

Only one conceptual alternative was developed at Route 179. This is a low-volume interchange. The basis for this conceptual alternative came from the concept proposed in the First Tier EIS. In that study, Route 98 was proposed to be relocated approximately 1,100 feet (335 meters) to the north to comply with access management guidelines. However, given the low traffic volumes at the interchange, the relocation of Route 98 1,100 feet (335 meters) north appeared to result in excessive impacts to agricultural and residential property. Therefore, as an alternative to the First Tier alternative, a new alternative was developed incorporating a roundabout configuration on the north side of the interchange, which eliminates the left turn movements at the intersection with the westbound ramps. The southern part of the interchange basically remains the same as presented in the First Tier study (Figure 10). The roundabout concept addresses access management guidelines and minimizes impacts to agricultural and residential property. Under this revised alternative, the proposed crossing lies approximately 100 feet (30 meters) east of the existing crossing in order to allow for better placement of the roundabout. The center of the roundabout lies approximately 520 feet (158 meters) north of I-70. The north frontage road in the northwest quadrant intersects Route 98 approximately 1,500 feet (457 meters) west of the Route 179 intersection. In the northeast quadrant, no new frontage roads are proposed. Route 98 serves as the frontage road to the east to Overton Bottoms. In the southwest quadrant, the south frontage road intersects Route 179 approximately 660 feet (201 meters) south of the eastbound ramps at I-70. There are no new frontage roads planned in the southeast quadrant of the interchange. Access between Route 179 and the Missouri River will be served by the existing local road network. Due primarily to cost, there are no plans for continuous frontage roads across the Missouri River.

No other alternatives were developed at Route 179 primarily because of the constraints present at the interchange. The presence of these constraints creates a “best fit” scenario for the development of any new alternative. These constraints consist of a potentially eligible historic property (Site D-126) in the southwest quadrant of the interchange; the close proximity of State Route 98, which nearly parallels I-70 in the northwest quadrant; and wetlands and water

resources associated with an unnamed tributary to the Missouri River in the northeast quadrant. These constraints, coupled with the low traffic volumes at the interchange, culminated in the decision made by the study team to develop one new alternative (subsequent to the one developed in the First Tier EIS) for further study.

2.5 Route BB

Initially, three alternatives were developed at Route BB. Two of the initial concepts propose the location of a new Route BB bridge west of the existing bridge and one proposes the new bridge east. The western options take advantage of the existing roadway geometry by providing the improvements to the inside of the existing curve rather than swinging to the outside. The western options are located nearer the existing Missouri River Bridge, which creates a shorter merging situation between the Route BB interchange and the bridge. The eastern option provides more distance to the Missouri River Bridge, but results in more commercial property impacts. The north and south frontage roads are not continuous to the west because of the presence of the Missouri River. As mentioned in the previous section, the frontage roads are not continuous at the river primarily due to cost. The concepts are described in more detailed below.

Option 1

This option proposes a new Route BB crossing over I-70 approximately 230 feet (70 meters) west of the existing bridge and a diamond interchange configuration (Figure 11). Under this option, Route BB is realigned from approximately 2,700 feet (823 meters) north of I-70 to approximately 650 feet (198 meters) south. At its furthest extent, the realigned Route BB is approximately 530 feet west of existing Route BB. In the northeast quadrant, the north frontage road is served by an existing roadway approximately 1,700 feet (518 meters) north of the existing westbound ramps. This existing roadway connects to the proposed new alignment via a short stretch of existing Route BB. The proposed north frontage road intersection is approximately 1,550 feet (472 meters) north of the proposed westbound ramps at I-70. In the southeast quadrant, the south frontage road intersects existing Route BB approximately 1,950 feet (594 meters) south of the eastbound ramps at I-70 to avoid impacting any residential properties.

Option 2

This option is identical to Option 1 on the north side of I-70, but differs on the south side with the presence of a roundabout intersection (Figure 12). It proposes a new Route BB crossing over I-70 approximately 230 feet (70 meters) west of the existing bridge and a diamond interchange configuration. The center of the proposed roundabout lies approximately 630 feet (192 meters) south of I-70. The roundabout ties together the eastbound ramps, Route BB and the south frontage road, which extends to the east.

Option 3

This option proposes a new Route BB crossing over I-70 approximately 760 feet (232 meters) east of the existing bridge and a diamond interchange configuration (Figure 13). Under this

option, Route BB is realigned from approximately 2,080 feet (634 meters) north of I-70 to approximately 3,150 feet (960 meters) south. At its furthest extent, the realigned Route BB is approximately 830 feet (232 meters) east of existing Route BB. In the northeast quadrant, the north frontage road is served by an existing roadway approximately 1,700 feet (518 meters) north of the existing westbound ramps. The proposed north frontage road intersection is approximately 1,430 feet (436 meters) north of the proposed westbound ramps at I-70. In the southeast quadrant, the south frontage road intersects existing Route BB approximately 1,750 feet (533 meters) south of the eastbound ramps at I-70.

Option 4

This option is nearly identical to Option 1. The only difference is the configuration of the south frontage road (Figure 14). Under this option, the south frontage road in the southeast quadrant intersects existing Route BB approximately 680 feet (207 meters) south of the eastbound ramps at I-70.

Option 5

This option is nearly identical to Option 3. The only difference is the configuration of the south frontage road (Figure 15). Under this option, the south frontage road in the southeast quadrant intersects existing Route BB approximately 770 feet (235 meters) south of the eastbound ramps at I-70. A frontage road connector roadway is proposed from realigned Route BB to existing Route BB. The length of this connector is approximately 700 feet (213 meters) long.

CHAPTER 3

Refinement and Evaluation of Conceptual Alternatives

After the development of the conceptual alternatives, the study team met with MoDOT and the GEC for the purpose of reviewing what had been developed and, where appropriate, screening or refining the options to be carried forward for more detailed analysis. These interchange concepts were evaluated based on information of record and were not evaluated based on detailed engineering. This level of analysis was intended to be more of a “high-level,” with more detailed analyses to be conducted at the next stage of interchange development.

The criteria used to screen these interchange concepts includes:

- socioeconomics (displaced housing and businesses);
- cultural resources (effects on listed or potentially eligible sites);
- wetlands and water resources; and
- traffic and operations.

Discussion on each interchange location is provided below.

3.1 Route 5

Three options were developed at this interchange. Of these three, Options 1 and 2 result in impacts to two potentially historic properties in the northeast quadrant of the interchange (property numbers D-118 and D-126, both old homes). The impacts to this home are a direct result of the placement of the frontage road in this quadrant. This location was developed in response to the access management suggested guidelines. The study team concluded that the north frontage road alignment under Option 3 was in a more favorable location when considering this historic home even though the suggested access management guideline was not adhered to. Because of this shift in the northeast quadrant, the study team concluded that the north frontage road in the northwest quadrant should be shifted to fall in line with the northeast quadrant. Wetlands and water resources did not factor into the development of any of these concepts. Their presence in the vicinity of the interchange is minimal.

Traffic operations were considered a differentiating factor in the analysis of the Option 2 concept. Under Option 2, the study team concluded that the loop ramp in the northeast quadrant was not as favorable as the diamond configuration provided in Options 1 and 3. The initial intent of the loop ramp was to allow for the placement of the north frontage road directly across from the westbound ramp terminals. However, this was not viewed as enough of a benefit given that Options 1 and 3 offered a more standard diamond layout.

The study team saw no need to make any modifications to the south frontage roads under any of the concepts. Therefore, based on this level of analysis, Option 3 was selected for further consideration and engineering. Option 1 was not recommended for further analysis because of

impacts to two potentially historic properties. Option 2 was not recommended for further analysis because of these same impacts to potential historic properties and the loop ramp in the northeast quadrant (a less-than-desirable configuration). Option 3 provides a standard diamond configuration without any adverse impacts to historic properties, homes or businesses.

Since Option 3 is the only alternative recommended for further study, no additional evaluation of multiple alternatives at the Route 5 interchange is warranted. This option is presented in detail in Chapter II, Section B.4.a of the EA.

3.2 Route B

Three options were developed at this interchange. The layout under Option 1 generally adheres to the suggested access management guidelines and consists of one loop ramp in the northeast quadrant of the interchange (westbound on-ramp). The north frontage road in the northwest quadrant is aligned with the westbound ramp terminals. The layout under Option 2 also satisfies the suggested access management guidelines and provides an alternative to a diamond configuration with loop ramps in the northeast and southwest quadrants. Option 3 was developed as a standard diamond and does not fully comply with the suggested access management guidelines.

The study team concluded that loop ramp configuration of Option 1 was not desirable from the perspective of traffic and operations, especially since Option 3 provides a diamond configuration without significant property or business impacts. The study team also viewed the frontage road alignments under Option 1 unfavorably given the increased length and level of impact to adjacent properties and businesses. Therefore, Option 1 was eliminated from further consideration.

Although, Option 2 results in two loop ramps, the study team elected to retain it for further consideration. The loop ramps are in a more favorable configuration by transitioning a low-speed to high-speed movement. The location of the frontage roads was shifted closer to the I-70 ramp terminals to minimize impacts to adjacent commercial properties.

Option 3 was viewed more favorably than Option 1 because of its more standard diamond configuration and was retained for further analysis.

3.3 Route 87

Three options were developed at this interchange. The layout under Option 1 adheres to the suggested access management guidelines with one exception at the south frontage road in the southwest quadrant. In the southwest quadrant, the frontage road is only 250 feet (76 meters) south of the eastbound ramp terminals and was viewed as undesirable.

The alignment of Route 87 under Options 1, 2 and 3 all displace the Texaco filling station on the west side of Route 87. Option 4 displaces the Conoco filling station and an abandoned motel on the other side of the road. The study team viewed the displacement of the Conoco filling station and hotel more desirable based on personal communication from the station owner at the first public meeting.

The loop ramp configurations of Option 2 were viewed unfavorably because they are off-ramps and are transitioning a high-speed to low-speed movement. Option 2 also results in more land impacts in the northwest and southeast quadrants. Additionally, a small cemetery exists in the northwest quadrant that would be at risk of impact from the loop ramp. Given that other options exist with a more standard configuration (diamond) and less severe impacts, this option was eliminated from consideration based on operational and land use issues.

Option 3 was viewed more favorably than Option 1 because the south frontage road is continuous across Route 87 and results in fewer land impacts. Since Option 3 is very similar to Option 1 but results in fewer land use impacts, Option 1 was eliminated from further analysis.

Option 4 provides an alternative to Option 3 by locating the new Route 87 bridge east of the existing bridge. The study team recommended retaining Options 3 and 4 for further analysis. However, the study team agreed to shift both the westbound and eastbound ramp terminals approximately 100 feet (30 meters) further south to minimize impacts to the commercial property along the north side of the intersection. The spacing between the ramp terminals remained constant at approximately 750 feet (229 meters).

Wetlands and water resources did not factor significantly into the analysis of these concepts.

3.4 Route 179

One alternative was developed at this interchange location. Reference Chapter 2.4 for discussion on the development of only one alternative at this location. Subsequent to the initial development of this concept, a cellular transmission tower was constructed in the northeast quadrant of the interchange between I-70 and Route 98. The study team agreed to shift the placement of the westbound off-ramp to avoid the newly-constructed tower. Otherwise, the study team saw no need for additional changes to this concept and no need for the development of additional alternatives at this location. Wetlands and water resources did not factor into the development of this alternative. However, the location of architectural property D-126 factored into the location of the south outer road west of Route 179. This outer road was located to avoid impacting the home on this property. It is presented in further detail in Chapter II, Section B.4.a of the EA.

3.5 Route BB

Five conceptual options were developed at this interchange. Of these, Options 1 and 4 and Options 3 and 5 are nearly identical to each other except for the placement of the south frontage road. The study team recommended consolidating Options 1 and 4 and Options 3 and 5. Since traffic operations or safety are not compromised by the placement of the south frontage road under Options 4 and 5, the study team recommended to eliminate Options 1 and 3 from further consideration. Options 4 and 5 provide basically the same alternative with fewer land use impacts and less frontage road construction. Water and cultural resources did not factor significantly into the analysis at this phase.

The study team evaluated the concept under Option 2. The study team felt that the roundabout proposed on the south side of I-70 was not warranted and resulted in higher impacts. Therefore, Option 2 was eliminated from further consideration.

CHAPTER 4

Final Interchange Alternatives

4.1 Routes 5 and 179

As mentioned earlier, Option 3 is the only alternative recommended for further study at the Route 5 interchange. No additional alternatives at the Route 5 interchange were developed or analyzed in greater detail. This option is presented in detail in Chapter II, Section B.4.a of the EA.

Only one alternative was carried forward at the Route 179 interchange. Like the Route 5 interchange, detail on the Route 179 interchange can be found in Chapter II, Section B.4.a of the EA.

4.2 Routes B, 87 and BB

From the previous discussions, two options were recommended to be carried forward for further analysis at Routes B, 87 and BB. The selected concepts become final interchange alternatives and are as follows:

Route B:	Options 2 and 3
Route 87:	Options 3 and 4
Route BB:	Options 4 and 5

For the sake of clarity in the EA, these final alternatives were renamed to the following and are all identified as such in Chapter II, Section B.4.b of the EA.

Interchange	Old Name	New Name
Route B:	Option 2	Option A
	Option 3	Option B
Route 87:	Option 3	Option A
	Option 4	Option B
Route BB:	Option 4	Option A
	Option 5	Option B

Each of these final alternatives have been evaluated based on a range of criteria and scored based on the level of adverse effect or benefit. These criteria included: (1) Engineering, (2) Traffic, (3) Social and Economic Factors, and (4) Environmental Factors. Each of these criteria have a range of sub-criteria for the purposes of evaluation. This evaluation matrix along with the criteria are presented in Table 4-1. Based on the data presented in Table 4-1, the following summarizes the selection of a recommended preferred alternative at Routes B, 87 and BB.

Route B

The recommended preferred alternative at Route B is Option B for the following reasons:

- lower construction cost;
- greater ease of construction;
- lower commercial and residential property acquisitions; and
- slightly lower wetland acreage impact.

Route 87

The recommended preferred alternative at Route 87 of Option B. The two options at Route 87 are nearly the same in terms of impacts to environmental and cultural resources. From an engineering standpoint, the two options are similar as well. However, Option B was selected for the following reasons:

- provides a more perpendicular bridge crossing than Option A; and
- more favored by the public (Conoco owner prefers buyout).

Route BB

The recommended preferred alternative at Route BB is Option A for the following reasons:

- lower construction cost;
- incorporates a more favorable bridge design having less skew over I-70;
- one less residential displacement;
- less prime farmland impacts; and
- less wetland acreage impact.

These analyses are summarized in Chapter II.B.4 of the EA.

Table 4-1. Alternative Evaluation—Interchange: Route B

Evaluation Factor	Definition/Clarification	Indicators And Effects	
		Option A	Option B
1.0 Engineering and Traffic Issues			
1.1 Length	Total length of alternative and its resultant impact on acquisition, construction, and operations and maintenance costs.	Ranking: Not Applicable Length not a relevant factor for interchange options	Ranking: Not Applicable Length not a relevant factor for interchange options
1.2 Cost	Consider economic burden as it relates to capital costs, right of way acquisition, construction cost, incidentals	Ranking: 2 Total estimated cost: \$109.6M, greater acquisition costs due to greater displacement of commercial businesses	Ranking: 3 Total estimated cost: \$67.1M
1.3 Constructability	Evaluate alternatives with respect to staging, maintenance of traffic and constructability.	Ranking: 2 Reduced ease of construction due to loop ramps and construction phase disruption to businesses	Ranking: 3 Greater ease of construction due to use of backage roads that do not disrupt businesses
2.0 Traffic			
2.1 Traffic Operations/ Efficiency	Evaluate alternatives with respect to accessibility due to differences in access management, changes in travel time, and capacity to meet future demand	Ranking: 4 Provides benefits for improved flow under predicted traffic volumes, no significant effect on travel time	Ranking: 4 Provides benefits for improved flow under predicted traffic volumes, no significant effect on travel time
2.2 Traffic Safety/Accident Potential	Evaluate alternatives with respect to reduction in accident rates and capacity to enhance incident management	Ranking: 3 Provides overall benefit for safety and incident management, but less favorable than Option B as north outer roads do not align.	Ranking: 4 Provides overall benefit for safety and incident management, more favorable than Option A as north outer roads align.
3.0 Social and Economic Factors			
3.1 Land Use	<i>Consistency.</i> Evaluate the consistency of the proposed improvement with existing land uses (transportation facility is a developed land use that is most consistent when aligned with other transportation land uses and least consistent when aligned with rural, undeveloped land uses (agricultural land, forest land, etc.). <i>Compatibility.</i> Evaluate the compatibility of the project with current and proposed land use planning efforts.	Ranking: 3 Located at an existing interchange, Aligns with developed uses, but less consistent as it bisects developed uses	Ranking: 4 Located at an existing interchange, Aligns with developed uses, maintains access and service to developed uses.

Table 4-1. Alternative Evaluation—Interchange: Route B

Evaluation Factor	Definition/Clarification	Indicators And Effects	
		Option A	Option B
3.2 Displacements	Residential: Number of residences impacted and potential effects due to parcel takes (may be partial) Commercial/Industrial: Number of commercial and industrial businesses taken. Utilities: Potential need to relocate transmission lines or other major utilities	Ranking: 1 Residential displacements: 1 Commercial displacements: 7 Church: 1	Ranking: 2 Residential displacements: 0 Commercial displacements: 5 Church: 1
3.3 Impacts to Existing I-70 Businesses	Evaluate potential impacts to existing (i.e., those remaining after displacements) I-70 businesses as it relates to changes in access and visibility	Ranking: 2 Provides for similar ingress/egress to existing businesses on south side of I-70 and NW quadrant Negative impact on available area for parking and maneuverability at Bobber truck stop relative to Option B	Ranking: 3 Provides for similar ingress/egress to existing businesses on south side of I-70 and NW quadrant
3.4 Environmental Justice	Evaluate potential disproportionate impacts on low income and minority populations	Ranking: Not Applicable	Ranking: Not Applicable
4.0 Environmental Factors			
4.1 Air Quality	Evaluate potential impact on air quality. Consideration of non-attainment areas.	Ranking: 3 No effect	Ranking: 3 No effect
4.2 Noise	Evaluate potential impact on sensitive receptors (residence, church, school, library).	Ranking: 3 No effect on sensitive receptors	Ranking: 3 No effect on sensitive receptors
4.3 Parklands	Evaluate potential impact on potential 4(f)/6(f) lands including Big Muddy NWR, Overton Bottoms Cons. Area, Katy Trail, Taylor's Landing, and historic properties/sites as well schools and fairgrounds.	Ranking: Not Applicable	Ranking: Not Applicable
4.4 Prime Farmland	Potential conversion of prime and unique farmland and farmland of statewide or local importance	Ranking: 3 <3 acres impacted	Ranking: 3 <3 acres impacted
4.5 Floodways & Floodplains	Evaluate potential impact on floodway and floodplain encroachment. Consider extent of alignment on structure, transverse vs. perpendicular crossings, etc.	Ranking: Not Applicable	Ranking: Not Applicable
4.6 Wetlands/Water Bodies	Evaluate potential impact on wetlands and water bodies. Consider extent of alignment on structure, transverse vs. perpendicular crossings, etc.	Ranking: 2 1.4 acres impacted	Ranking: 3 0.7 acres impacted

Table 4-1. Alternative Evaluation—Interchange: Route B

Evaluation Factor	Definition/Clarification	Indicators And Effects	
		Option A	Option B
4.7 Streams, Rivers and Groundwater Resources	Evaluate potential impact on streams/rivers and groundwater. Consider extent of alignment on structure, transverse vs. perpendicular crossings, etc., potential impact on public water supplies, potential for water quality degradation	Ranking: 3 No significant impact on surface or ground water resources	Ranking: 3 No significant impact on surface or ground water resources
4.8 Rare, Threatened and Endangered (RTE) Species	Evaluate potential impact on Federal Listed species including pallid sturgeon, Indiana and gray bat, interior tern, bald eagle Consider potential effects on state listed species (Buffalo grass, etc.)	Ranking: Not Applicable, no RTE species present at interchange	Ranking: Not Applicable, no RTE species present at interchange
4.9 Forest Land	Evaluate the potential impact of the alternatives on forest land within the study area.	Ranking: 3 Forest land consists of small, scattered woodlots of low to moderate quality	Ranking: 3 Forest land consists of small, scattered woodlots of low to moderate quality
4.10 CRP/WRP Land	Evaluate potential impacts to CRP/WRP lands.	Ranking: Not Applicable	Ranking: Not Applicable
4.11 Cultural Resources	Evaluate potential effects on NRHP sites or sites likely to be NRHP eligible.	Ranking: Not Applicable	Ranking: Not Applicable
4.12 Hazardous Waste Sites	Evaluate potential impacts of known or suspected hazardous waste sites	Ranking: 2 Potential clean up required at 2 existing/former gas stations	Ranking: 2 Potential clean up required at 2 existing/former gas stations
4.13 Visual Quality	Evaluate potential impact on visual and scenic landscapes	Ranking: 3 No notable aesthetic or scenic visual resources	Ranking: 3 No notable aesthetic or scenic visual resources
4.14 Secondary Impacts	Determine potential for induced development and secondary impacts	Ranking: 3 Improvement to be constructed at an existing interchange location. No increased potential for secondary impacts	Ranking: 3 Improvement to be constructed at an existing interchange location. No increased potential for secondary impacts