

ENGINEER'S REPORT
US 20 at I-69
Interchange Work
Bridge Replacement
Sight Distance Improvement



Steuben County

Des. No's 0300942, 9803670, 0201004

Indiana Department of Transportation
August 12/November 29, 2005

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Engineer's Report

US 20 at I-69 Interchange in Steuben County

Interchange Work, Des No. 0300942

Bridge Replacement, Des No. 9803670

Sight Distance Improvement, Des No. 0201004

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August 12/November 29, 2005

PURPOSE OF REPORT

This Engineer's Report describes the engineering assessment phase, including identification of a proposal to improve US 20. The Engineer's Report guides field survey, development of design plans, and continuation of environmental studies.

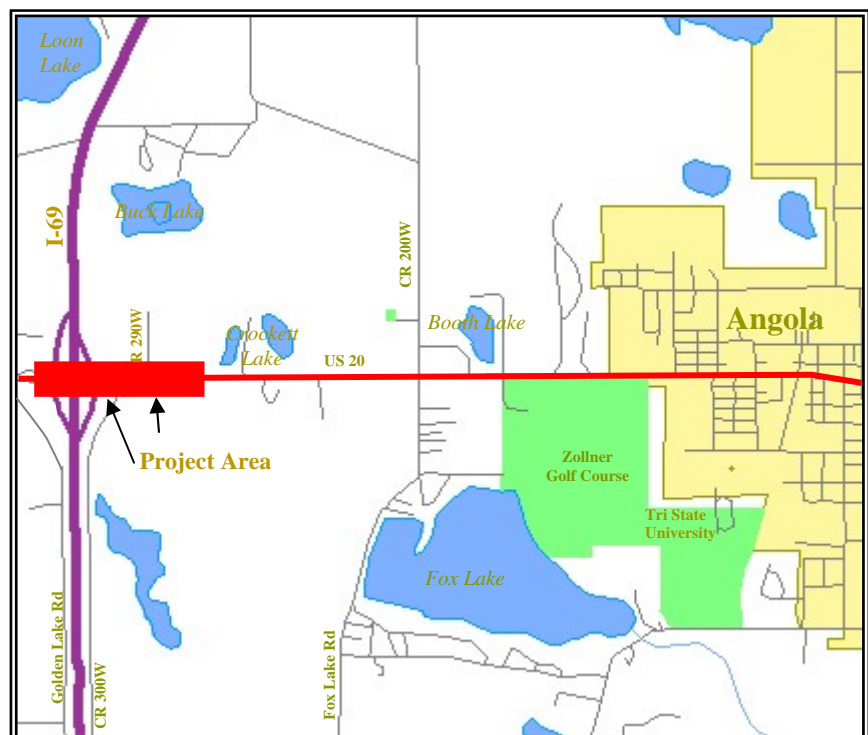
PROJECT LOCATION

Refer to the figure aside and the project location maps on pages A1 and A2. What is generally referenced as the "project" in this document actually involves three separate projects: Des. 0300942, Interchange Work (work type) at I-69 and US 20;

Des. 9803670, Bridge Replacement of US 20 over I-69 (kinned with Des. 0300942 under Kin # 4408); and Des. 0201004, Sight Distance Improvement of US 20 east 0.5 mile from I-69. The overall project is centered on US 20 at the CR 300W intersection. The project area extends along US 20 from 150' west of the I-69 west ramp terminal (RP 140+73) to 1880' east of the east ramp terminal (RP 141+23). (The study area extends 1200' west beyond the project area limits to capture the effects of the Golden Lake Road/CR 325W intersection.) East of the centerline of I-69, the project is located within the City of Angola's Urbanized Area. The project is located within Steuben County.

NEED AND PURPOSE OF PROJECT

The principal needs (deficiencies) of this project are (1) the general condition of the US 20 bridge over I-69, (2) left-turning traffic demands from US 20 to I-69 at the interchange creating



spillover into through traffic lanes, especially westbound, (3) the non-uniformity of through lanes in the area of commercial development east of I-69, (4) lack of left-turn refuge in the area called out by need #3, and (5) crest vertical curvature on US 20 at the east end of the commercial development that causes substandard stopping and intersection sight distances.

The purpose of the project is to mitigate these concerns by (1) widening and replacing the bridge, (2) providing longer left turn lane lengths between the ramp termini, (3) extending the length of the additional through lane farther east, (4) providing a continuous median/left-turn lane along the frontage of the commercial development, and (5) increasing the crest vertical curve length east of the commercial development.

PROJECT AREA HISTORY

Originally what was routed US 20 was a county and municipally maintained facility, as a gravel road by Steuben County and a city street by the City of Angola. In 1924 a concrete grading and paving force account project was constructed, establishing much of today's existing alignment and grade of the roadway, which was routed US 20. In 1944 three feet of concrete was added to each side of the road and in 1954 it received a bituminous overlay.

In 1963, the I-69 interchange (a diamond-type) was constructed, with the southwest diagonal ramp featuring a short 2-way operation that serviced Golden Lake Rd (the west side frontage road to I-69). The corresponding southeast diagonal ramp was given the conventional treatment with CR 300E (the east side frontage road to I-69) by extending it east away from the ramp.

In 1978, the US 20 bridge over I-69 was rehabilitated. The years 1986, 1999, and 2001 had pavement rehabilitation contracts let for sections of US 20 either east or west of I-69.

In 1997 the west ramp terminal at I-69 and US 20 was signalized. In 2003 the east terminal was signalized while the signal at the west terminal was upgraded.

In 2004, Golden Lake Rd was realigned away from the southwest diagonal ramp to intersect US 20 to the west of I-69 at CR 325W. This was done under Des #9607470, contract #25666.

EXISTING CONDITIONS

General

Refer to the aerial photographs on pages A3 and A4 and the ground-level photographs on pages A5 to A11. The stationing convention for this project is the same as that along the original plans for US 20.

The functional classification and posted speeds of the area roadways are as follows: **US 20**—to the west I-69, Rural Minor Arterial and has a posted speed limit of 50 mph, and to the east of I-69, Urban Other Principal Arterial and has a posted speed limit of 45 mph; **CR 300W**—Rural Local Road, no posted speed limit (50 mph per county policy for un-posted roads); **CR 290W**—Urban Local Street, no posted speed limit (50 mph). (Though CR 290W is within Angola's urbanized area boundary, currently it is maintained by Steuben County. The Steuben County Engineer estimates that in the near future, after more development occurs to the east between the subject project and Angola proper, the City may annex this area west to I-69.)

US 20 is **not** on the National Highway System, is on the National Truck Network, and is on the **4R** Network. Statewide, **US 20** is a regional east/west route in northern Indiana that connects Hammond, Gary, Portage, Michigan City, South Bend, Elkhart, Lagrange and Angola to each other. It is part of a major nationwide artery across the southern Great Lakes consisting of I-94, and US 12 in Michigan with I-80/90 Toll Road, **US 20**, US 6 and US 30 in Indiana. Its fundamental purpose in the context of such an artery is that it is one of two alternate routes to the Toll Road in northeastern Indiana (the other, US 6). In north-central Indiana it serves as the southern bypass of South Bend and Elkhart. In northwestern Indiana it serves as the east-west Extra-Heavy-Duty Highway.

Regionwide, **US 20** serves as the principal east-west route across central Steuben County as it accesses downtown Angola.

Locally, **CR 300W** serves local access along the east side of I-69 between Fox Lake Rd and US 20. **CR 290W** is a dead-end road that serves commercial and industrial properties north of US 20. Currently **Buck Lake Terrace Rd** is being constructed to serve a new retirement community north of US 20.

Pavement Condition

The latest, year 2002 quantitative pavement *surface* condition ratings represent US 20 in this state of repair:

Table I: Pavement Surface Condition Ratings				
US 20	IRI	RUT (inch)	PCR	PQI
Eastbound	67	0.16	94	90
Westbound	70	0.14	90	89
Remarks	<=100 excellent	>=0.25 severe	>90 excellent	>90 excellent

Table II: Vertical Alignment of US 20						
Tangent	Grade %	PVI (Station/ Elevation)	Vertical Curve Type	Length of curve (ft)	K value (ft)	CEDS with respect to K-value
1	-0.9977					
		430+50 / 1051.94	Sag	400	136.53	59 mph >45 mph OK
2	+1.932					
		No Vertical Curve				
3	+1.748					
		No Vertical Curve				
4	+1.508					
		437+50 / 1064.29	Crest	300	49.70	42 mph < 45 mph NG (Need 5)
5	-4.528					
		443+63 / 1035.99	Sag	300	66.25	41 mph < 45 mph NG (Need 5)
6	0.0					
		447+00 / 1035.99	Sag	300	279.59	>70 mph OK
7	+1.073					

Alignment

The horizontal alignments of **US 20** and **CR 290W** are tangent. A horizontal curve of 448' radius exists on **CR 300W** 180' south of US 20, meeting a CEDS of 42 mph (with 8% superelevation).

Table II explains vertical conditions on US 20. Along **CR 300W** no apparent vertical curvature exists and the road slopes down from US 20. **CR 290W** appears to slope up from US 20.

Cross Sections

Table III: Cross Section Information							
Road	Location	Southbound or Westbound			Northbound or Eastbound		R/W width
		Roadside Description	Lanes	Median	Lanes	Roadside Description	
US 20	Bridge Approach / Bridge over I-69	3 to 11' Shoulder 2:1 Slope	2 travel lanes @ 12'	16' Raised	2 travel lanes @ 12'	3 to 11' Shoulder 2:1 Slope	Unlimited at Interchange
	CR 300W to CR 290W	11' Usable Shoulder (10' Paved)	1 @ 12' and 1 @ 11'	None	1 @ 12'	11' Usable Shoulder (10' Paved)	Variable to 50' from Centerline
	Buck Lake Terrace Rd*	Same as Above	1 @ 12'	12' Left Turn Lane	1 @ 12'	Same as Above	
I-69 Diagonal Ramps	At Ramp Termini	Inside Shoulder 7' Usable 4' Paved			16' Traveled Way	Outside Shoulder 11' Usable 8' Paved	70' to 100' from Ramp Centerline
CR 300W	US 20	5' Shoulder, variable roadside	1 @ 9'	None	1 @ 9'	5' Shoulder, variable roadside	Approx 40' from CL
CR 290W	US 20	Variable shoulders at drives	1 @ 12'	None	1 @ 12'	Variable shoulders at drives	Approx 30' from CL
Buck Lake Terrace Rd*	US 20	Curb	2 turn lanes @ 12'	14' Raised, Curb	12' Travel Lane, 7'6" Parking Lane	Curb	Approx 55' from CL

*Recent Construction

Bridge

One bridge exists within the limits of this project—US 20 over I-69 (#020-76-04718A). It crosses I-69 at 90°. It has approach span lengths of 38' and 34' and main span lengths of 65' each. The types of these spans are reinforced concrete girder and continuous steel beam, respectively. Total structure length is 215'. Clear roadway width for both eastbound and westbound US 20 is 27' (with the raised median). Total clear roadway width is 70' (the raised median is 16'). Clear roadway width under the bridge is 57'5" and 56'8" for northbound and southbound I-69, respectively. Vertical clearance is 16'1" northbound and 16'9" southbound. The bridge was built in 1963 and last rehabilitated in 1978. The sufficiency rating is 72. Inspection ratings are as follows, which substantiate Need #1 (see page 2):

Deck	5	Fair
Superstructure	6	Satisfactory
Substructure	5	Fair

Interchange

A diamond interchange is provided between I-69 and US 20. Ramp junction information for the diagonal ramps is not included in this report as this project affects only the termini and not

the ramp junctions. Termini are intersections covered in the next subsection. Tower lighting is used at this interchange.

Intersections

Table IV: Intersections within Project Study Area					
Main Road	Side Road	Type	Signal?	Main Apprch Lane Config	Side Apprch Lane Config
US 20	SB Ramp Termini	4-Leg	Yes. 3 Phases	1 Through, 1 Through-Right EB 1 Left Turn, 2 Through WB	1 Left Turn, Right Turning Roadway SB
US 20	NB Ramp Termini	4-Leg	Yes. 2 to 3 Phases	1 Left Turn, 2 Through EB 1 Through, 1 Through-Right WB	1 Left Turn, Right Turning Roadway NB
US 20	CR 300W	T to South	No. Stop on S Leg	1 Through-Right EB, 1 Left-Through, 1Through WB	1 Lane NB Approach
US 20	CR 290W	T to North	No. Stop on N Leg	1 Left-Through EB, 1 Through, 1 Through-Right WB	1 Lane SB Approach
US 20	Buck Lake Terrace Rd	T to North	No. Stop on N Leg	1 Left-Turn, 1 Through EB; 1 Through, 1 Right-Turn WB	1 Left Turn, 1 Right Turn SB Approach

Between the northbound ramp terminus and CR 300W, the eastbound inside lane ends by sharply tapering (200') into the eastbound outside lane. No left-turn refuge is available for eastbound vehicles turning left onto CR 290W or the commercial drives preceding. No lighting is provided specifically for any of these intersections. Any illumination of the area comes from the commercial properties or the tower lighting of the interchange.

Right of Way

Width information is found in Table III. Limited access rights exist along US 20 between the SB ramp termini and CR 300W.

Land Use

The project is located in the Northern Lakes Natural Area. As well it is located in the Steuben Morainal Lake and on the Mississinewa Moraine. The project area is in the Great Lakes drainage basin and is drained to the southeast by Pigeon Creek and the northwest by Fawn River, both of which flow to the St Joseph River and into Lake Michigan.

Within the vicinity of the study area, land use is currently a mix of commercial (75%) and undeveloped (25%). In the areas currently undeveloped, half of it may be developed commercially in the future while the remaining half will not due to wetlands. Thus, in the future, land use is predicted to be 87% commercial and 13% undeveloped. Ten commercial driveways exist within the study limits—six to the south of US 20 and four to the north. Notable commercial entities in the study area are McDonalds, Subway, and BP to the south; and Marathon and Speedway to the north.

Utilities

The following types of utilities are evident in the project area: overhead electric powerlines and underground telecommunication lines. Others may exist, also. A notable powerline of 69 kV exists along the east side of I-69, follows the southeast right-of-way line, and crosses to the north side of US 20 and follows US 20 into Angola.

Hydraulics

The natural drainage and retention features in the area are highly irregular. Though drainage is said to be to either Pigeon Creek or Fawn River, how it gets to those major streams is not entirely apparent due to the kame-kettle topography and significant amount of wetland area. Also, US 20 tends to be located on the approximate watershed boundary between Pigeon Creek and Fawn River. Until coordination is made with Steuben County over existing tiling in the area during the design phase, specific drainage paths away from the project area remains undetermined.

The roadside of US 20 has surface drainage in ditches east of the northbound ramp termini. Within the I-69 interchange US 20 is curbed with curb drains and inlets that mostly drain to the north. West of the southbound ramp termini, drainage is in a ditch next to the southbound exit ramp to the lake northwest of the interchange.

TRAFFIC DATA

Traffic data for this project was obtained from United Consulting Engineers & Architects, under contract with the Traffic Statistics Unit. Details of the traffic data of this study area are provided on pages B4 to B14. Provided are annual average daily traffic, AM and PM peak hourly volumes, and truck percentages for both daily and hourly traffic. Data extends from Golden Lake Rd to CR 290W along US 20.

CAPACITY ANALYSIS

Unsignalized intersections along US 20 were analyzed with HCS 2000 software. Synchro version 6.0 was used to analyze signalized intersections within the study area. SimTraffic version 6.0 was used to analyze the arterial functions of US 20.

Current 4R standards prescribe a desirable level-of-service (LOS) of B and LOS C as a minimum for the design class of SR 49, Multi-Lane Suburban Urban Arterial. 3R standards prescribe LOS's of B desirable and D minimum for the same design class. As demonstrated in Table V, no sheer capacity problems exist at any of the signalized ramp terminal intersections analyzed. The unsignalized intersections' minor approaches have LOS's of F at CR 300, and E at CR 290 and CR 325E/Golden Lake Road, due to lack of gaps in the mainline traffic stream. See also pages B15 and B16 for results of traffic capacity analysis.

Other items pertaining to LOS: Year 2028 PM peak traffic arterial LOS results—LOS D at 18 mph for westbound US 20, and LOS C at 23 mph for eastbound US 20. (Below 22 mph is the cutoff for LOS C.)

CRASH DATA AND ANALYSIS

Crash (accident) history from January 1997 through December 2000 (4 years) was generated by the Crash Analysis Unit. Evaluation of the records showed a total of 99 reported crashes within the study limits, referenced from Golden Lake Rd to CR 290W along US 20. Twenty-one of the 99 crashes reported injuries. No crashes reported fatalities.

Table V: Level of Service (LOS) Results (AM-PM)—Intersection Exiting Conditions—Avg Delay in sec					
Year, Case					
US 20 & Golden Lake Rd	US 20 EB	US 20 WB	Golden Lake Rd NB (Stop)	CR 325W SB (Stop)	Unsignalized Intersection
2004, Existing	8 A / 9 A	9 A / 9 A	12 B / 15 B	15 B / 23 C	
2008, Existing	8 A / 9 A	9 A / 9 A	12 B / 16 C	16 C / 25 C	
2028, Existing	8 A / 10 A	9 A / 9 A	13 B / 21 C	20 C / 41 E	
US 20 & SB Ramps	US 20 EB	US 20 WB		SB Exit Ramp	Signalized Intersection
2004, Existing	19 B / 18 B	7 A / 6 A		9 A / 10 B	12 B / 11 B
2008, Existing	19 B / 18 B	7 A / 7 A		9 A / 11 B	12 B / 12 B
2028, Existing	19 B / 23 C	7 A / 3 A		11 B / 15 B	12 B / 12 B
US 20 & NB Ramps	US 20 EB	US 20 WB	NB Exit Ramp		Signalized Intersection
2004, Existing	3 A / 3 A	15 B / 16 B	8 A / 10 A		9 A / 10 B
2008, Existing	3 A / 3 A	15 B / 16 B	9 A / 11 B		9 A / 10 B
2028, Existing	3 A / 2 A	16 B / 18 B	10 B / 14 B		10 A / 11 B
US 20 & CR 300W		US 20 WB Left Turn	CR 300W NB (Stop)		Unsignalized Intersection
2004, Existing		1 A / 1 A	14 B / 25 C		
2008, Existing		1 A / 1 A	15 B / 28 D		
2028, Existing		1 A / 2 A	20 C / 71 F		
US 20 & CR 290W	US 20 EB Left Turn			CR 290W SB (Stop)	Unsignalized Intersection
2004, Existing	1 A / 2 A			14 B / 18 C	
2008, Existing	1 A / 2 A			12 B / 19 C	
2028, Existing	2 A / 3 A			15 C / 45 E	
US 20 & Buck Lake Terrace Rd	Data not available as side road did not exist at time of analysis				Unsignalized Intersection
2004, Existing					
2008, Existing					
2028, Existing					

Distribution of crash types is shown on Table VI: Most of the crashes consist of rear-end (44%), right-angle (20%), and left-turn (9%). Other tendencies are: 59% reported in ideal daylight conditions and 89% with ideal surface conditions. (See pages B19 to B21) For an estimated 16,700 vpd the study area is exposed to, this results in a rate of 5.5 crashes per million entering vehicle miles per mile (cr/mev/mi). This also equates to about 25 crashes per year (cr/yr) reported. The FHWA has crash frequency models that determine all cr/yr for the exposure on 4-leg intersections versus T, and signalized versus unsignalized (but not all-way stop control). Major and minor approach exposure (in vpd) is input and an expected crash frequency is output. Then comparing the reported rate with the expected rate, a severity factor is determined. The expected crash frequency of this area along US 20 is 10.8 cr/yr, and this yields a severity of 2.3. Applying this severity to the rate of 5.5 cr/mev/mi yields 2.4 cr/mev/mi expected. In Indiana, for

a rural minor arterial, the average crash rate is 2.3 cr/mev/mi, and for an other urban principal arterial the crash rate is 4.0 cr/mev/mi. This expected crash rate fits between these two average rates and therefore validates the FHWA model, as well as Needs 2 through 5 (see page 2), which all indicate safety concerns with this length of US 20.

The intersection with the most crashes is the I-69 east ramp terminus with a total of 8.8 crashes reported per year. Rear-end crashes account for about 6 per year of the total, or 68%. The intersection with the greatest severity factor is CR 300W with nine times the expected crashes. Next is CR 290W with a severity of 3.9. This section of the project area contains the

Table VI: Crash Histories and Rates (Referenced only on US 20)

	Property Damage Only	Personal Injury	Fatal	Total	Rear End	Head On	Same Direction Sideswipe	Opposite Direction Sideswipe	Off Road	Right Angle	Left Turn	Right Turn	Undetermined
Whole project—Golden Lake Rd to CR 290W (Exposure = 16740 entering vpd in 1999, 4 yr history, 0.74 mi length studied)													
History	78	21	0	99	44	8	6	1	5	20	9	4	2
Crash/mev/mi	4.31	1.16	0	5.47	2.43	0.44	0.33	0.06	0.28	1.11	0.50	0.22	0.11
Rprt Crash/yr	19.5	5.25	0	24.75	11	2	1.5	0.75	2.5	5	2.25	1	0.5
Expt Crash/yr				10.76									
Severity Index				2.30									
US 20 @ Golden Lake Rd (Exposure = 11886 entering vpd in 1999, 4 yr history)													
History	10	1	0	11	1	4	0	0	0	4	1	1	0
Rprt Crash/yr	2.5	0.25	0	2.75	0.25	1	0	0	0	1	0.25	0.25	0
Expt Crash/yr				1.28									
Severity Index				2.15									
US 20 @ I-69 West Ramp Terminus (Exposure = 14127 entering vpd in 1999, 4 yr history)													
History	9	3	0	12	7	0	1	0	0	0	3	0	1
Rprt Crash/yr	2.25	0.75	0	3	1.75	0	0.25	0	0	0	1.75	0	0.25
Expt Crash/yr				3.97									
Severity Index				0.76									
US 20 @ I-69 East Ramp Terminus (Exposure = 14553 entering vpd in 1999, 4 yr history)													
History	30	5	0	35	26	3	0	0	2	3	0	1	0
Rprt Crash/yr	7.5	1.25	0	8.75	6.5	0.75	0	0	0.5	0.75	0	0.25	0
Expt Crash/yr				4.18									
Severity Index				2.09									
US 20 @ CR 300W (Exposure = 14248 entering vpd in 1999, 4 yr history)													
History	18	7	0	25	5	1	3	1	0	10	5	1	0
Rprt Crash/yr	4.5	1.75	0	6.25	1.25	0.25	0.75	0.25	0	2.5	1.25	0.25	0
Expt Crash/yr				0.69									
Severity Index				9.06									
US 20 @ CR 290W (Exposure = 14393 entering vpd in 1999, 4 yr history)													
History	11	5	0	16	5	0	2	0	3	3	1	1	1
Rprt Crash/yr	2.75	1.25	0	4	1.25	0	0.5	0	0.75	0.75	0.25	0.25	0.25
Expt Crash/yr				1.03									
Severity Index				3.88									

eastbound inside lane-drop and a right turn with refuge (to CR 300W) simultaneously. Proceeding to the east is the intersection with CR 290W that along US 20 has one thru lane

eastbound and no left- turn refuge. The crest vertical curve that constrains intersection stopping sight distance is east of that. All of this is in an area with no access control and several commercial driveways.

Though left-turn queue spill-over occurs along US 20 at the west ramp terminus, reported crash rates are shown to be less severe than expected. But spill-over phenomena would be expected to contribute to more rear-end crashes, and it does in this project area as well. However it is not attributed to the west ramp terminus; it just increases the rate at the east ramp termini because queues often extend that far to the east. Also to be noted is that the crashes are reported at a time before recent construction to relocate Golden Lake Road, where Golden Lake Road access is now located to the west and directly accesses US 20. This work has since had an effect on traffic flow, as before slightly more vehicles used the west ramp terminus intersection turning left to access Golden Lake Road.

ASSESSMENT OF CORRECTIVE MEASURES AND RECOMMENDATIONS

Need #1 The Fort Wayne District programmed Des #9803670 in 1998 to rehabilitate the existing US 20 bridge over I-69. In 2001, due to worsening bridge ratings, the project type was changed to replacement. The width of the new bridge must accommodate long-term traffic operational demands (i.e. traffic volumes) across the interchange.

Need #2 Queue length determination was done for the existing configuration at the west ramp termini and east ramp termini for four time periods (2004, 2008, 2018, and 2028). The results are in Table VII and were obtained from the queuing reports generated by SimTraffic:

Table VII: Maximum Queues Along US 20 over I-69—Existing (in feet)								
Year, Peak	WB Left Turn (LT) @ W Ramp Terminus				EB Left Turn (LT) @ E Ramp Terminus			
	Existing Length Available = 227'				Existing Length Available = 280'			
	LT	Thru Inside	Thru Outside	Thru Avg	LT	Thru Inside	Thru Outside	Thru Avg
2004 AM	158	181		91	44	143	157	150
2004 PM	271	328	131	229.5	69	138	178	158
2008 AM	158	284		142	54	219	196	208
2008 PM	158		53	162	115	182	176	179
2018 AM	155	207		104	72	136	176	156
2018 PM	252	295	155	225	53	158	136	147
2028 AM	253	287		144	93	115	137	126
2028 PM	264	615	485	550	112	199	233	216

Yellow—Queue is within 1 truck-length (60') of surpassing available length.

Orange—Queue is within 1 car-length (20') of surpassing available length.

Note: The Thru-Average column demonstrates the theoretical result of traffic evening itself out anticipating a condition of equalized lane utilization at multilane approaches.

The above analysis shows that even in 2004 the westbound approach to the west ramp terminus surpasses its available left turn lane length and that the eastbound approach to the east ramp terminus has not yet done so. Even if the available lengths were equalized to 254 (the most the westbound available length can be increased to without decreasing the eastbound available length too much, and maintaining the same nested left-turn cross section), the westbound queues would still surpass its available length. Therefore, the left turn lanes need to be converted from

nested to side-by-side configuration. Table VIII shows the results of such a configuration, with at least 200' additional length westbound and 350' additional length eastbound.

Need #3 Due to the severity of the reported crash rates from the east ramp terminus to CR

Table VIII: Maximum Queues Along US 20 over I-69—Proposed (in feet)								
Year, Peak	WB Left Turn (LT) @ W Ramp Termini				EB Left Turn (LT) @ E Ramp Termini			
	Proposed Length Available = 565'				Proposed Length Available = 565'			
	LT	Thru Inside	Thru Outside	Thru Avg	LT	Thru Inside	Thru Outside	Thru Avg
2008 AM	171	275	143	209	70	156	94	125
2008 PM	180	349	349	349	54	160	69	115
2018 AM	172	179	109	144	29	217	74	146
2018 PM	261	273	187	230	54	198	138	168
2028 AM	344	179	112	146	74	216	178	197
2028 PM	220	362	301	332	76	216	121	169

290W, lane continuity, i.e. 2 through lanes in each direction, should be maintained throughout this group of intersections.

Need #4 Also in response to those severe crash rates as well as the number and density of commercial drives, a continuous median/left-turn lane (predominantly in the form of a two-way-left-turn-lane, or TWLTL) should be provided between CR 300W and the crest of the vertical curve to be described next. This auxiliary lane would further serve as left turn refuge for westbound US 20 to southbound CR 300W as well as for eastbound US 20 to northbound CR 290.

Need #5 The Fort Wayne District programmed Des #0201004 in 2002 to correct sight distance on the crest vertical curve from Sta 436+00 to Sta 439+00. The crest vertical curve does not meeting stopping distance (SSD); in addition, at CR 290W intersection sight distance (ISD) is substandard by 17% in a truck and 24% in a car. Existing ISD available is 500' and 380', and required is 610' and 490'. Corrective action in the form of vertical realignment is necessary to standardize SSD and ISD (specifics explained later).

Preliminary drawings of the recommended improvement are presented on pages A3 and A4, superimposed over an aerial base map. Listed are recommendations for the recommended course-of-action:

1. 4R standards are to be used due to (1) US 20 is on the 4R System, (2) all the pavement throughout the project limits is being replaced, and (3) future intentions for US 20 are for expansion to (A) either add travel lanes from the east end of the subject project to downtown Angola (see Table XI) or (B) build a US 20 bypass to the south or north of Angola. Terrain type is level. Design speeds are to be set at the existing posted speeds or per local policy (see pages 2 and 3), since those speeds are allowed by 4R standards. FHWA oversight is required in design review. The project limits (including incidental work) shall be as follows:

Subject Road	Limit	Referenced to	Distance	RP
US 20	West	Golden Lake Road	580' to the East	140+67

US 20	East	Buck Lake Terrace Rd	160' to the East	141+26
Southbound Ramps	N & S	US 20	225' North and 275' South	
Northbound Ramps	N & S	US 20	210' North and 175' South	
CR 300W	South	US 20	450' South	
CR 290W	North	US 20	155' North	
Buck Lake Terrace Rd	North	US 20	(No work on this sideroad)	

Work will not involve I-69 proper.

- The horizontal alignment of US 20 should not change. Vertical alignment of US 20 between Sta 432+00 and Sta 445+37 is expected be as shown on page A4, or a close approximation of that gradeline. In order to meet the ISD requirements at CR 290W and also meet stopping sight distance requirements, page A4 shows little change to the tangent and sag curve east, but lowers the subject crest curve 3.5' maximum and lengthens the curve by 400' thereby increasing the K value from 50 to 110. The ISD would be unlimited in a truck and 550' in a car.
- Proposed cross sections throughout the project limits shall be per the following table:

Table IX: Proposed Cross Section Information							
Road	Location	Southbound or Westbound		Northbound or Eastbound			R/W Width
		Roadside Description	Lanes	Median/ Left Turn Lane	Lanes	Roadside Description	
US 20	Bridge Approach and Bridge over I-69	Tie into Existing W of Ramps. 2'6" Curb & Gutter between Ramps and Bridge	2 Travel Lanes @ 12'	30' Raised W and E of Ramps, 6' Raised inside Ramps with side/side LT Lanes @ 12' ea	2 Travel Lanes @ 12'	Tie into Existing W of Ramps. 2' Curb, 2' Shelf, 2:1 Embankment	Same as existing W of CR 300W, 60' on both sides from CR 300W to CR 290 W, and 75' on both sides to Buck Lake Terrace Rd.
	CR 300W to CR 290W	2'6" Curb, 15' grass buffer for sidewalk or shared-use path	2 @ 12'	16'	2 @ 12'	2'6" Curb, 15' grass buffer for sidewalk	
	Buck Lake Terrace Rd	Transition from Curb & Gutter to 11' Usable Shoulder (10' Paved), 4:1 foreslope, 3' ditch, 3:1 backslope	1 to 2 Lanes Transition @ 12'	12' Left Turn Lane	2 to 1 Lanes Transition @ 12'	Transition from Curb & Gutter to 11' Usable Shoulder (10' Paved), 4:1 foreslopes, 3' ditch, 3:1 backslopes	
I-69 Diagonal Ramps	At Ramp Termini	Inside Shoulder 4'			16' Traveled Way	Outside Shoulder 8'	Same as existing
CR 300W	US 20	6' Shoulder, tie into existing	1 @ 11'	11' Left Turn Lane	1 @ 11'	6' Shoulder, tie into existing	50' on both sides
CR 290W	US 20	2'6" Curb & Gutter, 6' Shoulder	1 @ 12'	None	1 @ 12'	2' Curb & Gutter, 6' Shoulder	45' on both sides into existing
Buck Lake Terrace Rd	US 20	Same as Existing					Same as existing

Recommended clear roadway width on the bridge is 40' in each direction for a total of 80'.

- The right-turning roadways at the ramp termini should be reconstructed in a similar manner to what exists now. They shall handle an Indiana Design Vehicle. The northwest, northeast, and

southeast legs of these roadways are expected to have raised (but mountable) islands. The southwest right-turning roadway is not expected to have a raised island. The northwest and southeast exit ramp termini shall not have additional turn lanes (storage) on the ramps other than what is provided by the right-turning roadways.

5. Due to the width of the median inside the interchange from the side-by-side left turn arrangement, for illustrative purposes, the US 20 left turns are shown as slotted (tapered towards opposing traffic) as they approach their ramp terminal.
6. All driveways impacted by this project shall be reconstructed. Page A3 illustrates this, though one (the east drive to Speedway) is centered less than 100' from the centerline of CR 290W. Also along CR 290 are driveways to the same Speedway and Dhil's Auto Sales that may be significantly impacted due to vertical realignment of CR 290W. The designer shall determine whether it is prudent that these driveways should remain and if so, to what extent they be reconstructed.
7. The proposal will require 0.3 ac of agricultural land, 0.3 ac of residential land, and 0.8 ac of commercial land. Twelve parcels will be affected. Recommended right-of-way dimensions, areas, and number of parcels presented in this Engineer's Report are estimates at this stage of development of the project.

Traffic Maintenance

Traffic will be maintained through the site during construction. See page A12 for the provisional MOT strategy on the bridge, which will involve crossed traffic with Phase 1 featuring two lanes over the bridge (short left-turn lanes to ramps off the bridge) and three lanes in Phase 2 (featuring nested left turn lanes). Through the proposed segment of US 20 with four through lanes and a continuous-median/left-turn lane, traffic could be crossed over in a similar manner. In the area requiring more than 3' of vertical adjustment, two lanes of temporary pavement will need to be maintained through the site. The side roads and ramps should remain open while being reconstructed, though it is reasonable that CR 300W be closed periodically as it is not a dead-end route.

Survey Requirements

See pages A3 and A4. On all involved roadways, survey data shall be obtained 300' beyond incidental work. Resulting survey lengths are: 3800' along US 20, 1100' along the southbound ramps, 985' along the northbound ramps, 750' along CR 300W, 455' along CR 290 W, and 300' along Buck Lake Terrace Rd for a total of 7390'.

Cost Estimate	Year 2005	
Road Construction	\$4,510,000	Details of costs among the three projects are shown on page B18.
Bridge Construction	\$2,540,000	
Right-of-Way	\$480,000	
Engineering	\$250,000	
TOTAL	\$7,780,000	

BENEFIT/COST ANALYSIS

Benefit/Cost (B/C) analysis was carried out for the work described above. Beginning analysis year is 2008, while the ending (horizon) analysis year is 2028. Tabulation of costs and benefits is shown below:

Table X: Benefit/Cost Analysis (\$'s in 2005)				
Item		Existing Cost	Proposed Cost	Proposed Benefit
Construction		\$3,330,000	\$7,050,000	(\$3,720,000)
Engineering		\$140,000	\$250,000	(\$110,000)
Right-of Way		\$0	\$480,000	(\$480,000)
Total Agency		\$3,470,000	\$7,780,000	(\$4,310,000)
Design Life 2008 to 2028 (20 years)	Crashes	\$7,250,000	\$5,450,000	\$1,800,000
	User Time and Operation	\$67,760,000	\$64,920,000	\$2,840,000
	Total User	\$75,010,000	\$56,364,000	\$4,640,000
	NPV			\$330,000
	B/C			1.08

ENVIRONMENTAL ISSUES

The Environmental Assessment Section is investigating the social, economic, and environmental impacts to the project area associated with the proposed work. No significant impacts are expected. Potential wetlands may exist along US 20 between the northbound ramps and CR 300W (see page A11, photos 30-32), as well as near Buck Lake Terrace Road, south of US 20. Temporary commercial impacts east of the interchange are another concern during construction.

Assessment of social, economic, and natural impacts should account for the unrefined nature of these right-of-way limits by assessing potential impacts a reasonable extent beyond the proposed preliminary limits.

OTHER PROJECTS AND PLANNING ACTIVITIES IN THE AREA

Table XI: Other Projects in the Area			
Des #'s	Road	Category / Location	RFC (Ready for Contracts)
0500350	US 20	Added Travel Lanes from I-69 to SR 127 in Angola	June 2021 (May 2013)
0101515	I-69	Repl Superstr of Bridges over Green Lake, 0.14 mi S of SR 120	Jan 2005, not yet let
0101516	I-69	Repl Superstr of Bridges over Lake Charles, 0.55 mi S of SR 127	Jan 2005, not yet let
0101517	I-69	Repl Deck of Bridges over SR127	Jan 2005, not yet let
0101518	I-69	Repl Superstr of Bridges over Lake George Rd, 0.88 mi N of Toll	Jan 2005, not yet let
0101522	I-69	Rd	May 2007
0201000	I-69	Rehab of Bridge on CR 200N over I-69, 2.52 mi S of SR 127	July 2009
0300933	I-69	Intersection Improvements at SR 127 Interchange Ramp Termini	Jan 2014
0400048	I-69	Road Reconstruction from US 20 to IN/MI State Line	Jan 2005, not yet let
9607480	I-69	Repl Superstr on CR 400N over I-69, .37 mi S of SR 127	Feb 2010
0013110	SR	New Port of Entry along SB serving IN/MI State Line	Sept 2007
0500351	127	Intersection Improvement at Mill St, 0.28 mi N of US 20	June 2023 (May 2015)
	SR	Road Reconstruction from US 20 to Industrial Blvd in Angola	
	127		

The RFC dates of two of the subject projects (Des 0300942 and Des 9803670) are currently shown as December 15, 2009. The third, Des 0201004, is currently shown as November 15, 2009. The latter should be adjusted to agree with the two former projects. Coordination will be needed between the subject project and the I-69 ramp termini improvements at SR 127 since both interchanges are the two major access points to Angola and they are currently set for letting at nearly the same timeframe.

INDOT's Planning Section has recently (June 2005) commenced a feasibility study of an Angola bypass with respect to US 20. North and south routes are being considered. If the findings of either route recommend further NEPA-level study, such a bypass of Angola may negate the need for adding lanes on US 20 under Des 0500350 if a favorable location is shown to be to the south of Angola. It may negate the need for that work on US 20 and work on SR 127 under Des 0500351 if a favorable location is shown to be to the north of Angola. The designer needs to follow the progression of this feasibility study as to the proximity of the east project limits of the subject projects to the west limit of such a bypass corridor.

FIELD INVESTIGATIONS / COORDINATION

In May, 2004 a field inspection was held for the Sight Distance Correction project (Des 0201004). Attending were persons representing the Design Division, the Fort Wayne District Development and Operations offices, and the consultant Beam, Longest, and Neff representing INDOT's Engineering Assessment Section. See page C1 for minutes.

In November, 2004 a field inspection was held for the Interchange Work and Bridge Replacement projects (Des's 0300942 and 9803670). Attending were persons representing the Engineering Assessment Section, Environmental Assessment Section, Design Division, the Fort Wayne District Development office, and Angola Subdistrict office. Officials from Steuben County were also invited. See page C4 for minutes. At this field inspection, it was decided, at the request of the Fort Wayne District, to develop all three projects together.

Consistent contact has been made with the Steuben County Engineer in regard to county trail development, and a potential US 20 bypass of Angola.

CHANGES TO PROPOSAL

The Engineering Assessment Section shall be consulted if the general proposal of the project is to be changed. The person initiating the change should send a memo to the Engineering Assessment Section Manager for concurrence. Any request from the designer should be routed through the attending Design Division Section Manager. The memo should include justification for the change and the estimated cost difference.

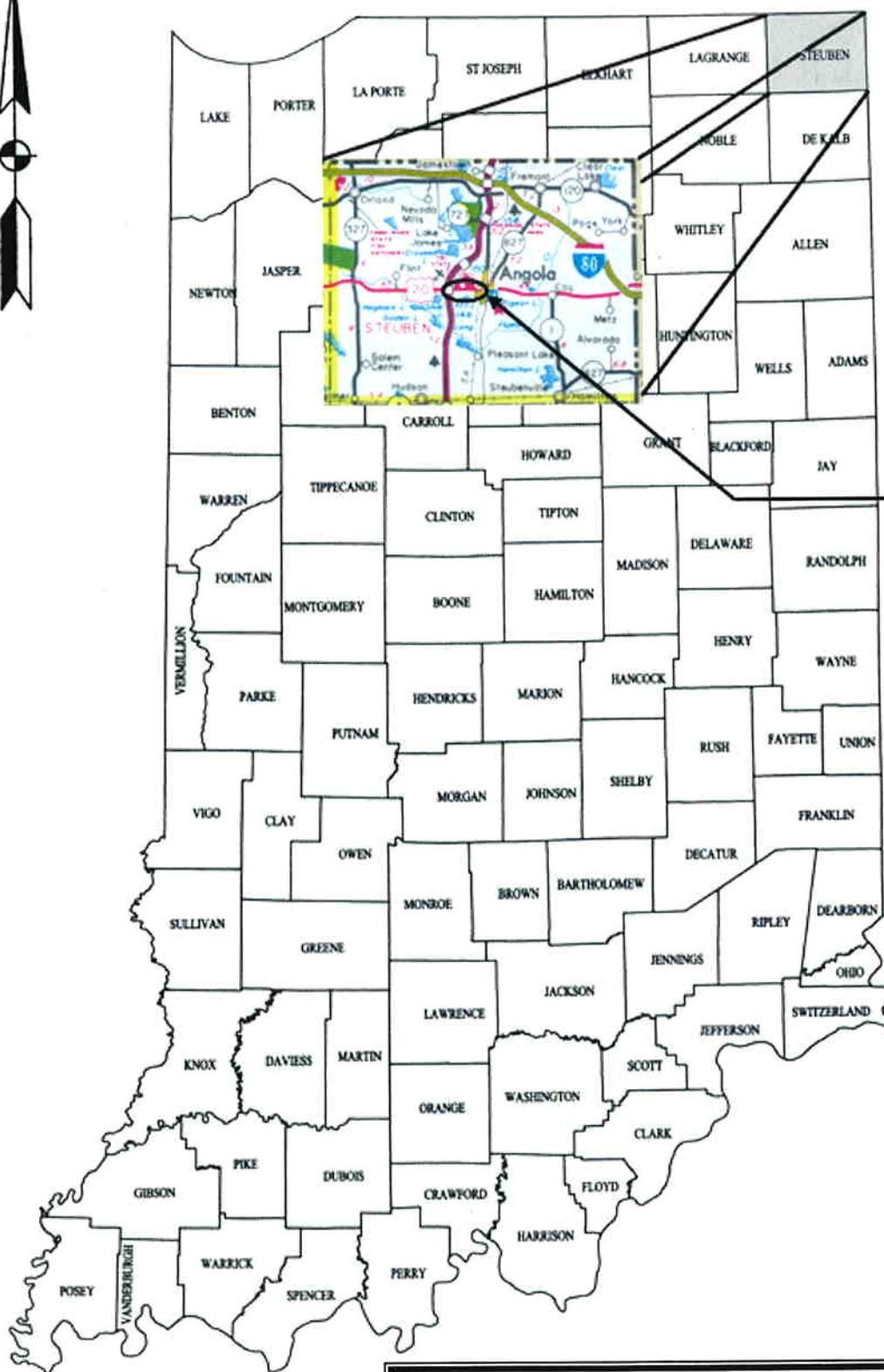
DAB/KJL

Attachments

cc:	Kimberly Peters (3)	Niru Shah	Mike Holowaty
	William Schmidt (survey)	Matt Thomas	Ben Lawrence
	Athar Khan	John Leckie (Fort Wayne District Development)	
	Sally Morgan	Ben Shaffer (Fort Wayne District Traffic)	
	Dennis Lee (FHWA)	Karl Leet	Engineering Assessment File

APPENDIX A

Maps, Photos, and Drawings



PROJECT
AREA

Des No.

0201004, 0300942, 9803670

Steuben County

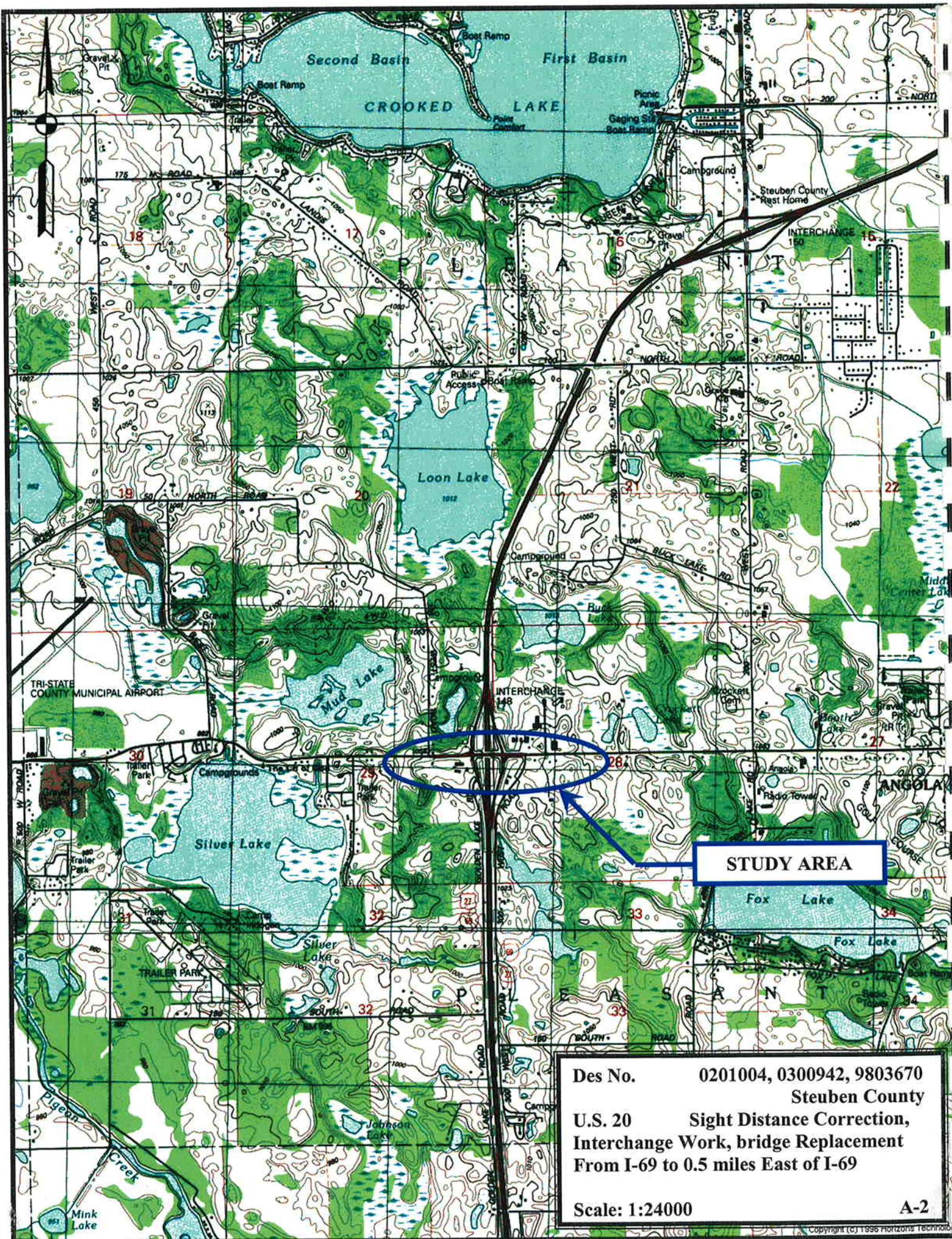
U.S. 20

Sight Distance Correction,

Interchange Work, bridge Replacement

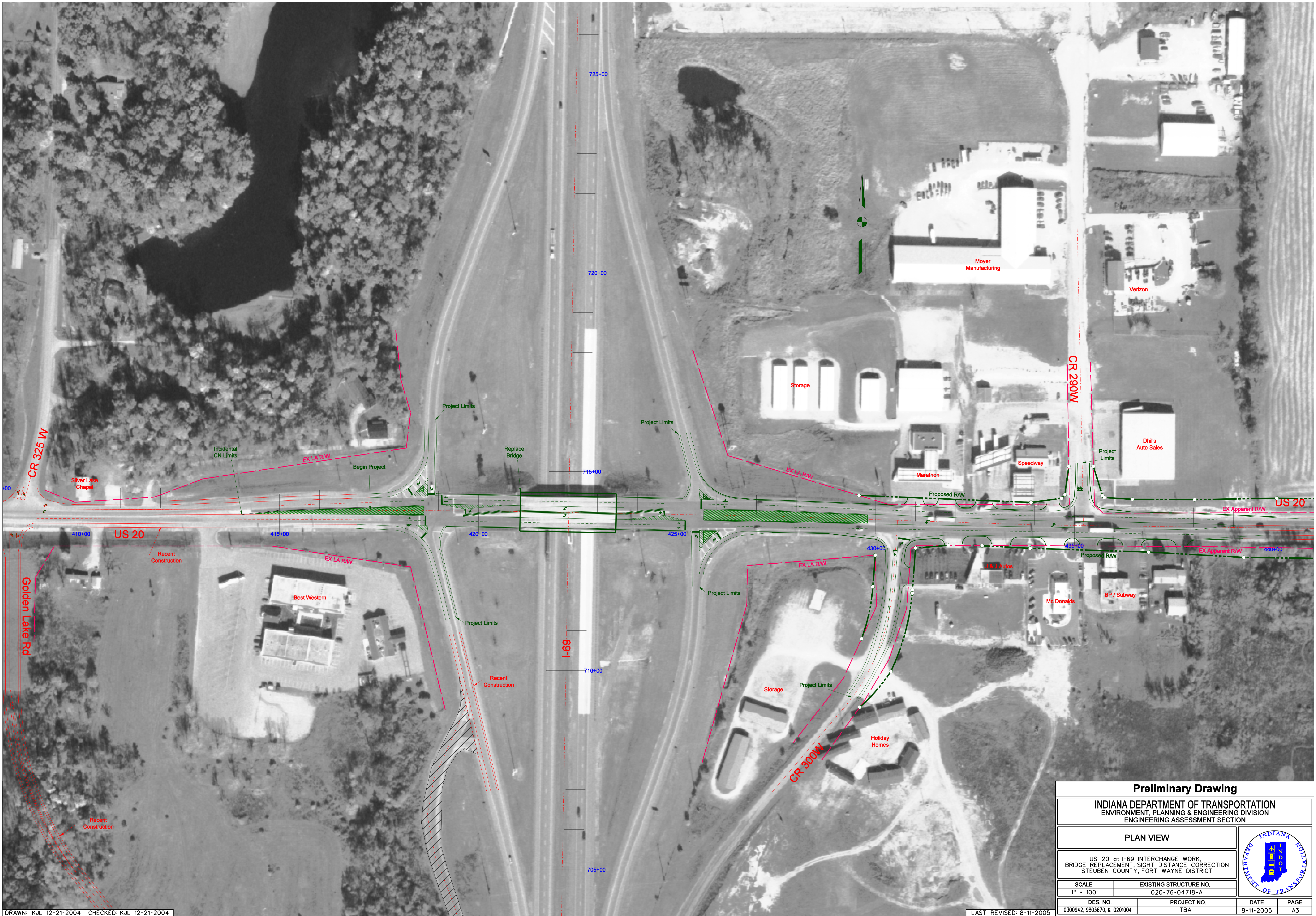
From I-69 to 0.5 miles East of I-69

A-1



Des No. 0201004, 0300942, 9803670
Steuben County
U.S. 20 Sight Distance Correction,
Interchange Work, bridge Replacement
From I-69 to 0.5 miles East of I-69

Scale: 1:24000 A-2



DRAWN: KJL 12-21-2004 | CHECKED: KJL 12-21-2004

LAST REVISED: 8-11-2005

Preliminary Drawing			
INDIANA DEPARTMENT OF TRANSPORTATION ENVIRONMENT, PLANNING & ENGINEERING DIVISION ENGINEERING ASSESSMENT SECTION			
PLAN VIEW			
US 20 at I-69 INTERCHANGE WORK, BRIDGE REPLACEMENT, SIGHT DISTANCE CORRECTION STEBEN COUNTY, FORT WAYNE DISTRICT			
SCALE 1" = 100'	EXISTING STRUCTURE NO. 020-76-04718-A		
DES. NO. 0300942, 9803670, & 0201004	PROJECT NO. TBA	DATE 8-11-2005	PAGE A3





1. N on I-69 at NB exit ramp (taper type) and US 20 bridge



2. N on I-69 at NB entrance (parallel type)



3. S on I-69 at SB exit ramp (taper type) and US 20 bridge

I-69/US 20 Interchange

Along I-69

4. N along I-69 from US 20 bridge



5. S on I-69 from US 20 bridge





8. Northeast Quadrant



7. W across US 20 bridge
noting nested left turn lanes



6. Northwest Quadrant

I-69/US 20 Interchange

On US 20 Bridge



9. Southwest Quadrant



10. Southeast Quadrant



11. NW ramp terminal (SB exit ramp)

13. SW entrance ramp (SB entrance ramp—2-way section to be removed)



12. NE ramp terminal (NB entrance ramp)

I-69 / US 20 Interchange—Ramp Termini

14. SE ramp terminal (NB exit ramp)





15. W on US 20 toward CR 325W (new Golden Lake Rd inter-section) Silver Lake Chapel to the right



16. Driveway to Angola Inn



I-69/US 20 Interchange

18. W on US 20 from existing ground of new Golden Lake Rd



W on US 20

17. E on US 20 toward I-69 interchange

19. E on US 20 from same point as #18





20. W on US 20 toward I-69 interchange along south driveways

21. E away from I-69 toward Angola



22. W on US 20 toward I-69 interchange along north driveways

I-69/US 20 Interchange

23. N at CR 290W (commercial access)



E on US 20

24. S at CR 300W (commercial access and I-69 east frontage road)





25. NW Quadrant



27. SW Quadrant



26. NE Quadrant (Silver Lake Chapel)



28. SE Quadrant

I-69/ US 20 Interchange—Newer Views of US 20/Golden Lake Rd/CR 325W



29. J & J Auto (now out of business)—was an old gas station



30. NE Quadrant of I-69 Interchange (Potential Wetlands)

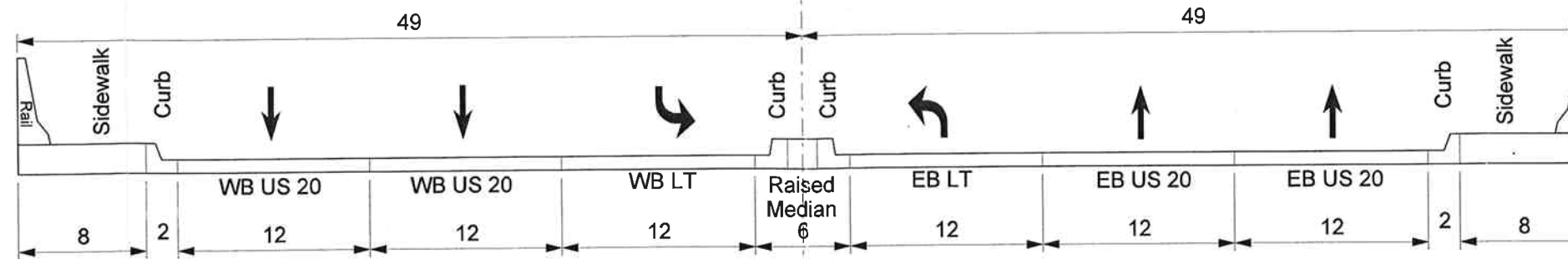
I-69/ US 20 Interchange—Environmental Items of Concern

31. & 32

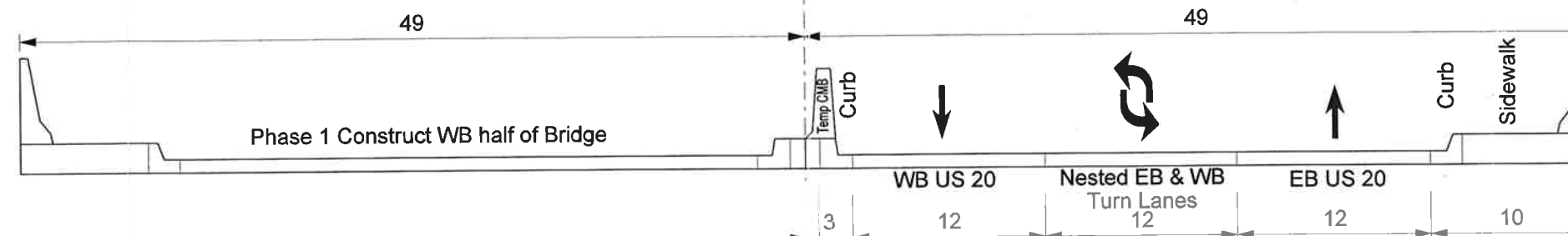
Between SE Ramp and CR 300W (Potential Wetlands)



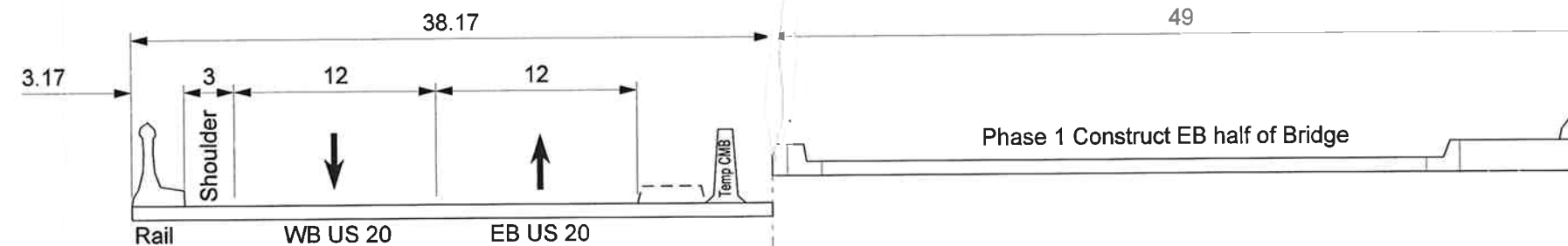
Proposed



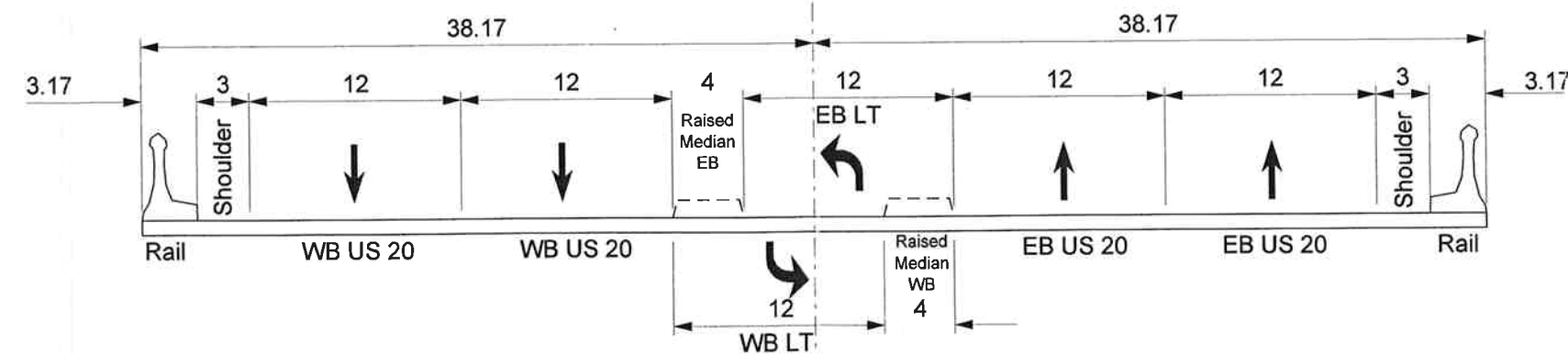
Phase 2



Phase 1



Existing



US 20 Bridge over I-69 MOT Phases

Scale 1"=10'

Basic Intersection Geometry Calculations for #0300942

US 20 / I-69 West Ramps

Lanes	2028 Max Hr Volume	% Trucks	PC/hr	Truck/hr	Design PC/cycle/Ln	Design Truck/cycle/Ln	Design Storage Length (ft)	Design Speed	Decel Length	Pocket Taper Length	Minimum Median	Typical Median	Lane Shift Taper Rate	Leg Length	EP-EP Leg Width	R/W Leg Width	Env Study Width
EB TH	2	660	15	561	99	10	2	350	45	0	30	0	45	1025	78	112	172
WB OPP	2																
WB LT	1	246	12	216	30	8	1	235	45	0	100	30	45	620	90	124	184
WB TH	2	629	13	547	82	10	2	350	45	0							
EB OPP	2																
SB LR	1	146	11	130	16	5	1	175	50	541	0	0	0	175	12	46	106

Length of Car (ft) 20
Length of Truck (ft) 75
Cycle (sec) 60
Storage Factor 2
Lane Width 12
* -- Yield control separate from Signal

Basic Intersection Geometry Calculations for #0300942

US 20 / I-69 East Ramps

Lanes	2028 Max Hr Volume	% Trucks	PC/hr	Truck/hr	Design PC/cycle/Ln	Design Truck/cycle/Ln	Design Storage Length (ft)	Design Speed	Decel Length	Pocket Taper Length	Minimum Median	Typical Median	Lane Shift Taper Rate	Leg Length	EP-EP Leg Width	R/W Leg Width	Env Study Width
EB LT	1	46	3	45	1	2	1	115	45	0	30	30	45	600	90	124	184
EB TH	2	622	15	529	93	9	2	330	45	0							
WB OPP	2																
WB TH	2	892	13	776	116	13	2	410	45	0	30	16	45	725	78	112	172
EB OPP	2																
NB LR	1	171	11	152	19	6	1	195	20	0	0	12	10	135	12	46	106

Length of Car (ft) 20
Length of Truck (ft) 75
Cycle (sec) 60
Storage Factor 2
Lane Width 12
* -- Yield control separate from Signal

APPENDIX B

Data and Analyses

**TRAFFIC FORECASTS – I-69 at U.S. 20
INTERCHANGE WORK
STEBEN COUNTY, INDIANA
EXECUTIVE SUMMARY**

The Indiana Department of Transportation intends to complete some interchange work at U.S. 20 and I-69 near the city of Angola, Steuben County, Indiana. In order to assist with the design of this project, traffic projections were requested at four intersections along the U.S. 20 corridor for the years 2008, 2018, and 2028. The specific intersections studied are listed in the table below. At the intersections, all inbound legs, including turning movements, and outbound legs were considered. The growth rates generated in this report were used to project traffic data from 2004 to the years 2008, 2018, and 2028. The traffic data is expressed in terms of average annual daily traffic (AADT), AM and PM design hour volumes (DHV), DHV as a percent of AADT, and the percentage of commercial vehicles for both AADT and DHV.

Intersection 1	U.S. 20 at C.R. 325 W./Golden Lake Road
Intersection 2	U.S. 20 at I-69
Intersection 3	U.S. 20 at C.R. 300 W.
Intersection 4	U.S. 20 at C.R. 290 W.

The subject intersections are located on the northwest side of the city of Angola in Steuben County, Indiana. In the study area, U.S. 20 runs east to west through this portion of Steuben County. The subject intersections are located just east of the Tri-State Steuben County Airport. Additionally, several gas stations/truck stops are located on the eastern fringe of the study area which results in higher commercial vehicle percentages along the U.S. 20 corridor. Given the urban nature of the study area, it is reasonable to expect growth along U.S. 20 to be low to moderate during the period 2004-2028.

GROWTH RATE DEVELOPMENT:

Two annual growth rates were derived using 1997 and 2001 INDOT History Files and the Indiana Small Urban and Rural Forecasting Program (ISURFP). An analysis of the selected growth rate used to project traffic volumes to 2008, 2018, and 2028 follows.

Annual Growth Rate using 1997 and 2001 INDOT AADT History File Counts = 2.17%

Annual Growth Rate using ISURFP = 0.76%

As a general rule, growth rates derived using the INDOT History Files tend to be exaggerated and growth rates derived using the ISURFP tend to be conservative. To compensate for these tendencies, the INDOT, Traffic Statistics Unit prefers to average the two rates together to arrive at a growth rate to apply. In this particular scenario, averaging the rates together yields a growth rate of 1.47%. UNITED applied this rate to

project 2004 data to 2008, 2018 and 2028. Growth rate development calculations are detailed in Appendix A.

TRAFFIC FORECAST FACTORS:

Given the aforementioned assumed growth rate, the following growth factors were used to develop future year traffic forecasts for the subject intersections, with 2004 being the base year:

First forecast year (2008) Growth Factor	1.0588
Second forecast year (2018) Growth Factor	1.2058
Third forecast year (2028) Growth Factor	1.3528

TRAFFIC FORECAST VOLUMES:

The traffic forecast volumes for the subject intersections were developed using the following methodology:

- INDOT and UNITED collected traffic data at the subject intersections in August and September 2004. The count data was adjusted using the appropriate 5-year average Seasonal Adjustment Factor. The following table shows the factor(s) applied at each intersection:

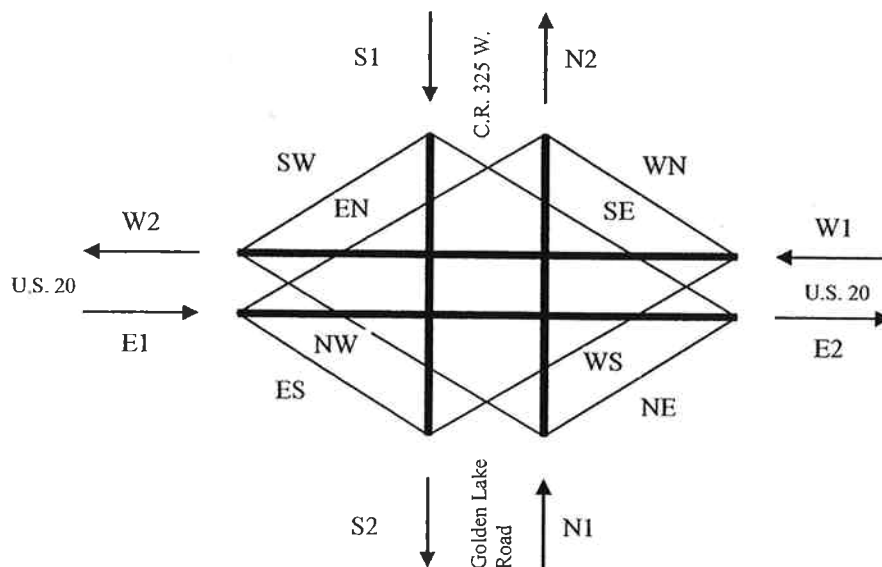
Intersection	Road - Functional Class	Applied Factor
Intersection 1	U.S. 20 – Rural Minor Arterial	0.922
	C.R. 325 W. / Golden Lake Road – Rural Local Road	0.939
Intersection 2	U.S. 20 – Rural Minor Arterial	0.922
	U.S. 20 – Urban Minor Arterial	0.958 & 0.978
	I-69 Ramps – Urban Interstate	0.922
	I-69 Ramps – Rural Interstate	0.934
Intersection 3	U.S. 20 – Urban Minor Arterial	0.958 & 0.978
	C.R. 300 W. – Urban Local Road	0.958
Intersection 4	U.S. 20 – Urban Minor Arterial	0.958
	C.R. 290 W. - Urban Local Road	0.958

- Classified traffic counts were obtained where possible.
- Once the adjustments were made for seasonal variation, the total entering and exiting traffic volumes were balanced until the entering volume equaled exiting volume.
- Turning movement percentages for the intersection of U.S. 20 at I-69 were provided by INDOT. Turning movement percentages for the remaining intersections along U.S. 20 were derived using professional judgment. The turning movement

percentages were applied to adjusted traffic volumes both for the whole day and for each peak hour.

- The turning movement volumes were then added together and balanced until the sum of the exiting movements matched the total balanced exiting volume.
- The design hours were determined by summing the hourly volumes at each count station along the corridor. The AM and PM Peak Hours were determined to be 11:00-12:00 and 4:00-5:00, respectively. The appropriate seasonal and multiple axle factors were applied to the peak hour data, as well as turning movements percentages. The intersections were balanced so that entering traffic matched exiting traffic. The adjusted and balanced hourly volumes were divided by the adjusted and balanced daily volumes, yielding the DHV as a percent of AADT. The percentage of commercial vehicles of the AADT and DHV is based on the hourly classified special traffic counts. Documentation of the balancing process and commercial vehicle percentages are contained in Appendix A - Base Year Traffic Data.
- After the intersections were balanced, growth factors were applied to the adjusted base year data to project traffic for the years 2008, 2018, and 2028.

INTERSECTION FORECAST SUMMARY DATA SHEET			
PROJECT:	I-69 at U.S. 20 Interchange Work		
ROUTE:	Intersection 1: U.S. 20 at C.R. 325 W./Golden Lake Road		
COUNTY:	Steuben		
AM DHV:	11:00-12:00	PM DHV:	4:00-5:00



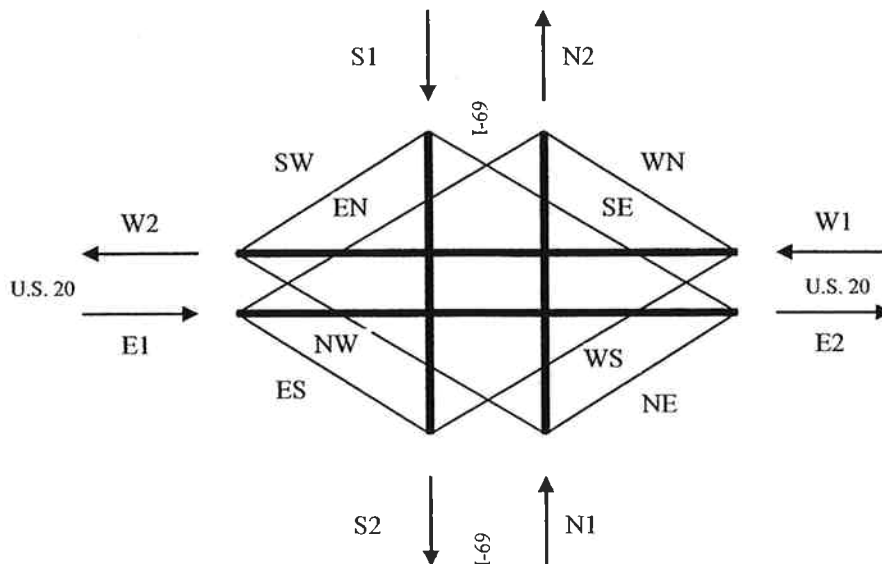
Movement	2004 AADT	2008 AADT	2018 AADT	2028 AADT	Commercial Vehicles % AADT
SW	45	48	54	61	20%
ST	5	5	6	7	14%
SE	80	85	96	108	19%
ES	305	323	368	413	21%
ET	5710	6046	6885	7724	17%
EN	75	79	90	101	15%
NE	525	556	633	710	18%
NT	30	32	36	41	20%
NW	60	64	72	81	18%
WN	45	48	54	61	23%
WT	5055	5352	6095	6838	18%
WS	340	360	410	460	17%
W2	5160	5463	6222	6980	18%
E1	6090	6448	7343	8239	17%
S2	650	688	784	879	19%
N1	615	651	742	832	18%
E2	6315	6686	7615	8543	17%
W1	5435	5755	6554	7352	18%
N2	145	154	175	196	18%
S1	130	138	157	176	19%

INTERSECTION FORECAST SUMMARY DATA SHEET			
PROJECT:	I-69 at U.S. 20 Interchange Work		
ROUTE:	Intersection 1: U.S. 20 at C.R. 325 W./Golden Lake Road		
COUNTY:	Steuben		
AM DHV:	11:00-12:00	PM DHV:	4:00-5:00

Movement	2004 AM DHV	2008 AM DHV	2018 AM DHV	2028 AM DHV	AM DHV % AADT	Commercial Vehicles % AM DHV
SW	2	2	2	3	4	0%
ST	0	0	0	0	0	0%
SE	3	3	4	4	4	33%
ES	21	22	25	28	7	10%
ET	315	334	380	426	6	22%
EN	7	7	8	9	9	14%
NE	27	29	33	37	5	22%
NT	1	1	1	1	3	0%
NW	3	3	4	4	5	0%
WN	3	3	4	4	7	0%
WT	289	306	348	391	6	20%
WS	18	19	22	24	5	33%
W2	294	311	355	398	6	19%
E1	337	357	406	456	6	21%
S2	39	41	47	53	6	21%
N1	31	33	37	42	5	19%
E2	345	365	416	467	5	22%
W1	310	328	374	419	6	20%
N2	5	5	6	7	3	20%
S1	5	5	6	7	4	20%

Movement	2004 PM DHV	2008 PM DHV	2018 PM DHV	2028 PM DHV	PM DHV % AADT	Commercial Vehicles % PM DHV
SW	5	5	6	7	11	20%
ST	1	1	1	1	20	0%
SE	7	7	8	9	9	14%
ES	39	41	47	53	13	28%
ET	442	468	533	598	8	15%
EN	3	3	4	4	4	33%
NE	39	41	47	53	7	18%
NT	2	2	2	3	7	0%
NW	5	5	6	7	8	20%
WN	3	3	4	4	7	33%
WT	481	509	580	651	10	13%
WS	33	35	40	45	10	9%
W2	491	520	592	664	10	13%
E1	484	512	584	655	8	16%
S2	73	77	88	99	11	19%
N1	46	49	55	62	7	17%
E2	488	517	588	660	8	15%
W1	517	547	623	699	10	13%
N2	8	8	10	11	6	25%
S1	13	14	16	18	10	15%

INTERSECTION FORECAST SUMMARY DATA SHEET			
PROJECT:	I-69 at U.S. 20 Interchange Work		
ROUTE:	Intersection 2: U.S. 20 at I-69		
COUNTY:	Steuben		
AM DHV:	11:00-12:00	PM DHV:	4:00-5:00



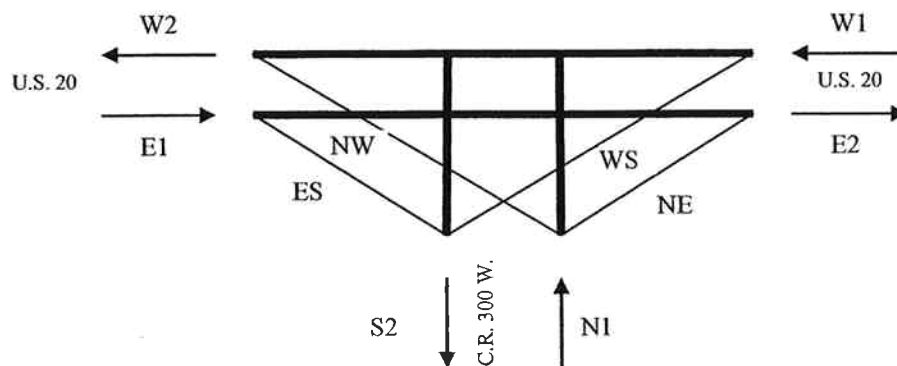
Movement	2004 AADT	2008 AADT	2018 AADT	2028 AADT	Commercial Vehicles % AADT
SW	670	709	808	906	16%
ST	135	143	163	183	15%
SE	715	757	862	967	16%
ES	505	535	609	683	29%
ET	5190	5495	6258	7021	17%
EN	265	281	320	358	27%
NE	1400	1482	1688	1894	16%
NT	20	21	24	27	17%
NW	375	397	452	507	16%
WN	585	619	705	791	13%
WT	4390	4648	5293	5939	18%
WS	2665	2822	3213	3605	15%
W2	5435	5755	6554	7352	18%
E1	6315	6686	7615	8543	17%
S2	3305	3499	3985	4471	17%
N1	1790	1895	2158	2422	16%
E2	7305	7735	8808	9882	17%
W1	7640	8089	9212	10335	17%
N2	1220	1292	1471	1650	12%
S1	1520	1609	1833	2056	16%

INTERSECTION FORECAST SUMMARY DATA SHEET			
PROJECT:	I-69 at U.S. 20 Interchange Work		
ROUTE:	Intersection 2: U.S. 20 at I-69		
COUNTY:	Steuben		
AM DHV:	11:00-12:00	PM DHV:	4:00-5:00

Movement	2004 AM DHV	2008 AM DHV	2018 AM DHV	2028 AM DHV	AM DHV % AADT	Commercial Vehicles % AM DHV
SW	37	39	45	50	6	19%
ST	9	10	11	12	7	22%
SE	48	51	58	65	7	17%
ES	28	30	34	38	6	39%
ET	293	310	353	396	6	22%
EN	24	25	29	32	9	4%
NE	83	88	100	112	6	18%
NT	1	1	1	1	5	0%
NW	23	24	28	31	6	17%
WN	40	42	48	54	7	3%
WT	250	265	301	338	6	21%
WS	157	166	189	212	6	16%
W2	310	328	374	419	6	20%
E1	345	365	416	467	5	22%
S2	194	205	234	262	6	20%
N1	107	113	129	145	6	18%
E2	424	449	511	574	6	21%
W1	447	473	539	605	6	17%
N2	65	69	78	88	5	3%
S1	94	100	113	127	6	18%

Movement	2004 PM DHV	2008 PM DHV	2018 PM DHV	2028 PM DHV	PM DHV % AADT	Commercial Vehicles % PM DHV
SW	52	55	63	70	8	12%
ST	11	12	13	15	8	9%
SE	56	59	68	76	8	11%
ES	50	53	60	68	10	20%
ET	404	428	487	547	8	15%
EN	34	36	41	46	13	3%
NE	99	105	119	134	7	11%
NT	1	1	1	1	5	0%
NW	27	29	33	37	7	11%
WN	40	42	48	54	7	5%
WT	438	464	528	593	10	13%
WS	182	193	219	246	7	12%
W2	517	547	623	699	10	13%
E1	488	517	588	660	8	15%
S2	243	257	293	329	7	14%
N1	127	134	153	172	7	11%
E2	559	592	674	756	8	14%
W1	660	699	796	893	9	12%
N2	75	79	90	101	6	4%
S1	119	126	143	161	8	11%

INTERSECTION FORECAST SUMMARY DATA SHEET			
PROJECT:	I-69 at U.S. 20 Interchange Work		
ROUTE:	Intersection 3: U.S. 20 at C.R. 300 W.		
COUNTY:	Steuben		
AM DHV:	11:00-12:00	PM DHV:	4:00-5:00



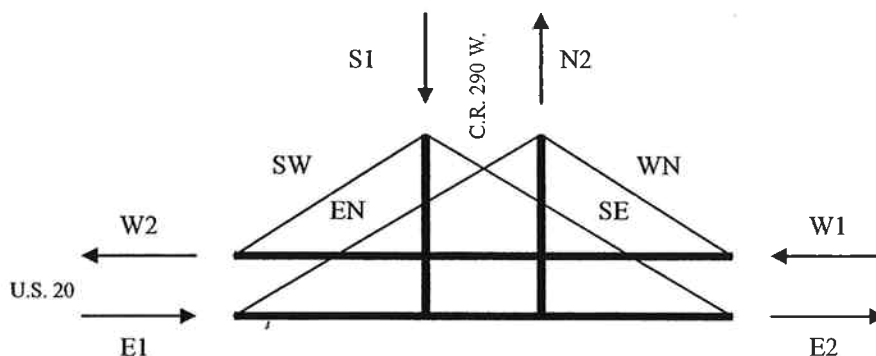
Movement	2004 AADT	2008 AADT	2018 AADT	2028 AADT	Commercial Vehicles % AADT
SW	x	x	x	x	x
ST	x	x	x	x	x
SE	x	x	x	x	x
ES	220	233	265	298	16%
ET	7080	7496	8537	9578	17%
EN	x	x	x	x	x
NE	315	334	380	426	14%
NT	x	x	x	x	x
NW	170	180	205	230	16%
WN	x	x	x	x	x
WT	7470	7909	9007	10105	17%
WS	250	265	301	338	13%
W2	7640	8089	9212	10335	17%
E1	7305	7735	8808	9882	17%
S2	470	498	567	636	15%
N1	485	514	585	656	15%
E2	7400	7835	8923	10011	16%
W1	7720	8174	9309	10444	17%
N2	x	x	x	x	x
S1	x	x	x	x	x

INTERSECTION FORECAST SUMMARY DATA SHEET			
PROJECT:	I-69 at U.S. 20 Interchange Work		
ROUTE:	Intersection 3: U.S. 20 at C.R. 300 W.		
COUNTY:	Steuben		
AM DHV:	11:00-12:00	PM DHV:	4:00-5:00

Movement	2004 AM DHV	2008 AM DHV	2018 AM DHV	2028 AM DHV	AM DHV % AADT	Commercial Vehicles % AM DHV
SW	x	x	x	x	x	x
ST	x	x	x	x	x	x
SE	x	x	x	x	x	x
ES	6	6	7	8	3	17%
ET	418	443	504	565	6	21%
EN	x	x	x	x	x	x
NE	18	19	22	24	6	17%
NT	x	x	x	x	x	x
NW	8	8	10	11	5	13%
WN	x	x	x	x	x	x
WT	439	465	529	594	6	18%
WS	14	15	17	19	6	14%
W2	447	473	539	605	6	17%
E1	424	449	511	574	6	21%
S2	20	21	24	27	4	15%
N1	26	28	31	35	5	15%
E2	436	462	526	590	6	20%
W1	453	480	546	613	6	17%
N2	x	x	x	x	x	x
S1	x	x	x	x	x	x

Movement	2004 PM DHV	2008 PM DHV	2018 PM DHV	2028 PM DHV	PM DHV % AADT	Commercial Vehicles % PM DHV
SW	x	x	x	x	x	x
ST	x	x	x	x	x	x
SE	x	x	x	x	x	x
ES	23	24	28	31	10	9%
ET	536	568	646	725	8	14%
EN	x	x	x	x	x	x
NE	4	4	5	5	1	50%
NT	x	x	x	x	x	x
NW	25	26	30	34	15	4%
WN	x	x	x	x	x	x
WT	635	672	766	859	9	12%
WS	20	21	24	27	8	10%
W2	660	699	796	893	9	12%
E1	559	592	674	756	8	14%
S2	43	46	52	58	9	9%
N1	29	31	35	39	6	10%
E2	540	572	651	731	7	15%
W1	655	694	790	886	8	12%
N2	x	x	x	x	x	x
S1	x	x	x	x	x	x

INTERSECTION FORECAST SUMMARY DATA SHEET			
PROJECT:	I-69 at U.S. 20 Interchange Work		
ROUTE:	Intersection 4: U.S. 20 at C.R. 290 W.		
COUNTY:	Steuben		
AM DHV:	11:00-12:00	PM DHV:	4:00-5:00



Movement	2004 AADT	2008 AADT	2018 AADT	2028 AADT	Commercial Vehicles % AADT
SW	1050	1112	1266	1420	3%
ST	x	x	x	x	x
SE	115	122	139	156	3%
ES	x	x	x	x	x
ET	6420	6797	7741	8685	17%
EN	975	1032	1176	1319	10%
NE	x	x	x	x	x
NT	x	x	x	x	x
NW	x	x	x	x	x
WN	180	191	217	244	27%
WT	6670	7062	8043	9023	19%
WS	x	x	x	x	x
W2	7720	8174	9309	10444	17%
E1	7400	7835	8923	10011	16%
S2	x	x	x	x	x
N1	x	x	x	x	x
E2	6540	6925	7886	8847	17%
W1	6850	7253	8260	9267	19%
N2	1155	1223	1393	1562	13%
S1	1165	1234	1405	1576	3%

INTERSECTION FORECAST SUMMARY DATA SHEET			
PROJECT:	I-69 at U.S. 20 Interchange Work		
ROUTE:	Intersection 4: U.S. 20 at C.R. 290 W.		
COUNTY:	Steuben		
AM DHV:	11:00-12:00	PM DHV:	4:00-5:00

Movement	2004 AM DHV	2008 AM DHV	2018 AM DHV	2028 AM DHV	AM DHV % AADT	Commercial Vehicles % AM DHV
SW	22	23	27	30	2	14%
ST	x	x	x	x	x	x
SE	3	3	4	4	3	0%
ES	x	x	x	x	x	x
ET	403	427	486	545	6	20%
EN	33	35	40	45	3	24%
NE	x	x	x	x	x	x
NT	x	x	x	x	x	x
NW	x	x	x	x	x	x
WN	30	32	36	41	17	7%
WT	431	456	520	583	6	18%
WS	x	x	x	x	x	x
W2	453	480	546	613	6	17%
E1	436	462	526	590	6	20%
S2	x	x	x	x	x	x
N1	x	x	x	x	x	x
E2	406	430	490	549	6	20%
W1	461	488	556	624	7	17%
N2	63	67	76	85	5	16%
S1	25	26	30	34	2	12%

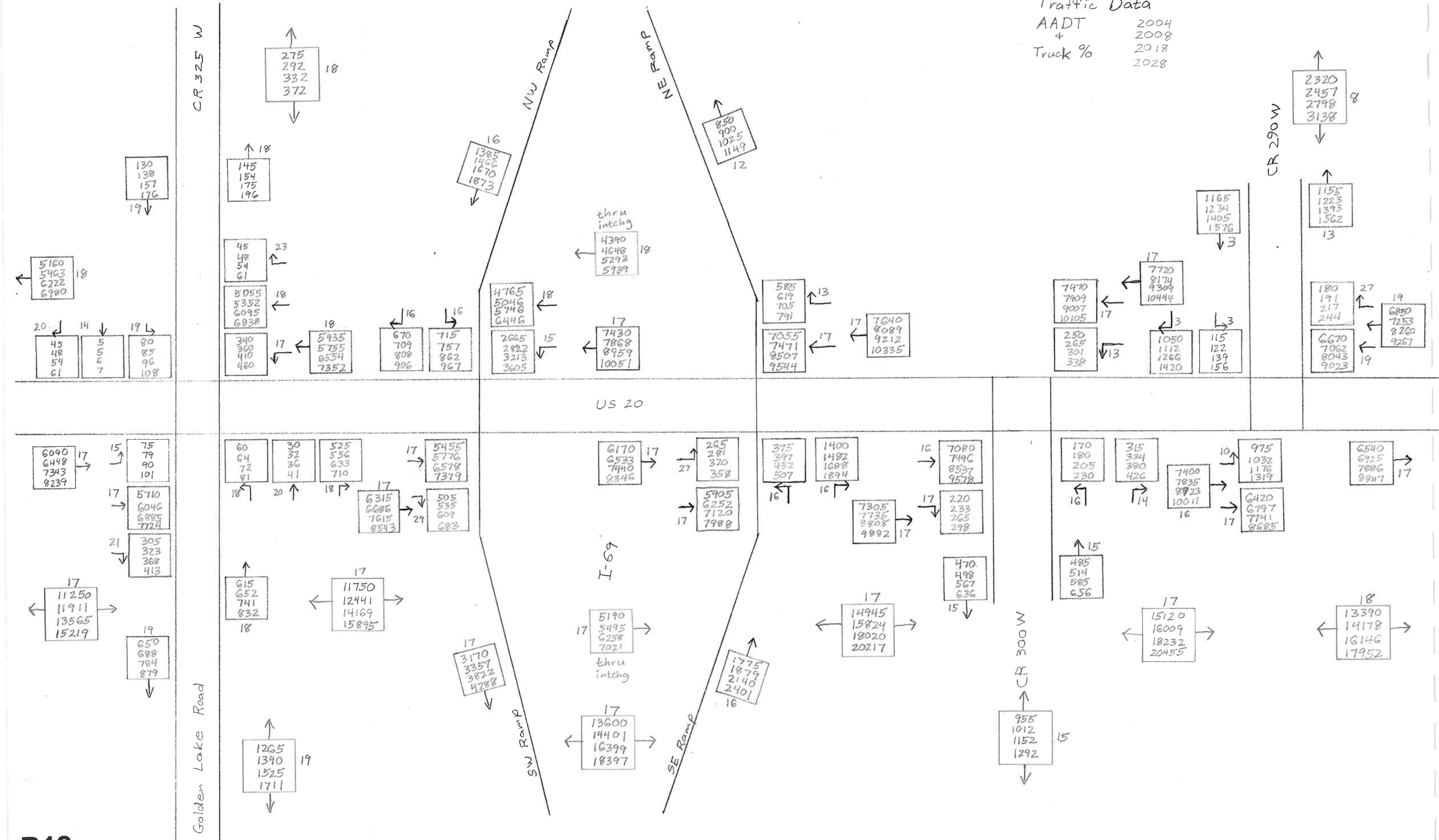
Movement	2004 PM DHV	2008 PM DHV	2018 PM DHV	2028 PM DHV	PM DHV % AADT	Commercial Vehicles % PM DHV
SW	14	15	17	19	1	7%
ST	x	x	x	x	x	x
SE	2	2	2	3	2	50%
ES	x	x	x	x	x	x
ET	494	523	596	668	8	16%
EN	46	49	55	62	5	4%
NE	x	x	x	x	x	x
NT	x	x	x	x	x	x
NW	x	x	x	x	x	x
WN	9	10	11	12	5	33%
WT	641	679	773	867	10	12%
WS	x	x	x	x	x	x
W2	655	694	790	886	8	12%
E1	540	572	651	731	7	15%
S2	x	x	x	x	x	x
N1	x	x	x	x	x	x
E2	496	525	598	671	8	16%
W1	650	688	784	879	9	13%
N2	55	58	66	74	5	9%
S1	16	17	19	22	1	13%

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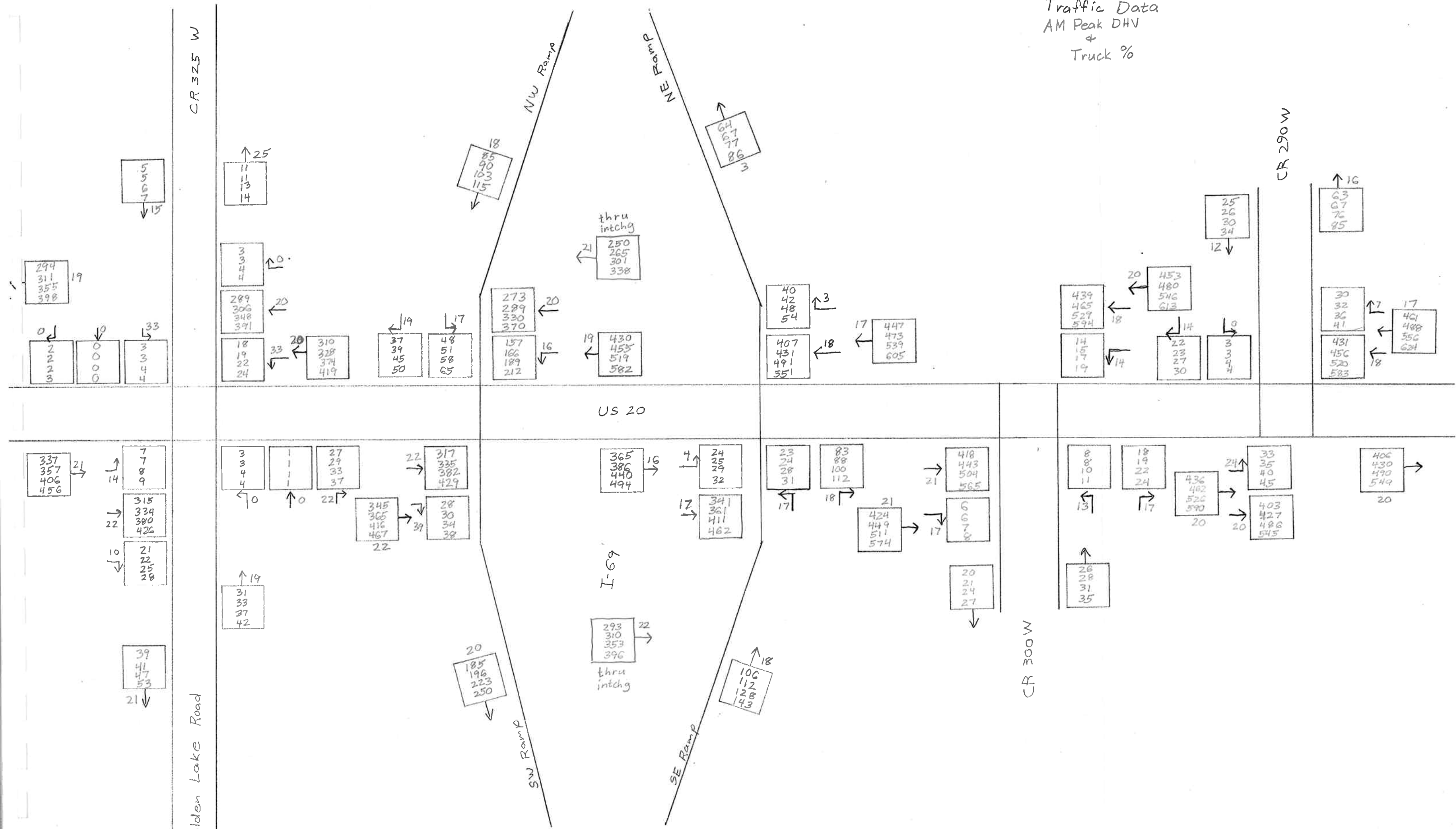
I-69 at US 20 Interchange Work

Traffic Data

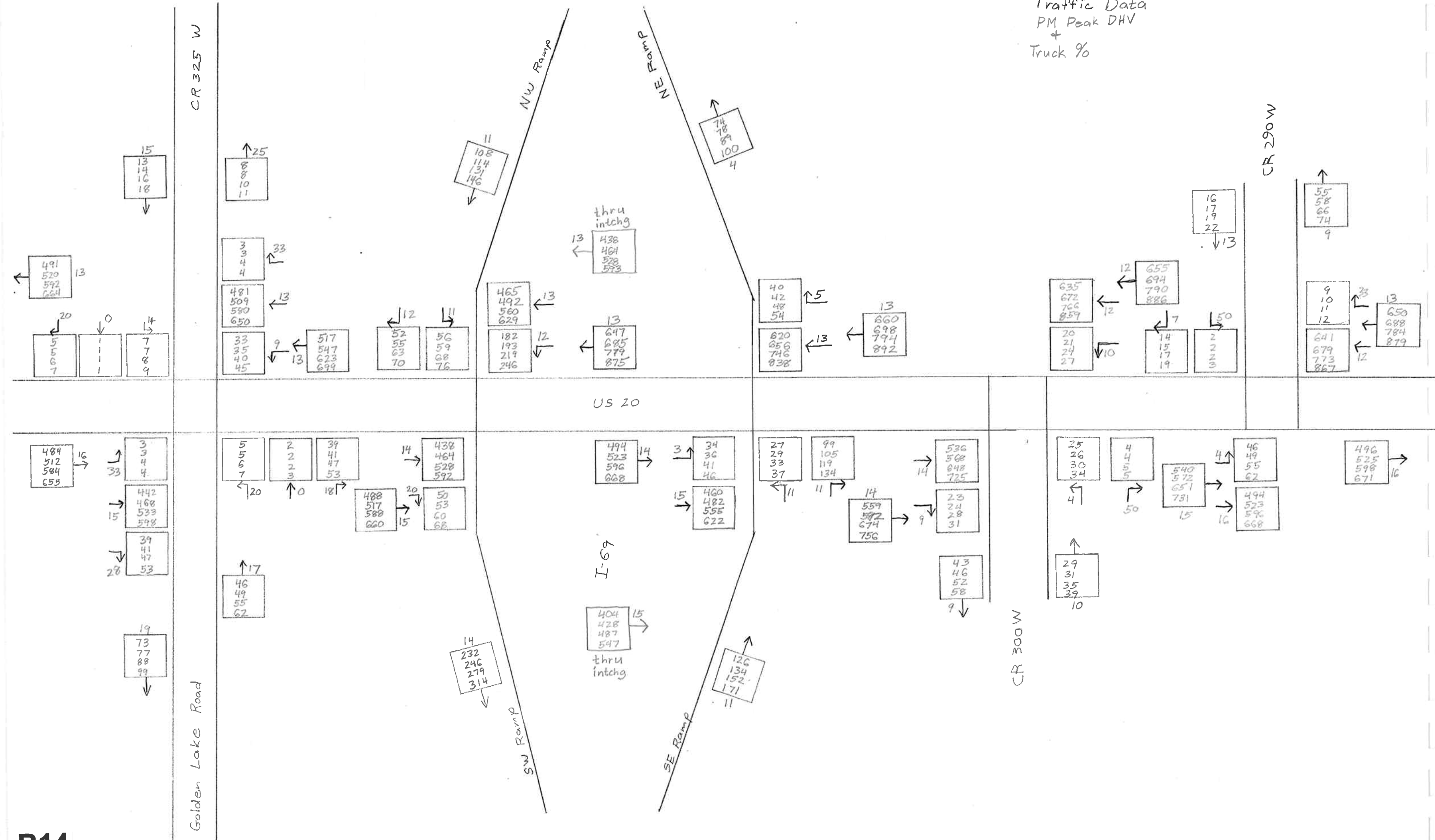
AADT 2004
+ 2008
Truck % 2018
2028



I-69 at US 20 Interchange Work
Traffic Data
AM Peak DHV
+
Truck %



I-69 at US 20 Interchange Work
 Traffic Data
 PM Peak DHV
 +
 Truck %



I-69 at US 20 Interchange Work

Traffic Data
Existing
LOS AM/PM

2004
2008
2018
2029

CR 325 W

CR 290 W

Golden Lake Road

US 20

I-69

NW Ramp

Pub E IN

SW Ramp

SE Ramp

CR 300 W

14.9B 22.5C
15.6C 24.5C
16.4C 31.0B
17.6C 40.8E

10.0A 13.9B
10.1B 14.5B
10.4B 15.7C
10.7B 17.1C
18.2C 29.8D
19.3C 33.0D
22.4C 44.3E
26.2D 61.8F

8.1A 9.0A
8.1A 9.1A
8.3A 9.4A
8.4A 9.8A

11.5B 14.5B
11.7B 15.1C
12.5B 17.2C
13.2B 20.5C

8.5A 8.7A
8.6A 8.8A
8.8A 9.1A
9.0A 9.4A

15.8C 27.6D
16.6C 30.2D
18.8C 31.1E
21.4C 51.6F
11.0A 12.9B
11.2B 13.3B
11.8B 14.5B
12.4B 16.6C

18.7B 18.4B
18.6B 18.1B
18.5B 19.0B
18.8B 23.4C

11.6B 11.4B
11.7B 11.6B
11.2B 12.5B
12.0B 12.1B

8.7A 10.2B
9.2A 10.5B
10.0B 11.2B
10.7B 14.9B

6.8A 6.7A
6.2A 6.5A
5.6A 7.0A
5.3A 1.7A
5.8A 5.4A
7.0A 7.0A
5.6A 9.5A
7.6A 7.0A

6.5A 6.3A
6.7A 6.8A
5.6A 7.7A
6.8A 3.1A

Intsch
9.3A 10.2B
9.2A 10.1B
10.2B 10.3B
9.9A 11.3B

14.9B 15.7B
14.6B 15.7B
16.5B 16.0B
15.8B 17.6B

2.7A 2.7A
2.6A 2.5A
2.9A 2.4A
2.6A 2.0A

2.2A 2.1A
2.2A 2.0A
2.1A 1.8A
2.1A 2.8A
2.7A 2.8A
2.6A 2.5A
3.0A 2.5A
2.6A 2.8A

8.5A 10.1B
8.9A 10.5B
9.0A 11.4B
10.0B 16.2B

WB Arterial
22 D 20 D
19 D 20 D
20 D 18 D
20 D 19 D

24C 24C
25C 25C
26C 24C
25C 23C

All cycle lengths
50 sec, except
2028 PM - at 60 sec

EB Arterial

0.9A 1.1A
1.0A 1.1A
1.0A 1.3A
1.1A 1.6A

14.2B 25.2B
14.8B 28.4D
17.0C 41.1E
19.7C 56.6F

11.8B 17.5C
12.2B 19.9C
13.8B 24.7C
15.3C 45.0E

1.1A 1.5A
1.2A 1.6A
1.4A 2.0A
1.6A 2.5A

Existing LOS's + MOE's

		2004				2008				2018				2028			
		AM		PM		AM		PM		AM		PM		AM		PM	
		L	T R App	L	T R App	L	T R App	L	T R App	L	T R App	L	T R App	L	T R App	L	T R App
Golden Lake Rd W	E	8.1A		9.0A		8.1A		9.1A		8.3A		9.4A		8.4A		9.8A	
		8.5A		8.7A		8.6A		8.8A		8.8A		9.1A		9.0A		9.4A	
	CR 325 W	N 15.8C	11.0A	11.5B	27.6D	12.9B	14.5B	16.6C	11.2B	11.7B	30.2D	13.3B	15.1C	18.8C	11.8B	12.5B	39.1E
		S 18.2C	10.0A	14.9B	29.8D	13.9B	22.5C	19.3C	10.1B	15.6C	33.0D	14.5B	24.5C	22.4C	10.4B	18.4C	44.3E
I-69 W Ramps	E	18.7B		18.7B		18.4B		18.6B		18.1B		18.5B		18.5B		19.0B	
	W	5.8A	6.8A	6.5A	5.4A	6.7A	6.3A	6.2A	7.0A	6.7A	6.5A	7.0A	6.8A	5.6A	5.6A	9.5A	7.0A
	N																
	S	8.9A		8.9A	10.2B		10.2B	9.2A		9.2A	10.5B		10.5B	10.0B		10.0B	11.2B
	T	11.6B			11.4B			11.7B			11.6B			11.2B		12.5B	11.2B
I-69 E Ramps	E	2.2A	2.7A	2.7A	2.1A	2.8A	2.7A	2.2A	2.6A	2.6A	2.0A	2.5A	2.5A	2.1A	3.0A	2.9A	1.8A
	W	14.9B		14.9B		15.7B		15.7B		14.6B		15.7B		16.5B		16.5B	16.0B
	N	8.5A		8.5A	10.1B		10.1B	8.9A		8.9A	10.5B		10.5B	9.0A		9.0A	11.4B
	S																
	T	9.3A			10.2B			9.2A			10.1B			10.2B			10.3B
CR 300 W	E																
	W	0.9A			1.1A			1.0A			1.1A			1.0A			1.3A
	N	14.2B			25.3C			14.8B			28.4D			17.0C			41.1E
CR 290 W	E	1.1A			1.5A			1.2A			1.6A			1.4A			2.0A
	W																
	N	11.8B			17.5C			12.2B			18.9C			13.8B			24.7C
	S																
	T																
Type II Arterial		Speed (50 sec)	LOS	Speed (50 sec)	LOS	Speed (50 sec)	LOS	Speed (50 sec)	LOS	Speed (50 sec)	LOS	Speed (50 sec)	LOS	Speed (50 sec)	LOS	Speed (50 sec)	LOS
Simulated WB US 20		22 mph	C	20 mph	D	19 mph	D	20 mph	D	21 mph	D	18 mph	D	20 mph	D	19 mph	D
EB US 20		24 mph	C	24 mph	C	25 mph	C	25 mph	C	26 mph	C	24 mph	C	25 mph	C	23 mph	C
MOE's																	
VMT (mi)		808		1076		842		1219		949		1339		1063		1519	
VHD (hr)		10.9		15.3		12.4		17.9		12.4		23.5		15.8		28.9	
VHT (hr)		30.5		40.9		32.8		46.8		35.5		55.5		41.5		63.4	
% Delay		35.7%		37.4%		37.8%		38.2%		34.9%		42.3%		38.1%		42.4%	
Overall Speed (mph)		26.5 mph		26.3 mph		25.7 mph		26.0 mph		26.7 mph		24.1 mph		25.6 mph		24.0 mph	

Proposed MOE's

Arterial	WB US 20		22 mph	C	22 mph	C	23 mph	C	22 mph	C	23 mph	C	22 mph	C	
	EB US 20		26 mph	C	27 mph	C	26 mph	C	25 mph	C	26 mph	C	25 mph	C	
MoE's	Raw		% Chg	Raw		% Chg	Raw		% Chg	Raw		% Chg	Raw		% Chg
VMT	855			1147			939			1380			1077		
VHD	16.2			15.5			11.8			19.9			14.8		
VHT	32.0			42.9			34.5			52.6			41.1		
% Delay	35.0%		-2.8	36.1%		-2.1	34.2%		-0.7	37.8%		-4.5	36.0%		-2.1
Overall Speed	26.7		+3.89	26.7		+2.69	27.2		+1.87	26.2		+8.71	26.2		+2.34
				2008			2018			2028			2028		

US 20 #0300942 70301 In Traffic (2034)

AADT Vpd	% Trucks	AM Vph	% Trucks	PM Vph	% Trucks	Off Peak Vph	% Trucks	Week End Vph	% Trucks
18495	16.7	1076	18.3	1472	13.8	603	17.4	1005	16.1
		3 hrs		3 hrs		18 hrs/weekday 14 hrs/weekend		10 hrs	
3088.6		196.9	203.1						
							Factored From AM		Factored From PM

0.68

0.56

$$\text{Weekday User Cost} = \text{AM}(\text{C} + \text{Tr}) \cdot 3 + \text{PM}(\text{C} + \text{Tr}) \cdot 3 + \text{OP}(\text{C} + \text{Tr}) \cdot 18$$

$$\text{Weekend User Cost} = \text{WE}(\text{C} + \text{Tr}) \cdot 10 + \text{OP}(\text{C} + \text{Tr}) \cdot 14$$

Total Days		
CN	Weekday	Weekend
2008	261	104
2009	261	104
2010	260	105 W
2011	260	105 W
2012 L	260	104
2013	260	104
2014	260	104
2015 L	260	104
2016	260	105 W
2017	261	104
2018	261	104
2019	262	104
2020 L	261	104
2021	261	105 W
2022	260	105 W
2023	260	104
2024 L	262	104
2025	261	104
2026	261	104
2027	261	104
2028 L	260	106 W

Int'm →

Design →

Itemized Agency Costs (2005) US 20 Interchange Work at I-69 Steuben Co.

Mother Proposed

Baby 030942 Baby 0201004 Baby 9803670

Item	Price	per Unit	Quant		Cost		Quant		Cost		Quant		Cost	
			Total		Total		Total		Total		Total		Total	
Construction														
Remove Pavt	\$0.75		243525		\$182,644		121762		\$91,322		121763		\$91,322	\$0
Reconstruct Side Roads	\$7.84	sq ft	24,960		\$195,686		19200		\$150,528		5760		\$45,158	\$0
5 Lane Rural Section	\$670.00	ft	3,190		\$2,137,300		1595		\$1,068,650		1595		\$1,068,650	\$0
One Lane Ramp or Turn Lane	\$153.00	ft	2,200		\$336,600		2200		\$336,600				\$0	\$0
Earthwork	Vary	LSUM	1		\$500,000		1		150,000		1		350,000	
New Bridge (Dry Crossing)	\$90.00	sq ft	23,520		\$2,116,800		0		\$0				\$0	\$2,116,800
Traffic Maintenance	\$50.00	ft	4,950		\$247,500		3195		\$159,750		1755		\$87,750	\$0
Drive Improvements	\$5,000.00	each	11		\$55,000		3		\$15,000		8		\$40,000	\$0
Mobilize/Demobilize	\$100,000.00	LSUM	1		\$100,000		0.5		\$50,000		0.5		\$50,000	\$0
Miscellaneous	20 % constr		\$5,871,530		\$1,174,308		\$2,021,850		\$404,370		\$1,732,881		\$346,576	\$423,360
Subtotal--Construction					\$7,046,000				\$2,426,000				\$2,079,000	\$2,540,000
Engineering														
Road Engineering	3 % constr		\$4,246,392		\$127,000		\$2,184,898		\$66,000		\$1,638,135		\$49,000	\$13,000
Bridge Engineering	6 % constr		\$2,116,800		\$127,000		\$0		\$0		\$0		\$0	\$127,000
Subtotal--Engineering					\$254,000				\$66,000				\$49,000	\$140,000
Right-of-Way														
Agricultural Area	\$4,000.00	ac	0.292		\$1,168				\$0		0.292		\$1,168	\$0
Residential Area	\$50,000.00	ac	0.329		\$16,450				\$0		0.329		\$16,450	\$0
Commercial Area	\$360,000.00	ac	0.839		\$302,040				\$96,120		0.572		\$205,920	\$0
Temporary Area	\$4,000.00	ac			\$0				\$0				\$0	\$0
Damages	\$25,000.00	parcel	4		\$100,000		1		\$25,000		3		\$75,000	\$0
Fee	\$5,000.00	parcel	12		\$60,000		3		\$15,000		9		\$45,000	\$0
Subtotal--Right-of-Way					\$480,000				\$136,000				\$344,000	\$0
Total Project (2005)			Total-->		\$7,780,000		Total-->		\$2,628,000		Total-->		\$2,472,000	Total--> \$2,680,000

Interchange Work

Sight Distance Correction

Bridge Replacement

Highway Crash Analysis

Stop 4 Leg
Golden Lake Road (CR 330W)

Sig 4 Leg
I-69 W Term

Existing Sig 4 Leg
I-69 E Term

Stop T
CR 300W

Stop T
CR 290W

	Major	Minor	Major	Minor	Major	Minor	Major	Minor
2004	11525	745	13745	1585	14775	485	14250	1165
2008	11900	790	14554	1466	15644	514	15088	1234
2018	13439	898	16574	1670	18117	585	17183	1405
2028	15077	1008	18594	1873	20326	656	19278	1676
1999	11192	594	12833	1294	13796	452	13306	1087

Expected
Reported
Severity

4.18
8.75
[2.09]

103
400
[3.88]

[2.30]

	cr/yr	cr/yr	cr/yr	cr/yr
2008	1.43	4.39	4.63	1.21
2018	1.66	4.87	5.13	1.43
2028	1.92	5.34	5.62	1.65
Total Design Life	34	98	103	29

12.47
14.06
15.65
283

	cr/yr	cr/yr	cr/yr	cr/yr
2008	3.07	3.34	7.34	4.69
2018	3.57	3.70	8.79	5.63
2028	4.13	4.06	10.15	6.40
Total Design Life	72	74	177	112

28.12
32.33
36.48
650

PDO 78.8%
PI 21.2%

Proposed Improvement - Crash Reduction (of Predictions)

	0	(if above expected, 2.7% but no decrease, since below expected)	27% ↓	32% ↓ + 10% (ISD) 42% ↓
2008	Same	7.07	4.99	2.72
2018	Same	7.83	5.98	3.27
2028	Same	8.58	6.90	3.71
Total Design Life	74	157	120	65
Severity	[0.76]	[1.53]	[6.16]	[2.25]

21.48
24.28
27.37
489
[1.73]

Crash
Analysis

B20

Totals

	Rear End	Head On	Same Direction	Opposite Direction	Off Road	Right Angle	Left Turns	Right Turns	Day	Dawn/Dusk	Dark (St. Lights)	Dark (No St. Lights)	Prop Damage	Injury	Fatal	Dry	Wet	Slush	Snow/Ice	Other
97	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
US20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
@	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CR 325w	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Golden Lake Rd	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
97	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
US20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
@	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
I-69	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
w Term	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
97	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
US20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
@	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
I-69	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
w Term	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
97	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
US20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
@	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
I-69	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
E Term	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26

US 20
0300942

Crash
Analysis

Totals

	Rear End	Head On	Same Direction	Opposite Direction	Off Road	Right Angle	Left Turns	Right Turns	Day	Dawn/Dusk	Dark (St. Lights)	Dark (No St. Lights)	Prop Damage	Injury	Fatal	Dry	Wet	Slush	Snow/Ice	Other
97	1	1	1	1	1	1	1	1	2	1	1	1	2	1	1	2	1	1	1	2
98	1	1	1	1	1	2	1	1	1	1	1	3	4	1	1	5	1	1	5	1
99	3	1	1	1	1	7	2	1	7	2	3	1	9	3	1	12	1	1	12	1
00	2	1	1	1	1	1	2	1	3	1	1	1	3	3	1	5	1	1	6	1
Total	5	3	3	3	3	10	5	1	13	3	5	4	18	7	1	24	1	1	25	1
97	1	1	1	1	1	1	1	1	3	1	1	1	3	2	1	3	1	1	5	1
98	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1
99	1	1	1	1	1	1	1	1	1	1	1	1	4	1	1	4	1	1	4	1
00	1	1	1	1	1	1	1	1	3	1	1	1	3	2	1	4	1	1	5	1
Total	5	3	3	3	3	3	3	3	8	3	3	2	11	5	1	12	3	1	16	1
97	5	1	1	1	1	1	1	1	5	1	1	1	5	2	1	5	1	1	7	1
98	10	1	1	1	1	2	2	1	10	2	1	1	11	3	1	12	1	1	14	1
99	12	2	1	1	1	4	2	1	13	2	4	4	17	6	1	20	2	1	23	1
00	5	2	2	1	1	2	1	1	9	3	4	1	10	3	1	16	1	1	16	1
Total	32	6	5	4	4	9	6	4	37	8	10	6	43	18	4	51	5	4	59	4
97	5	1	1	1	1	1	1	1	5	1	1	1	5	2	1	5	1	1	7	1
98	10	1	1	1	1	2	2	1	10	2	1	1	11	3	1	12	1	1	14	1
99	12	2	1	1	1	4	2	1	13	2	4	4	17	6	1	20	2	1	23	1
00	5	2	2	1	1	2	1	1	9	3	4	1	10	3	1	16	1	1	16	1
Total	32	6	5	4	4	9	6	4	37	8	10	6	43	18	4	51	5	4	59	4
97	5	1	1	1	1	1	1	1	5	1	1	1	5	2	1	5	1	1	7	1
98	10	1	1	1	1	2	2	1	10	2	1	1	11	3	1	12	1	1	14	1
99	12	2	1	1	1	4	2	1	13	2	4	4	17	6	1	20	2	1	23	1
00	5	2	2	1	1	2	1	1	9	3	4	1	10	3	1	16	1	1	16	1
Total	32	6	5	4	4	9	6	4	37	8	10	6	43	18	4	51	5	4	59	4
97	5	1	1	1	1	1	1	1	5	1	1	1	5	2	1	5	1	1	7	1
98	10	1	1	1	1	2	2	1	10	2	1	1	11	3	1	12	1	1	14	1
99	12	2	1	1	1	4	2	1	13	2	4	4	17	6	1	20	2	1	23	1
00	5	2	2	1	1	2	1	1	9	3	4	1	10	3	1	16	1	1	16	1
Total	32	6	5	4	4	9	6	4	37	8	10	6	43	18	4	51	5	4	59	4
97	5	1	1	1	1	1	1	1	5	1	1	1	5	2	1	5	1	1	7	1
98	10	1	1	1	1	2	2	1	10	2	1	1	11	3	1	12	1	1	14	1
99	12	2	1	1	1	4	2	1	13	2	4	4	17	6	1	20	2	1	23	1
00	5	2	2	1	1	2	1	1	9	3	4	1	10	3	1	16	1	1	16	1
Total	32	6	5	4	4	9	6	4	37	8	10	6	43	18	4	51	5	4	59	4
97	5	1	1	1	1	1	1	1	5	1	1	1	5	2	1	5	1	1	7	1
98	10	1	1	1	1	2	2	1	10	2	1	1	11	3	1	12	1	1	14	1
99	12	2	1	1	1	4	2	1	13	2	4	4	17	6	1	20	2	1	23	1
00	5	2	2	1	1	2	1	1	9	3	4	1	10	3	1	16	1	1	16	1
Total	32	6	5	4	4	9	6	4	37	8	10	6	43	18	4	51	5	4	59	4
97	5	1	1	1	1	1	1	1	5	1	1	1	5	2	1	5	1	1	7	1
98	10	1	1	1	1	2	2	1	10	2	1	1	11	3	1	12	1	1	14	1
99	12	2	1	1	1	4	2	1	13	2	4	4	17	6	1	20	2	1	23	1
00	5	2	2	1	1	2	1	1	9	3	4	1	10	3	1	16	1	1	16	1
Total	32	6	5	4	4	9	6	4	37	8	10	6	43	18	4	51	5	4	59	4
97	5	1	1	1	1	1	1	1	5	1	1	1	5	2	1	5	1	1	7	1
98	10	1	1	1	1	2	2	1	10	2	1	1	11	3	1	12	1	1	14	1
99	12	2	1	1	1	4	2	1	13	2	4	4	17	6	1	20	2	1	23	1
00	5	2	2	1	1	2	1	1	9	3	4	1	10	3	1	16	1	1	16	1
Total	32	6	5	4	4	9	6	4	37	8	10	6	43	18	4	51	5	4	59	4
97	5	1	1	1	1	1	1	1	5	1	1	1	5	2	1	5	1	1	7	1
98	10	1	1	1	1	2	2	1	10	2	1	1	11	3	1	12	1	1	14	1
99	12	2	1	1	1	4	2	1	13	2	4	4	17	6	1	20	2	1	23	1
00	5	2	2	1	1	2	1	1	9	3	4	1	10	3	1	16	1	1	16	1
Total	32	6	5	4	4	9	6	4	37	8	10	6	43	18	4	51	5	4	59	4
97	5	1	1	1	1	1	1	1	5	1	1	1	5	2	1	5	1	1	7	1
98	10	1	1	1	1	2	2	1	10	2	1	1	11	3	1	12	1	1	14	1
99	12	2	1	1	1	4	2	1	13	2	4	4	17	6	1	20	2	1	23	1
00	5	2	2	1	1	2	1	1	9	3	4	1	10	3	1	16	1	1	16	1
Total	32	6	5	4	4	9	6	4	37	8	10	6	43	18	4	51	5	4	59	4
97	5	1	1	1	1	1	1	1	5	1	1	1	5	2	1	5	1	1	7	1
98	10	1	1	1	1	2	2	1	10	2	1	1	11	3	1	12	1	1	14	1
99	12	2	1	1	1	4	2	1	13	2	4	4	17	6	1	20	2	1	23	1
00	5	2	2	1	1	2	1	1	9	3	4	1	10	3	1	16	1	1	16	1
Total	32	6	5	4	4	9	6	4	37	8	10	6	43	18	4	51	5	4	59	4
97	5	1	1	1	1	1	1	1	5	1	1	1	5	2	1	5	1	1	7	1
98	10	1	1	1	1	2	2	1	10	2	1	1	11	3	1	12	1	1	14	1
99	12	2	1	1	1	4	2	1	13	2	4	4	17	6	1	20	2	1	23	1
00	5	2	2	1	1	2	1	1	9	3	4	1	10	3	1	16	1	1	16	1
Total	32	6	5	4	4	9	6	4	37	8	10	6	43	18	4	51	5	4	59	4
97	5	1	1	1	1	1	1	1	5	1	1	1	5	2	1	5	1	1	7	1
98	10	1	1	1	1	2	2	1	10	2	1	1	11	3	1	12	1	1	14	1
99	12	2	1	1	1	4	2	1	13	2	4	4	17	6	1	20	2	1	23	1
00	5	2	2	1	1	2	1	1	9	3	4	1	10	3	1	16	1	1	16	1
Total	32	6	5	4	4	9	6	4	37	8	10	6	43	18	4	51	5	4	59	4
97	5	1	1	1	1	1	1	1	5	1	1	1	5	2	1	5	1	1	7	1
98	10	1	1	1	1	2	2	1	10	2	1	1	11	3	1	12	1	1	14	1
99	12	2	1	1	1	4	2	1	13	2	4	4	17	6	1	20	2	1	23	1
00	5	2	2	1	1	2	1	1	9	3	4	1	10	3	1	16	1	1	16	1
Total	32	6	5	4	4	9	6	4	37	8	10	6	43	18	4	51	5	4	59	4
97	5	1	1	1	1	1	1	1	5	1	1	1	5	2	1	5	1	1	7	1
98	10	1	1	1	1	2	2	1	10	2	1	1	11	3	1	12	1	1	14	1
99	12	2	1	1	1	4	2	1	13	2	4	4	17	6	1	20	2	1	23	1
00	5	2	2	1	1	2	1	1	9	3	4	1	10	3	1	16	1	1	16	1
Total	32	6	5	4	4	9	6	4	37	8	10	6	43	18	4	51	5	4	59	4
97	5	1	1	1	1	1	1	1	5	1	1	1	5	2	1	5	1	1	7	1
98	10	1	1	1	1	2	2	1	10	2	1	1	11	3	1	12	1	1	14	1
99	12	2	1	1	1	4	2	1	13	2	4	4	17	6	1	20	2	1	23	1
00	5	2	2	1	1	2	1	1	9	3	4	1	10	3	1	16	1	1	16	1

#0300942
US 20 @ I-69

B/C Analysis

2005 \$'s

Item	Existing Cost	Proposed Cost	Proposed Benefit
CN	3,330,000	7,050,000	(3,720,000)
Eng	140,000	250,000	(110,000)
R/W	0	480,000	(480,000)
<u>Total Agency</u>	<u>3,470,000</u>	<u>7,780,000</u>	<u>(4,310,000)</u>
Crashes	7,250,000	5,450,000	1,800,000
User Time/Op	67,760,000	64,920,000	2,840,000
<u>Total Users</u>	<u>75,010,000</u>	<u>70,370,000</u>	<u>4,640,000</u>
NPV			330,000
B/C			1.08

NBI-NUMBER: 5600
BRIDGE-NUMBER: 020-76-04718A
FACILITY-CARRIED: US 20
LOGMILE-OVER: 8.03

FEATURE(S)
INTERSECTED: I-69
LOGMILE-UNDER: 147.47
LOCATION: 2.55 W SR 127

Ref. Post 140 Offset 32

Inspection Date: 4/23/2003

Inspector's Initials: MCH

- | | |
|--|---|
| <input type="checkbox"/> Inventory Data Updated | <input checked="" type="checkbox"/> 2 Year Inspection |
| <input type="checkbox"/> Under/In Water Inspection | <input type="checkbox"/> Condition Data Updated |
| <input type="checkbox"/> Special or Partial Inspection | <input type="checkbox"/> In Depth Inspection |
| <input type="checkbox"/> Other Data Updated | <input type="checkbox"/> Fracture Critical Inspection |
| <input type="checkbox"/> Clearance Measurement Inspection | <input type="checkbox"/> Submitting Correction |
| <input type="checkbox"/> Damage Inspection | |
| <input checked="" type="checkbox"/> Normal Inspection Report | |
| <input type="checkbox"/> Photo(s) Taken | <u>Monitor Freq. (# Months) :</u> |
| <input type="checkbox"/> Notified District | <u>Follow-up Inspection Date:</u> |
| <input type="checkbox"/> Notified Design | <u>Special Equipment Needs:</u> |
| <input type="checkbox"/> Notified Central Office Bridge | |
| <input type="checkbox"/> Other | |
| <input type="checkbox"/> Special Feature(s) | |

Specific Comments

<u>ITEM</u>	<u>DATE</u>	<u>COMMENT</u>	<u>PERSON</u>
058.01	4/23/2003	Deck has many transverse cracks, some spalls, especially at joints. (need to be filled with asphalt). Some have been filled with bituminous.	MCH
058.08	5/1/2001	Bridge railing is damaged on south side at center line.	MCH/KDS
058.16	5/1/2001	Joints are loose, spalls, intermediate joints leak, causing problems with superstructure.	MCH/KDS
058.16	4/23/2003	There are a lot of spalls, and concrete is falling down at the longitudinal centerline joint. The loose concrete needs to be removed and some type of protection (plywood) needs to be installed. See photos.	MCH
059A.06	5/1/2001	Concrete girders have vertical cracks, extending underneath girder.	MCH/KDS
059B.01	5/1/2001	Paint has some rust.	MCH/KDS

NBI-NUMBER: 5600
BRIDGE-NUMBER: 020-76-04718A
FACILITY-CARRIED: US 20
LOGMILE-OVER: 8.03

FEATURE(S)
INTERSECTED: I-69
LOGMILE-UNDER: 147.47
LOCATION: 2.55 W SR 127

Ref. Post 140 Offset 32

<u>060.01</u>	<u>5/1/2001</u>	Abutment has cracks with some leaching.	<u>MCH/KDS</u>
<u>060.10</u>	<u>4/23/2003</u>	Pier caps have delaminations, spalls, exposed rebar at bents # 2 and #4.	<u>MCH</u>
<u>060.14</u>	<u>4/23/2003</u>	Concrete pillars have vertical cracks, leaching, loss of section, with exposed rebar at bent #2 and bent #4. Loss of section is increasing. Lots of loose concrete needs to be removed, and may need to add pneumatically applied concrete.	<u>MCH</u>
<u>060.19</u>	<u>5/1/2001</u>	Crash wall have cracks at bent # 2 and bent # 4.	<u>MCH/KDS</u>
<u>065.02</u>	<u>5/1/2001</u>	Approach slab is narrow, (6 foot) with cracks and spalls.	<u>MCH/KDS</u>
<u>ALL</u>	<u>5/1/2001</u>	Note; this could possibly be two structures. (There seems to be a one inch gap down thru substructure) (check plans)	<u>MCH/KDS</u>
<u>ALL</u>	<u>4/23/2003</u>	Letting scheduled for 5/25/01. Des. # 9803670. This project has been changed from a rehab to a replacement, postponing the work. This project has also been delayed due to discussions, and many e-mails, about the need for an interchange modification to be coordinated with this project. Some temporary repairs may be necessary due to delays.	<u>MCH</u>

General Inventory Data

CONTRACT-PREF: B
CONTRACT-NUM: 11275
BRIDGE-NUMBER: 020-76-04718A
STRUCTURE-DESG: A
DISTRICT-CODE: 2
COUNTY-CODE: 76
ROUTE-NUM-O: 20
ROUTE-NUM-U: 69
LOGMILE-OVER: 8.03
LOGMILE-UNDER: 147.47
FACILITY-CARRIED: US 20
FEATURES-INTERSECTED: I-69
LOCATION-21: 2.55 W SR 127
STRUCT-MATL: 4
STRUCT-CONST: 2
STR-TYPE-MAIN-ENGL: CSB
MAIN-WIDE-TYPE-ENGL:
APPRO-MATL: 1
APPRO-CONST: 2
STR-APPRO-PRIM-ENGL: RCG
OTHER-APPRO-CODES: N
NUMBER-MAIN-SPANS: 2
NUMBER-APPRO-SPANS: 2
LANES-OVER: 5
LANES-UNDER: 4
SKEW: 0
LENGTH-MAX-SPAN: 65
STRUCTURE-LENGTH: 215
TOT-HZ-CLR-OV-EN: 27
TOT-HZ-CLR-OV-WS: 27
TOT-HZ-CLR-UN-EN: 57.4
TOT-HZ-CLR-UN-WS: 56.7
BRIDGE-ROADWAY-WIDTH: 70
DECK-WIDTH: 76.1
SIDEWALK-WIDTH-LEFT: 2
SIDEWALK-WIDTH-RIGHT: 2
DECK-MEDIANS: 6
STR-FLARED: 0
MIN-VERT-OV-FT: 99
MIN-VERT-OV-IN: 99
MIN-VERT-CLR-CODE: H
MIN-VERT-UN-FT: 16
MIN-VERT-UN-IN: 1
MIN-LATERAL-RIGHT: 10.2
MIN-LATERAL-LEFT: 27.1
APPROACH-RDWY-WIDTH: 70

TSF-BRIDGE-RAILING: 0
TSF-TRANSITIONS: 0
TSF-APP-GUARDRAIL: 1
TSF-TERMINAL-END: 1
BRIDGE-RAIL-TYPE: E
TRAFFIC-DIR: 2
TYPE-INTERCHANGE: C
MIN-NAV-VERT-CLR-L:
CITY-TOWN-CODE: 00000
YEAR-BUILT: 1963
YR-RECONSTRUCTED: 1978
WIDEN-YR:
LAST-REPAIR-YR:
DECK-STR-TYPE: 1
CONCRETE-FORM: N
METAL-FORM: N
DECK-THICKNESS: 007
TYPE-WEAR-SURFACE: 3
TYPE-MEMBRANE: 0
TYPE-DECK-PROT: 0
ASPHALT-THICKNESS: 02

Deck Condition

DECK-WEAR-SURFACE: 5
DECK-UNDERSIDE: 5
BRIDGE-JOINT-TYPE-SW: A
BRIDGE-JOINT-COND-SW: P
BRIDGE-JOINT-TYPE-NE: A
BRIDGE-JOINT-COND-NE: P
BRIDGE-JOINT-TYPE-INTERIOR: A
BRIDGE-JOINT-COND-INTERIOR: P
DECK-LONGI-JOINT: 6
DECK-TRANS-JOINT: 5
COND-OF-DECK: 5

Approach Condition

APPRO-ROAD-COND: 6

SuperStructure Condition

SPSTR-BEARING: 7
 SPSTR-STEEL-GIRDER: N
 SPSTR-STEEL-BEAM: 7
 SPSTR-STEEL-DIAPH: 7
 SPSTR-STL-CROSS-BRACE N
 SPSTR-CONCRETE-GIRDE 6
 SPSTR-CONCRETE-BEAM: N
 SPSTR-CONCRETE-DIAPH: N
 SPSTR-CONCRETE-SLABS: N
 SPSTR-INTEGRAL-PIER: N
 SPSTR-TIMBER-BEAMS: N
 SPSTR-ARCH-RING: N
 SPSTR-SPANDREL-WALL: N

COND-OF-SPSTR

6

Check Items:

SPSTR-STRINGER: N
 SPSTR-FLOOR-BEAM N
 SPSTR-KNEE-BRACE: N

SPSTR-TRUSSES: N

Check Items:

SPSTR-EYEBARS: N	SPSTR-LOW-BRACE-LA N
SPSTR-VERTICALS: N	SPSTR-CONNECT-PLAT N
SPSTR-DIAGONALS: N	SPSTR-GUSSET-PLATE: N
SPSTR-UPPER-CHORD: N	SPSTR-STAY-PLATE: N
SPSTR-LOWER-CHORD: N	SPSTR-LACING: N
SPSTR-UPPER-BRACE: N	SPSTR-RIVETS: N
SPSTR-PORTALS: N	SPSTR-BOLTS: 7
SPSTR-TOP-LATERAL: N	SPSTR-SPLICE-PLATE: 7
SPSTR-LATERAL-STRUT N	SPSTR-BRACKETS: 7
SPSTR-SWAY-BRACE: N	SPSTR-TACK-WELD: 7

SPSTR-FULL-WELD: 7
 SPSTR-OTHER-CONNEC N
 SPSTR-HANGER: N
 SPSTR-NUM-HANG-BARS 00
 SPSTR-HINGES: N
 SPSTR-PINS: N
 SPSTR-NUM-PINS: 00
 SPSTR-HANGER-BAR: N
 SPSTR-MUDWALL: 6
 SPSTR-CURTAIN-WALL: 6

Collision Damage Condition:

SPSTR-COLLISION-DAMAGE 7
NUM-MEMBERS-DAMAGED: 0
SEVERITY-OF-DAMAGE: N

Paint Condition:

PAINT-CONDITION: 6
PAINT-TYPE: 2
PAINT-EST-REMAIN-LIFE: 06
PAINT-CONTRACT-NUMBE M 21067
PAINT-CORTEN-STEEL: N
PAINT-YR: 94
PAINT-MO: 7
TONS-STEEL: 161
PAINT-RATE: 6

Channel & Channel Protection:

CHAN-PROTECTION: N
CHAN-TYPE-PROT: N
COND-OF-CHAN-PROT N
PIER-ABUT-PROT:

Foundation Information:

SCOUR-TOT-NUM-PIER: 5
SCOUR-ABUT-TYPE-1: E
SCOUR-ABUT-TYPE-2: E
SCOUR-PIER-VISIBLE: N
SCOUR-NUM-INTERMD-PIER: 3
SCOUR-IN-PIER-TYPE1: A
SCOUR-IN-PIER-TYPE2:
SCOUR-IN-PIER-TYPE3:
SCOUR-IN-PIER-TYPE7: I
SCOUR-NUM-PIER-WATER: NA
SCOUR-NUM-HAVE-SCOUR: NA

Substructure Condition:

SBSTR-BRIDGE-SEAT:	6
SBSTR-BACKWALL:	N
SBSTR-BREASTWALL:	N
SBSTR-BENT-CAP:	6
SBSTR-WING-WALL:	N
SBSTR-FOOTING:	N
SBSTR-PILES:	N
SBSTR-SCOUR:	N
SBSTR-EROSION:	7
SBSTR-CCRETE-SLP-WALL:	6
SBSTR-SETTLEMENT:	8
SBSTR-PIER-CAP:	6
SBSTR-COL-SOLID-STEM:	N
SBSTR-CCRETE-PILLAR:	5
SBSTR-CCRETE-PILE:	N
SBSTR-INTERMD-FOOTING:	N
SBSTR-BRACE:	N
SBSTR-INTERMD-EROSION:	7
SBSTR-SCOUR:	N
SBSTR-INTERMD-SETTLE:	8
SBSTR-COLLISION-DAMAGE	7
SBSTR-CRASH-WALL	6

Overall Condition of Substructure**COND-OF-SBSTR****5**

NBI-NUMBER: 5600

Inspection Report Page 4

Culvert & Underfill Structures:

CULV-BARREL: N
CULV-HEADWALL: N
COND-CULVERT-RET-WAL N

Estimated Remaining Life:

EST-LIFE-SURFACE: 03
EST-LIFE-DECK: 03
EST-LIFE-JOINTS: 03
EST-LIFE-SUPERSTRUCTUR 15
EST-LIFE-SUBSTRUCTURE: 15
EST-LIFE-APPROACH: 03
EST-LIFE-CHANNEL: NA
EST-LIFE-CULVERT: NA
OPC-CODE: A
NUM-TONS-POSTED:

Appraisal Condition:

OPERATING-RATING: 265
OP-TONS: 65
INVENTORY-RATING: 243
INV-TONS: 43
GROSS-TONS: 34
OVERLOAD-PROBLEM: N
APPRA-OF-STR-COND: 5
APPRA-DECK-GEOMETRY: 5
ADT-OVER: 15213
ADT-UNDER: 20637
ADT-OVER-YR: 1
ADT-UNDER-YR: 1
FUNC-CLASS-OVER: 6
FUNC-CLASS-UNDER: 1
APPRA-OF-UNDERCLR: 4
APPRA-OF-WATERWAY-ADEQ: N
APPRA-APPROACH-ALIGN: 8
SCOUR-CRITICAL-BRIDGES: N

Inspectors Proposed Improvements:

YR-NEED-IMPROVED: 1
Type-Work-Needed 1ST-CD: 35
Type-Work-Needed 2ND-CD: 1
LENGTH-OF-IMPRV: 215

District Priority in HIP:

PRIOR-NUM:
PRIOR-NUM-YR:
ORIG-YR-HIP: 98
NEW-BRIDGE-NUMBER: 4718B
DESIG-NUMBER: 03670
READY-LETT-YR: 1
READY-LETT-MO: 2
WORK-TYPE: 2
BRIDGE-IMPROV-COST: 0
RDWY-IMPROV-COST: 0
TOTAL PROJECT COST: 0
YR. OF COST ESTIMATE:

Critical Features:

FRAC-INSP-CD: N
FRAC-INSP-NUM-MO:
FRACTURE-INSP-MO:
FRACTURE-INSP-YR:
UNDERWATER-INSP-CD: N
UNDERWATER-INSP-NUM-MO:
UNDERWATER-INSP-MO:
UNDERWATER-INSP-YR:
SPCL-INSP-CD: N
SPCL-INSP-NUM-MO:
SPECIAL-INSP-MO:
SPECIAL-INSP-YR:
SPECIAL-INSP-ITEM:
DEF-O-FT: 99
DEF-O-IN: 99
DEF-U-FT: 16
DEF-U-IN: 11

Structural Details:

INTERMD-DIAPH:	Y
INTERMD-DIAPH-CONNECT:	3
BEARING-DIAPH:	Y
BEARING-DIAPH-CONNECT:	4
JACKING-FRAME:	Y
VERT-WEB-STIFF:	N
VERT-WEB-STIFF-CONNECT:	N
CROSS-BRACING:	N
CROSS-BRACING-TYPE:	N
TRANSV-PLATE-NO-BRACE:	N
TRANSV-PLATE-WITH-BRACE:	N
WEB-WELDS:	N
FLANGE-WELDS:	N
FLANGE-COVER-PLATE:	N
LONG-WEB-STIFF:	N
PLATE-WELD-FLANGE:	N
STEEL-BOX-GIRDER:	N
HANGER-CONNECT:	N
HINGE-PIN-CONNECT:	N
CANTIL-BEARING:	N
STEEL-BOX-PIER-CAP:	N
CONCRETE-SEG:	N
OPEN-SPANDREL-ARCH:	N
SUSPEN-CABLES:	N
SUSPEN-TIE-CHORDS:	N
OTHER-DETAIL-FLAG:	N
REDUNDANT-CODE:	1
NUMBER-BEAMS:	14
NUMBER-GIRDERS:	12
NUMBER-STRINGERS:	00
NUMBER-FLOOR-BEAMS:	00

Roadway Management Data:

BRIDGE-DATA-SORTS:	N
LARGEST-VERT-DISTANCE:	0169
IDENTIFY-PIER:	3
IDENTIFIED-PLANS-MEASURE	M
PREDOMINAT-SUBSTR-TYPE:	3
PREDOMINAT-SUPPORT-SYS-	1
IDENTIFY-PIER-USED-ABOVE:	3
SUBDISTRICT-UNIT-NO:	6241
SUBDISTRICT-UNIT-NAME:	ANGOLA
SUFFICIENCY-RATING:	72
SUFFICIENCY-RATING-YY:	2002
SUFFICIENCY-RATING-MM:	4
SUFFICIENCY-RATING-DD:	1
FUNCTIONALLY-OBSOLETE:	N
STRUCTURALLY-DEFICIENT:	N
BRIDGE-REMARKS:	

NATIONAL-ROAD-SYSTEM:

sort no: 6110

APPENDIX C

Miscellaneous



Beam, Longest and Neff, LLC

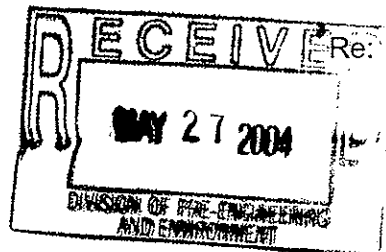
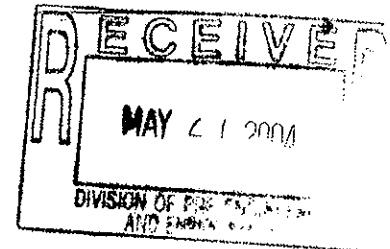
Consulting Engineers and Land Surveyors

8126 Castleton Road
Indianapolis, IN 46250
317.849.5832
317.841.4280 fax
www.b-l-n.com

File

May 25, 2004

Mr. Brad L. Steckler, P.E. Manager
Engineering Assessment Section
Indiana Department of Transportation
N848 Government Center North
100 North Senate Avenue
Indianapolis, Indiana 46204



Engineering Assessment
US 20 from I-69 to 2600 ft East of I-69
Sight Distance Correction
Steuben County, Indiana
Des. No. 0201004

Dear Mr. Steckler:

A field investigation was held for the US 20 sight distance correction project on May 20, 2004 at 10:00 a.m. at the project site. The purpose of the on-site meeting was to collect necessary field data and discuss possible improvement alternates with Indiana Department of Transportation (INDOT) personnel. Those in attendance included:

Contact	Company	Phone
John Leckie	INDOT -- Ft. Wayne Development	260-969-8252
Bill Grepke	INDOT -- Ft. Wayne Operations	260-969-8224
Elena Veksler	INDOT -- Design	317-233-2073
Kris Thomas	INDOT -- Design	317-233-2064
Rebecca Cross	Beam, Longest & Neff, L.L.C. (INDOT Environmental Rep.)	317-849-5832
Andrew Bauer	Beam, Longest and Neff, L.L.C. (BLN)	317-849-5832
Monte Mildenberg	BLN	317-849-5832

Existing Conditions

US 20 is an east/west roadway with average lane widths of 12 ft with 11 ft shoulders (10 ft paved, 1 ft aggregate). From I-69 to CR 290 W, US 20 is three lanes wide (one through lane in each direction, with an additional through/left turn lane for westbound traffic). From CR 290 W east US 20 is a two lane roadway. The pavement surface appeared to be in good condition.

The horizontal alignment of US 20 is tangent throughout the project area. The vertical alignment of US 20 has a pronounced crest vertical curve east of CR 290 W, and slopes down gradually to the east to a series of sag vertical curves. The pavement markings on the vertical curve are no passing in both directions at the crest, switching to permitted passing for eastbound traffic once the vehicles have cleared the crest of the curve.

CR 290 W is a two lane road "T" intersecting US 20 from the north approximately 900 ft east of the ramps for northbound I-69. CR 290 W ends in a cul de sac approximately 1000 ft north of US 20. Possible intersection sight distance deficiencies were observed at CR 290 W looking east on US 20.

General Information

Between CR 290 W and I-69 several commercial structures including two gas stations exist. A residential structure is located on the south side of US 20 east of CR 290 W. East of the residential structure land use is agricultural or wooded fields. A pond exists on the north side of US 20 just east of the project area. Underground utilities within the project limits include fiber optic, telephone, and gas. Overhead electric lines exist within the project. Utility poles exist on both sides of US 20.

Neither traffic nor accident data had been received prior to the field check.

The posted speed limit is 45 m.p.h. on US 20.

Alternates

In discussions with Ft. Wayne District personnel prior to the field check, the area of concern was identified as the crest vertical curve on US 20 just east of CR 290 W. At the field check the following items were discussed:

- 1) According to Ft. Wayne District personnel, the crest vertical curve on US 20 east of CR 290 W needs to be lengthened due to a lack of stopping sight distance on US 20. Preliminary estimates by BLN indicate the curve can be lengthened to achieve desirable stopping sight distance without encroaching into adjacent vertical curves.
- 2) Potential intersection sight distance deficiencies exist at the intersection of US 20 and CR 290 W. Preliminary estimates by BLN indicate the deficiencies would be corrected by lengthening the crest vertical curve on US 20 east of CR 290 W to provide stopping sight distance.
- 3) Ft. Wayne District personnel did not have accident figures, but indicated some accidents had occurred within the termini of the crest vertical curve east of CR 290 W. BLN has requested accident data from INDOT Central Office.
- 4) A profile correction is anticipated to require US 20 to be closed during construction. The official detour route suggested by Ft. Wayne District included I-69 and SR 127. Several routes exist for possible local detours. Due to the existing conditions (cut slopes, proximity of the pond and buildings) a temporary runaround is not considered feasible.
- 5) Right-of-way is approximately 50 ft on each side of US 20, based on the location of utilities and physical features. This appears to be consistent with the available existing plans for US 20.

This is our understanding of the concerns discussed at the meeting. If there are any additional questions or comments, please contact this office.

Very truly yours,

BEAM, LONGEST, AND NEFF, L.L.C.

A handwritten signature in black ink, appearing to read "Andrew Bauer", with a long horizontal flourish extending to the right.

Andrew Bauer, P.E.

AJB/ce

xc: All Attendees
File #3901-701

INDIANA DEPARTMENT OF TRANSPORTATION
INDIANAPOLIS, INDIANA 46204-2249
INTER-DEPARTMENT COMMUNICATION

May 3, 2005

MEMORANDUM

To: FILE

From: Karl Leet, Senior Highway Engineer
Engineering Assessment Section
Division of Environment, Planning, and Engineering

Re: Des Nos. 0300942, 9803670, and 0201004
Interchange Work—US 20 at I-69; Bridge Replacement—US 20 over I-69; Sight
Distance Correction at CR 290W
Field Check Meeting Minutes

A field check was held on November 15, 2004 to discuss the project intended work and to gather input/information from Design and Fort Wayne District personnel. The three concurrent projects include interchange work and bridge replacement at US 20 and I-69, and sight distance correction just east of there at CR 290W, all west of Angola in Steuben County. Attendees of the meeting were:

Karl Leet—Engineering Assessment Section
Bo Dieckmeyer—Environmental Assessment Section
Tim Muench—Design Division
Phil Ellet—Angola Area Engineer, Fort Wayne District
John Leckie—Development Engineer, Fort Wayne District
Mike Hallien & Kirk Smith—Bridge Inspection, Fort Wayne District

Also invited but unable to attend were representatives from Steuben County. Later, contact was made by telephone with David Sommerlott, Steuben County Engineer. His comments are recorded afterwards.

The minutes of the meetings are as follows:

- All sketches as presented by the Engineering Assessment Section appear satisfactory. In the process of replacing the bridge, it will be widened to allow for 6' sidewalks on both sides and to allow side-by-side left turn lanes separated by a 6' raised median. CR 300W will have a left turn lane added to ease the LOS F forecasted for existing with only a single lane approach to US 20. CR 290W will not have additional lanes added to its approach to US 20, due to increased commercial impacts.
- Fort Wayne District Development revealed to the Engineering Assessment Section the existence of an independent sight distance correction project (Des # 0201004). We had not made the connection that this second project was that close to the subject project. Development suggested Eng Assess consolidate the area assessment into one report, noting a boundary between Des's. The consultant assigned as of 11-15-04 (Beam,

Longest, & Neff) had not started actively conceiving and sketching an alternate. Our Section will have asked the consultant to cease-and-desist work for purposes of project consolidation.

- Development is not sure what Steuben County's plans are for multi-use paths. If a path was to adjacently parallel the US 20 corridor, then the US 20 bridge over I-69 needs to have increased widening for a 10' wide multi-use path on either side of US 20.
- Eng Assess inquired about the history of proposals for an Angola bypass with respect to US 20. Meeting attendees said it was a local initiative to rid downtown Angola of through-truck traffic, headed by downtown merchants, and it has a history predating the construction of I-69 to bypass the city to the north. Now, with the present routing of I-69 and the commercial development to the north of Angola, such a bypass is considered superfluous and infeasible by INDOT.
- Fort Wayne District bridge personnel have given the existing bridge the following ratings: Deck—5, Superstructure—6, Substructure—5, and Overall—6. It has a sufficiency rating of 72.

On December 16, 2004 a telephone conversation was held with David Sommerlott of Steuben County. He had the following comments:

- No trail is planned to parallel US 20 at I-69. There is no need for the proposed bridge widening to accommodate a 10' multi-use path, but only 6' sidewalks.
- In regards to a US 20 bypass, not only is bypassing around the north not feasible due to commercial impacts, but bypassing around the south is also infeasible due to wetland, lake, and recreational land impacts.
- A retirement community is to be soon completed on the north side of US 20 called Buck Lake Terrace. Sight Distance Correction work should minimize impacts to the new approach (a public road), and yet be cognizant to its location thereby improving intersection sight distance at both this new approach and CR 290W.

These meeting minutes are my understanding of events that transpired.

KJL/kjl