APPENDIX DD

US 50 INTERCHANGE

DESIGN OPTIONS ANALYSIS

Date: November 20, 2009

To: PMC

From: Section 2 EEAC Team

RE: Evaluation of I-69/US 50 Interchange Options

Washington (I-69/US 50) Interchange evaluation

The preliminary design of the I-69 preferred alternative interchange at US 50 has been developed through close coordination between the EEAC, the PMC and INDOT over the past several years. In the scoping phase of this project in 2004/5, a folded diamond interchange was proposed at US 50 and was shown as an option with alignment Alternative 1 (which became Alternative A after the screening stage). Based upon direction provided by INDOT at the Access Committee meeting of June 22, 2005, the folded diamond option was dropped and a full diamond interchange, serving a relocated portion of a four-lane divided US 50, was carried forward for detailed study as part of Alternative A. See the DEIS document, p. 3-25.

At that time, INDOT directed that the proposed interchange would be a full diamond interchange with adequate space between ramp terminals to allow for the possible future addition of interior loop ramps to convert the interchange to a higher-capacity, cloverleaf-type should future traffic volumes warrant. At the US 50 crossing, I-69 would be at-grade, and US 50 would go over on twin structures. Figure A shows the proposed full diamond interchange. Note that the proximity of the CSX railroad tracks to the north of US 50 would mean that constructing a full diamond interchange at the current location of US 50 would require that the north interchange ramps be on structure over the railroad. It would also require that I-69 remain elevated over both US 50 and the CSX tracks, since there is not enough distance between the two to allow I-69 to pass under US 50 and over the CSX tracks. A variety of alternative solutions to address this problem were investigated, and the full diamond option with a relocated US 50 presented in the DEIS was ultimately recommended. This option is referred to as Option A in the following discussion.

At the July 30, 2009 Access Review meeting, the full diamond interchange with a relocated four-lane US 50 was presented as the preferred alternative. INDOT asked that a folded diamond interchange be reconsidered to reduce construction costs. The folded diamond interchange alternative would place all of the ramps on the south side of US 50, and would therefore not require that US 50 be as extensively relocated as is the case for the full diamond. US 50 would still need to be relocated for a length of 0.9 miles to reduce the degree of horizontal curvature and provide adequate sight distance at the interchange. I-69 would be on twin structures over US 50. These twin structures would be long enough to span over the relocated four-lane US 50. Immediately east of the new interchange, the relocated US 50 would convert to a two-lane facility. The folded diamond option, Option B, is shown in Figure B.

The EEAC also developed a third option that would be a modification of the full diamond interchange. This option would maintain the exact configuration of the original full diamond interchange and could accommodate a future four lane US 50, but would initially construct only a two-lane relocated US 50 through the interchange, which is located approximately at the point where US 50 currently transitions from a four-lane, divided highway to a two-lane section. The modified full diamond option, Option C, is shown in Figure C. Note that this would entail replacing approximately 0.5 miles of the existing four-lane US 50 with a relocated two-lane facility.

Further discussion among the PMC, the EEAC, and INDOT identified a fourth option for evaluation-a tight diamond configuration. Ramp termini on a tight diamond are typically spaced 250-400 feet apart, with left turn lanes provided on the intersecting roadway between the ramps. This fourth option provides a tight diamond interchange located at essentially the same location as the folded diamond interchange option, just to the south of the existing US 50. This option, Option D, would thus entail a much more limited relocation of US 50. As with the folded diamond interchange, the relocated US 50 would consist of a four-lane, divided section through the interchange, and taper to two lanes immediately to the east. The tight diamond interchange option is shown in Figure D.

During the October 2009 Section 2 Section Coordination Team meeting (monthly coordination involving FHWA, INDOT, the PMC and the EEAC), it was suggested that the EEAC investigate placing a typical diamond configuration at the same location as the folded diamond (Option B) and tight diamond (Option D). This option, Option E, offered the same cost benefits of Options B and D, in that a minimal section of US 50 would need to be relocated. This option is shown in Figure E.

Below is a summary comparison of the five options (Low Cost Criteria provides a 60-foot wide median with an asphalt pavement section on I-69 and the Initial Cost Criteria provides an 84-foot wide median with a concrete pavement section on I-69):

Table 1: Cost Comparison:

	Low Cost Criteria	Initial Cost Criteria
Option A Diamond Interchange (sized to accommodate interior loop ramps) with Four-Lane US 50 Reconstruction*	$21,768,000	$23,809,000
Option B Folded Diamond Interchange with Four-Lane US 50**	$14,771,000	$16,493,000
Option C Diamond Interchange (sized to accommodate interior loop ramps) with Two-Lane US 50 Reconstruction	$17,921,000	$19,805,000
Option D Tight Diamond Interchange with Four-Lane	$16,032,000	$17,758,000

	Low Cost Criteria	Initial Cost Criteria
US 50**		
Option E Diamond Interchange (will not accommodate interior loop ramps) with Four-Lane US 50**	$18,160,000	$20,114,000

Note: The folded diamond interchange configuration requires a wider US 50 structure over I-69 to accommodate the interior loop ramp movements. Either full diamond interchange alternative assumes that the right-of-way for a four-lane US 50 alternative is purchased.

*Relocation/reconstruction of approximately 2.2 miles of US 50
**Relocation/reconstruction of approximately 0.9 miles of US 50

Impact comparison:

The impacts of the interchange options also were compared and are shown in Table 2 below.

Table 2: Impact Comparison

	Options A & C Diamond Interchange*	Option B Folded Diamond Interchange	Option D Tight Diamond Interchange	Option E Diamond Interchange
Wetlands (acres)	0.20	0.62	0.62	0.68
Forest (acres)	0	0	0	0
Farmland (acres)	136	38	33	64
Streams (LF)	3,920	2,270	1,130	2,340
Residential Relocations	1	4	4	5

*Impacts for the Full Diamond Interchange with either a four-lane or two-lane relocation of US 50 would be identical since the two-lane option would include sufficient R/W to allow future expansion of US 50 to a four-lane section.

Traffic forecasts:

The interchange traffic forecast presented in the DEIS predicts that all ramps will operate at a level of service (LOS) B or higher in 2030. The traffic projections on US 50 indicate that a small delay will occur at both the northbound and southbound exit ramps, allowing these approaches to operate just within the delay range for LOS B. The relatively low traffic projections for the ramps do not indicate future interior loop ramps will be warranted (see Figure 'F'). Interior loop ramps would reduce traffic congestion at the ramp termini of US 50 by eliminating the left turn movements and the cost of traffic signals at the US 50/ramp termini intersections. (Currently, all options include traffic signals at INDOT's earlier request.) These interior loop ramps would provide a "free flow" movement for vehicles using this interchange. It is assumed that updated traffic projections will be developed as part of the final design process.

Safety analysis:

AASHTO's *A Policy on Geometric Design of Highways and Streets* (a.k.a. the Green Book), on which the INDOT Design Manual is based, states on page 778 that "The diamond interchange has several advantages over a comparable partial cloverleaf or folded diamond interchange: all traffic can enter and leave the major road at relatively high speeds, left turning maneuvers entail little extra travel, and a relatively narrow band of right-of-way is needed, sometimes no more than that needed for the highway alone". Full diamond interchanges are the typical configuration utilized for most of the rural interchanges throughout the State of Indiana.

The principal disadvantages of a folded diamond interchange are:

- Large trucks must operate more slowly on the smaller curve radii of the loop ramps.
- With adjacent ramp terminals on the cross road, proper signage is needed to assure motorist safety and prevent wrong-way movements onto the exit ramp.

In an attempt to quantify the potential differences in safety between the full diamond and the folded diamond interchange options, the FHWA's Interchange Safety Analysis Tool (ISAT) was used. This spreadsheet-based analysis tool, described in Report No. FHWA-HRT-07-045, predicts numbers of crashes by type based on interchange type, geometry, and traffic volumes. Since only a relative comparison of the two interchange types is needed for the current comparative analysis, and not a specific prediction of a number of crashes, the data collection and analysis tasks necessary to calibrate the model to local southwest Indiana conditions were bypassed. Based on this analysis, the folded diamond interchange would be expected to experience approximately 4.1% more total crashes than the full diamond interchange. At projected year 2030 traffic volumes, the uncalibrated model predicts approximately 30 total crashes per year (30.4 for the folded diamond and 29.2 for the full diamond interchange). While the exact number of crashes of course is a rough estimate, the relative difference in expected crash experience between the two interchange types –approximately one crash per year - should be indicative of the relative difference in overall safety.

Summary:

The folded diamond interchange (Option B) would cost approximately $7.0 – 7.3 million less than the full diamond-sized for interior loop ramps (Option A). Stream impacts and farmland impacts for the folded diamond would also be less, but there would be three additional residential relocations and 0.42 acres more wetland impacts. There are potential safety questions with use of a folded diamond configuration at this location, which is expected to be one of the more heavily used interchanges in Sections 1 – 4, although modeling indicates the difference in safety may be on the order of only about 4-7%. Some of these concerns could be reduced through proper signage and signalization at the interchange. Implementing the folded diamond (or any of the other Options C, D or E) also may entail some additional public outreach, since this design was not presented in the DEIS nor the public hearing.

A third alternative (Option C) would provide a diamond interchange (sized for interior loop ramps) as proposed in the DEIS, but with only a two-lane relocated US 50 section. This would avoid the safety concerns of the folded diamond design, and would save approximately $3.8 – 4.0 million, as compared to the full diamond with a four-lane US 50. Right-of-way for the ultimate four-lane section of US 50 would be purchased at the time of initial construction, and thus right-of-way and environmental impacts for this modified alternative would be the same as for the full diamond interchange. This alternative would reduce the current length of the four-lane portion of US 50 by approximately 0.5 miles and replace it with a relocated two-lane road.

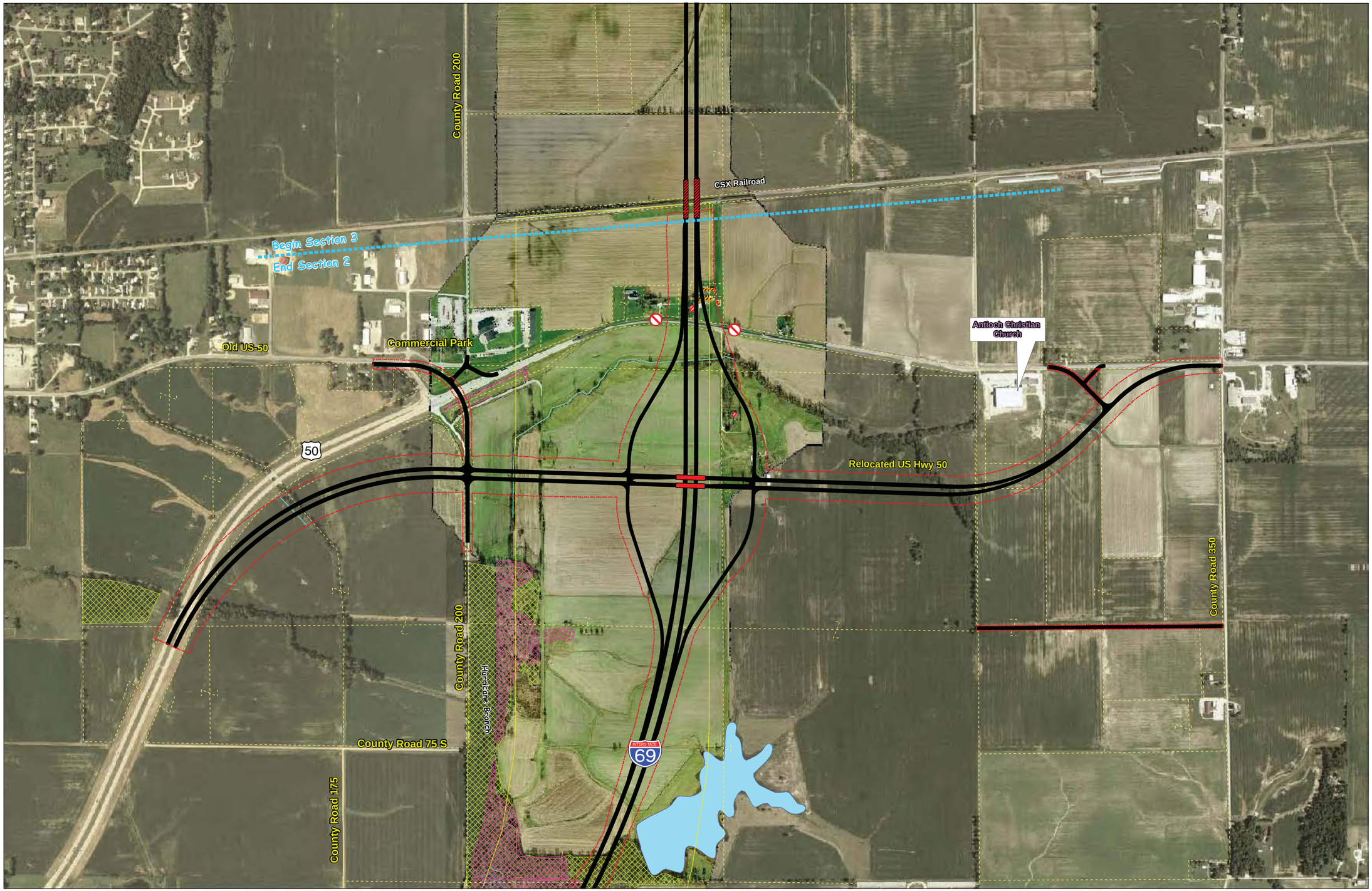
The fourth alternative evaluated was the tight diamond, Option D. Environmental impacts for this alternative would be similar to those of the folded diamond, but with slightly less farmland impacts and about 50% less stream impacts. Wetland impacts and relocations would be the same, and both would be higher than for the full diamond. The tight diamond option would be less expensive than the full diamond, by $5.7 - 6.0 million, but would be approximately $1.3 million more than the folded diamond.

The last alternative evaluated was the diamond interchange, Option E, which utilizes a lesser relocation of US 50 and does not accommodate future interior loop ramps. Environmental impacts for this alternative would be generally similar to those of the tight and folded diamonds. Farmland and stream impacts would be similar to the folded diamond, but approximately 50% greater than the tight diamond option. Wetland impacts would also be the similar to the tight and folded diamond options. Option E would require five relocations. Option E would be less expensive than the full diamond Option A (sized to accommodate future interior loop ramps), by $3.6 – 3.7 million, but would cost $3.4 – 3.6 million more than the folded diamond configuration.

While the cost estimates appear to justify construction of a folded diamond interchange, the recommended US 50 configuration is the diamond interchange, Option E. The recommendation is based on the safety concerns about a folded diamond at this location, as well as the potential traffic demands at this intersection in the future. Additionally, consideration for economic

development potential has been paramount in discussions of the US 50 interchange with local officials and stakeholders throughout the planning studies. Local officials and stakeholders have expressed on multiple occasions that a diamond configuration both aesthetically and functionally would provide the best potential for economic development and was therefore desired over other options. US 50 is part of the National Highway System (NHS) and the National Truck Network (NTN). The National Highway System (NHS) is a system of those highways determined to have the greatest national importance to transportation, commerce and defense in the United States. It consists of the Interstate highway system, logical additions to the Interstate system, selected other principal arterials, and other facilities which meet the requirements of one of the subsystems within the NHS. US 50 qualifies as an NHS Non-Interstate principal arterial route. The National Truck Network (NTN) is a national network of highways which allow the passage of trucks of specified minimum dimensions and weight. The intent of this designation is to promote uniformity throughout the nation for legal truck sizes and weights. For example, a 12 foot lane width is required for all NTN highways.

As these designations indicate, US 50 has a higher truck volume than any other crossroad located within the corridor, and is most likely to experience major commercial development, once I-69 is completed from I-64 to the Crane facility. While the traffic projections contained in the EIS documentation for the project suggest a design year LOS of B for all interchange ramps at this location, the potential for more development (particularly at this location) warrant providing the best operational configuration. Operationally, a diamond interchange provides a much more efficient system to move traffic through the interchange than a folded diamond. As well, it offers the opportunity to easily modify the ramp termini in the future by the addition of turning roadways when warranted. This would provide a more efficient connection for traffic exiting to and from US 50. The best combination of safety, long term operational efficiency and construction costs justify selection of a diamond configuration (Option E).



LEGEND

Preferred Alternative

- Section 2 Corridor Approved in Tier 1
- Proposed Right-of-Way Limits
- Proposed I-69 Pavement
- Proposed New or Reconstructed Local Road Pavement
- Proposed New Bridges
- Proposed Road Closure

Natural Features

- Wetlands
- Lakes/Ponds
- Floodplain
- Rivers/Streams
- Forest

Proposed Relocations/Acquisitions

- Church
- Residence
- Commercial
- Garage/Outbuilding
- Property Lines (As of 2005)

PROPOSED ROADWAY INFORMATION AND RIGHT-OF-WAY PURCHASESWILL NOT BE FINALIZED UNTIL THE DESIGN STAGE, WHICH FOLLOWS THE FINAL APPROVAL OF THE PROJECT BY FEDERAL HIGHWAY ADMINISTRATION IN A RECORD OF DECISION (ROD).

N

300 0 300 600 900 1,200 1,500

Feet

Scale: 1" = 300'

Aerial Photography Taken Winter 2003-2004

I-69 Evansville to Indianapolis
Tier 2 Studies
Section 2
Indiana Department of Transportation

HANNUM, WAGLE & CLINE engineering

JACOBS

Figure A

RECOMMENDED FOR APPROVAL _____ DESIGN ENGINEER DATE

DESIGNED: LA | DRAWN: KM

CHECKED: BR | CHECKED: LA

INDIANA DEPARTMENT OF TRANSPORTATION

FOLDED DIAMOND INTERCHANGE FIGURE B

HORIZONTAL SCALE	BRIDGE FILE
1"=300'	
VERTICAL SCALE	DESIGNATION
N/A	0300378
SURVEY BOOK	SHEETS
	59 of 65
CONTRACT	PROJECT
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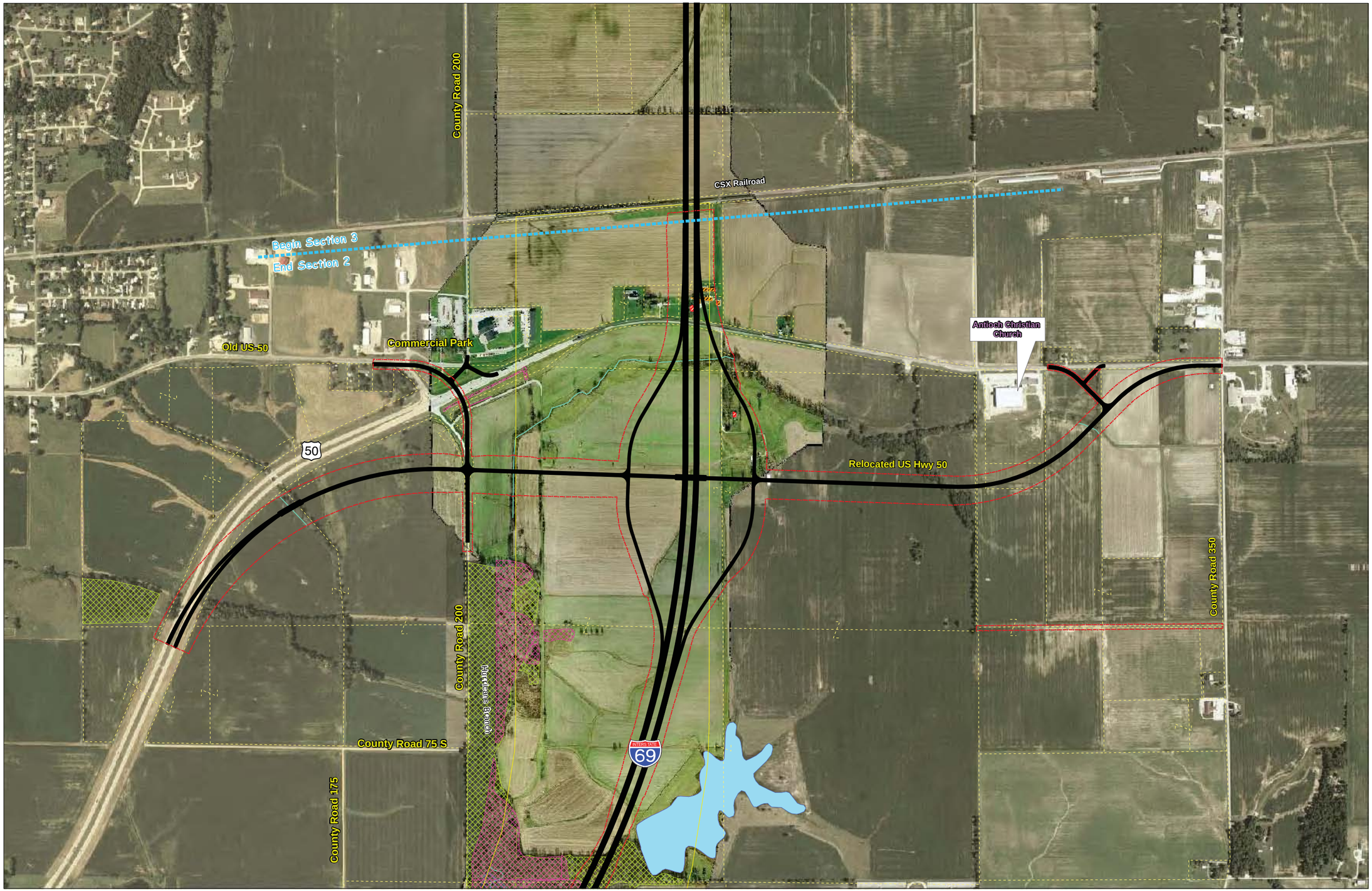

LEGEND

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N

300 0 300 600 900 1,200 1,500

Feet

Scale: 1" = 300'

Aerial Photography Taken Winter 2003-2004

I-69 Evansville to Indianapolis
Tier 2 Studies
Section 2
Indiana Department of Transportation

HANNUM, WAGLE & CLINE engineering

JACOBS

Figure C

1600+00
1620+00
1640+00
1660+00
1680+00
1590+00
50
Co. Rd. 200
MATCHLINE STA. 1590+00
L.A. R/W
I-69 CORRIDOR
BRIDGE OVER RAILROAD
END SECTION 2 STA. 1643+86.39
N1° 03'09"E
RAMP 1
RAMP 2
RAMP 3
RAMP 4
+53, STR. NO. 121
TWIN BRIDGE OVER US 50
P.O.T. 179+44.00
P.T. 165+42.99

U.S. 50
P.I. = 145+04.92
N = 14037652.53
E = 1605465.11
DELTA = 14°26'22" RT.
D = 0°49'07"
R = 7000.00'
T = 2169.51'
L = 4207.59'
E = 328.49'
SE = 2.4%

RAMP 4
P.I. = 407+56.82
N = 14036605.88
E = 1605864.61
DELTA = 15°37'55" LT.
D = 3°49'11"
R = 1500.00'
T = 205.99'
L = 409.24'
E = 14.01'

RAMP 4
P.I. = 401+50.10
N = 14036243.85
E = 1605986.55
DELTA = 12°55'38" RT.
D = 3°49'11"
R = 1500.00'
T = 169.94'
L = 338.43'
E = 9.60'

RAMP 3
P.I. = 324+18.86
N = 14037908.25
E = 1605865.80
DELTA = 5°04'23" LT.
D = 1°08'45"
R = 5000.00'
T = 221.50'
L = 442.70'
E = 4.90'

RAMP 3
P.I. = 313+51.26
N = 14038832.21
E = 1605948.68
DELTA = 2°46'57" RT.
D = 0°45'50"
R = 7500.00'
T = 182.14'
L = 364.22'
E = 2.21'

RAMP 1
P.I. = 112+71.12
N = 14036281.80
E = 1606173.01
DELTA = 12°13'45" RT.
D = 3°49'11"
R = 1500.00'
T = 160.69'
L = 320.16'
E = 8.58'

RAMP 1
P.I. = 116+25.42
N = 14036625.44
E = 1606264.14
DELTA = 14°48'05" LT.
D = 3°49'11"
R = 1500.00'
T = 194.83'
L = 387.49'
E = 12.60'

RAMP 2
P.I. = 207+68.41
N = 14038166.51
E = 1606265.53
DELTA = 7°17'45" LT.
D = 2°17'31"
R = 2500.00'
T = 159.38'
L = 318.34'
E = 5.08'

RAMP 2
P.I. = 213+94.05
N = 14038770.46
E = 1606186.24
DELTA = 3°09'00" RT.
D = 0°45'50"
R = 7500.00'
T = 206.22'
L = 412.33'
E = 2.83'

LEGEND
WETLANDS
FLOODPLAINS
RECLAIMED MINE LAND
PREFERRED ALIGNMENT

RECOMMENDED FOR APPROVAL _____ DESIGN ENGINEER DATE

DESIGNED: LA | DRAWN: KM
CHECKED: BR | CHECKED: LA

INDIANA
DEPARTMENT OF TRANSPORTATION

TIGHT DIAMOND INTERCHANGE
FIGURE D

HORIZONTAL SCALE	BRIDGE FILE
1"=300'	
VERTICAL SCALE	DESIGNATION
N/A	0300378
SURVEY BOOK	SHEETS
	59 of 65
CONTRACT	PROJECT
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jacobs

1600+00
1620+00
1640+00
1660+00
1680+00

US 50
P.I. = 145+04.92
N = 14037652.53
E = 1605465.11
DELTA = 34°26'22" RT.
D = 0°49'07"
R = 7000.00'
T = 2169.51'
L = 4207.59'
E = 328.49'
SE = 2.4%

Co. Rd. 200

P.O.C. STA 142+00.00 RELOCATED US 50 =
P.O.T. STA 332+75.99 RAMP 3 =
P.O.T. STA 400+00.00 RAMP 4

50

RAMP 4
P.I. = 404+44.57
N = 14036853.61
E = 1605340.46
DELTA = 25°14'29" LT.
D = 7°09'43"
R = 800.00'
T = 179.12'
L = 352.43'
E = 19.81'
SE = 7.4%
DS = 45 MPH

RAMP 4
P.I. = 418+27.49
N = 14036956.82
E = 1605186.58
DELTA = 35°11'59" RT.
D = 3°49'11"
R = 1500.00'
T = 475.79'
L = 921.47'
E = 73.69'
SE = 7.1%
DS = 55 MPH

Ramp 3
P.I. = 326+51.85
N = 14037943.01
E = 1605164.60
DELTA = 52°22'30" LT.
D = 11°27'33"
R = 500.00'
T = 245.89'
L = 457.06'
E = 57.19'
SE = 7.8%
DS = 40 MPH

RAMP 3
P.I. = 315+48.15
N = 14038775.37
E = 1605946.35
DELTA = 40°51'41" RT.
D = 4°46'29"
R = 1200.00'
T = 447.01'
L = 855.80'
E = 80.55'
SE = 7.8%
DS = 55 MPH

I-69 CORRIDOR

P.O.C. STA 157+00.00 RELOCATED US 50 =
P.O.T. STA 129+06.57 RAMP 1 =
P.O.T. STA 200+00.00 RAMP 2

RAMP 1
P.I. = 124+95.82
N = 14036953.82
E = 1606141.93
DELTA = 29°30'33" LT.
D = 8°11'06"
R = 700.00'
T = 184.35'
L = 360.52'
E = 23.87'
SE = 6.8%
DS = 40 MPH

RAMP 1
P.I. = 114+80.25
N = 14036085.83
E = 1606186.74
DELTA = 27°42'01" RT.
D = 3°49'11"
R = 1500.00'
T = 369.83'
L = 725.19'
E = 44.92'
SE = 7.1%
DS = 55 MPH

Ramp 2
P.I. = 204+82.23
N = 14037853.98
E = 1606765.09
DELTA = 21°43'08" LT.
D = 5°43'46"
R = 1000.00'
T = 191.84'
L = 379.07'
E = 18.23'
SE = 6.7%
DS = 45 MPH

RAMP 2
P.I. = 220+77.42
N = 14039340.74
E = 1606174.43
DELTA = 17°34'23" RT.
D = 3°49'11"
R = 1500.00'
T = 231.85'
L = 460.06'
E = 17.81'
SE = 7.1%
DS = 55 MPH

+50, STR. NO. 122
BRIDGE OVER CSX RR

+53, STR. NO. 121
TWIN BRIDGE OVER US 50

+30, STR. NO. 123
BRIDGE OVER CSX RR

END SECTION 2 - STA. 1643+86.39

P.O.C. STA 1630+52.79 I-69 =
P.O.T. STA 150+00.00 RELOCATED US 50

CSX RAILROAD

IP&L TRANSMISSION LINES

MATCHLINE STA. 1590+00

CONST. LIMITS
L.A. R/W

INTERSTATE 69

LEGEND

WETLANDS
FLOODPLAINS
RECLAIMED MINE LAND
PREFERRED ALIGNMENT

THE LOCAL SERVICE ROADS SHOWN ARE FOR INFORMATION ONLY. THE ACCESSING OR PURCHASING OF LAND LOCKED PARCELS WILL BE ADDRESSED DURING THE RIGHT OF WAY PROCESS.

RECOMMENDED FOR APPROVAL
DESIGN ENGINEER DATE

DESIGNED: LA
DRAWN: KM
CHECKED: BR
CHECKED: LA

INDIANA
DEPARTMENT OF TRANSPORTATION

PLAN SHEET
Figure E

HORIZONTAL SCALE	BRIDGE FILE
1"=300'	
VERTICAL SCALE	DESIGNATION
N/A	0300378
SURVEY BOOK	SHEETS
	59 of 61
CONTRACT	PROJECT
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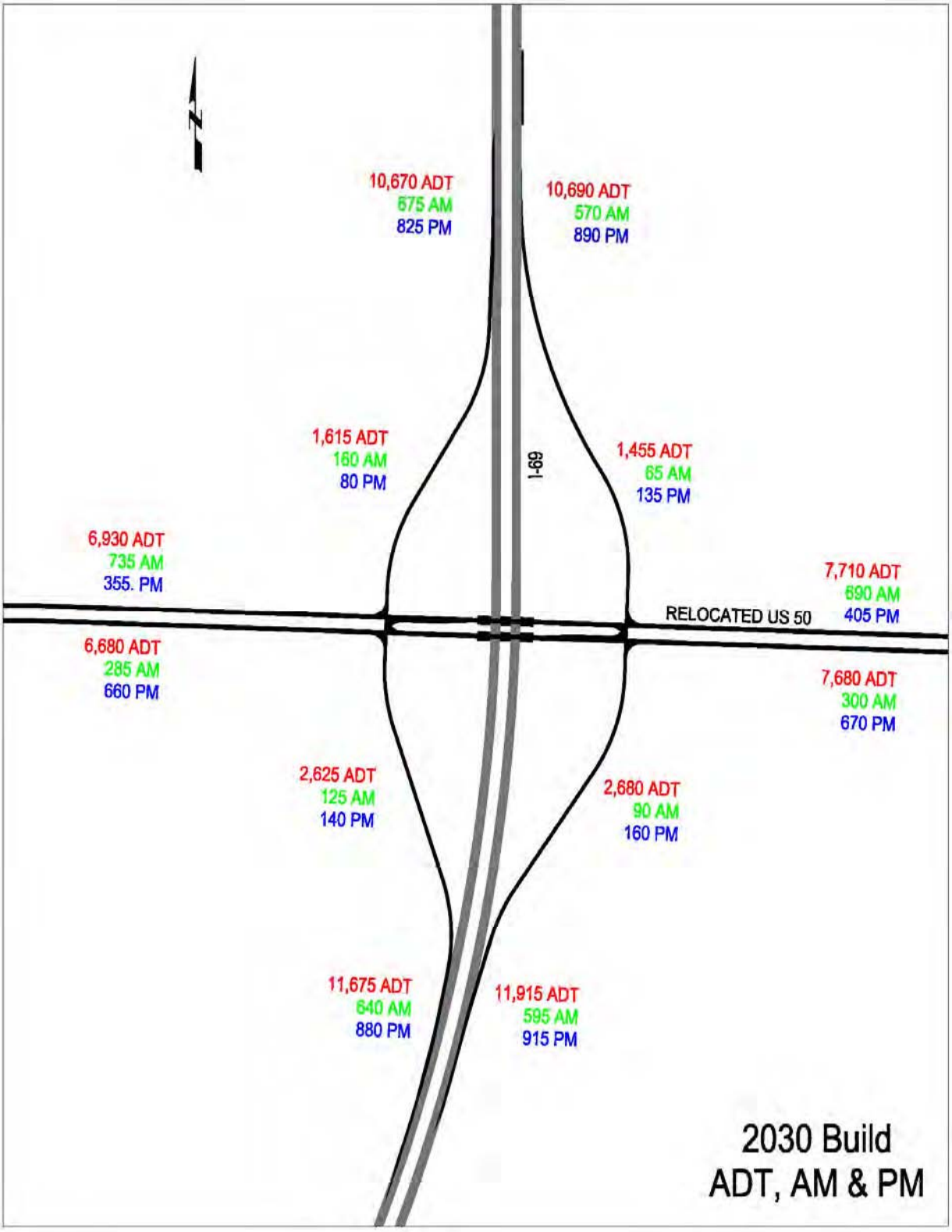

Figure 'F'

Traffic Volumes, I-69 / US 50 Interchange

ADT = Average Daily Traffic in Year 2030

I-69 TIER 2 PROJECT COSTS
SECTION 2, SR 64 to US 50
US 50 Interchange Diamond Configuration-Option A
Segment Location: US 50 Interchange
Segment Length: 0

ROADWAY CONSTRUCTION COST

Roadway Worksheet Cost, 2007 Dollars	$11,272,425.69		$12,177,858.02	
APPIA Estimator Items Cost, 2007 Dollars	$0.00		$0.00	
Karst Cost, 2007 Dollars	$0.00		$0.00	
Total Roadway Construction Cost, 2007 Dollars	**$11,272,425.69**	**-**	**$12,177,858.02**	

BRIDGE CONSTRUCTION COST

Typical Bridge Cost, 2007 Dollars	$4,261,886.20		$4,261,886.20	
Complex Bridge Cost, 2007 Dollars	$0.00		$0.00	
Total Bridge Construction Cost, 2007 Dollars	**$4,261,886.20**	**-**	**$4,261,886.20**	

TOTAL CONSTRUCTION COST

Roadway Construction, 2007 Dollars (Bid)	$11,272,425.69		$12,177,858.02	
Bridge Construction, 2007 Dollars (Bid)	$4,261,886.20		$4,261,886.20	
Total Construction Cost, 2007 Dollars	**$15,534,311.89**		**$16,439,744.22**	
Annual Inflation Rate (2007-2010) 3.50%				
Roadway Construction, 2010 Dollars = (1+Inflation rate)^3 * (Roadway Construction, 2007 Dollars)	$12,497,939.86		$13,501,808.86	
Bridge Construction, 2010 Dollars =(1+inflation rate)^3 * (Bridge Construction, 2007 Dollars)	$4,725,229.41		$4,725,229.41	
Potential Design Modifications Road, (2% - 4%) 2010 Dollars	$249,958.80	(2%)	$540,072.35	(4%)
Potential Design Modifications Bridge, (2% - 4%) 2010 Dollars	$94,504.59	(2%)	$189,009.18	(4%)
Total Construction Cost, 2010 Dollars	**$17,567,632.65**		**$18,956,119.81**	
Construction Change Orders Increase, 2010 Dollars (2.5%-5%)	$439,190.82	(2.5%)	$947,805.99	(5%)
Total Constructed Cost, 2010 Dollars(rounded)	**$18,007,000**	**-**	**$19,904,000**	

DESIGN COSTS

	Percentage Used			
Highway Design Engineering (4% Rural/6% Urban), 2010 Dollars	4.0%	$499,917.59		$540,072.35
Bridge Design Engineering (7% Rural/8%Urban), 2010 Dollars	7.0%	$330,766.06		$330,766.06
Total Design Cost, 2010 Dollars(rounded)		**$831,000**	**-**	**$871,000**

CONSTRUCTION- AGENCY ADMINISTRATION COST

General Administration, Construction Inspections, Public Outreach, etc., 2010 Dollars (7.5%)	$1,318,000.00		$1,422,000.00	
Total Construction Administration Cost, 2010 Dollars	**$1,318,000**	**-**	**$1,422,000**	

RIGHT-OF-WAY COSTS

Land Acquisition and Improvements, 2007 Dollars	$1,174,150.00			
Relocations, 2007 Dollars	$20,000.00			
Administrative Costs, 2007 Dollars	$190,000.00			
Total Right-of-Way Cost, 2007 Dollars	**$1,384,150**			
Right-of-Way, 2010 Dollars = (1+Inflation rate)^3 * (Right-of-Way, 2007 Dollars)	$1,535,000.00			
Contingency, (5%) 2010 Dollars	$76,750.00			
Total Right-of-Way Cost, 2010 Dollars(rounded)	**$1,612,000**	**-**	**$1,612,000**	

UTILITY RELOCATION COSTS

Reimbursable Utility Costs, 2007 Dollars				
Total Utility Relocation Cost, 2007 Dollars	**$0.00**			
Utility Relocation Cost, 2010 Dollars = (1+Inflation rate)^3 *(Utility Relocation Cost, 2007 Dollars)	$0.00			
Contingency, 2010 Dollars (5%)	$0.00			
Total Utility Relocation Cost, 2010 Dollars	**$0**	**-**	**$0**	

MITIGATION COSTS

Mitiagtion Costs, 2007 Dollars	$0.00			
Mitiagtion Costs, 2010 Dollars=(1+Inflation rate)^3 *(Mitigation Cost, 2007 Dollars)	$0.00			
Total Mitigation Cost, 2010 Dollars	**$0**	**-**	**$0**	

TOTAL COST, 2010 DOLLARS(rounded) $21,768,000 - $23,809,000

I-69 TIER 2 PROJECT COSTS
SECTION 2, SR 64 to US 50
US 50 Interchange Folded Diamond-Option B
Segment Location: US 50 Interchange
Segment Length: 0

ROADWAY CONSTRUCTION COST

Roadway Worksheet Cost, 2007 Dollars	$7,904,797.21		$8,764,728.18	
APPIA Estimator Items Cost, 2007 Dollars	$0.00		$0.00	
Karst Cost, 2007 Dollars	$0.00		$0.00	
Total Roadway Construction Cost, 2007 Dollars	**$7,904,797.21**	**-**	**$8,764,728.18**	

BRIDGE CONSTRUCTION COST

Typical Bridge Cost, 2007 Dollars	$2,756,160.00		$2,756,160.00	
Complex Bridge Cost, 2007 Dollars	$0.00		$0.00	
Total Bridge Construction Cost, 2007 Dollars	**$2,756,160.00**	**-**	**$2,756,160.00**	

TOTAL CONSTRUCTION COST

Roadway Construction, 2007 Dollars (Bid)	$7,904,797.21		$8,764,728.18	
Bridge Construction, 2007 Dollars (Bid)	$2,756,160.00		$2,756,160.00	
Total Construction Cost, 2007 Dollars	**$10,660,957.21**		**$11,520,888.18**	
Annual Inflation Rate (2007-2010) 3.50%				
Roadway Construction, 2010 Dollars = (1+Inflation rate)^3 * (Roadway Construction, 2007 Dollars)	$8,764,189.97		$9,717,610.80	
Bridge Construction, 2010 Dollars =(1+inflation rate)^3 * (Bridge Construction, 2007 Dollars)	$3,055,803.86		$3,055,803.86	
Potential Design Modifications Road, (2% - 4%) 2010 Dollars	$175,283.80	(2%)	$388,704.43	(4%)
Potential Design Modifications Bridge, (2% - 4%) 2010 Dollars	$61,116.08	(2%)	$122,232.15	(4%)
Total Construction Cost, 2010 Dollars	**$12,056,393.70**		**$13,284,351.24**	
Construction Change Orders Increase, 2010 Dollars (2.5%-5%)	$301,409.84	(2.5%)	$664,217.56	(5%)
Total Constructed Cost, 2010 Dollars(rounded)	**$12,358,000**	**-**	**$13,949,000**	

DESIGN COSTS

	Percentage Used			
Highway Design Engineering (4% Rural/6% Urban), 2010 Dollars	4.0%	$350,567.60		$388,704.43
Bridge Design Engineering (7% Rural/8%Urban), 2010 Dollars	7.0%	$213,906.27		$213,906.27
Total Design Cost, 2010 Dollars(rounded)		**$564,000**	**-**	**$603,000**

CONSTRUCTION- AGENCY ADMINISTRATION COST

General Administration, Construction Inspections, Public Outreach, etc., 2010 Dollars (7.5%)	$904,000.00		$996,000.00	
Total Construction Administration Cost, 2010 Dollars	**$904,000**	**-**	**$996,000**	

RIGHT-OF-WAY COSTS

Land Acquisition and Improvements, 2007 Dollars	$702,100.00
Relocations, 2007 Dollars	$40,000.00
Administrative Costs, 2007 Dollars	$70,000.00
Total Right-of-Way Cost, 2007 Dollars	**$812,100**
Right-of-Way, 2010 Dollars = (1+Inflation rate)^3 * (Right-of-Way, 2007 Dollars)	$900,000.00
Contingency, (5%) 2010 Dollars	$45,000.00

Total Right-of-Way Cost, 2010 Dollars(rounded)	**$945,000**	**-**	**$945,000**

UTILITY RELOCATION COSTS

Reimbursable Utility Costs, 2007 Dollars	
Total Utility Relocation Cost, 2007 Dollars	**$0.00**
Utility Relocation Cost, 2010 Dollars = (1+Inflation rate)^3 *(Utility Relocation Cost, 2007 Dollars)	$0.00
Contingency, 2010 Dollars (5%)	$0.00

Total Utility Relocation Cost, 2010 Dollars	**$0**	**-**	**$0**

MITIGATION COSTS

Mitiagtion Costs, 2007 Dollars	$0.00
Mitiagtion Costs, 2010 Dollars=(1+Inflation rate)^3 *(Mitigation Cost, 2007 Dollars)	$0.00

Total Mitigation Cost, 2010 Dollars	**$0**	**-**	**$0**

TOTAL COST, 2010 DOLLARS(rounded)	**$14,771,000**	**-**	**$16,493,000**

I-69 TIER 2 PROJECT COSTS
SECTION 2, SR 64 to US 50
US 50 Interchange Diamond Configuration - 2 Lanes--Option C
Segment Location: US 50 Interchange
Segment Length: 0

ROADWAY CONSTRUCTION COST

Roadway Worksheet Cost, 2007 Dollars	$10,275,249.78		$11,180,682.11	
APPIA Estimator Items Cost, 2007 Dollars	$0.00		$0.00	
Karst Cost, 2007 Dollars	$0.00		$0.00	
Total Roadway Construction Cost, 2007 Dollars	**$10,275,249.78**	**-**	**$11,180,682.11**	

BRIDGE CONSTRUCTION COST

Typical Bridge Cost, 2007 Dollars	$2,323,223.10		$2,323,223.10	
Complex Bridge Cost, 2007 Dollars	$0.00		$0.00	
Total Bridge Construction Cost, 2007 Dollars	**$2,323,223.10**	**-**	**$2,323,223.10**	

TOTAL CONSTRUCTION COST

Roadway Construction, 2007 Dollars (Bid)	$10,275,249.78		$11,180,682.11	
Bridge Construction, 2007 Dollars (Bid)	$2,323,223.10		$2,323,223.10	
Total Construction Cost, 2007 Dollars	**$12,598,472.88**		**$13,503,905.21**	
Annual Inflation Rate (2007-2010) 3.50%				
Roadway Construction, 2010 Dollars = (1+Inflation rate)^3 * (Roadway Construction, 2007 Dollars)	$11,392,353.10		$12,396,222.11	
Bridge Construction, 2010 Dollars =(1+inflation rate)^3 * (Bridge Construction, 2007 Dollars)	$2,575,798.98		$2,575,798.98	
Potential Design Modifications Road, (2% - 4%) 2010 Dollars	$227,847.06	(2%)	$495,848.88	(4%)
Potential Design Modifications Bridge, (2% - 4%) 2010 Dollars	$51,515.98	(2%)	$103,031.96	(4%)
Total Construction Cost, 2010 Dollars	**$14,247,515.12**		**$15,570,901.93**	
Construction Change Orders Increase, 2010 Dollars (2.5%-5%)	$356,187.88	(2.5%)	$778,545.10	(5%)
Total Constructed Cost, 2010 Dollars(rounded)	**$14,604,000**	**-**	**$16,349,000**	

DESIGN COSTS

	Percentage Used			
Highway Design Engineering (4% Rural/6% Urban), 2010 Dollars	4.0%	$455,694.12		$495,848.88
Bridge Design Engineering (7% Rural/8%Urban), 2010 Dollars	7.0%	$180,305.93		$180,305.93
Total Design Cost, 2010 Dollars(rounded)		**$636,000**	**-**	**$676,000**

CONSTRUCTION- AGENCY ADMINISTRATION COST

General Administration, Construction Inspections, Public Outreach, etc., 2010 Dollars (7.5%)	$1,069,000.00		$1,168,000.00	
Total Construction Administration Cost, 2010 Dollars	**$1,069,000**	**-**	**$1,168,000**	

RIGHT-OF-WAY COSTS

Land Acquisition and Improvements, 2007 Dollars	$1,174,150.00			
Relocations, 2007 Dollars	$20,000.00			
Administrative Costs, 2007 Dollars	$190,000.00			
Total Right-of-Way Cost, 2007 Dollars	**$1,384,150**			
Right-of-Way, 2010 Dollars = (1+Inflation rate)^3 * (Right-of-Way, 2007 Dollars)	$1,535,000.00			
Contingency, (5%) 2010 Dollars	$76,750.00			
Total Right-of-Way Cost, 2010 Dollars(rounded)	**$1,612,000**	**-**	**$1,612,000**	

UTILITY RELOCATION COSTS

Reimbursable Utility Costs, 2007 Dollars				
Total Utility Relocation Cost, 2007 Dollars	**$0.00**			
Utility Relocation Cost, 2010 Dollars = (1+Inflation rate)^3 *(Utility Relocation Cost, 2007 Dollars)	$0.00			
Contingency, 2010 Dollars (5%)	$0.00			
Total Utility Relocation Cost, 2010 Dollars	**$0**	**-**	**$0**	

MITIGATION COSTS

Mitiagtion Costs, 2007 Dollars	$0.00			
Mitiagtion Costs, 2010 Dollars=(1+Inflation rate)^3 *(Mitigation Cost, 2007 Dollars)	$0.00			
Total Mitigation Cost, 2010 Dollars	**$0**	**-**	**$0**	

TOTAL COST, 2010 DOLLARS(rounded) $17,921,000 - $19,805,000

I-69 TIER 2 PROJECT COSTS
SECTION 2, SR 64 to US 50
US 50 Interchange Tight Diamond-Option D
Segment Location: US 50 Interchange
Segment Length: 0

ROADWAY CONSTRUCTION COST

Roadway Worksheet Cost, 2007 Dollars	$7,121,678.19		$7,947,646.43	
APPIA Estimator Items Cost, 2007 Dollars	$0.00		$0.00	
Karst Cost, 2007 Dollars	$0.00		$0.00	
Total Roadway Construction Cost, 2007 Dollars	**$7,121,678.19**	**-**	**$7,947,646.43**	

BRIDGE CONSTRUCTION COST

Typical Bridge Cost, 2007 Dollars	$4,473,480.00		$4,473,480.00	
Complex Bridge Cost, 2007 Dollars	$0.00		$0.00	
Total Bridge Construction Cost, 2007 Dollars	**$4,473,480.00**	**-**	**$4,473,480.00**	

TOTAL CONSTRUCTION COST

Roadway Construction, 2007 Dollars (Bid)	$7,121,678.19		$7,947,646.43	
Bridge Construction, 2007 Dollars (Bid)	$4,473,480.00		$4,473,480.00	
Total Construction Cost, 2007 Dollars	**$11,595,158.19**		**$12,421,126.43**	
Annual Inflation Rate (2007-2010) 3.50%				
Roadway Construction, 2010 Dollars = (1+Inflation rate)^3 * (Roadway Construction, 2007 Dollars)	$7,895,931.91		$8,811,697.66	
Bridge Construction, 2010 Dollars =(1+inflation rate)^3 * (Bridge Construction, 2007 Dollars)	$4,959,827.24		$4,959,827.24	
Potential Design Modifications Road, (2% - 4%) 2010 Dollars	$157,918.64	(2%)	$352,467.91	(4%)
Potential Design Modifications Bridge, (2% - 4%) 2010 Dollars	$99,196.54	(2%)	$198,393.09	(4%)
Total Construction Cost, 2010 Dollars	**$13,112,874.33**		**$14,322,385.89**	
Construction Change Orders Increase, 2010 Dollars (2.5%-5%)	$327,821.86	(2.5%)	$716,119.29	(5%)
Total Constructed Cost, 2010 Dollars(rounded)	**$13,441,000**	**-**	**$15,039,000**	

DESIGN COSTS

	Percentage Used				
Highway Design Engineering (4% Rural/6% Urban), 2010 Dollars	4.0%	$315,837.28		$352,467.91	
Bridge Design Engineering (7% Rural/8%Urban), 2010 Dollars	7.0%	$347,187.91		$347,187.91	
Total Design Cost, 2010 Dollars(rounded)		**$663,000**	**-**	**$700,000**	

CONSTRUCTION- AGENCY ADMINISTRATION COST

General Administration, Construction Inspections, Public Outreach, etc., 2010 Dollars (7.5%)	$983,000.00		$1,074,000.00	
Total Construction Administration Cost, 2010 Dollars	**$983,000**	**-**	**$1,074,000**	

RIGHT-OF-WAY COSTS

Land Acquisition and Improvements, 2007 Dollars	$702,100.00
Relocations, 2007 Dollars	$40,000.00
Administrative Costs, 2007 Dollars	$70,000.00
Total Right-of-Way Cost, 2007 Dollars	**$812,100**
Right-of-Way, 2010 Dollars = (1+Inflation rate)^3 * (Right-of-Way, 2007 Dollars)	$900,000.00
Contingency, (5%) 2010 Dollars	$45,000.00

Total Right-of-Way Cost, 2010 Dollars(rounded)	**$945,000**	**-**	**$945,000**

UTILITY RELOCATION COSTS

Reimbursable Utility Costs, 2007 Dollars	
Total Utility Relocation Cost, 2007 Dollars	**$0.00**
Utility Relocation Cost, 2010 Dollars = (1+Inflation rate)^3 *(Utility Relocation Cost, 2007 Dollars)	$0.00
Contingency, 2010 Dollars (5%)	$0.00

Total Utility Relocation Cost, 2010 Dollars	**$0**	**-**	**$0**

MITIGATION COSTS

Mitiagtion Costs, 2007 Dollars	$0.00
Mitiagtion Costs, 2010 Dollars=(1+Inflation rate)^3 *(Mitigation Cost, 2007 Dollars)	$0.00

Total Mitigation Cost, 2010 Dollars	**$0**	**-**	**$0**

TOTAL COST, 2010 DOLLARS(rounded)	**$16,032,000**	**-**	**$17,758,000**