NOTE: Information contained in this report reflects the best information available at the time of publication. Minor revisions to elements such as interchange layout, schedule, costs, etc. may have occurred since publication. **D. Cleveland (May 3, 2018)**

Alternative Selection Report

Interchange Modification

I-65 at SR 267 in Boone County

and

New Interchange

I-65 at CR550S in Boone County

Des. No. 1400071

August 4, 2017

Prepared for:

Prepared by:

EXECUTIVE SUMMARY

Tables ES-1 and ES-2 summarize the results of the decision-making criteria for the selection of the preferred alternative at each location. Traffic operations, safety, and cost are the primary factors in the decision-making process; however, the other criteria provide supplemental support for the decision. Depending on the nature of the protected resource, environmental impacts can also elevate to a primary factor.

Table ES-1 | Decision Criteria Summary (SR 267)

Criteria		Interchange Alternative			
		Parclo A (slip ramp)	DDI (Grade Sep.)	Conventional DDI	SPUI
2040 Traffic Operations	AM	Total delay = 33 hours VMT = 7,474 miles VHT = 300 hours	Total delay = 29 hours VMT = 7,692 miles VHT = 299 hours	Total delay = 36 hours VMT = 7,298 miles VHT = 297 hours	Total delay = 35 hours VMT = 6,911 miles VHT = 288 hours
	PM	Total delay = 29 hours VMT = 8,317 miles VHT = 159 hours	Total delay = 29 hours VMT = 8,400 miles VHT = 162 hours	Total delay = 38 hours VMT = 7,972 miles VHT = 164 hours	Total delay = 36 hours VMT = 7,534 miles VHT = 157 hours
Safety		15 total conflict points	16 total conflict points	18 total conflict points	24 total conflict points
Total Cost		$35.44 million	$24.06 million	$20.01 million	$22.61 million
Constructability		Reconstruct and widen bridge under traffic condition	Existing two-way bridge untouched for significant period while constructing EB bridge	Existing two-way bridge untouched for significant period while constructing EB bridge	Closure of existing bridge required during new bridge construction
Future Expandability		Bridge can be easily widened but loop ramps would need reconstruction	Bridges easily widened with minimal approach work	Bridges easily widened with minimal approach work	Widening would require raising bridge profile and approaches – new deck
Right-of-Way		22.9 acres	12.7 acres	12.7 acres	8.7 acres
Environmental Impacts		Large contiguous wetland impact	Boone's Pond impact (Section 4(f)); large contiguous wetland impact	Minimal impacts	Least impacts
Infrastructure Economics		Nothing saved	Utilizes SR 267 bridge reconstructed in 2010	Utilizes SR 267 bridge reconstructed in 2010	Nothing saved

Note: VMT (vehicle miles travelled), VHT (vehicle hours travelled)

The **Conventional DDI is the preferred alternative for the I-65 interchange at SR 267**. All four alternatives provide desirable traffic operations and safety. Cost is the primary differentiator with the Conventional DDI being the lowest cost of the four alternatives. The Conventional DDI alternative fully utilizes the existing SR 267 bridge, recently reconstructed in 2010, both during and after construction. Use of the existing SR 267 bridge will minimize disruption to SR 267 traffic operations during construction.

Table ES-2 | Decision Criteria Summary (CR550S)

Criteria		Interchange Alternative			
		Tight Diamond	Conventional DDI	SPUI	Conv. Diamond
2040 Traffic Operations	AM	Total delay = 57 hours VMT = 7,467 miles VHT = 339 hours	Total delay = 42 hours VMT = 7,336 miles VHT = 305 hours	Total delay = 43 hours VMT = 7,498 miles VHT = 314 hours	Total delay = 56 hours VMT = 7,480 miles VHT = 342 hours
	PM	Total delay = 59 hours VMT = 7,930 miles VHT = 180 hours	Total delay = 47 hours VMT = 7,813 miles VHT = 164 hours	Total delay = 45 hours VMT = 7,966 miles VHT = 165 hours	Total delay = 58hours VMT = 7,950 miles VHT = 183 hours
Safety		30 total conflict points	18 total conflict points	24 total conflict points	30 total conflict points
Total Cost		$18.46 million	$19.30 million	$22.11 million	$19.03 million
Constructability		New terrain alignment – no disruption	New terrain alignment – no disruption	New terrain alignment – no disruption	New terrain alignment – no disruption
Future Expandability		Bridges easily widened but adding a 3rd left turn lane would be undesirable.	Bridges easily widened with minimal approach work	Widening would require raising bridge profile and approaches – new deck	Bridge easily widened with minimal approach work
Right-of-Way		52.7 acres	55.3 acres	55.0 acres	59.5 acres
Environmental Impacts		Minimal Impacts	Minimal impacts	Minimal impacts	Minimal impacts
Infrastructure Economics		New terrain alignment – nothing to save	New terrain alignment – nothing to save	New terrain alignment – nothing to save	New terrain alignment – nothing to save

Note: VMT (vehicle miles travelled), VHT (vehicle hours travelled)

The **Conventional DDI is the preferred alternative for the I-65 interchange at CR550S**. All four alternatives provide desirable traffic operations and safety, with the Conventional DDI performing slightly better than the other alternatives for each criterion. The Conventional DDI alternative is preferred, even though it is estimated to cost an approximately $0.27 million more than the Conventional Diamond alternative and $0.84 million more than the Tight Diamond alternative, because the Conventional DDI safeguards against unforeseen fluxuations in the future land development and traffic forecasts. The area is currently wide-open and prime for continued, rapid development. Left turning movements tend to pose the greatest challenge to signalized intersections because they require green time that could otherwise be used for thru movements. The I-65 at CR550S interchange will experience a heavy westbound CR550S to southbound I-65 left turning volume. The Conventional DDI provides a free-flowing westbound CR550S to southbound I-65 movement.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 PURPOSE OF REPORT

The purpose of this report is to summarize the analysis of various interchange alternatives for modification of the I-65 interchange with SR 267 and the new I-65 interchange with Boone County Road 550 South (CR550S), to document decision-making criteria for selection of the preferred interchange alternative at each location, and to select the preferred alternative at each location. This analysis represents a portion of the traffic operations analysis that will be contained in the Interstate Access Document (IAD). While this Alternative Selection Report focuses on the interchange build alternatives, the traffic operations analysis required to satisfy FHWA's eight Policy Points is more comprehensive and will include additional items such as:

- Transportation management options;
- Traffic operations of adjacent interchanges including the potential to improve those corridors in lieu of improving the subject interchanges;
- Analysis of major intersections immediately adjacent to the subject interchanges; and,
- Detailed safety analysis.

2.0 PREVIOUS REPORTS AND TECHNICAL MEMOS

This Alternative Selection Report is a continuation of the analysis contained in previous reports and technical memos noted below. It provides information that will be incorporated into Policy Point #3 (Operational Analysis) of the IAD.

- **Abbreviated Interchange Justification Report (July 2013):** The Indiana Department of Transportation (INDOT) prepared an Abbreviated Interchange Justification (IJ) Report for existing I-65 at SR 267 interchange to accommodate construction of a northbound I-65 slip ramp utilizing Perry Worth Road creating direct access to Albert White Boulevard/CR 400S. The Abbreviated IJ Report documented the need to prepare an IAD for a Long-Term Solution at the I-65 interchange with SR 267. The report identified a partial cloverleaf type "A" (Parclo A), with a slip ramp feeding the loop in the northwest quadrant, as a preliminary preferred interchange type.

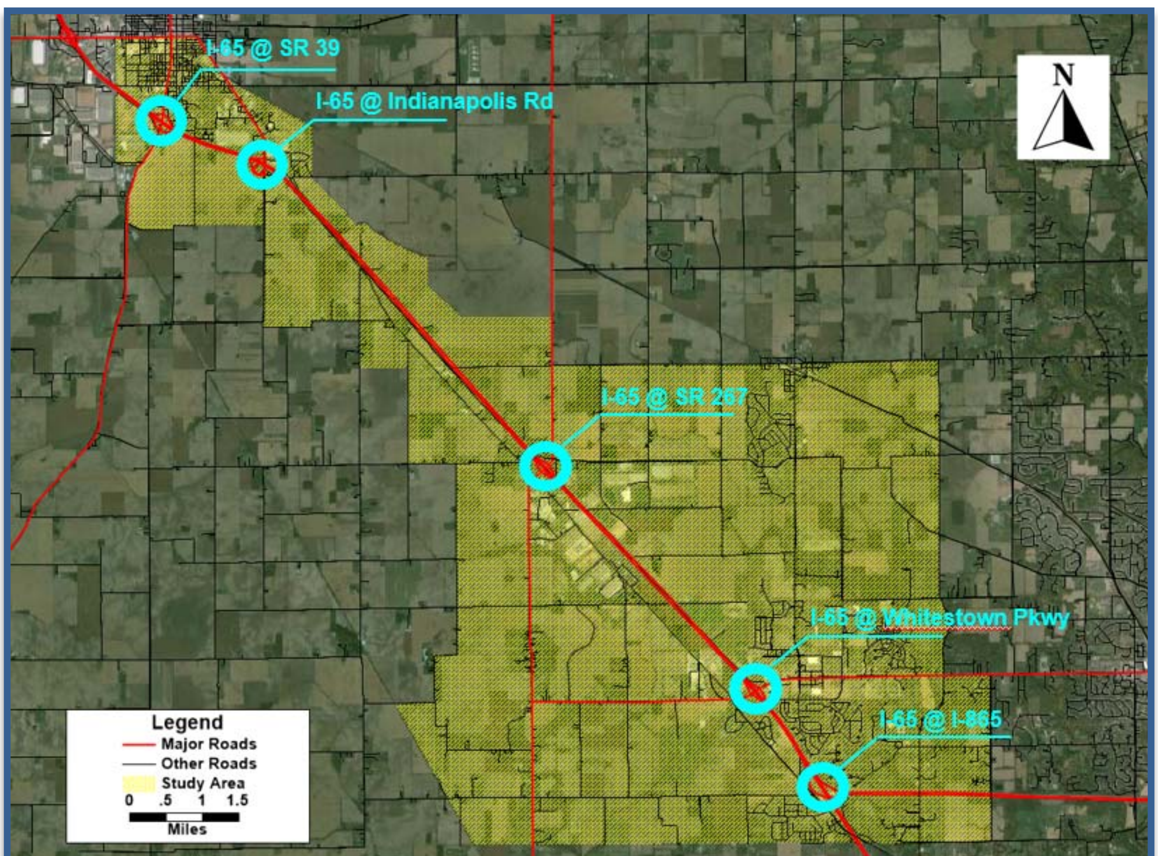
- **Tech Memo #1 (December 20, 2017):** Tech Memo #1 confirmed that construction of a new I-65 interchange at CR550S has value. It serves the need of the anticipated heavy growth in the area and draws future traffic from SR 267 and Whitestown Parkway corridors. An I-65 at CR550S interchange eliminates the need to make costly future improvements to the Whitestown Parkway interchange as a result of the diversion. Tech Memo #1 investigated the following three corridor scenarios.
  - ✓ No-Build;
  - ✓ Build 1 – SR 267 modification (diverging diamond interchange [DDI] with grade separation at east junction); and,
  - ✓ Build 2 **(preferred)** – SR 267 modification (DDI with grade separation at east junction) plus new tight diamond interchange (TDI) at CR550S.

Note: *The SR 267 DDI with grade separation alternative in Build 1, noted above, represents a major interchange modification and was considered an equivalent interchange investment as a Parclo A with slip ramp for the purposes of Tech Memo #1. The CR550S TDI in Build 2, noted above, represents a typical new urban interchange and was considered an equivalent interchange investment as a conventional diverging diamond interchange (DDI) and a single point urban interchange (SPUI) for the purposes of Tech Memo #1.*

- **Tech Memo #2 (April 3, 2017):** Tech Memo #2 confirmed that the construction of a new I-65 interchange at CR550S diverts enough future traffic from the SR 267 corridor such that a lesser magnitude interchange modification at I-65 and SR 267 is viable. A lesser magnitude interchange still meets the traffic operation needs of the projects comparable to the Parlco A with slip ramp as identified in the Abbreviated IJ Report. The lesser magnitude interchange, such as a conventional DDI or SPUI, can be constructed in tandem with a new I-65 interchange at CR550S for less than the original project budget. The memo concluded that a conventional DDI (or similar interchange type) and a TDI (or similar interchange type) at CR550S could be constructed within the original budget.

- **Framework Document (May 8, 2017):** The Framework Document established the study area **(Figure 1)** and summarized the travel demand modeling methodology used to determine the base year and future design year traffic data for the project.

Figure 1 | Study Area



These previous reports and technical memos provide for a logical progression of decision-making. The Abbreviated IJ Report established the need for a Long-Term Solution at I-65 and SR 267, which resulted in the need for an IAD. Tech Memo #1 established that a new CR550S interchange has value and provides benefit to SR 267 and Whitestown Parkway by drawing significant future traffic from those corridors. Tech Memo #2 established that constructing a new I-65 at CR550S interchange allows a less costly interchange solution at I-65 and SR 267, such that both interchanges can be completed within the original budget. The Framework Document establishes the methodology for preparation of the IAD.

Traffic data **(Appendix B)** for this project was generated for the No-Build, Build 1, and Build 2 corridor scenarios discussed in Tech Memo #1. Within those three corridor scenarios, the forecasted traffic volumes were not affected by interchange type at a particular location. Forecasted traffic volumes for I-65 mainline, merge, diverge, and weave movements are not dependent on interchange type. It is important to note that the new CR550S access in the Build 2 corridor scenario draws approximately 25 percent more traffic in the design year to the I-65 corridor between Whitestown Parkway and SR 267. Link zonal analysis, a tool in the TransCAD travel demand modeling software used for this project that identifies the magnitude of trips from various traffic zones within the study area that passes through a particular roadway link, confirmed that this is because of the high amount of anticipated development in the immediate CR550S interchange area. The link zonal analysis also confirmed that I-65 between Whitestown Parkway and SR 267 is a more efficient route than the local road network. South of Whitestown Parkway and north of SR 267, the forecasted I-65 mainline traffic for Build 1 and Build 2 are similar. All I-65 at SR 267 interchange alternatives analyzed used the same SR 267 forecasted traffic volumes. All I-65 at CR550S interchange alternatives analyzed used the same CR550S forecasted traffic volumes. This allowed the I-65 at SR 267 interchange and the I-65 at CR550S interchange to be analyzed independent of each other.

3.0 STUDY AREA I-65 MAINLINE CAPACITY ANALYSIS

As the No-Build, Build 1, and Build 2 corridor scenario traffic was not dependent on interchange type at a particular location, so too is the HCS analysis the same regardless of interchange type. Build 2 introduces a new I-65 access point at CR550S resulting in the need for additional mainline segment, merge, diverge, and weave analysis. Capacity analysis was performed using Highway Capacity Software (HCS 2010). Level of Service (LOS) is reported as “A” through “F” with LOS A representing uninhibited, free-flow conditions and LOS F representing gridlock. The point between LOS D and LOS E typically represents when a facility has reached its capacity, and congestion and queuing tend to occur on a more frequent basis as this threshold is exceeded. The HCS analysis confirms that the existing I-65 mainline, and the associated merges, diverges, and weaves, is anticipated to perform adequately (minimum LOS D or better) in the design year, even with the increased traffic between Whitestown Parkway and SR 267, with the exception of the northbound and southbound weaving between I-865 and Whitestown Parkway, which is discussed later in this section. Mainline I-65 has plenty of capacity and is not the issue. Providing adequate capacity at the interchanges so that queuing on the diverge ramps does not impact the mainline I-65 traffic operation is the challenge for this project. **Tables 1, 2, and 3** summarize the HCS analysis for the No-Build, Build 1, and Build 2 corridor scenarios. A graphical summary is contained in **Appendix C**. Individual HCS reports are contained in **Appendix D**.

Table 1 | No-Build Corridor Scenario – Mainline, Merge, Diverge, Weave Analysis Summary

No-Build			Year 2016				Year 2040			
			AM		PM		AM		PM	
			LOS	Density	LOS	Density	LOS	Density	LOS	Density
Mainline Freeway	N.B.	SR 39 to North Terminus	A	8.7	B	11.2	A	10.9	B	14.8
		CR 100 E to SR 39	A	9.4	B	11.5	B	11.8	B	15.0
		SR 267 to CR 100 E	A	10.2	B	13.1	B	12.8	B	17.7
		Whitestown Pkwy to SR 267	B	12.4	B	15.4	C	19.3	C	20.7
		I-865 to Whitestown Pkwy	A	9.8	B	15.1	C	18.9	C	20.5
	S.B.	SR 39 to North Terminus	A	9.1	B	11.0	B	15.0	B	13.2
		CR 100 E to SR 39	A	10.5	B	13.3	B	16.4	B	14.7
		SR 267 to CR 100 E	B	11.7	B	13.0	B	17.7	B	15.6
		Whitestown Pkwy to SR 267	B	13.3	B	14.1	C	18.8	C	20.1
		I-865 to Whitestown Pkwy	B	13.3	B	12.5	C	21.3	C	20.7
Merge	N.B.	SR 39 to I-65	A	8.7	B	11.3	B	11.2	B	15.2
		CR 100 E to I-65	A	9.2	B	11.3	B	11.9	B	15.0
		SR 267 to I-65	B	11.9	B	14.5	B	14.8	B	19.7
		Whitestown Pkwy to I-65	B	14.5	B	17.3	C	21.6	C	22.6
		I-865 to I-65	NA	NA	NA	NA	NA	NA	NA	NA
	S.B.	SR 39 to I-65	B	11.5	B	13.3	B	17.6	B	15.8
		CR 100 E to I-65	B	10.9	B	12.3	B	17.2	B	15.3
		SR 267 to I-65	B	15.9	B	16.6	C	22.0	C	24.5
		Whitestown Pkwy to I-65	NA	NA	NA	NA	NA	NA	NA	NA
Diverge	N.B.	I-65 to SR 39	A	9.6	B	11.9	B	12.9	B	16.1
		I-65 to CR 100 E	B	13.3	B	17.1	B	16.6	C	22.5
		I-65 to SR 267	A	0.0	A	0.0	A	0.0	A	0.0
		I-65 to Whitestown Pkwy	A	8.0	B	14.9	B	19.8	C	24.4
	S.B.	I-65 to SR 39	A	8.2	B	10.4	B	15.0	B	13.2
		I-65 to CR 100 E	B	13.3	B	15.4	B	20.0	B	18.1
		I-65 to SR 267	B	12.3	B	13.8	B	19.5	B	16.9
		I-65 to Whitestown Pkwy	B	13.6	B	14.4	B	19.8	C	20.7
		I-65 to I-865	NA	NA	NA	NA	NA	NA	NA	NA
Weave	N.B.	CR 100 E to SR 39	NA	NA	NA	NA	B	13.0	NA	NA
		SR 267 to CR 100 E	NA	NA	NA	NA	NA	NA	NA	NA
		Whitestown Pkwy to SR 267	NA	NA	NA	NA	NA	NA	NA	NA
		I-865 to Whitestown Pkwy	B	10.3	B	15.2	B	19.1	F	*
	S.B.	CR 100 E to SR 39	B	11.4	B	13.7	B	18.7	B	16.5
		SR 267 to CR 100 E	NA	NA	NA	NA	NA	NA	NA	NA
		Whitestown Pkwy to SR 267	NA	NA	NA	NA	NA	NA	NA	NA
		I-865 to Whitestown Pkwy	B	13.9	B	12.8	F	**	C	20.4

Density (passenger cars/mile/lane)
*Note: * and ** indicates HCS did not report a density – the volume to capacity (V/C) is 1.080 (*) and 1.093 (**)*

Table 2 | Build 1 Corridor Scenario – Mainline, Merge, Diverge, Weave Analysis Summary

Build 1			Year 2016				Year 2040			
			AM		PM		AM		PM	
			LOS	Density	LOS	Density	LOS	Density	LOS	Density
Mainline Freeway	N.B.	SR 39 to North Terminus	A	8.7	A	10.9	A	10.8	B	14.7
		CR 100 E to SR 39	A	9.4	B	11.6	B	11.9	B	14.9
		SR 267 to CR 100 E	A	10.1	B	13.4	B	12.7	B	17.2
		Whitestown Pkwy to SR 267	B	12.4	B	15.7	C	20.0	C	20.5
		I-865 to Whitestown Pkwy	A	9.7	B	14.0	B	17.3	C	21.9
	S.B.	SR 39 to North Terminus	A	9.1	B	11.0	B	15.0	B	13.2
		CR 100 E to SR 39	A	10.6	B	12.5	B	16.3	B	14.7
		SR 267 to CR 100 E	B	11.8	B	13.2	B	17.8	B	15.7
		Whitestown Pkwy to SR 267	B	13.3	B	14.1	C	18.6	C	20.1
		I-865 to Whitestown Pkwy	B	13.1	B	12.3	C	21.1	C	20.7
Merge	N.B.	SR 39 to I-65	A	8.7	B	10.9	B	11.1	B	15.2
		CR 100 E to I-65	A	9.2	B	11.5	B	12.0	B	14.8
		SR 267 to I-65	B	11.8	B	14.8	B	14.6	B	19.3
		Whitestown Pkwy to I-65	B	14.5	B	17.6	C	22.3	C	22.3
		I-865 to I-65	NA	NA	NA	NA	NA	NA	NA	NA
	S.B.	SR 39 to I-65	B	11.6	B	13.3	B	17.4	B	15.9
		CR 100 E to I-65	B	11.1	B	12.5	B	17.3	B	15.4
		SR 267 to I-65	B	16.0	B	16.7	C	21.8	C	24.5
		Whitestown Pkwy to I-65	NA	NA	NA	NA	NA	NA	NA	NA
Diverge	N.B.	I-65 to SR 39	A	9.6	B	12.2	B	13.0	B	16.1
		I-65 to CR 100 E	B	13.2	B	17.4	B	16.5	C	21.8
		I-65 to SR 267	A	0.0	A	0.0	A	0.0	A	0.0
		I-65 to Whitestown Pkwy	A	7.9	B	14.8	B	19.7	C	24.4
	S.B.	I-65 to SR 39	A	8.2	B	10.4	B	15.0	B	13.2
		I-65 to CR 100 E	B	13.4	B	15.5	B	19.9	B	18.2
		I-65 to SR 267	A	0.0	A	0.0	A	3.7	A	1.6
		I-65 to Whitestown Pkwy	B	13.8	B	14.5	B	19.5	C	20.7
		I-65 to I-865	NA	NA	NA	NA	NA	NA	NA	NA
Weave	N.B.	CR 100 E to SR 39	NA	NA	NA	NA	B	13.1	B	13.1
		SR 267 to CR 100 E	NA	NA	NA	NA	NA	NA	NA	NA
		Whitestown Pkwy to SR 267	NA	NA	NA	NA	NA	NA	NA	NA
		I-865 to Whitestown Pkwy	B	10.3	B	15.2	B	19.1	F	*
	S.B.	CR 100 E to SR 39	B	11.6	B	13.7	B	18.6	B	16.6
		SR 267 to CR 100 E	NA	NA	NA	NA	NA	NA	NA	NA
		Whitestown Pkwy to SR 267	NA	NA	NA	NA	NA	NA	NA	NA
		I-865 to Whitestown Pkwy	B	13.4	B	12.5	F	**	C	23.6

Density (passenger cars/mile/lane)
*Note: * and ** indicates HCS did not report a density – the volume to capacity (V/C) is 1.061 (*) and 1.114 (**)*

Table 3 | Build 2 Corridor Scenario – Mainline, Merge, Diverge, Weave Analysis Summary

Build 2			Year 2016				Year 2040			
			AM		PM		AM		PM	
			LOS	Density	LOS	Density	LOS	Density	LOS	Density
Mainline Freeway	N.B.	SR 39 to North Terminus	A	8.6	B	11.2	A	10.8	B	15.2
		CR 100 E to SR 39	A	9.5	B	11.8	B	11.6	B	15.4
		SR 267 to CR 100 E	A	10.2	B	13.4	B	12.9	B	17.9
		CR550S to SR 267	B	12.1	B	15.7	C	19.6	C	22.4
		Whitestown Pkwy to CR550S	B	12.9	B	16.2	C	25.4	C	25.0
		I-865 to Whitestown Pkwy	A	9.7	B	14.0	C	18.6	C	20.4
	S.B.	SR 39 to North Terminus	A	9.1	B	11.0	B	15.0	B	13.4
		CR 100 E to SR 39	A	10.6	B	12.4	B	16.5	B	14.6
		SR 267 to CR 100 E	B	11.9	B	13.1	B	17.8	B	15.8
		CR550S to SR 267	B	13.4	B	14.1	C	20.1	C	20.9
		Whitestown Pkwy to CR550S	B	14.0	B	14.5	C	21.8	D	26.4
		I-865 to Whitestown Pkwy	B	13.5	B	12.4	C	21.3	C	20.6
Merge	N.B.	SR 39 to I-65	A	8.6	B	11.4	B	11.1	B	15.6
		CR 100 E to I-65	A	9.3	B	11.6	B	11.7	B	15.4
		SR 267 to I-65	B	11.9	B	15.4	B	14.5	B	19.8
		CR550S to I-65	B	12.9	B	16.3	C	20.7	B	23.4
		Whitestown Pkwy to I-65	B	15.1	C	20.5	D	29.0	C	27.5
		I-865 to I-65	NA	NA	NA	NA	NA	NA	NA	NA
	S.B.	SR 39 to I-65	B	11.6	B	13.3	B	17.7	B	15.8
		CR 100 E to I-65	B	11.2	B	12.3	B	17.4	B	15.2
		SR 267 to I-65	B	16.3	B	16.5	C	22.9	C	25.6
		CR550S to I-65	B	15.7	B	16.2	C	25.7	D	29.7
		Whitestown Pkwy to I-65	NA	NA	NA	NA	NA	NA	NA	NA
Diverge	N.B.	I-65 to SR 39	A	9.8	B	12.4	B	12.5	B	16.7
		I-65 to CR 100 E	B	13.3	B	17.5	B	16.8	C	22.6
		I-65 to SR 267	A	0.0	B	13.5	A	0.0	A	0.0
		I-65 to CR550S	A	0.0	B	17.6	B	12.7	B	10.9
		I-65 to Whitestown Pkwy	A	7.8	B	14.5	B	18.6	C	23.2
	S.B.	I-65 to SR 39	A	8.1	B	10.5	B	15.0	B	13.3
		I-65 to CR 100 E	B	13.4	B	15.4	C	20.1	B	18.0
		I-65 to SR 267	A	0.0	B	13.9	A	3.8	A	1.6
		I-65 to CR550S	A	0.0	B	14.6	A	5.4	A	6.7
		I-65 to Whitestown Pkwy	B	14.5	B	14.9	C	23.1	C	26.3
		I-65 to I-865	NA	NA	NA	NA	NA	NA	NA	NA
Weave	N.B.	CR 100 E to SR 39	NA	NA	NA	NA	NA	NA	NA	NA
		CR550S to SR 267	NA	NA	NA	NA	NA	NA	NA	NA
		Whitestown Pkwy to CR550S	NA	NA	NA	NA	D	31.0	NA	NA
		I-865 to Whitestown Pkwy	B	10.3	B	15.0	B	18.8	F	*
	S.B.	CR 100 E to SR 39	B	11.6	B	13.5	B	18.8	B	16.3
		CR550S to SR 267	NA	NA	NA	NA	NA	NA	NA	NA
		Whitestown Pkwy to CR550S	NA	NA	NA	NA	C	26.8	D	32.2
		I-865 to Whitestown Pkwy	B	14.0	B	12.5	F	**	C	21.8

Density (passenger cars/mile/lane)

*Note: * and ** indicates HCS did not report a density – the volume to capacity (V/C) is 1.168 (*) and 1.130 (**)*

It is important to note that while some LOS results are worse for the Build 2 corridor scenario than the No-Build and Build 1, this analysis does not reflect the critical benefit Build 2 provides by diverting traffic from the existing Whitestown Parkway interchange and preventing queuing onto mainline I-65 at that location.

The design year weaving between I-865 and Whitestown Parkway is anticipated to perform, in a similar manner for the No-Build, Build 1, and Build 2 corridor scenarios, at a LOS F for northbound I-65 during the PM peak period and for southbound I-65 during the AM peak period. While improving the weaving operation between I-865 and Whitestown Parkway may be beyond the scope of this project, there are relatively minor improvements that could be made, possibly as a separate project, to improve the operations at these locations. Additional discussion regarding potential improvements will be included in the IAD.

For the southbound weaving movement, the entry of the Whitestown Parkway ramp at I-65 southbound provides a configuration of three thru lanes on I-65 and a one-lane parallel type entry that is a continuous auxiliary lane from Whitestown Parkway, referred to as a 3+1 entry. The existing exit at I-865 has a configuration of a two-lane plus two-lane split, meaning two lanes continue south on I-65 and two lanes exit to I-865, referred to as a 2+2. This entry/exit scenario is unbalanced with a 3+1 entry and a 2+2 exit, resulting in a weave such that Whitestown Parkway motorists merging onto I-65 must cross two lanes of traffic to travel southbound. To improve the weave, the entry/exit can be rebalanced as a 3+1 entry to a 3+2 exit. The proposed solution allows three lanes of I-65 southbound through the entry/exit area requiring Whitestown Parkway vehicles travelling south on I-65 to only cross one lane of traffic through the two interchanges. South of the exit at I-865, the three thru lanes on I-65 southbound would be dropped approximately 0.5 miles from the painted nose of the gore at I-865. See **Appendix F** for a schematic exhibit of this proposed configuration provided by FHWA - Indiana Division.

Similar consideration could be made for the northbound weave between I-865 and Whitestown Parkway. The existing northbound I-65 to Whitestown diverge ramp contains two lanes on the ramp proper, fed by a single dedicated auxiliary lane and a shared thru/exit at the immediate gore area. Advanced overhead signage, depicting the exit configuration, could be an interim improvement. It may be possible to provide a widened pavement at this exit to accommodate a more desirable two-lane exit.

4.0 SR 267 AND CR550S INTERCHANGE CAPACITY ANALYSIS

Interchange alternatives were analyzed separately for the I-65 interchanges with SR 267 and CR550S. **Table 4** lists the interchange alternatives considered at each location. Schematic layouts for each of these interchange alternatives are contained in **Appendix A**. Adequate improvements, such as number of thru lanes on SR 267 and CR550S through the interchange and number and length of turn lanes at the I-65 ramp junctions, were provided to meet the minimum LOS thresholds established in the Framework Document. Because INDOT has decided to implement the preferred Build 2 corridor scenario corridor for this project, all interchange alternatives capacity analysis results in this section assume the construction of a new I-65 interchange at CR550S.

Table 4 | Interchange Alternatives Considered

SR 267	CR550S
Parclo A with Slip Ramp Feeding Loops in Northwest and Southeast Quadrants	Tight Diamond Interchange
DDI with Grade Separation at the East Junction	Conventional DDI
Conventional DDI (no grade separations)	SPUI
SPUI	Conventional Diamond Interchange

Synchro 7 was used to perform capacity analysis for the signalized intersections. Synchro 7 is based on *Highway Capacity Manual* (HCM) equations and produces performance results such as LOS, average delay, and volume to capacity (V/C) ratios. Synchro alone will not capture the impacts that queuing may have on overall traffic operations. TransModeler software was used as an independent microsimulation check of the Synchro results to verify that no queuing from one intersection impacted an adjacent intersection.

TransModeler was also used to provide an "apples to apples" comparison of the various interchange alternatives. It can be difficult to compare the performance of interchange alternatives by simply looking at the capacity analysis results of their ramp junctions. For instance, the east and west ramp junctions of a Tight Diamond Interchange may operate efficiently with simple signal phasing and plenty of green time for all approaches, while the signalized intersection of an SPUI has three distinct phases competing for green time. The resulting LOS for the SPUI signalized intersection may be worse than the LOS for the Tight Diamond Interchange signalized intersections; however, the SPUI may provide overall better operations because, instead of experiencing potential delays at two signalized intersections, the motorist would only experience potential delay at one signalized intersection. Similarly, a Parclo A interchange can pull left-turning vehicles out of the signalized intersections and onto free-flow loop ramps; however, the travel time and travel distance associated with the loop ramps can accumulate over time.

Performance metrics such as total delay in hours, vehicle miles travelled (VMT), and vehicle hours travelled (VHT) were established for the TransModeler microsimulation. Consistent study areas for each of the alternatives at each of the interchange locations were identified to provide as accurate a comparison as possible. **Tables 5 and 6** summarize the results of the microsimulation performance metrics results.

Table 5 | Microsimulation Performance Metrics Summary (SR 267 Interchange)

Alternatives	2040 AM Peak Period			2040 PM Peak Period		
	Delay	VMT	VHT	Delay	VMT	VHT
Parclo A with Slip Ramp	33	7,474	300	29	8,317	159
DDI with Grade Separation at East Junction	29	7,692	299	29	8,400	162
Conventional DDI	36	7,298	297	38	7,972	164
SPUI	35	6,911	288	36	7,534	157

At SR 267, the Parclo A with slip ramp and DDI with grade separation alternatives have the lowest overall delay, which typically results in a more favorable LOS. While the free-flow elements such as loop ramps and grade separated semi-directional ramps reduce overall delay, the additional travel length resulting from these free-flow features also results in higher VMT and VHT than the SPUI and Conventional DDI alternatives. The proposed SPUI and Conventional DDI alternatives have significant enough improvements, in terms of number of SR 267 thru lanes and number and length of turn lanes at the ramp junctions, to provide desirable traffic operations in 2040. While both the SPUI and the Conventional DDI alternatives provide desirable results, the SPUI alternative outperforms the Conventional DDI alternative in overall delay, VMT, and VHT for both the 2040 AM and PM peak periods. Traffic operations is just one of multiple decision-making criteria when selecting a preferred interchange alternative.

Table 6 | Microsimulation Performance Metrics Summary (CR550S Interchange)

Alternatives	2040 AM Peak Period			2040 PM Peak Period		
	Delay	VMT	VHT	Delay	VMT	VHT
Tight Diamond Interchange	57	7,467	339	59	7,930	180
Conventional DDI	42	7,336	305	47	7,813	164
SPUI	43	7,498	314	45	7966	165
Conventional Diamond Interchange	56	7,480	342	58	7,950	183

At CR550S, the Tight Diamond Interchange and the Conventional Diamond Interchange alternatives perform similarly and have higher overall delay and VHT than the Conventional DDI and the SPUI alternatives for the 2040 AM and PM peak periods. The Conventional Diamond Interchange alternative is less compact, providing less space between the ramp junctions and Indianapolis Boulevard to the west and Perry Worth Road to the east, which could become a challenge as this area experiences more development in the future. Right-of-way access control is important. The Tight Diamond Interchange alternative is more compact and provides more spacing between the ramp junctions and the adjacent local roads; however, the coordination between the Tight Diamond Interchange ramp junction signals can be challenging, and unforeseen traffic surges or unusually heavy truck traffic can create queuing into the adjacent ramp junction traffic signal. The Conventional DDI alternative performs the best in all 2040 AM and PM peak period metrics, except for the 2040 PM peak overall delay, in which it performs second best to the SPUI alternative. The SPUI performs second best of all interchange alternatives in the 2040 AM peak period overall delay and 2040 AM and PM peak period VHT. The Conventional DDI outperforms the other interchange alternatives for these microsimulation metrics. Traffic operations is just one of multiple decision-making criteria when selecting a preferred interchange alternative.

Tables 7 and 8 summarize 2040 AM and PM peak period Synchro results. Synchro reports are contained in **Appendix E**. All the interchange alternatives satisfy the Synchro analysis thresholds established in the Framework Document (minimum LOS D and desirable LOS C).

Table 7 | Synchro Results Summary (SR 267 Interchange)

Alternatives		2016 AM Peak Period		2016 PM Peak Period		2040 AM Peak Period		2040 PM Peak Period	
		LOS	Avg. Delay (sec.)	LOS	Avg. Delay (sec.)	LOS	Avg. Delay (sec.)	LOS	Avg. Delay (sec.)
Parclo A with Slip Ramp	SB Ramp Junction	A	8.7	A	8.2	B	12.6	B	14.8
	NB Ramp Junction	B	14.9	B	15.6	B	13.3	B	17.1
DDI with Grade Separation at East Junction	East End Crossover	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	West End Crossover	A	8.3	A	7.1	B	11.8	B	11.2
Conventional DDI	East End Crossover	A	4.4	A	5.3	C	23.2	B	11.9
	West End Crossover	A	7.5	A	6.2	B	11.8	B	11.2
SPUI	Main Signal	B	19.7	B	19.5	C	21.3	D	39.4

As previously discussed in the TransModeler performance metrics section of this report, the Parclo A with slip ramp and the DDI with grade separation alternatives have better Synchro results than the Conventional DDI and the SPUI alternatives. The SPUI alternative has the worst 2040 Synchro signalized intersection LOS and the highest average delay of all the SR 267 alternatives; however, it does meet the minimum thresholds established in the Framework Document. The previously reported microsimulation performance metrics are a more useful direct comparison of the alternatives than the Synchro results.

Table 8 | Synchro Results Summary (CR550S Interchange)

Alternatives		2016 AM Peak Period		2016 PM Peak Period		2040 AM Peak Period		2040 PM Peak Period	
		LOS	Avg. Delay (sec.)	LOS	Avg. Delay (sec.)	LOS	Avg. Delay (sec.)	LOS	Avg. Delay (sec.)
Tight Diamond Interchange	SB Ramp Junction	B	13.6	B	14.9	C	24.1	C	24.4
	NB Ramp Junction	A	7.8	A	7.9	B	19.8	B	12.5
Conventional DDI	East End Crossover	A	1.7	A	1.7	B	17.8	B	12.4
	West End Crossover	B	15.7	B	15.9	B	12.7	B	14.3
SPUI	Main Signal	B	17.5	B	18.2	C	33.6	D	42.2
Conventional Diamond Interchange	SB Ramp Junction	B	13.1	B	14.7	D	37.8	D	47.7
	NB Ramp Junction	A	7.3	A	8.0	C	20.5	B	16.3

The Conventional DDI has the best 2040 Synchro signalized intersection LOS and lowest average delay of all the CR550S alternatives. The previously reported microsimulation performance metrics are a more useful direct comparison of the alternatives than the Synchro results.

5.0 SAFETY CONSIDERATIONS

Detailed safety analysis will be contained in the IAD. The safety analysis for mainline I-65 will be the same regardless of the interchange types selected. The goal of this safety discussion is to provide a general comparison between the various interchange alternatives. Safety is related to factors such as traffic volumes, speed, geometrics, and conflict point exposure. Severity can tend to be more related to speed and crash type. All the proposed interchange alternatives would be constructed to INDOT standards for corresponding appropriate design speeds and would be considered safe. Traffic volumes will be the same for each interchange alternative type at each location. The best way to provide a general safety comparison of the proposed alternatives is to assess the number of potential conflict points for each. The higher the number of conflict points, the higher the potential for crash exposure. **Table 9** summarizes the number and type of conflict points for the typical DDI, Diamond Interchange, and SPUI configurations.

Table 9 | Summary of Number of Conflict Points for Typical DDI, Diamond Interchange, and SPUI

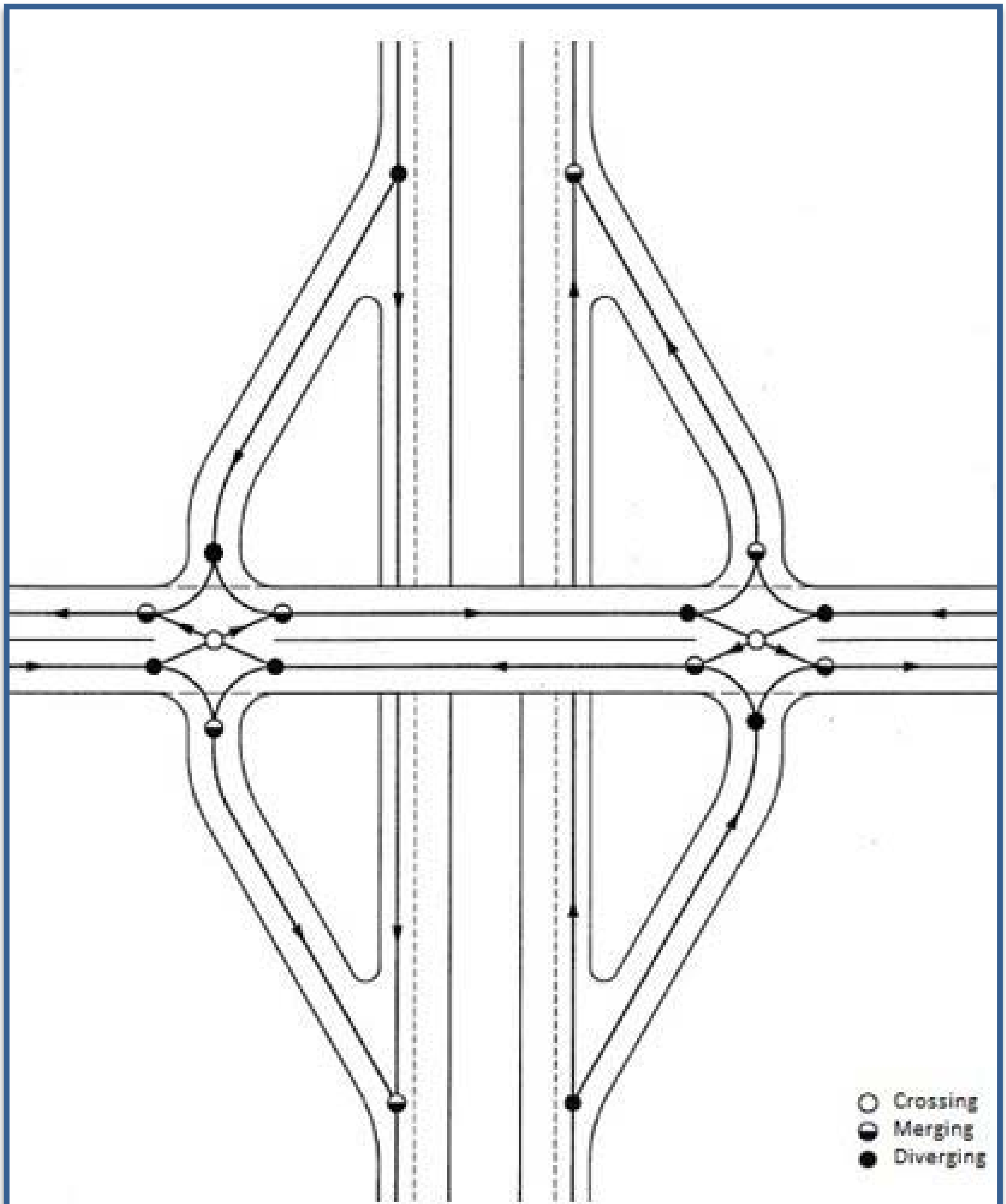
Interchange Type	Conflict Points			
	Diverging	Merging	Crossing	Total
DDI	8	8	2	18
Diamond Interchange	10	10	10	30
SPUI	8	8	8	24

Crossing conflicts would tend to result in higher severity crash types such as head-on crashes and right-angle crashes, while merging and diverging conflicts would tend to result in a higher percentage of less severe sideswipe crashes. Total DDI conflict points (18) are the lowest of the three interchange types, with only two conflict points classified as crossing; however, it is important to note that the total traffic volume passing through the two crossing conflict points for the DDI will be similar to the total volume passing through the ten crossing conflict points for the Diamond Interchange and the eight crossing conflict points for the SPUI. The DDI's overall reduction in conflict points, especially for the crossing conflict points, provide for less motorist decision making, which should result in better safety.

For the I-65 interchange at SR 267, the Conventional DDI alternative provides better safety than the SPUI alternative. The Parclo A with slip ramp (15 conflict points) and the DDI with grade separation (16 conflict points) alternatives have even fewer conflict points than the Conventional DDI alternative, potentially providing even better safety; however, the free-flow nature of the loop ramps for the Parclo A and the semi-directional ramps for the DDI with grade separation alternatives promotes higher speeds which could have a negative effect. The Conventional DDI and the SPUI alternatives are more conducive to pedestrian crossings at the signalized intersections than the free-flow, higher speed aspects of the Parclo A with slip ramp and the DDI with grade separation alternatives.

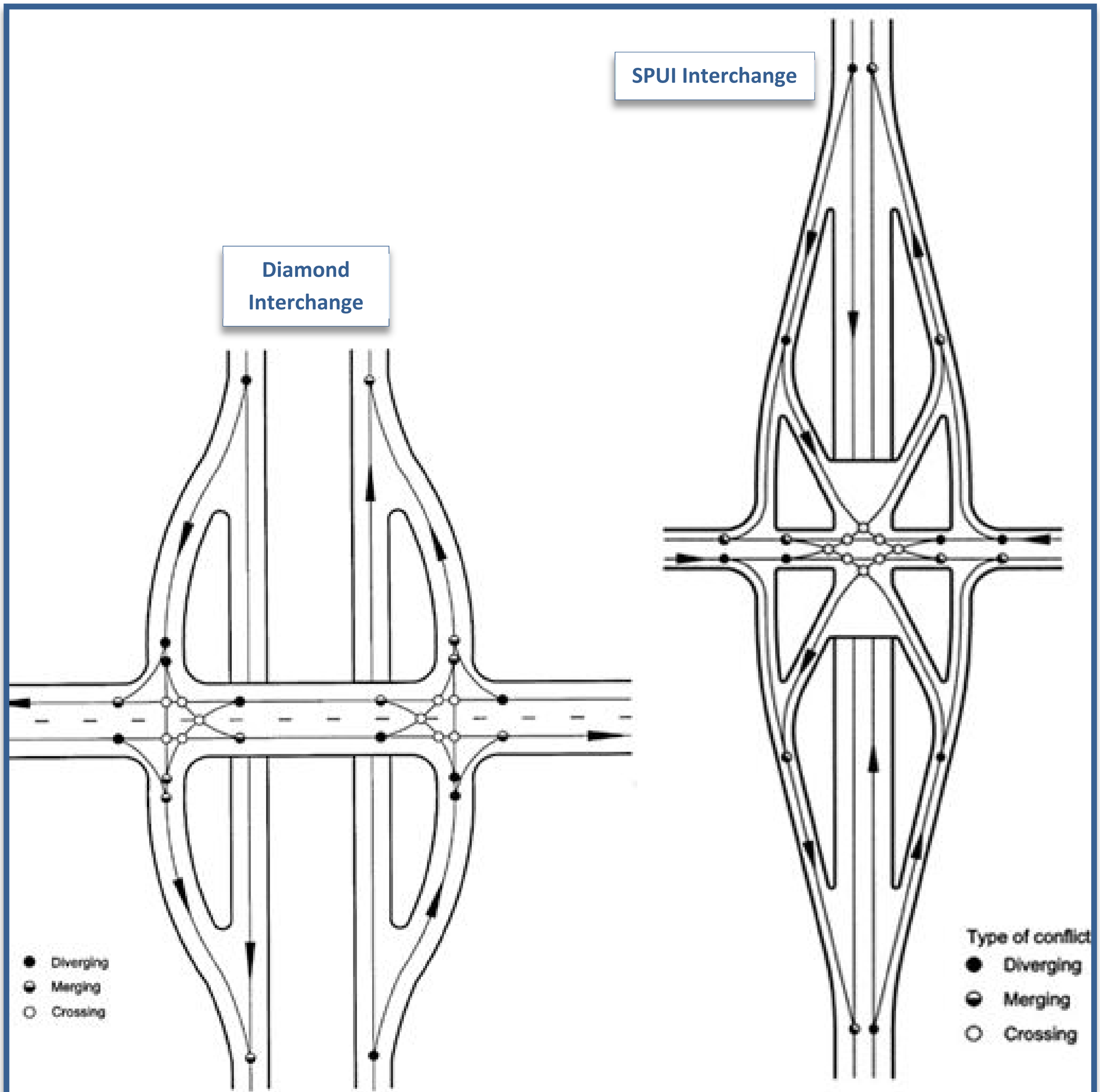
For the I-65 interchange at CR550S, the Conventional Diamond Interchange alternative has the same number of conflict points as the Tight Diamond Interchange alternative. The Conventional DDI alternative provides the highest level of safety of the four interchange alternative types. All the interchange alternatives are anticipated to handle pedestrian crossings at the signalized intersections in similar fashion. **Figure 2** illustrates the number of conflict points for the typical DDI. **Figure 3** illustrates the number of conflict points for the typical Diamond Interchange and SPUI.

Figure 2 | Conflict Points for Typical DDI



Source: MoDOT Safety Evaluation of DDI - 2015

Figure 3 | Conflict Points for Typical Diamond Interchange and SPUI



Source: MoDOT Safety Evaluation of DDI - 2015

6.0 ESTIMATED COSTS

The summary of costs in **Tables 10 and 11** are for planning purposes only. More detailed cost estimates will be developed during the design phase.

Table 10 | Preliminary Cost Estimate (SR 267 Interchange)

Estimated Cost Item	Interchange Alternative (in millions)			
	Parclo A	DDI (Grade Sep.)	Conventional DDI	SPUI
Bridge Infrastructure	$4.5	$3.4	$1.25	$5.0
Roadway Infrastructure	$21.0	$13.6	$12.0	$12.0
Preliminary Engineering	$2.5	$2.7	$2.7	$2.7
Utilities Relocations	$2.88	$1.6	$1.6	$0.6
Right-of-Way	$2.52	$1.4	$1.4	$0.95
Construction Inspection	$2.04	$1.36	$1.06	$1.36
Total Estimated Cost	$35.44	$24.06	$20.01	$22.61

Table 11 | Preliminary Cost Estimate (CR550S Interchange)

Estimated Cost Item	Interchange Alternative (in millions)			
	Tight Diamond	Conventional DDI	SPUI	Conv. Diamond
Bridge Infrastructure	$3.2	$3.4	$6.8	$2.9
Roadway Infrastructure	$9.3	$9.7	$9.0	$9.0
Preliminary Engineering	$1.7	$1.7	$1.7	$1.7
Utilities Relocations	$2.0	$2.0	$2.0	$3.0
Right-of-Way	$1.3	$1.45	$1.36	$1.47
Construction Inspection	$0.96	$1.05	$1.25	$0.96
Total Estimated Cost	$18.46	$19.30	$22.11	$19.03

7.0 CONSTRUCTABILITY

For the I-65 interchange at SR 267, the Conventional DDI alternative has a constructability advantage over the Parclo A with slip ramp and the SPUI alternatives because the existing SR 267 bridge is wide enough to carry the required SR 267 westbound three thru lanes. Existing two-way traffic can remain in operation on the SR 267 bridge while a new bridge, carrying two eastbound thru lanes, is constructed to the north. This allows major construction to occur with no disruption to existing traffic. Existing SR 267 traffic will be disrupted only when the DDI roadway and crossing intersections are constructed. The SPUI alternative is the most challenging from a constructability standpoint. The existing SR 267 interchange would need to be closed for the duration of the SPUI bridge construction. The Parclo A with slip ramp alternative requires a wider SR 267 bridge opening over I-65 to accommodate the loop ramp merges onto I-65. This requires total demolition of the existing SR 267 bridge and disruption to two-way SR 267 traffic during construction.

For the I-65 interchange at CR550S, all interchange construction is new construction on new alignment, and the constructability is the same for all four alternatives.

8.0 FUTURE EXPANDABILITY

Travel demand modeling methodology for this project is solid, and growth forecasts were carefully prepared to accommodate Indianapolis MPO model socio-economic data as well as and current and planned future developments; however, travel demand modeling is still just a tool, albeit the best tool available. Since both interchanges have an abundance of surrounding open land that is rapidly developing, it is important to consider future expandability in the selection of the preferred interchange alternative.

The Parclo A alternative is difficult for future expansion due to the loops in the northwest and southeast quadrants. Loops are not easily expanded and a change of interchange type may be required for future expansion, especially since the northwest loop is already a two-lane loop.

The SPUI alternative is the most challenging to expand in the future at each interchange location, if the need where ever to arise. The SPUI bridge design is complex with lengthy, deep beam lines on angles at each corner of the structure. If additional thru lanes across the bridge were ever needed, the angled beam lines would be too long and deep to be easily accommodated. The bridge and approach profiles would likely need to be raised, resulting in total bridge replacement.

The Conventional DDI alternative is easiest to accommodate for future expansion. The existing bridges could be widened to accommodate additional thru lanes or the intersections could be grade separated and become a free-flow interchange. Traffic could be accommodated in either scenario.

9.0 RIGHT-OF-WAY IMPACTS

Tables 12 and 13 summarize the anticipated right-of-way impacts for each interchange location.

Table 12 | Anticipated Right-of-Way Impacts (SR 267 Interchange)

Impacts	Interchange Alternative			
	Parclo A	DDI (Grade Sep.)	Conventional DDI	SPUI
Commercial Relocations	1	0	0	0
Residential Relocations	0	0	0	0
Total Right-of-Way (acres)	22.9	12.7	12.7	8.7

The westbound SR 267 to southbound I-65 loop ramp and the southbound I-65 diverge ramp to westbound and eastbound SR 267, associated with the Parclo A with slip ramp alternative, requires the relocation of a commercial facility that is currently under construction. The SPUI alternative the least right-of-way impact of the four alternatives.

Table 13 | Anticipated Right-of-Way Impacts (CR550S Interchange)

Impacts	Interchange Alternative			
	Tight Diamond	Conventional DDI	SPUI	Conv. Diamond
Commercial Relocations	1	1	1	1
Residential Relocations	0	0	0	0
Total Right-of-Way (acres)	52.7	55.3	55.0	59.5

All I-65 interchange at CR550S alternatives require the acquisition of a hog barn facility in the northeast quadrant of the interchange. It appears that this facility is currently non-operational. It is also likely that this property will be sold to a real estate developer that would eliminate the agricultural/commercial use of the property, prior to the commencement of construction. The Tight Diamond alternative has the least right-of-way impact while the SPUI and Conventional DDI alternatives have similar right-of-way impacts, approximately midway between the Tight Diamond alternative and the Conventional Diamond alternative.

10.0 ENVIRONMENTAL IMPACTS

There are multiple environmental concerns for the I-65 interchange at SR 267. Boone's Pond Public Fishing Area, comprised of a six-acre borrow pit and adjacent wooded area, is in the northeast quadrant north of Perry Worth Road. The DDI with grade separation alternative would require acquisition of right-of-way from this recreational facility and a Section 4(f) process to illustrate that there is no prudent or feasible alternative for its use. The prudent and feasible criteria could result in the realignment of the interchange, even if it adds cost to the project. Cost is only one of many considerations of the Section 4(f) process. It is anticipated that the other three interchange alternatives can avoid the Section 4(f) use. There are also wetlands in the interchange area. Some are low-quality wetlands that formed from non-maintained roadside ditches. All alternatives impact these wetlands in similar fashion. There is a large, contiguous wetland in the southeast quadrant of the interchange between the northbound I-65 to eastbound and westbound SR 267 and the northbound I-65 slip ramp to CR400S. The Parclo A with slip ramp and the DDI with grade separation alternatives impact this contiguous, large wetland. The Conventional DDI and the SPUI alternatives would have minimal impact to this wetland.

Environmental resources for the I-65 interchange at C550S include a small stream, some low-quality wetlands that formed from non-maintained roadside ditches, and potential hazardous materials associated with the hog barn facility. None of the impacts to these resources are significant environmental concerns. All four interchange alternatives would have similar environmental impacts on these resources.

11.0 INFRASTRUCTURE ECONOMICS

The existing SR 267 bridge over I-65 was reconstructed in 2010. It can be re-used in its current condition with the DDI alternatives.

12.0 REAGAN PARKWAY NO-BUILD/BUILD CONSIDERATION

Additional analysis was performed to consider the effects of a potential future Reagan Parkway extension north to SR 267, paralleling the west side of I-65 through the project area. Since the Reagan Parkway extension is not currently a funded and programmed project, it was not included in the official traffic models for the subject project; however, stand-alone analysis was performed to determine what level of impact, if any, the Reagan Parkway might have on the selection of preferred interchange alternatives at SR 267 and CR550N. For instance, if traffic operations were a critical factor when deciding between alternatives at an interchange, and the Reagan Parkway was anticipated to increase traffic through that interchange, then more consideration would be given to choosing an alternative better suited to handle that future potential traffic.

The analysis showed that construction of the Reagan Parkway in the study area would reduce traffic on mainline I-65, south of SR 267 and through the project area by approximately 2%, 3%, and 8% for the No-Build, Build 1, and Build 2 corridor scenarios, respectively. This makes sense because the Reagan Parkway would parallel I-65 to the west and provide an alternate route. The analysis showed that construction of the Reagan Parkway is anticipated to increase SR 267 traffic through the I-65 interchange by approximately 5%, 5%, and 15% for the No-Build, Build 1, and Build 2 corridor scenarios, respectively. The analysis showed that construction of the Reagan Parkway is anticipated to increase CR550S through a new I-65 interchange by approximately 2% for the Build 1 and Build 2 corridor scenarios. It is important to note that while the percentages for the anticipated SR 267 traffic increase are higher than for the anticipated I-65 traffic decrease, the volume on I-65 mainline is significantly higher than the volume on SR 267.

13.0 INTERCHANGE ALTERNATIVES DECISION CRITERIA MATRIX

Tables 14 and 15 summarize the results of the decision-making criteria for the selection of the preferred alternative at each location. Traffic operations, safety, and cost are the primary factors in the decision-making process; however, the other criteria provide supplemental support for the decision. Depending on the nature of the protected resource, environmental impacts can also elevate to a primary factor.

Table 14 | Decision Criteria Summary (SR 267)

Criteria		Interchange Alternative			
		Parclo A (slip ramp)	DDI (Grade Sep.)	Conventional DDI	SPUI
2040 Traffic Operations	AM	Total delay = 33 hours VMT = 7,474 miles VHT = 300 hours	Total delay = 29 hours VMT = 7,692 miles VHT = 299 hours	Total delay = 36 hours VMT = 7,298 miles VHT = 297 hours	Total delay = 35 hours VMT = 6,911 miles VHT = 288 hours
	PM	Total delay = 29 hours VMT = 8,317 miles VHT = 159 hours	Total delay = 29 hours VMT = 8,400 miles VHT = 162 hours	Total delay = 38 hours VMT = 7,972 miles VHT = 164 hours	Total delay = 36 hours VMT = 7,534 miles VHT = 157 hours
Safety		15 total conflict points	16 total conflict points	18 total conflict points	24 total conflict points
Total Cost		$35.44 million	$24.06 million	$20.01 million	$22.61 million
Constructability		Reconstruct and widen bridge under traffic condition	Existing two-way bridge untouched for significant period while constructing EB bridge	Existing two-way bridge untouched for significant period while constructing EB bridge	Closure of existing bridge required during new bridge construction
Future Expandability		Bridge can be easily widened but loop ramps would need reconstruction	Bridges easily widened with minimal approach work	Bridges easily widened with minimal approach work	Widening would require raising bridge profile and approaches – new deck
Right-of-Way		22.9 acres	12.7 acres	12.7 acres	8.7 acres
Environmental Impacts		Large contiguous wetland impact	Boone's Pond impact (Section 4(f)); large contiguous wetland impact	Minimal impacts	Least impacts
Infrastructure Economics		Nothing saved	Utilizes SR 267 bridge reconstructed in 2010	Utilizes SR 267 bridge reconstructed in 2010	Nothing saved

Note: VMT (vehicle miles travelled), VHT (vehicle hours travelled)

The **Conventional DDI is the preferred alternative for the I-65 interchange at SR 267**. All four alternatives provide desirable traffic operations with the Parclo A with slip ramp and DDI with grade separation alternatives having the least overall delay and the Conventional DDI and the SPUI alternatives having the least VMT and VHT. All four alternatives would be constructed to INDOT standards and would be considered safe; however, the SPUI has more conflict points than the Conventional DDI, the DDI with grade separation, and the Parclo A with slip ramp. Cost is a primary differentiator among the alternatives. The Parclo A with slip ramp alternative was eliminated from further consideration because it costs approximately $15.43 million more the Conventional DDI alternative. The DDI with grade separation alternative was eliminated from further consideration because is costs approximately $4.05 million more than the Conventional DDI alternative and results in the use of a Section 4(f) resource, which would require proof that there is no prudent or feasible alternative to a DDI with grade separation.

With the choice of preferred alternative narrowed to the Conventional DDI and SPUI, the Conventional DDI alternative is preferred. Not only does the Conventional DDI cost approximately $2.60 million less than the SPUI, it fully utilizes the design life of a recent INDOT infrastructure investment (SR 267 bridge reconstructed in 2010) and provides the additional benefit of minimizing disruption to SR 267 traffic operations during construction of the interchange modification. The Conventional DDI also safeguards against unforeseen fluctuation in the future land development and traffic forecasts because, unlike the SPUI alternative, it is relatively easy to expand in the future, if necessary.

Table 15 | Decision Criteria Summary (CR550S)

Criteria		Interchange Alternative			
		Tight Diamond	Conventional DDI	SPUI	Conv. Diamond
2040 Traffic Operations	AM	Total delay = 57 hours VMT = 7,467 miles VHT = 339 hours	Total delay = 42 hours VMT = 7,336 miles VHT = 305 hours	Total delay = 43 hours VMT = 7,498 miles VHT = 314 hours	Total delay = 56 hours VMT = 7,480 miles VHT = 342 hours
	PM	Total delay = 59 hours VMT = 7,930 miles VHT = 180 hours	Total delay = 47 hours VMT = 7,813 miles VHT = 164 hours	Total delay = 45 hours VMT = 7,966 miles VHT = 165 hours	Total delay = 58hours VMT = 7,950 miles VHT = 183 hours
Safety		30 total conflict points	18 total conflict points	24 total conflict points	30 total conflict points
Total Cost		$18.46 million	$19.30 million	$22.11 million	$19.03 million
Constructability		New terrain alignment – no disruption	New terrain alignment – no disruption	New terrain alignment – no disruption	New terrain alignment – no disruption
Future Expandability		Bridges easily widened but adding a 3rd left turn lane would be undesirable	Bridges easily widened with minimal approach work	Widening would require raising bridge profile and approaches – new deck	Bridge easily widened with minimal approach work
Right-of-Way		52.7 acres	55.3 acres	55.0 acres	59.5 acres
Environmental Impacts		Minimal Impacts	Minimal impacts	Minimal impacts	Minimal impacts
Infrastructure Economics		New terrain alignment – nothing to save	New terrain alignment – nothing to save	New terrain alignment – nothing to save	New terrain alignment – nothing to save

Note: VMT (vehicle miles travelled), VHT (vehicle hours travelled)

The **Conventional DDI is the preferred alternative for the I-65 interchange at CR550S**. While all four alternatives provide desirable traffic operations, the Conventional DDI has low forecasted delay (lowest for the AM peak and second lowest for the PM peak), as well as the lowest VMT an VHT of all alternatives.

While all four alternatives would be constructed to INDOT standards and would be considered safe, the Conventional DDI has the least conflict points of all alternatives. The Conventional Diamond and Tight Diamond alternatives perform similarly; however, the Tight Diamond alternative was eliminated from further consideration because if the Tight Diamond alternative would need to be expanded in the future, it would require triple lefts from CR550S to the I-65 merge ramp which is operationally undesirable and would require additional bridge widening.

As previously discussed in this report, even though the traffic modeling and growth forecasting methodology is solid and is based on the best tools available, the precise final buildout of this area is not yet known. The area is currently wide-open and prime for continued, rapid development. Left turning movements tend to pose the greatest challenge to signalized intersections because they require green time that could otherwise be used for thru movements. The I-65 at CR550S interchange will experience a heavy westbound CR550S to southbound I-65 left turning volume. The proposed Tight Diamond alternative already has dual left turn lanes for this movement. The Conventional DDI safeguards against unforeseen fluctuation in the future land development and traffic forecasts because it provides a free-flowing westbound CR550S to southbound I-65 movement.

The SPUI alternative was eliminated from further consideration because it did not perform as well as the Conventional DDI alternative with anticipated traffic operations, it is not as easily expandable in the future if necessary, and it is estimated to cost approximately $2.81 million more than the Conventional DDI alternative.

With the choice of preferred alternative narrowed to the Conventional DDI and the Conventional Diamond, the Conventional DDI alternative is preferred even though it is estimated to cost an approximately $0.27 million more than the Conventional Diamond alternative.