

**Engineer's Report  
Engineering Assessment Section  
Environment, Planning and Engineering Division  
Indiana Department of Transportation**

**Pavement Replacement  
Des. No. 0100699  
Project No. STP-4979(00C)**

**US 52 from Wabash River to 2.31 Miles East of Wabash River  
Tippecanoe County**

**March 18, 2005**

**2<sup>nd</sup> Draft**

**Beam, Longest and Neff, L.L.C.  
8126 Castleton Road  
Indianapolis, Indiana 46250**

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PREPARED BY: Andrew J. Bauer P.E., Project Engineer, Beam, Longest and Neff, L.L.C.

**I. PURPOSE OF REPORT:**

The Engineer's Report documents the engineering assessment phase, including an outline of the proposal to improve US 52. The report describes the project at a preliminary level and will guide the ongoing environmental and succeeding design phases. The Engineer's Report is pre-decisional and deliberative, pending completion of environmental studies.

**II. PROJECT LOCATION:**

The pavement replacement project is located on US 52 in Lafayette in Tippecanoe County. It is within the Crawfordsville District. The kin number is 4356. The original project limits were from the Wabash River (RP 44+88) to 3.03 miles east of the Wabash River at Union Street (RP 47+91). Based on discussions at the field check and later correspondence with the Engineering Assessment Section, the eastern terminus of the project is revised to Beech Lane (RP 47+19), revising the project length to 2.31 miles. The Wabash River bridges and the Beech Lane intersection are not included within the limits of this project. (The limits of the project immediately adjacent to the subject project, Des. No. 9802510, have been revised to extend north to Beech Lane.) See Appendices A-1 and A-2 for project location maps.

**III. PROJECT NEED AND PURPOSE:**

The principal need for this project is evidenced by the deteriorating condition of the existing pavement. Further discussion of deficiencies is presented later under Existing Conditions, Traffic Data and Capacity Analysis and Crash Data.

The chief purpose of this project is to replace the existing pavement within the project limits. Improvements to intersection geometry to improve traffic operation are also incorporated as needed.

**IV. EXISTING CONDITIONS:**

See Appendices A-3 through A-8 for ground-level photographs and Appendix A-9 for an aerial view.

This section of US 52 is on Indiana's "3R" road network and is not on the National Truck Network or the National Highway System (NHS). US 52 is classified as an *urban principal arterial*, suburban sub-class.

### *Roadway History & Pavement Condition:*

The current dual eastbound lanes were the original undivided east and westbound 11 ft lanes paved with concrete in 1936. These lanes were resurfaced with asphalt in 1956 and 1962. The eastbound lanes were resurfaced again in 1973, when the westbound lanes were constructed with concrete. Surface pavement is concrete within the project limits with the exception of the eastbound lanes between Duncan Road and the Wabash River, which in 2003 have been overlaid with asphalt (M-26669). The INDOT Pavement Management Section rated US 52 for the 2003 Pavement Surface Report. The International Roughness Index (IRI), a measure of ride quality, was found to be 210 (poor). The Pavement Condition Rating (PCR) measures the distresses on a pavement surface. The PCR for US 52 was determined to be 68 (poor). Finally, the Pavement Quality Index (PQI), a composite index of the above factors, was calculated. The PQI was 46 assigning an overall pavement rating of "poor".

### *Cross Section & Alignment:*

US 52 is a four lane divided highway, with two 12 ft travel lanes in each direction, with 10 ft paved (11 ft usable) outside shoulders and 4 ft paved inside shoulders. From the Wabash River to Beech Lane, US 52 has paved shoulders and a depressed grass median, varying from 30 ft to 100 ft in width. Existing right of way varies in width through the project area and is limited access. Partial access control exists within the project limits.

The existing alignment has several vertical and horizontal curves within the project limits. At the field check no apparent alignment deficiencies were noted.

### *Major Intersections:*

Three signalized intersections exist within the project limits, described as follows:

#### *Duncan Road:*

The intersection angle is approximately 70 degrees. All four approaches have left and right auxiliary turn lanes. The eastbound and westbound US 52 approaches both have two through travel and receiving lanes while the southbound and northbound Duncan Road approaches have one through travel and receiving lane. The traffic signal at Duncan Road was last modernized in 2001, under Des. No. 0000960.

#### *Schuyler Avenue:*

At this intersection US 52 travels southeast to northwest and Schuyler Avenue travels southwest to northeast. The intersection angle is approximately 50 degrees. The northwest approach on US 52 has an auxiliary right turn lane, two through travel lanes, dual left turn lanes and two receiving lanes. The southeast approach on US 52 has an auxiliary right turn lane, two through travel lanes, an auxiliary left turn lane and two receiving lanes. The southwest approach on Schuyler Avenue has one receiving lane and two combination through/turn lanes, one for through/left turn movements and one for through/right turn movements. The northeast approach on Schuyler Avenue has one auxiliary right turn lane, one through travel lane, one auxiliary left turn lane and two

receiving lanes. There is a potential for traffic congestion at Schuyler Avenue. The traffic signal was last modernized in 1997, according to the District.

Underwood Street/O’Ferrall Road:

The intersection angle is approximately 80 degrees. The northbound and southbound US 52 approaches have the same configuration: one auxiliary right turn lane, two through travel lanes, one auxiliary left turn lane and two receiving lanes. The eastbound Underwood Street approach and westbound O’Ferrall Road approach have one combination left/through/right approach lane and one receiving lane. A traffic signal was installed at Underwood Street/O’Ferrall Road in 2002, under Des. No. 0101094.

In addition to the three signalized intersections within the project limits, a system of acceleration/deceleration ramps located approximately halfway between Duncan Road and Schuyler Avenue provide access from US 52 to a railyard south of the highway. Existing plans are unavailable, but it is known the ramps were constructed in the 1990s.

The bridges listed in Table 1 are located within or immediately adjacent to the project limits. Bridges within the project limits are further described below.

<b>Table 1: Bridge Structure Information</b>				
<b>Structure Number</b>	<b>Eastbound/ Westbound Traffic</b>	<b>Within Limits or Adjacent to Project</b>	<b>Featured US 52 carried over by Structure</b>	<b>Approximate Station Location</b>
52-79-1784JBWB	Westbound	Adjacent	Wabash River & SR 43	229+50
52-79-1784DEBL	Eastbound	Adjacent	Wabash River & SR 43	229+50
52-79-2459JAWB	Westbound	Within Limits	CSX Railroad & 9 <sup>th</sup> St	269+00
52-79-2459AEBL	Eastbound	Within Limits	CSX Railroad & 9 <sup>th</sup> St	269+00
52-79-2030JAWB	Westbound	Within Limits	NS Railroad	149+00
52-79-2030BEBL	Eastbound	Within Limits	NS Railroad	149+00

There is also a railroad bridge over US 52 west of Schuyler Avenue that is unaffected by this project.

**STR. NOS. 52-79-2459AEBL & JAWB**

These structures carry US 52 over the CSX Railroad and 9<sup>th</sup> Street. Both the eastbound and westbound structures were originally constructed in 1972 and are reinforced concrete girder and continuous composite steel beam bridges. The eastbound structure has 6 spans of 32’, 92’, 108’, 94’, 101’ and 92’ and a minimum vertical clearance of 14’-5”. The westbound structure has 6 spans of 32’, 92’, 3 @ 101’ and 92’ and a minimum vertical clearance of 14’-8”. Both bridges have a 40’ minimum clear roadway width, which meets 4R criteria for existing bridges to remain in place. In 1991 new bridge deck overlays were placed on the decks of both structures, and new concrete railings were constructed. Per the 2003 Bridge Inspection Report the eastbound structure has a sufficiency rating of 98, deck condition rating of 6, superstructure condition rating of 7 and a substructure condition rating of 7. The westbound structure has a sufficiency

rating of 99.2, deck condition rating of 7, superstructure condition rating of 7 and a substructure condition rating of 7.

**STR. NOS. 52-79-02030BEBL & JAWB**

These structures carry US 52 over the Norfolk Southern Railroad. The eastbound structure was originally constructed in 1935. The substructure units were widened and a new superstructure was installed in 1972. The existing structure is a 5 span (35'-6" each) continuous composite prestressed concrete box beam bridge with a minimum vertical clearance of 22'-8". In 1992 a bridge deck overlay was placed on the deck and new concrete railings were constructed. The bridge has a 40' minimum clear roadway width and has a sufficiency rating of 96.4, deck condition rating of 7, superstructure condition rating of 7 and substructure condition rating of 7 per the 2003 Bridge Inspection Report. The westbound structure was built in 1972 and is a continuous composite steel beam bridge. It has three spans of 69', 100' and 59' and a 40'-9" minimum clear roadway width. The minimum clear roadway widths on both structures meet 4R criteria for existing bridges to remain in place. In 1992 a bridge deck overlay was placed on the deck and new concrete railings were constructed. The bridge has a sufficiency rating of 88.3, deck condition rating of 6, superstructure condition rating of 7 and substructure condition rating of 7 per the 2003 Bridge Inspection Report.

*Land Use:*

Land use within the project limits is a mix of commercial, industrial and residential. According to the FEMA issued Flood Maps, the floodplain of the Wabash River extends east from the Wabash River approximately 2000 ft into the project.

*Drainage:*

Drainage is collected and conveyed in open ditches.

*Miscellaneous:*

The posted speed limit on US 52 within the project limits is 55 mph from the Wabash River bridge to 0.5 mile east of the east end of the Wabash River bridge, and 40 mph for the remainder of the project. The posted speed limit on Schuyler Avenue is 35 mph. Duncan Road and Underwood Street/O'Ferrall Road have no posted speed limit.

Street lighting (of unknown ownership) exists within the project limits at the signalized intersections. No sidewalks exist within the project limits.

**V. OTHER PROJECTS IN THE AREA:**

This project is scheduled as Ready For Contracts (RFC) in 2010. In addition, there are eleven other projects currently listed within the project area, both completed projects and those in active development. These projects are listed in Table 2 below.

<b>Table 2. Other Projects in the Area</b>				
<i>Road</i>	<i>Des No.</i>	<i>Description</i>	<i>Type</i>	<i>Targeted Letting</i>
US 52	0000960	At Duncan Road	Traffic Signal Modernization	2/13/2001
US 52	0101094	At Underwood Street/O'Ferrall Road	New Signal Installation	6/18/2002
US 52	0200650	Eastbound Lanes Only from Wabash River to 0.8 mile E of River at bridge over CSX RR	HMA Overlay, Functional	2/18/2003
US 52	0400067	EB Bridge over Wabash River, 0.46 mile E of SR 443	Bridge Maintenance and Repair	8/17/2005
US 52	0400598	Bridge over Wabash River	Bridge Painting	12/14/2005
US 52	0400774	Eastbound Bridge over Wabash River, 0.46 mile E of SR 443	Bridge Replacement	5/26/2010
US 52	0400879	From 1.86 miles W of SR 443 to Wabash River	Patch and Rehab PCC Pavement	5/25/2005
US 52	9802510	SR 38 to Beech Lane, 1.2 mi S of SR 26 to 1.2 mi N of SR 26	Road Replacement	2/15/2009
US 52	9900510	At Norfolk Southern Corp Railroad, 1.92 Miles S of SR 25 (S Jct)	New Bridge	1/15/2006
US 52	0201210	EB Bridge over CSX RR, N 9 <sup>th</sup> St, Road and Ramp, 0.56 mile W of SR 25	Bridge Rehabilitation	5/16/2006
US 52	0201211	WB Bridge over CSX RR, N 9 <sup>th</sup> St, Road and Ramp, 0.56 mile W of SR 25	Bridge Rehabilitation	4/15/2006

At the field check the District indicated it would be desirable to include the Bridge Rehabilitation projects over the CSX Railroad (Des. No. 0201210 and 0201211) in the subject road project. The subject road project now includes Des. Nos. 0201210 and 0201211 under the overall kin number 4356. The Bridge Replacement project for the eastbound bridge over the Wabash River (Des. No. 0400774) is scheduled as RFC in the same year as the subject road project. These two projects should be coordinated for construction purposes.

## **VI. TRAFFIC DATA AND CAPACITY ANALYSIS:**

The INDOT Traffic Statistics Unit has provided current and projected traffic data for the intersections of US 52 and Duncan Road, Schuyler Avenue and Underwood Street (See Appendix B). From that data the following AADT values were calculated:

Between Underwood Street and Schuyler Avenue:

2004 Average Annual Daily Traffic (AADT):	29,770	vehicles per day (vpd)
2029 AADT:	37,220	vpd
Commercial Vehicles (% AADT):	9	%

Between Schuyler Avenue and Duncan Road:

2004 Average Annual Daily Traffic (AADT): 31,740 vehicles per day (vpd)  
 2029 AADT: 39,690 vpd  
 Commercial Vehicles (% AADT): 10 %

The level of service (LOS) on a multi-lane urban arterial is a function of the LOS of each individual signalized intersection along the arterial and the interaction (or coordination) between such intersections. In general, the number of through lanes required to effect suitable operation of the individual signalized intersections is the same number required between those intersections. LOS values for the existing signalized intersections are given in Table 3. All intersections meet the minimum design criteria for LOS in the design year with the exception of Schuyler Avenue in 2029 PM peak hour. Per Table 53-6 of the Indiana Design Manual, 4R standards prescribe minimum acceptable LOS of C for suburban sub-class, D for intermediate sub-class. Therefore if the Schuyler Avenue intersection could be improved to LOS of C, it would be assumed US 52 operates at a minimum acceptable level for the project design year (2029), meaning no additional through travel lanes would be warranted along the mainline. Potential improvements to the Schuyler Avenue intersection are discussed in the Project Alternates and Recommendation section of this report.

The traffic data at the intersections of US 52 with Underwood Street, Schuyler Avenue and Duncan Road were analyzed using HCS 2000, ver4.1e. The LOS calculated at each intersection for the existing lane configuration is listed, as follows:

<b>Table 3: LOS for Existing Signalized Intersection along US 52</b>						
<b>Intersections</b>	<b>Year</b>					
	<b>2004</b>		<b>2009</b>		<b>2029</b>	
	<b>AM</b>	<b>PM</b>	<b>AM</b>	<b>PM</b>	<b>AM</b>	<b>PM</b>
Duncan Road	B	B	B	B	B	B
Schuyler Avenue	C	C	C	C	C	D
Underwood Street/O'Ferrall Road	B	C	C	C	C	C

**VII. CRASH DATA:**

Accident (crash) analysis has been performed to determine the locations and types of crashes, and to identify the potential causes. The INDOT Crash Analysis Unit has provided crash data for accidents having occurred within the project limits. The results are tabulated in below:

<b>Table 4a - Crash Data and Analysis US 52 from Wabash River to Beech Lane</b>															
<b>Year</b>	<b>Number of Crashes</b>	<b>Crash Severity</b>			<b>Total Number of</b>		<b>Crash Types</b>								
		<b>Property Damage Only</b>	<b>Personal Injury</b>	<b>Fatal</b>	<b>Injuries</b>	<b>Fatalities</b>	<b>Rear End</b>	<b>Head On</b>	<b>Sideswipe</b>	<b>Off Road</b>	<b>Right Angle</b>	<b>Left Turn</b>	<b>Right Turn</b>	<b>Animal</b>	<b>Undetermined</b>
1998	50	42	8	0	9	0	31	0	4	5	7	1	0	2	0
1999	94	82	12	0	19	0	54	0	9	8	16	3	2	2	0
2000	95	78	17	0	27	0	68	1	4	9	7	2	3	0	1
<b>Totals</b>	<b>239</b>	<b>202</b>	<b>37</b>	<b>0</b>	<b>55</b>	<b>0</b>	<b>153</b>	<b>1</b>	<b>17</b>	<b>22</b>	<b>30</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>1</b>

Table 4b - Crash Data and Analysis by Location – 1998 to 2000 US 52 from Wabash River to Beech Lane															
Location	Number of Crashes	Crash Severity			Total Number of		Crash Types								
		Property Damage Only	Personal Injury	Fatal	Injuries	Fatalities	Rear End	Head On	Sideswipe	Off Road	Right Angle	Left Turn	Right Turn	Animal	Undetermined
US 52 from Wabash River to Duncan Rd	39	31	8	0	10	0	32	0	1	3	0	0	0	3	0
Duncan Rd Intersection	58	48	10	0	12	0	42	0	1	7	5	1	2	0	0
US 52 from Duncan Road to Schuyler Ave	10	10	0	0	0	0	5	0	2	2	0	0	0	1	0
Schuyler Ave Intersection	85	74	11	0	18	0	52	0	11	4	12	2	3	0	1
US 52 from Schuyler Ave to Underwood St	33	29	4	0	8	0	17	0	0	5	8	3	0	0	0
Underwood St Intersection	11	8	3	0	6	0	3	1	2	1	4	0	0	0	0
US 52 from Underwood St to Beech Ln	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beech Ln Intersection	3	2	1	0	1	0	2	0	0	0	1	0	0	0	0
<b>Totals</b>	<b>239</b>	<b>202</b>	<b>37</b>	<b>0</b>	<b>55</b>	<b>0</b>	<b>153</b>	<b>1</b>	<b>17</b>	<b>22</b>	<b>30</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>1</b>

According to Indiana Design Manual (IDM) Fig. 55-8E, rear end and right angle accidents, which account for 75% of the reported accidents in the years analyzed, can be caused by large volumes of turning vehicles, large total intersection volume and restricted sight distance. Adding and standardizing auxiliary turn lanes and improving curb radii are all appropriate intersection enhancements. The intersections at Duncan Road and Schuyler Avenue have been improved with appropriate measures since 2000, so the data may not reflect the current accident potential.

### VIII. PROJECT ALTERNATES AND RECOMMENDATION:

Due to the total replacement of the existing pavement within the project limits, 4R criteria will be utilized. The design criteria for the project are as follows:

Functional Classification:	Urban Principal Arterial
Design Classification:	Reconstruction (4R), Multi-lane Urban Arterial, Suburban
Design Speed:	55 mph: from Wabash River to 0.5 mile east of the Wabash River 40 mph: from 0.5 mile east of the Wabash River to Beech Drive
Cross Sectional Elements	
Lane Width:	12 ft
Shoulder Width:	Right: 11 ft usable 10 ft paved Left: 4 ft usable/paved
Auxiliary Lane Width:	12 ft
Clear Zone:	40 mph: 18 ft from edge of travel lane 55 mph: 35 ft from edge of travel lane
Bridge Clear Roadway Width:	Travelway plus 2 ft on each side
IDM Reference Table:	53-6

Taking no action within the project area was considered. However, this would not address the deteriorating condition of the existing pavement. Therefore, 2 build alternates were developed for this project:

1. Pavement Replacement on US 52, Partial Improvements to Schuyler Avenue (recommended)
2. Pavement Replacement on US 52, Ideal Improvements to Schuyler Avenue

**Alternate 1 Pavement Replacement on US 52, Partial Improvements to Schuyler Avenue**

Alternate 1 is the recommended alternate. Alternate 1 involves removal and total replacement of the existing pavement within the project limits. Median width would remain unchanged. Drainage would continue to be maintained with the existing side ditches. See Appendix A-9 for a plan view of Alternate 1 superimposed over an aerial base map. See Appendix A-10 for a typical section. See Appendix C-1 for the Preliminary Pavement Recommendation.

Based upon the analysis of available existing plans, no potential vertical stopping sight deficiencies were identified within the project limits.

As noted in Traffic Data and Capacity Analysis section of this report, the only signalized intersection not meeting minimum LOS criteria was Schuyler Avenue. Upon further analysis, improving LOS to C would require additional auxiliary lanes on Schuyler Avenue. An additional left turn lane (creating dual lefts) would be added to the westbound Schuyler Avenue approach, and a combination through/right turn lane would be added to the eastbound Schuyler Avenue approach. On the eastbound approach the existing through/left turn lane would be converted to an exclusive left turn lane, and the existing through/right turn lane would be converted to an exclusive through lane. The proposed through/right turn lane would maintain two through lanes on the southern approach. See Appendix A-9 for a plan view of the intersection. The resultant US 52/Schuyler Avenue LOS are shown in Table 5 below:

<b>Table 5: LOS for Signalized Intersection at Schuyler Avenue, Proposed Lane Configuration</b>			
<b>Year</b>			
<b>2009</b>		<b>2029</b>	
<b>AM</b>	<b>PM</b>	<b>AM</b>	<b>PM</b>
B	C	C	C

With the proposed improvements no individual traffic movement’s LOS is below a D, and the overall intersection LOS is a C. These improvements will require additional right of way along Schuyler Avenue both north and south of US 52.

Turn lane lengths at the signalized intersections were analyzed using the projected traffic data and the methods described in the Indiana Design Manual. The recommended turn lane lengths are listed in Table 6a & 6b:

<b>Table 6a: Recommended Turn Lane Lengths On US 52</b>		
US 52 Turn Lane Location	Turn Lane Lengths (Storage Only)	
	Left Turn Lane (ft)	Right Turn Lane (ft)
Northbound at Duncan Road	200	100
Southbound at Duncan Road	100	160
Northbound at Schuyler Avenue	100	375
Southbound at Schuyler Avenue	330	140
Northbound at Underwood Street	100	100
Southbound at Underwood Street	100	100

<b>Table 6b: Recommended Turn Lane Lengths On Intersecting Roadways</b>		
Intersecting Road Turn Lane Location	Turn Lane Lengths (Storage Only)	
	Left Turn Lane (ft)	Right Turn Lane (ft)
Northbound Duncan Road	265	190
Southbound Duncan Road	100	100
Eastbound Schuyler Avenue	100	100*
Westbound Schuyler Avenue	110	200
Northbound Underwood Street	100	100
Southbound Underwood Street	100	100

\* - proposed through/right turn lane

For the turn lanes on US 52, appropriate deceleration lengths and tapers should be provided. For the turn lanes on the intersecting roadways, deceleration lengths and tapers should be checked for feasibility, and if possible provided.

Existing signing shall be replaced throughout the project limits.

Existing lighting shall be evaluated for lighting performance and clear zone criteria and if necessary, improved and/or relocated.

The traffic signal at Schuyler Avenue shall be modernized/replaced as a part of the subject road project. The traffic signals at Duncan Road and Underwood Street/O'Ferrall Road, having been recently modernized or installed (2001 and 2002, respectively) should be evaluated during design, but no major improvements are anticipated as a part of this project.

In addition to the turn lane lengths on the approaches to US 52, the lengths of the acceleration/deceleration lanes at the entrance to the rail yard were checked for compliance with design criteria. Since the primary purpose of the interchange is to serve the railroad yard south of US 52, the ramp lanes were reviewed for truck traffic. Existing deceleration distance is substandard for both southbound and northbound traffic. Acceleration distance for both directions meets INDOT criteria. Construction of desirable ramp length for southbound deceleration would require the widening of the bridge west of the interchange. Accident data for this portion of US 52 (from Duncan Road to Schuyler Avenue, approximately 0.7 mile) indicates 9 accidents over three years, although the exact location and whether those accidents are actually related to

the ramp lanes is unknown. All the reported accidents were property damage only. The volume of truck traffic utilizing the ramps is also unknown (per Crawfordsville District Traffic the volume of traffic on the ramps is very low). The cost of widening the bridge to accommodate the lengthened deceleration lane is approximately \$1,000,000. A benefit/cost analysis resulted in a B/C ratio substantially less than 1. Per Crawfordsville District Development the lengthening of the deceleration lane is beyond the scope of this project and therefore not included in this project. This will require a Level Two Design exception.

The deceleration ramp for westbound traffic can be lengthened 300 ft to meet design criteria without significant additional costs or right of way impacts, and is therefore included in the preferred alternate. The acceleration/deceleration lane pavement that is immediately adjacent to the travel lanes (i.e the lane running parallel to the travel lanes) for all four ramps should be replaced as a part of this project.

District personnel have determined the Bridge Rehabilitation projects scheduled as ready for contracts for 2006 (Des. Nos. 0201210 & 0201211) can be delayed until the construction of the subject road project, therefore the proposed bridge improvements shall be incorporated into this project. In addition to Des. Nos. 0201210 and 0201211, improvements to the bridges over the Norfolk Southern Railroad will be included in this road project. As directed by INDOT Bridge Rehabilitation both pairs of structures (Str. Nos. 52-79-2030 & 52-79-2459) will have their existing overlays removed and new bridge deck overlays placed. Other repairs will be done to the structures as required. The designer should evaluate the performance level of the existing railings to determine their compliance with design criteria.

#### **Alternate 2 Pavement Replacement on US 52, Ideal Improvements to Schuyler Avenue**

Alternate 2 would include all the improvements listed in Alternate 1, with minor changes to the improvements proposed for Schuyler Avenue. In addition to the auxiliary lanes describe in Alternate 1, an addition left turn lane would be added to the southern approach to Schuyler Avenue, creating dual left turn lanes. This decreases average intersection delay, but does not improve the LOS. The right of way impacts for this alternate are greater than Alternate 1, with potential relocations along either side of Schuyler Avenue. Due to the limited value added to the project Alternate 2 is not the recommended alternate.

#### **IX. ESTIMATED COST:**

The following year 2005 estimated costs have been compiled for each of the viable alternates:

	Alternate 1*	Alternate 2
Pavement	\$3,280,000	\$3,290,000
Drainage	\$480,000	\$480,000
Earthwork	\$1,300,000	\$1,300,000
Miscellaneous	\$2,590,000	\$2,590,000
Road Construction Total =	\$7,650,000	\$7,660,000
52-79-2030 Bridges	\$800,000	\$800,000
52-79-2459 Bridges	\$2,000,000	\$2,000,000
Schuyler Avenue Traffic Signal	\$100,000	\$100,000
Overall Construction Total =	\$10,550,000	\$10,560,000
Right-of-Way	\$30,000	\$110,000
Engineering	\$790,000	\$790,000
PROJECT TOTAL =	\$11,370,000	\$11,460,000

\*Recommended Alternate

## X. ENVIRONMENTAL CONSIDERATIONS

With the exception of the Schuyler Avenue intersection, no apparent notable environmental resources/constraints are involved with this project. The property located in the southeast quadrant of the Schuyler Avenue intersection is a filling station and may require right of way acquisition. This may involve underground storage tanks. INDOT's Environmental Assessment Section will prepare the necessary environmental document for this project. Proposed right-of-way dimensions, areas and number of parcels presented in this Engineer's Report are estimates at this stage in development of the project. Assessment of social, economic and environmental 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.

## XI. SURVEY REQUIREMENTS

Survey requirements for the recommended alternative are as follows:  
 Along US 52 mainline survey is required from 500 ft west of RP 44+88 to 500 ft east of RP 47+19 (13,200 Lft). Survey coverage would be 200 ft to each side of the centerline of US 52. At Duncan Road, Schuyler Avenue and Underwood Street, additional survey would be required beyond the 200 ft previously mentioned. An additional 500 ft of survey in each direction, 75 ft to each side of each cross street, would be required. Total survey length would be 16,200 ft.

## XII. RIGHT-OF-WAY REQUIREMENTS

Construction along mainline US 52 is anticipated to be accomplished within the existing right of way. Construction at the intersections within the project limits is anticipated to be accomplished within the existing right of way, with the exception of Schuyler Avenue. Potential right of way acquisitions exist in all four quadrants of the intersection. Potential takes in the northern quadrants are anticipated to be minimal, with no relocations anticipated. Anticipated right of way requirements in the southern quadrants are more substantial, but should be designed to avoid relocations. If turning roadways are proposed at locations where turning roadways currently do not exist, this may require additional right-of-way at those locations. If clear zone requirements cause right of way needs to go beyond the existing right of way, the designer is instructed to utilize

measures to reduce or eliminate the necessary right of way. These measures can include tighter ditches, design exceptions, guardrail, etc.

Proposed right-of-way requirements presented in this Engineer's Report are approximate, developed using limited information available at this stage. Later phases of project development will establish precise right-of-way requirements. The more refined right-of-way limits generated from these later phases may differ from the estimates presented at this time.

**XIII. MAINTENANCE OF TRAFFIC**

Traffic maintenance will be necessary due to the type of construction recommended in the recommended alternate. Detours are undesirable due to the high volume of traffic on US 52. It is anticipated traffic would be maintained on US 52 during construction, utilizing crossovers to transfer the traffic to the opposite lanes during construction. This would also facilitate bridge construction as necessary.

**XIV. MEETINGS AND COORDINATION:**

A field inspection was held for the referenced project on December 2, 2003 at the project location. See Appendix C-2 for the meeting minutes. Coordination with various relevant parties was undertaken during the assessment of this project. These parties included Environmental Assessment Section, Design Division, Crawfordsville District Development and Crawfordsville District Traffic.

**XV. CHANGES TO PROPOSAL:**

The Engineering Assessment Section shall be consulted if the proposal is to be changed. The person requesting the change should send a letter for concurrence to the Engineering Assessment Section Manager. The designer should route any request for a change to the attending Design Division Manager. This letter should include justification for the change and the estimated cost difference.

cc: Sandra Vaughn      Design-Project Coordinator (3 copies)  
Anne Rearick      Design Division Section Manager  
Matt Thomas      Design-Utilities Engineer  
William Schmidt      Design-Location Survey  
Lyle Sadler      Environmental Assessment  
Athar Khan      Geotechnical Engineer  
Sally Morgan      Land Acquisition  
Steve Isenhower      District Development Engineer  
Brad Steckler      Engineering Assessment Section

## APPENDICES

### **Appendix A (Contains drawings and exhibits)**

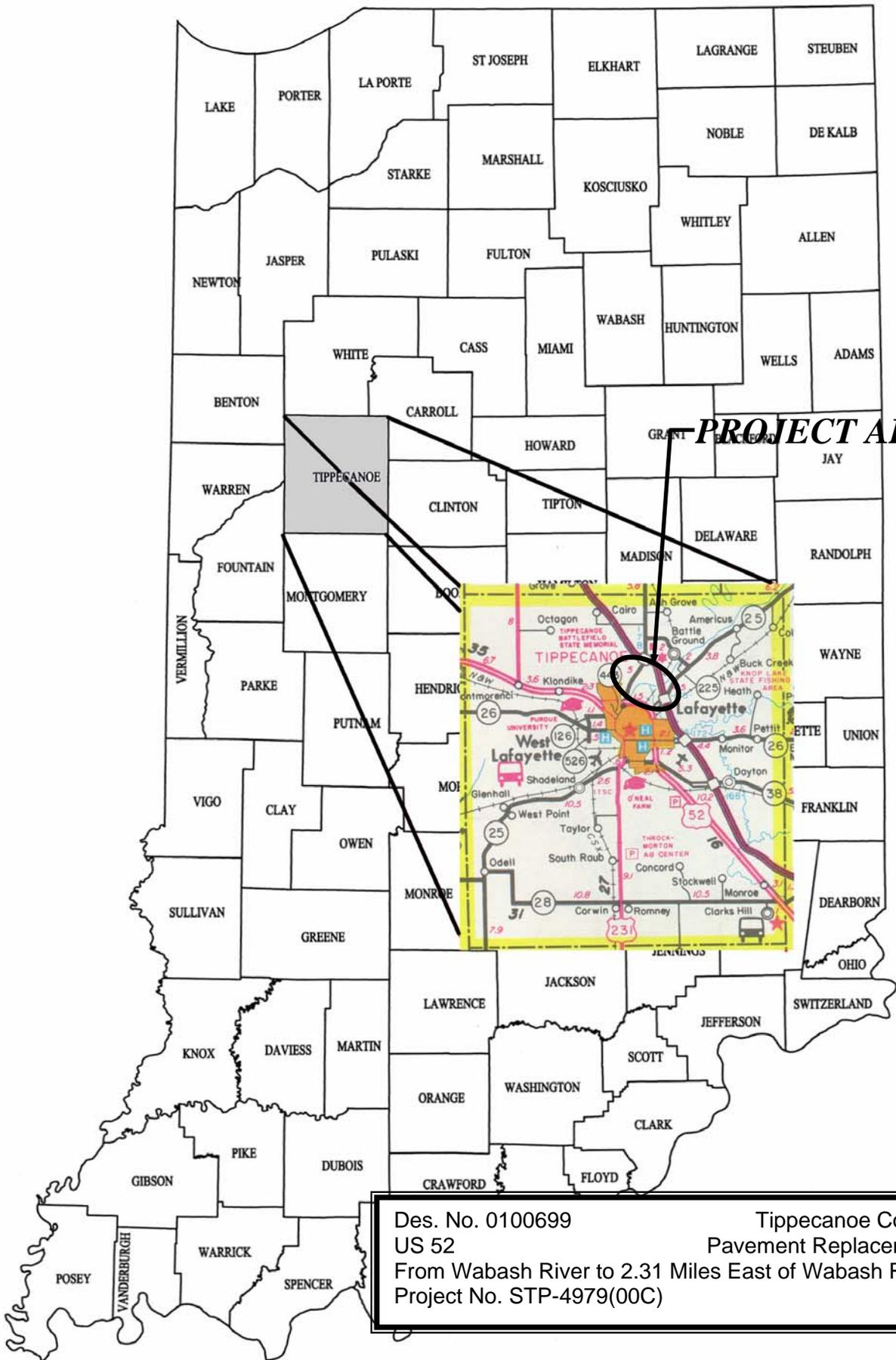
- A-1 Location Map
- A-2 Topographic Map
- A-3 – A-8 Ground Level Photographs
- A-9a – A-9c Aerial Layout
- A-10 Typical Section

### **Appendix B (Contains data and analysis)**

- B-1 – B-6 Traffic Statistics

### **Appendix C (Contains everything else)**

- C-1 Preliminary Pavement Recommendation
- C-2 – C-4 Field Check Minutes



**PROJECT AREA**

Des. No. 0100699  
 US 52  
 From Wabash River to 2.31 Miles East of Wabash River  
 Project No. STP-4979(00C)

Tippecanoe County  
 Pavement Replacement

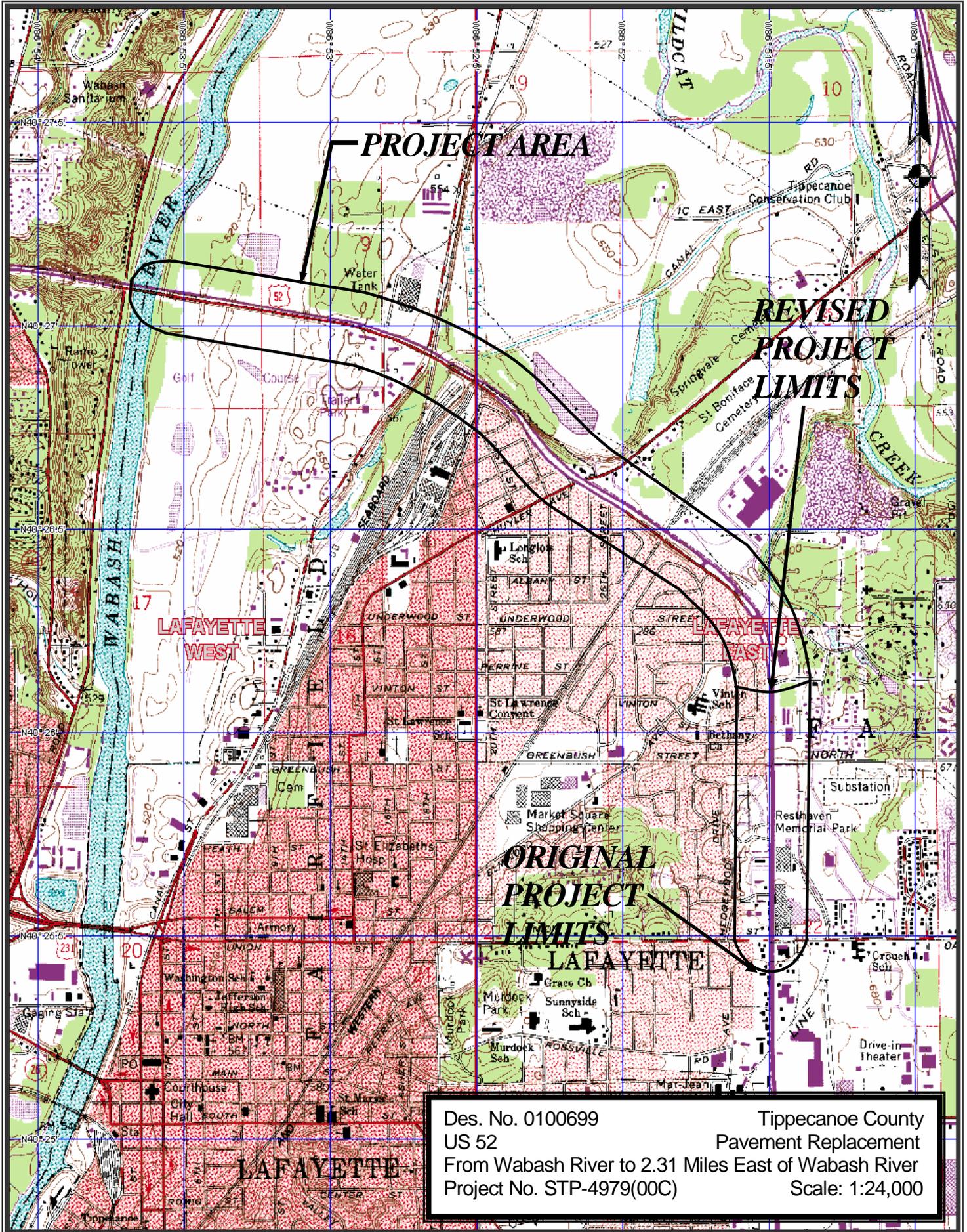




Photo 1:  
Looking west at beginning of project over Wabash River.

Photo 2:  
Looking west at intersection of US 52 and Duncan Road.



Photo 3:  
Looking north at US 52 from Duncan Road.



Photo 4:  
Looking east on US 52  
from Duncan Road.

Photo 5:  
Looking south at US 52  
from Duncan Road.



Photo 6:  
Bridge carrying US 52  
over railroad & 9<sup>th</sup> Street.



Photo 7:  
Railroad bridge over US 52.

Photo 8:  
Looking southwest on Schuyler Avenue from US 52.



Photo 9:  
Looking northwest on US 52 from Schuyler Avenue.



Photo 10:  
Looking southwest at US 52 from Schuyler Avenue.

Photo 11:  
Looking east on US 52 from Schuyler Avenue.



Photo 12:  
Looking east on US 52.



Photo 13:  
Looking northwest on US 52 from O'Ferrall Road.

Photo 14:  
Looking south across US 52 towards Underwood Street.



Photo 15:  
Looking southeast on US 52 from O'Ferrall Road.



Photo 16:  
Looking north on US 52  
towards Beech Lane (end  
of project).

Photo 17:  
Looking north on US 52  
from Beech Lane (end of  
project).



Photo 18:  
Looking south on US 52  
from Beech Lane (end of  
project).