

**Preliminary Engineering Assessment
Prepared For:
INDOT Greenfield District**

**US 31 Roadway Reconstruction
From Beechwood Lane to Mills Avenue**



**Marion County, Indiana
Des. No.: 0100721**

**Prepared By:
American Structurepoint, Inc.
7260 Shadeland Station
Indianapolis, Indiana 46256**

June 7, 2007

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APPENDIX

Appendix A – Graphics (Project location map, topographic project location map, ground-level photographs, proposed typical section, and conceptual plans)

Appendix B – Data and Analysis (Traffic data and forecasts, preliminary pavement design, crash data, and preliminary hydraulic data and recommendation)

Appendix C – Field Check meeting minutes with INDOT Greenfield District

Preliminary Engineering Assessment

Des. No. 0100721
Type of Work: Roadway Reconstruction
Route: US 31 from Beechwood Lane to Mills Avenue
Functional Classification: Urban Principal Arterial
County: Marion County
Posted Speed Limit: 45 mph

PURPOSE OF REPORT

The purpose of this Preliminary Engineering Assessment is to document the engineering assessment phase, including an outline of the proposal for improvements along US 31. This report includes relevant background data associated with the development of this project's recommended improvements. This report provides conclusions and recommendations that will serve as a guide for preparing ongoing environmental studies and succeeding survey and design.

PROJECT LOCATION

This roadway reconstruction project is located on US 31 in Indianapolis, Marion County, within the Indiana Department of Transportation's (INDOT) Greenfield District. The project begins approximately 1.55 miles south of I-465 at Beechwood Lane and continues north to approximately 0.39 miles north of I-465 (R.P. 105+62 to R.P. 107+56, a distance of approximately 1.94 miles). Refer to Appendix "A" for maps further detailing the location of the project.

PROJECT NEED AND PURPOSE

The primary need for this project is the deteriorating pavement condition due to the heavy traffic volumes. Secondary needs for this project include replacing storm sewer system, addressing the lack of pedestrian access along US 31, improving the relatively poor level of service at the intersection of US 31 and Thompson Road, and improving the safety of Ramp "C" from eastbound I-465 to southbound US 31.

The purpose of this project will be to address the deficiencies noted above by improving the roadway proper and enhancing safety.

PROJECT HISTORY, PRIOR STUDIES

In the year 2000, the INDOT Greenfield District submitted a "Mini-Scoping" report to the INDOT Central Office to apply for project approval. On August 16, 2004 a field inspection was conducted in conjunction with INDOT Central Office and the INDOT Greenfield District. In addition, a separate meeting was held on September 10, 2004, with representatives from INDOT Central Office, the INDOT Greenfield District, the local MPO, and Indianapolis DPW in attendance. The meeting minutes for the Field Inspection are included in Appendix "C" of this study.

After approval from the INDOT Central Office, USI Consultants, Inc. was awarded the project and began an engineering assessment. In 2005 the study was halted by INDOT and all of the information was transferred from USI to INDOT's Central Office. In late 2006, the INDOT Greenfield District awarded American Structurepoint, Inc. the project to complete the engineering assessment. Relevant information/findings by USI Consultants, Inc. are included in the appendices of this study.

EXISTING FACILITY

See Appendix A for aerial photographs including street names, existing land use, and conceptual plan, along with ground level photographs of the project site.

This facility serves as a major thoroughfare between Indianapolis and Greenwood.

- **Function:**

This portion of US 31 is classified as an *Urban Principal Arterial* and is not on the National Highway System or the National Truck Network. It is classified as a 3R Route and the state has no plans to relinquish the facility. The posted speed limit throughout the project site is 45 mph.

- **Roadway Cross Section:**

US 31 is a 6-lane facility with three 12'-0" lanes in each direction with curb and gutter and a raised, curbed median that varies in width from 4'-0" to 16'-0". Currently no sidewalks exist adjacent to US 31. Designated left turn lanes, 12'-0" in width, are present both northbound and southbound at all signalized intersections. 12'-0" designated left turn lanes are also present northbound at Beechwood Avenue, Powell Street, and Elbert Street; and southbound at Beechwood Avenue, Gilbert Avenue, Turtle Creek Drive, Stover Avenue, Lawrence Avenue, and Markwood Avenue.

The existing right-of-way width through the project varies from 50'-0" on each side of the centerline of US 31 for a total width of 100'-0" to 85'-0" on each side of the centerline of US 31 for a total width of 170'-0".

- **Existing Pavement Conditions:**

This section of US 31 was originally built in 1941 utilizing Portland Cement Concrete pavement. The original roadway included four 11'-0" lanes (two in each direction). The pavement was resurfaced with bituminous concrete in 1951 and with hot asphalt emulsion in 1966. In 1976, the roadway was widened to three 12'-0" travel lanes in each direction, which is the current roadway cross section. At that time, concrete curb and gutter was installed along with a raised, curbed median varying in width from 4'-0" to 16'-0" to accommodate left turn lanes. The roadway was then resurfaced in 1994, and resurfaced for the last time in 2004.

The existing pavement is in fair to good condition due to the recent resurfacing in 2004. The majority of the curbs, including the raised curbed median, are in poor condition. The curb heights throughout the project limits have been diminished from the resurfacing of US 31. The raised curbed median within the project limits shows signs of wear due to erosion and vehicle encroachment.

- **Cross Streets and Intersections:**

Within the project limits, 12 at-grade intersections exist as well as the interchange with I-465. Four signalized intersections are present within the extent of the project, with exclusive left turn lanes at each. The following is a list of the streets that intersect US 31:

1. Mills Avenue

The Mills Avenue intersection is the first signalized intersection north of the I-465 interchange on US 31 (South East Street). Opposing left turn lanes exist on US 31 (South East Street). The east leg of Mills Avenue has a designated left turn and right turn lane, as well as one through lane. The west leg of Mills Avenue has a designated left turn lane, and a combined thru-right lane. All four quadrants of the Mills Avenue intersection are commercial properties.

2. Markwood Avenue

Markwood Avenue intersects US 31 (South East Street) on the east side and is stop controlled with a single lane approach. Currently, a southbound left turn lane exists on US 31 (South East Street) accessing the residential properties along Markwood Avenue.

3. Lawrence Avenue

Lawrence Avenue also intersects US 31 (South East Street) on the east side. A left turn lane is present for southbound US 31 (South East Street). Lawrence Avenue is stop controlled with a single lane approach and provides access for the adjacent residential properties.

4. Stover Avenue

Stover Avenue intersects US 31 (South East Street) on the east side. A southbound left turn lane exists on US 31 (South East Street) to provide access to the residential properties to the east of US 31 (South East Street). Stover Avenue is stop controlled with a single lane approach

5. Elbert Street

Elbert Street intersects US 31 on the west side. It is the first intersection on US 31 south of the I-465 interchange. It provides right-in/right-out access only for the adjacent commercial and residential properties. Elbert street is stop controlled with a single lane approach.

6. Thompson Road

The Thompson Road intersection with US 31 is the first signalized intersection south of the I-465 interchange. Presently, one designated southbound left turn lane and one designated northbound left turn lane exist on US 31. Thompson Road intersects US 31 at approximately 75 degrees. The west leg of Thompson Road has a designated left turn lane, one thru lane, and one shared thru and right turn lane. The east leg of Thompson Avenue

has a designated left turn lane, two thru lanes, and a channelized right turn lane. A Taco Bell exists in the northwest quadrant, a restaurant is in the southwest quadrant, a CVS is in the southeast quadrant, and a vacant gas station is located in the northeast quadrant.

7. Powell Street / Turtle Creek Drive

Powell Street intersects US 31 on the west side, and Turtle Creek Drive intersects US 31 on the east side. Powell Street and Turtle Creek Drive share a median separation along US 31. Dedicated northbound and southbound left turn lanes exist at this location on US 31. Both Powell Street and Turtle Creek Drive are stopped controlled with a single lane approach. The single lane approach on Powell Street is approximately 20'-0" in width.

8. Epler Avenue

Epler Avenue intersects US 31 at approximately 90 degrees. It is a signalized intersection with opposing designated left turn lanes on US 31. The northwest, northeast, and southwest quadrants of this intersection are commercial properties, whereas, the southeast quadrant is residential. Both the east leg and the west leg of Epler Avenue have a designated right turn lane and a shared thru and left turn lane.

9. Gilbert Avenue

Gilbert Avenue intersects US 31 on the east side at approximately 90 degrees and is stop controlled with a single lane approach. A southbound left turn lane exists on US 31 accessing the primarily residential properties along Gilbert Avenue.

10. Edgewood Avenue

Edgewood Avenue intersects US 31 at approximately 90 degrees. The intersection is signalized with opposing designated left turn lanes on US 31. Both the east and west leg of Edgewood Avenue has a designated right turn lane and a shared thru and left turn lane. The southwest quadrant of this intersection contains a residential property. A church is located in the southeast quadrant. A Sunoco gas station is located in the northwest quadrant, while a commercial development is located in the northeast quadrant.

11. Woodhill Drive

Woodhill Drive intersects US 31 on the west side with a single lane approach. Woodhill Drive is stop controlled with access only being provided to southbound US 31. The land around Woodhill Drive is primarily residential.

12. Beechwood Lane

The Beechwood Lane intersection is the southern most intersection within this project. Beechwood Lane intersects US 31 on the west side at approximately 90 degrees. It is stop controlled with a single lane approach and services the adjacent residential properties. A designated northbound left turn lane is present on US 31. A commercial development exists on the east side of US 31 at Beechwood Lane. A southbound left turn lane exists on US 31 for access to this property.

- **Land Use:**

Existing land use along US 31 is primarily commercial. However, some residential areas are present, primarily along the minor roads.

Multiple utilities were visually observed within the project limits. These utilities include water, gas, storm sewer, sanitary sewer, cable, telephone, and both buried and overhead electric. The designer shall coordinate with the local utility companies during the design stage for verification of utility locations and potential utility conflicts with any proposed work.

- **Bridge Structures:**

There are two bridge structures located within the project limits. Near the southern limits of the project Structure No. 31-49-3357A spans Little Buck Creek. The second bridge structure is Structure No. 31-49-04448A on US 31 over I-465 and Lick Creek.

Structure No. 31-49-3357A over Little Buck Creek is a two span reinforced concrete girder bridge with 40'-0" spans, vertical abutments and wing walls. The original structure was built in 1940, and it was last rehabilitated and widened in 1968 under Contract No. T-7402. The structure has a total out-to-out coping width of 104'-6" and has a skew angle of 30 degrees right. A bridge replacement engineer's report was completed on December 13, 2002 for this particular structure (Des. No. 0100317). Further coordination between the two projects will be needed during the design phase.

Structure No. 31-49-04448A over I-465 and Lick Creek is a 7 span, 375'-0" long reinforced concrete girder structure that was originally built in 1962. It is located at R.P. 107+17 and was last rehabilitated and overlaid in 1986 under Contract No. B-15797.

- **Drainage:**

The existing roadway drainage for the majority project site is collected utilizing inlets along the curb line and an enclosed storm sewer system. The existing drainage is collected by means of open ditches outside the limits of the curb and gutter section and in the areas surrounding the I-465 interchange. The existing storm sewer drainage patterns shall not be affected and shall continue to outlet into Little Buck Creek and Lick Creek. See Appendix "B" for the preliminary hydraulic review.

FIELD CHECK

INDOT conducted a preliminary field inspection on August 16, 2004. American Structurepoint, Inc. conducted a second preliminary field inspection on March 27, 2007. Meeting minutes from both field inspections are located in Appendix "C" of this report.

TRAFFIC DATA AND CAPACITY ANALYSIS

Information provided by the INDOT Traffic Statistics Unit indicates an AADT of 62,060 (2003) from I-465 to Thompson Road, an AADT of 43,660 (2003) from Thompson Road to Epler Avenue, and an AADT of 37,530 (2003) from Epler Avenue to Stop 12 Road. INDOT Traffic Statistics Unit also provided current and projected traffic data for each intersection and each minor road within the project limits. A summary of the traffic data is located in Appendix "B".

The four signalized intersections within the project limits were analyzed using Synchro version 6 to obtain an existing level of service as well as a future level of service. The future level of service was analyzed using the proposed lane configuration shown in the conceptual plan located in Appendix "A". A summary of the findings can be found in the following table, while an expanded version from Synchro is located in Appendix "B".

Level of Service for Signalized Intersections		
Intersection	2005 Level of Service	2028 Level of Service
Edgewood Avenue	B	D
Epler Avenue	B	D
Thompson Road	F	D
Mills Avenue	B	C

CRASH DATA AND ANALYSIS

Crash data within the project limits was obtained from INDOT for years 1997 through 2000 and is summarized in Appendix "B" of this report.

An analysis of the crash data shows that 35% of the 172 total crashes that occurred at intersections within the project limits were right angle collisions. This high percentage of right angle collisions at unsignalized intersections may be caused by the lack of adequate gaps due to the high volume of traffic. A secondary cause of these accidents may be due to the numerous lanes the vehicle needs to cross while entering or exiting US 31 at these locations. The high percentage of right angle collisions at signalized intersections may indicate that there is poor visibility of the signals or that the signals are inadequately timed.

The analysis also shows that 29% of the 172 crashes that occurred at intersections within the project limits were rear end collisions. The rear end collisions that occurred at the unsignalized intersections may be indicative of poor traffic control device visibility, a large number of turning vehicles, or a lack of adequate gaps due to a high volume of conflicting vehicles. The high number of rear end collisions that happened at signalized intersections may indicate that additional turn lanes are needed and/or pavement markings and signage needs to be improved.

Upon analyzing the crash data and examining potential intersection improvements to specifically reduce accidents, it has been determined that the addition of designated right turn lanes in each direction at each signalized intersection, signal modifications, improved sight distance, pavement markings, and signage will all be included as part of the proposed improvements for this project. It has also been determined that the closure of the median crossing at Elbert Street, Powell Street, Beechwood Lane, Lawrence Avenue, Stover Avenue, and Markwood Avenue will minimize potential conflict locations.

IDENTIFICATION OF PROPOSAL

The proposed project will be designed to meet the current INDOT Design Standards for 4R Projects. Chapter 53 ["New Construction/Reconstruction"] of the INDOT Design Manual will be applicable to this project due to the entire pavement replacement of US 31 within the project limits. The design speed for the project will be 45 mph.

The proposed project includes full depth pavement replacement and installation of a new storm sewer system. In addition, new curb and gutter, 6'-0" buffer zone, 5'-0" sidewalks, and a raised concrete median will be constructed throughout this project.

Auxiliary lanes shall be constructed through the Thompson Road intersection, resulting in four northbound and four southbound thru lanes. A second designated left turn lane shall be added at Thompson Road. Dedicated Right turn lanes shall be added at Thompson Road, Edgewood Avenue, Epler Avenue, and Mills Avenue. The existing signalized intersections of Edgewood Avenue and Epler Avenue shall be reconstructed approximately 400'-0" east and west of US 31 to allow for the existing left turn lanes to be better aligned as described in the "Intersection Improvements" section of this report.

The ramp from eastbound I-465 to southbound US 31 shall be reconstructed and changed from a 55 mph design speed to a 45 mph design speed per recommendations from INDOT Greenfield District. The I-465 interchange is not to be reconstructed as part of this project, except for the previously stated eastbound I-465 ramp to southbound US 31. The project also includes the replacement and/or modification of the existing traffic signals and updated signage.

Also included in this the project is the closure of the intersection of US 31 and Elbert Street. Access shall be given to the adjacent properties by the construction of a new access road in the northwest quadrant of the Thompson Road and US 31 intersection. The median crossings for Beechwood Avenue, Powell Street, Markwood Avenue, Lawrence Avenue, Elbert Street, and Stover Avenue shall be closed, thus removing the existing left turn lanes. Beechwood Avenue, Powell Street, Markwood Avenue, Lawrence Avenue, and Stover Avenue shall have only right-in/right-out access to US 31. A conceptual plan is located in Appendix "A" of this report.

Approximately 47 existing driveways have been identified throughout the project limits. Current information from INDOT indicates that all driveways shall be retained. However, the designer shall coordinate with INDOT, the local MPO, and the City of Indianapolis to determine if driveway consolidation is feasible, and if so, at which locations.

Fire protection and school bus routes could be affected by these closures, and input from the IFD and Perry Township Schools regarding this issue should be considered during the design stage. Also, currently IndyGo has no plans to install shelters within the project limits. See Appendix "C" for further details.

- **Design Standards**

Recommended Alternative:	Described in Project Recommendation portion of this report
Geometrics:	Current INDOT Design Standards for 4R Projects INDOT Design Manual, Chapter 55
Lane Widths:	12 ft.
Sidewalk Widths:	5 ft.
Required Sideslopes:	6:1 to Clear Zone; 3:1 Max. to existing ground
Functional Classification:	Urban Principal Arterial
Design Speed:	45 mph
Posted Speed:	45 mph
Terrain:	Level
Horizontal Alignment:	Existing
Vertical Alignment:	Similar to existing
Clear Zone:	10 ft. from edge of travel lane (curbed section)
Stopping Sight Distance:	350 ft.
Intersection Sight Distance:	500 ft. for passenger cars and 610 ft. for single unit trucks
Additional Right-of-Way:	Approximately 4.0 acres of commercial land Approximately 2.1 acres of residential land
Number of Affected Property Owners:	Approximately 63
Project Length:	1.94 miles

- **Proposed Typical Section**

The typical section for US 31 from the beginning of the project to just south of Thompson Road and also from the northern limits of the I-465 bridge to the end of the project will consist of three 12'-0" through lanes in each direction with curb and gutter. A 5'-0" sidewalk separated by a 6'-0" grass buffer zone is proposed throughout this section. A raised concrete median that varies in width from 4'-0" to 16'-0" shall separate the northbound and southbound lanes. At the intersections of Edgewood Avenue and Epler Avenue, a 12'-0" designated left turn lane and a 12'-0" designated right turn lane shall be constructed for both northbound and southbound directions along US 31. Northbound US 31 at Mills Avenue shall include one 12'-0" designated left turn lane and one 12'-0" designated right turn lane.

The typical section from just south of Thompson Road to the southern limits of the bridge over I-465 shall consist of four 12'-0" through lanes in each direction with curb and gutter. A 5'-0" sidewalk separated by a 6'-0" grass buffer zone is also proposed for this section. A raised concrete median that varies in width from 4'-0" to 16'-0" shall separate the northbound and southbound lanes. Southbound US 31 shall include two 12'-0" designated left turn lanes, with a 12'-0" designated right turn lane at the intersection with Thompson Road. Northbound US 31 at Thompson Road shall include one 12'-0" designated right turn and one 12'-0" designated left turn lane.

The typical section for Ramp "C" from eastbound I-465 to southbound US 31 shall consist of one 16'-0" lane with a 4'-0" paved inside shoulder and an 8'-0" paved outside shoulder.

All street approaches, alleys, and drives shall be designed in accordance with INDOT Design Standards. All sidewalks shall be designed to meet current ADA requirements. Refer to Appendix "A" for the conceptual plan and the proposed roadway typical section.

- **Pavement Recommendation**

Full depth pavement replacement is being proposed for this project. The recommended preliminary pavement design thickness is 16" ± 4". The final pavement type and thickness will be determined during the design stage in consultation with the INDOT Pavement Design Engineer. Refer to Appendix "B" for the preliminary pavement design.

- **Vertical and Horizontal Alignment Improvement**

The horizontal alignment along US 31 shall stay the same as the existing horizontal alignment. All minor roads throughout the project shall maintain their existing horizontal alignment.

The vertical alignment shall be designed to accommodate improved drainage and/or to tie-in to the existing ground within the right-of-way for US 31 and all minor roads throughout the project. A similar vertical alignment to that which currently exists is anticipated for this project.

- **Design Exceptions**

No design exceptions are anticipated for this project.

- **Hydraulic Recommendation**

This project shall include the installation of a new storm sewer. Per the preliminary hydraulic review, three bridges were identified and examined for hydraulic adequacy.

Site 1 is the bridge on US 31 spanning both Lick Creek and I-465 (Structure No. 31-49-04448A). The existing 7 span, 375'-0" long reinforced concrete girder structure meets current hydraulic standards and will not be widened or replaced as part of this project.

Site 2 is the bridge over Little Buck Creek. The existing 2 span, 80'-0" long reinforced concrete girder bridge meets current hydraulic standards and will not be replaced as part of this project. An engineer's report entitled US 31 Bridge Replacement over Little Buck Creek (Des. No. 0100317) was completed on December 13, 2002 which involves the replacement of this bridge. Per discussions with the INDOT Greenfield District, Des. No. 0100317 has a ready for contracts (RFC) date of November 15, 2009. Further coordination between the two projects will be required during the design phase.

Site 3 is a bridge over an unnamed tributary of the White River. The existing 5'-0" x 4'-0" concrete culvert does not meet current hydraulic standards and is proposed to be replaced with a 10'-0" x 6'-0" concrete box culvert or similar type structure. Refer to Appendix "B" for the preliminary hydraulic review.

Per Indiana Department of Transportation Field Inspection Minutes dated October 19, 2004, no work shall be proposed on the bridge over I-465 and Lick Creek. Also, according to the above mentioned minutes, construction for Des. No. 0100317 Little Buck Creek Bridge Replacement project should be in conjunction with this project, unless construction for Des. No. 0100721 is pushed out past

the year 2009. Currently, INDOT has an RFC date of May 30, 2011 for Des. No. 0100721. Therefore, no bridge work is proposed for this project.

- **Lighting, Signals, Signage, and Utilities**

The City of Indianapolis owns the street lighting within the project limits. The designer shall coordinate with the City of Indianapolis during the design stage regarding the need for replacing and/or the addition of new lighting within the project limits. No INDOT lighting is included as a part of this project.

Signal work such as loop detection, installation of new conduit, and other modernization is assumed to be required at all signalized intersections. The relocation of the existing signal poles and controller cabinets will be needed with the addition of designated right turn lanes in both the northbound and southbound directions at all signalized intersections within the project limits. The designer shall coordinate further with INDOT to determine the extent of the signal work at each intersection.

Existing signage, included overhead signs, shall be replaced as part of this project.

Underground utilities within the project limits may require relocation due to the proposed construction. The designer is to coordinate with INDOT, the City of Indianapolis, and the utility companies to determine the extent of such impacts and relocations.

- **Intersection Improvements**

Intersection improvements are required at the following intersections:

1. US 31 and Edgewood Avenue

Designated right turn lanes shall be added in both the northbound and southbound direction on US 31 at Edgewood Avenue. The added right turn lanes are proposed to be 12'-0" in width. Edgewood Avenue shall be reconstructed for approximately 400'-0" east and 400'-0" west of US 31. Currently the existing left turn lanes are offset, and the proposed improvements will allow for the existing left turn lanes to be better aligned providing a safer and more efficient movement for those vehicles. Refer to Appendix "A" for the conceptual plan and ground level photos at this location.

2. US 31 and Epler Avenue

Designated right turn lanes shall be added in both the northbound and southbound direction on US 31 at Epler Avenue. The added right turn lanes are proposed to be 12'-0" in width. Epler Avenue shall be reconstructed for approximately 400'-0" east and 400'-0" west of US 31. Currently the existing left turn lanes are offset, and the proposed improvements will allow for the existing left turn lanes to be better aligned providing a safer and more efficient movement for those vehicles. Refer to Appendix "A" for the conceptual plan and ground level photos at this intersection.

3. US 31 and Thompson Road

Designated right turn lanes shall be added in both the northbound and southbound direction on US 31 at Thompson Road. The added right turn lanes are proposed to be 12'-0" in width. In addition, auxiliary lanes shall be constructed on US 31 through the Thompson Road intersection resulting in four northbound and four southbound through lanes. Thompson Road

shall be reconstructed for approximately 600' west and approximately 1000' east of US 31. Three designated left turn lanes shall be added on the west leg of Thompson Road, while dual left turn lanes shall be constructed on the east leg. Designated right turn lanes shall be added in both directions on Thompson Road. Refer to Appendix "A" for the conceptual plan and ground level photos at this intersection.

An engineer's report entitled SR 135 (Thompson Road) Pavement Rehabilitation (Des. No. 0013870) was completed on March 15, 2002 by USI Consultants Inc. Per discussions with the INDOT Greenfield District, Des. No. 0013870 has a ready for contracts (RFC) date of September 15, 2008. Further coordination between the two projects will be required during the design phase.

4. US 31 and Mills Avenue

A designated right turn lane shall be added in the northbound direction on US 31 at Mills Avenue. The added right turn lane is proposed to be 12'-0" in width. Refer to Appendix "A" for the conceptual plan and ground level photos at this intersection.

5. US 31 and Elbert Avenue

The intersection of Elbert Avenue and US 31 shall be closed to traffic. Epler Avenue will remain open, and a new intersection with Bixler Avenue shall be constructed to maintain access to the adjacent residential and commercial properties. Access from US 31 to Epler Avenue shall be maintained through the construction of a new access road off of Thompson Road parallel to US 31 and west of intersection of US 31 and Thompson Road. Refer to Appendix "A" for the conceptual plan and ground level photos at this location.

6. US 31 and Beechwood Avenue, Powell Street, Markwood Avenue, Lawrence Avenue, and Stover Avenue

The existing median crossing and left turn lane on US 31 for each of these intersections shall be removed. Proposed access to US 31 for each of these intersections shall be accomplished through a right-in/right-out movements only. Refer to Appendix "A" for the conceptual plan and ground level photos at these individual intersections.

COST ESTIMATE (Year 2007 Dollars)

Construction Items	
Roadway Construction	\$ 12,990,000
Contingencies (20%)	\$ 1,970,000
Construction Total	\$ 14,960,000
Non-Construction Items	
Engineering	\$ 1,200,000
Right-of-Way	\$ 1,036,000
Non-Construction Total	\$ 2,236,000
PROJECT TOTAL	\$ 17,196,000

ENVIRONMENTAL ISSUES

Based on cursory inspection, it is not anticipated that this project will generate significant social, economical, or environmental impacts. The INDOT Environmental Services Section will further direct the evaluation and preparation of the appropriate environmental document for this project.

It should be noted that the auxiliary lanes that are to be added through the intersection of Thompson Road and US 31 could become classified as "added travel lanes", in which case they would require an air quality review by EPA and IDEM. However, if the auxiliary lanes are in the intersection influence area only, then air quality studies and review may not be required. It is necessary for INDOT to conform to the regional plan regarding ozone and air quality, and the issue concerning "added travel lanes" must be considered so the proper studies are conducted by the local MPO.

The proposed project is to be built with minimal or no right-of-way acquisition and is not anticipated to have significant impacts.

SURVEY REQUIREMENTS

The survey limits for this project will be approximately 2.1 miles in length and extend from 500'-0" south of Beechwood Lane (RP 105+62) to approximately 500'-0" north of Mills Avenue (RP 107+56) along US 31. The survey coverage should extend approximately 25'-0" beyond the existing right-of-way of US 31 or 75'-0" each side of centerline.

A minimum of 500'-0" of survey will be required for each minor road within the project limits. The survey limits will extend 50'-0" either side of the centerline for each minor road. Approximately 1200'-0" of survey will be needed on Thompson Road east of US 31, and approximately 800'-0" will be needed west of US 31. Additional survey will be needed in the northwest quadrant of the US 31 and Thompson Road intersection for the design of the new local access road leading from Thompson Road to Elbert Avenue. The survey will include cross-sections at all drainage structures for upgrading to current standards, along with boundary resolution for all adjacent properties within the project limits.

RIGHT-OF-WAY IMPACTS

Existing plans for US 31 within the project limits were not available from INDOT Central Office. However, it is anticipated that this project will require the acquisition of permanent and temporary right-of-way. Temporary right-of-way will be needed for the construction of driveways throughout the project limits. Approximately 47 existing driveways have been identified throughout the project, not all of which will need temporary right-of-way for construction.

Proposed right-of-way will be needed in the northwest and southeast quadrants of the intersections of Edgewood Avenue and Epler Avenue for the construction of the additional right turn lane. Proposed right-of-way will also be required for the construction of the new local access road west of US 31 between Thompson Road and Elbert Street. Additionally, proposed right-of-way will be needed in all four quadrants of the Thompson Road and US 31 intersection due to the added travel lanes on all four legs. Proposed right-of-way will also be needed in the southeast quadrant of the Mills Avenue intersection for the addition of the right turn lane. There are an estimated 63 properties affected, with a total estimated take of 4.0 acres of commercial land and 2.1 acres of residential land. The project will consist of two definite relocations with three additional potential relocations.

Proposed right-of-way requirements presented in this 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.

TRAFFIC MAINTENANCE DURING CONSTRUCTION

The Greenfield District, along with the city of Indianapolis, have recommended that the US 31 roadway remain open to traffic during construction. This recommendation is being made due to the high volumes of traffic utilizing this section of US 31 as a primary north/south roadway into and out of the city of Indianapolis. For this reason, a detour alternate was discarded from the maintenance of traffic scheme alternates.

Two maintenance of traffic alternatives were investigated for the construction of this project and are listed below.

- **Alternate No. 1 (preferred)**

This alternate will have four lanes, two in each direction, open at all times during construction including left turn lanes at signalized intersections. A minimum of one lane of traffic in each direction shall be maintained at all times on the minor roads.

Phase I of this alternate will include removing the existing curbed median and placing temporary pavement. Traffic will be maintained on east half of US 31, while the west half of US 31 is being constructed. Signals will need to be modified to properly address the movements at each signalized intersection. Ramp "C", eastbound I-465 to southbound US 31, shall be closed to traffic. Vehicles will be detoured to the interchange of I-465 and I-65. The detour will then direct them south on I-65 to Southport Road, then west on Southport Road back towards US 31. This phase will also include the construction of the new local access road in the northwest quadrant of the Thompson Road and US 31 intersection.

Phase II of this alternate will shift traffic over to the newly constructed west side of US 31 while the new pavement is constructed on the east half. During this phase, access to Ramp "D" for vehicles entering onto I-465 from northbound US 31 shall be maintained at all times.

The third and final phase of this alternate will be the construction of the new permanent median. Throughout this alternate, traffic shall be maintained using approved suitable traffic control devices and methods, and access to adjacent properties shall be maintained at all times during construction.

- **Alternate No. 2**

This alternate will have three northbound lanes open at all times during construction on US 31, while detouring the southbound traffic onto parallel SR 135. A minimum of one lane of traffic in each direction shall be maintained at all times on the minor roads.

Phase I of this alternate will include removing the existing curbed median and placing temporary pavement. Traffic will be maintained on east half of US 31, while the west half of US 31 is

being constructed. Signals will need to be modified to properly address the movements at each signalized intersection. Southbound traffic approaching the project would be detoured west on Troy Avenue to SR 135 (South Meridian Street). This phase will also include the construction of the new local access road in the northwest quadrant of the Thompson Road and US 31 intersection.

Phase II of this alternate will shift traffic over to the newly constructed west side of US 31 while the new pavement is constructed on the east half. The detour for southbound traffic mentioned in Phase I of this alternate would still apply for Phase II construction. During this phase, access to Ramp "D" for vehicles entering onto I-465 from northbound US 31 shall be maintained at all times.

The third and final phase of this alternate will be the construction of the new permanent median. Throughout this alternate, traffic shall be maintained using approved suitable traffic control devices and methods, and access to adjacent properties shall be maintained at all times during construction.

The final maintenance of traffic scheme will be evaluated and further determined during the design stage with concurrence from the designer, INDOT Greenfield District, and the city of Indianapolis.

RELATED PROJECTS, CONSISTENCY

The subject project has a ready for contract (RFC) date of May 30, 2011. In addition to this roadway replacement project, there are two projects in the vicinity currently in the INDOT Highway Project Listing (May 2007).

- SR 135 (Thompson Road) Pavement Rehabilitation
Des No. 0013870
RFC: 09/15/08
- US 31 Bridge Replacement over Little Buck Creek
Des No. 0100317
RFC: 11/15/2009

The designer shall ensure to coordinate the construction and maintenance of traffic activities of the subject project with the above referenced projects and other local projects.

COORDINATION

Coordination of the proposed project has been undertaken with the following divisions and district of the Indiana Department of Transportation:

1. Greenfield District (Tom Byrne, Fike Abbasi, Aamir Turk, Matt Beeson, Bill Jarvis)
2. Hydraulics Unit, Design (Crystal Weaver)
3. Pavement Design (Kumar Dave)
4. Traffic Statistics Unit, Roadway Management (Rebecca Black)

RECOMMENDATIONS/CONCLUSIONS/CONCURRENCE

The purpose of this project is to replace the existing full depth pavement. In addition, new storm sewer, new curb and gutter, sidewalks, and raised concrete median will be constructed throughout the project. The proposed project includes replacement and/or modification of existing traffic signals, updated signage, improving the intersection of US 31 and Thompson Road, and improving the safety of Ramp "C" from eastbound I-465 to southbound US 31.

Based upon gathered data, field visits, and the information compiled in this report, it is recommended that US 31 from 1.55 miles south of I-465 at Beechwood Lane to approximately 0.39 miles north of I-465 (R.P. 105+62 to R.P. 107+56) be reconstructed as outlined in the "Identification of Proposal" section of this report. In conclusion, this project will be designed under the current INDOT Design Standards for 4R Projects, clear zone requirements shall be satisfied, traffic shall be maintained by using phase construction as outlined in the "Traffic Maintenance During Construction" section of this report, and no adverse environmental impacts should occur.

INDIANA DEPARTMENT OF TRANSPORTATION
DESIGN DIVISION
INDIANAPOLIS, INDIANA 46204-2228
INTER-DEPARTMENT COMMUNICATION

November 29, 2005

MEMORANDUM

TO: Kevin Knoke
Engineering Assessment Section
Division of Environment, Planning, and Engineering

FROM: Crystal Weaver *CW*
Hydraulics Engineer

SUBJECT: PRELIMINARY HYDRAULICS RECOMMENDATION
Road: US 31, 1.55 miles south of I-465 (Beechwood Lane) to 0.39
miles north of I-465 (Mills Avenue)
Des #: 0100721
County: Marion
Crossing: Lick Creek, Little Buck Creek, and UNT White River

After review of the above noted project, the following hydraulic sizing parameters are recommended:

Lick Creek:

Approximate Drainage Area:	23 mi ²
Approximate Q 100 Discharge:	8800 cfs
Approximate Q 100 Elevation:	708.95 ft
Approximate Q 100 Depth:	13.0 ft
Approximate Area Below Q 100:	710 sq ft
Maximum Allowable Backwater:	0.19 ft
Approximate Grade Raise:	0 ft

Discussion of Structure Sizing and Survey Requirements

The project discussed above involves the US 31 bridge spanning Lick Creek. The existing bridge is a 7 span, 375 foot long concrete structure. It meets current hydraulic standards, so it is recommended that the proposed structure match the existing structure.

Little Buck Creek:

Approximate Drainage Area:	14.8 mi ²
Approximate Q 100 Discharge:	6500 cfs
Approximate Q 100 Elevation:	718.93 ft
Approximate Q 100 Depth:	12.00 ft
Total Approximate Area of Bridge:	965 ft ²
Maximum Allowable Backwater:	0.24 ft
Approximate Grade Raise:	0 ft

Discussion of Structure Sizing and Survey Requirements

The project discussed above involves the US 31 bridge over Little Buck Creek. The existing bridge is a 2 span, 80 foot long concrete structure. It meets current hydraulic standards, so it is recommended that the proposed structure match the existing structure.

Unnamed Tributary of the White River

Approximate Drainage Area:	0.40 mi ²
Approximate Q 100 Discharge:	155 cfs
Approximate Q 100 Depth:	2.60 ft
Approximate Area Below Q 100:	24 ft ²
Maximum Allowable Backwater:	0.73 ft
Approximate Grade Raise:	0 ft

Discussion of Structure Sizing and Survey Requirements

The project discussed above involves the US 31 culvert spanning an unnamed tributary of the White River. The current structure is a 5 foot span by 4 foot rise, with a 5 foot corrugated metal pipe extension on the downstream side. It does not meet current hydraulic standards. It is recommended that the structure be replaced with a 10 foot span by 6 foot rise concrete box culvert. Additional survey will be needed for the retention pond down stream of the structure.

If you have any questions or comments, please contact me at (317) 233-2096

CMW

Cc: file

APPENDIX C
FIELD CHECK MEETING MINUTES

**INDOT Greenfield District – US 31 (Des No. 0100721) Engineering Assessment
Field Check Meeting Minutes**

Meeting Date: March 27, 2007

Location: At project site
Indianapolis, IN

Purpose: Field Check

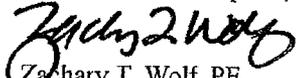
<u>Attendees</u>	<u>Representing</u>	<u>Phone</u>	<u>E-Mail</u>
Tom Byrne	INDOT Greenfield District	317-467-3469	tbyrne@indot.in.gov
Richard J Zielinski	American Structurepoint	317-547-5580	rzielinski@structurepoint.com
Zachary T Wolf	American Structurepoint	317-547-5580	zwolf@structurepoint.com

The following notes reflect our understanding of the discussions and decisions made at this meeting. If you have any questions, additions, or comments, please contact the issuer of these minutes.

- 1 Meeting began at 1:00 p.m. local time.
2. General Items of discussion
 - a Tom Byrne will be the main point of contact for the INDOT Greenfield District
 - b Project Information
 - i. Final Scope due on May 31, 2007 **Structurepoint to verify.**
 - ii Purpose of project is the pavement replacement of US 31 from Beechwood Avenue to Mills Avenue, excluding US 31 northbound and southbound bridges over I-465. Currently, 3 -12' lanes exist with a central raised median that varies in width from 4' to 16'.
 - iii Curb replacement, along with new storm sewer, throughout the project.
 - iv The ramp from I-465 eastbound to US 31 southbound is to be reconstructed with a 45 mph design speed.
 - v New 5' sidewalk with a 6' grass or landscape buffer is to be designed.
 - vi Traffic signal modernization at Thompson Road.
 - vii No new lighting is required. Existing lighting is to be upgraded as necessary.
 - viii Accident data, traffic data, and hydraulic data for the project have been provided.
 - ix An additional thru lane, along with exclusive turn lanes, is to be constructed through to the Thompson Road intersection making it an 8-lane facility in this area.
 - x Elbert Street's access to US 31 shall be closed.
 - xi. Bridge replacement over Buck Creek is to be included **Structurepoint is to follow up with Mr. Byrne to determine if this is still true based on project schedule.**
 - xii Drawings provided by USI Consultants indicate I-465 westbound ramp to US 31 northbound shall be reconstructed **Structurepoint shall contact Gregory Wendling at USI Consultants to verify and discuss the purpose of this work. This was not included in the original mini-scope nor the previous field check minutes.**

- xiii The INDOI Inter-department communication, dated 19 October 2004, was then discussed. The document has been attached to these meeting minutes. It was determined that all items noted in the "Recommendations" section of this document still hold true. **Structurepoint is to verify these recommendations as they scope the project.**
- 3 The meeting adjourned at 2:00 p.m. local time.
- 4. Mr. Zielinski and Mr. Wolf then drove the project and noted the following:
 - a Posted speed limit was noted to be 45 mph throughout the project.

Very truly yours,
American Structurepoint, Inc


Zachary T. Wolf, PE
Project Manager

ZIW:ztw

INDIANA DEPARTMENT OF TRANSPORTATION
INDIANAPOLIS, IN 46204-2228
INTER-DEPARTMENT COMMUNICATION
19 October 2004

MEMORANDUM

TO: Project File

FROM: Kevin Knoke, Highway Engineer II
Engineering Assessment Section
Division of Environment, Planning and Engineering

PROJECT: Des. 0100721 US 31; Pavement Replacement; RP 105+62 to RP 107+56
Beachwood Avenue to Mills Avenue; Marion County

SUBJECT: Field Inspection Minutes

This memo is to confirm that a field inspection was held on 16 August 2004 at the project site. A summary of the minutes is prepared for the record and for all the attendees for their information and comments. The following personnel attended the inspection:

Fike Abbasi	INDOT- Central Office Design
Kumar Dave	INDOT- Materials and Tests
David Butts	INDOT- Central Office Engineering Assessment Section
Kevin Knoke	INDOT- Central Office Engineering Assessment Section
Tom Byne	INDOT- Greenfield District Development

A separate meeting was held with Engineering Assessment and the city of Indianapolis on 10 September, with representatives from the Indianapolis DPW and MPO in attendance. Relevant comments from that 10 September meeting are included in these minutes.

Purpose

The purpose of the field check was to assess the existing US 31 corridor within the limits previously noted. Then, determine need for pavement replacement and define the "scope" of the project and for the purpose of preparing the Engineer's Report. The project has a work category of *Reconstruction (non-I)* and a work type of *Pavement Replacement*.

Existing Conditions

US 31 is currently a six lane facility with a raised curbed median. The existing alignment is essentially tangent and was originally constructed in 1941 as Portland Cement Concrete pavement with four 11' travel lanes (two in each direction). The pavement was resurfaced with bituminous concrete in 1951 and again in 1966 with hot asphalt emulsion. Then, in 1976 the road was widened to three 12' travel lanes in each direction, with concrete curb and gutter, incorporating a 14' wide raised median with left turn lanes. The 1976 widened section is the current roadway cross section.

No sidewalks are present along US 31. US 31 is classified as an *Urban Principal Arterial* and is not on the National Highway System. The route is no longer on the National Truck Network due to parallel I-65. The road is classified as a 3R Route. The state has no plans to relinquish the facility.

Recommendations

- All of the US 31 mainline pavement shall be replaced, including new pavement right up to the US 31 NB and SB bridges over I-465
- The I-465 interchange is not to be reconstructed as part of this project except the I-465 to southbound US 31 ramp as described below
- The project limits are to be Beechwood Avenue to the southern edge of Mills Avenue
- Auxiliary lanes will be constructed through the Thompson Road intersection (resulting in four northbound and four southbound through lanes)
- Right turn lanes on US 31 will be added at Thomson Road, Edgewood Avenue, Epler Avenue, and at all signalized intersections
- Edgewood Avenue and Epler Avenue would be reconstructed for about 400' east and west of US 31 to 'line up' the existing left turn lanes
- The ramp from I-465 to US 31 southbound would be reconstructed and changed from a 55 mph design speed ramp to a **45 mph design speed ramp**. The District reported that the weave for US 31 southbound traffic from I-465 to the left turn lane to eastbound Thompson Road is difficult for motorists to navigate
- An auxiliary lane for southbound US 31 traffic would start at the southern end of the I-465 bridge and continue thru the intersection
- The plan is to let the reconstruction of **DES 0013870 Thompson Road (SR 135) project first** and when completed, then let the subject US 31 project. The two projects should not run concurrently because of the expected traffic impacts. US 31 project will take two construction seasons with a possible construction start date of 2009. **The DES 0100317 Bridge replacement project should be incorporated as part of and constructed at the same time as Des 0100721 unless Des 0100721 is pushed out past 2009.**
- Construction of the proposed backage road at the NW quadrant of the Thompson Road/ US 31 intersection does not appear to have any major issues or concerns. One residential home would be relocated
- **Close Elbert Street access to US 31 entirely.**
- **Closing the median crossings for Powell Street, Beechwood Ave, Lawrence Ave., Stover Ave., Markwood and Elbert Street thus removing the left turn lanes (Lawrence, Powell, Beechwood, Markwood, and Stover will be right in and right out only)** was discussed. Fire protection and school bus routes could be affected and input from the IFD and Perry Township schools regarding this issue should be requested
- Traffic Maintenance:
 - The District and the City would prefer at least four lanes open at all times during construction including left turn lanes at signalized intersections. Pave the median and shift traffic to one side. Then reconstruct and shift the four lanes to the opposite side. The final step would be to install the permanent median
 - An alternate plan would be to have three lanes in the NB direction open the existing US 31 alignment and detour the SB direction traffic on parallel SR 135

Engineering Assessment will look into the one way option further, but the consensus seems to be to have two lanes in each direction open

- Sidewalks:
 - A five foot wide sidewalk separated by a six foot grass or landscaped buffer is recommended by INDOT. The city is in favor of the continuous sidewalks. The sidewalks are necessary. They would improve access to bus stops and would improve pedestrian movements.
 - Provide connectivity to the Thompson Road east-west sidewalks as well as north of the Thompson Road/US 31 intersection on the west side along the frontage road
 - Study the need for pedestrian refuge since select groups can only traverse it half of the width across the street in one phase of the signal. Make sure during capacity analysis that a pedestrian cycle is provided
 - No multi-use path along US 31 is currently in the plan. Indianapolis DPW is to verify this statement
- Air Quality:
 - The auxiliary lanes to be added through the Thompson Road/US 31 intersection could become 'added travel lanes' which would require air quality review by EPA/IDEM. If the lanes are in the intersection influence area only, air quality studies and review may not be required
 - INDOT must have conformity to the regional plan regarding ozone and air quality. This 'added travel lanes' versus 'auxiliary lanes' issue must be considered at the planning programming stage so the proper studies are made by the MPO
- Lighting: The city has a moratorium on lighting and no additional lighting (other than updating lighting already installed) is proposed
- Driveways: Indy MPO requests consolidation of driveways where feasible and INDOT will look into this request but the current proposal is to retain existing access except at Lawrence Ave, Stover Ave. and Elbert Street which are in the I-465/US 31 interchange influence area
- Median type:
 - City requests context sensitive design such as landscaping in context with the area
 - Decorative pavement between sidewalks and curb is possible
 - INDOT needs a public information meeting to solicit information from neighborhood groups
 - **CACs needed?—CACs are not recommended.**
- Drainage/Utilities:
 - Storm sewer drainage flow patterns will not be affected and continue to be outlet into Buck Creek. The city has separate storm and sanitary sewers within the project limits
 - No utility issues were identified within the project limits. City suggests two trunk lines (one on each side of road) for the storm sewer preventing unnecessary laterals which make construction more difficult and future maintenance more costly

- Water quality ordinance & NPDES - will this affect the project and what is the current policy/ requirements?
- Environmental issues
 - None identified at the field check, environmental assessment section to study area and advise regarding wetlands, historic properties, etc.



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RECEIVED
8-20-04

NO SHELTERS PLANNED FOR
U.S. 31 SOUTH (SOUTH EAST
STREET)

August 20, 2004

Mr. Kevin Knoke
Indiana Department of Transportation
100 N. Senate Avenue
Indianapolis, Indiana 46204-2249

RE: IndyGo Shelters and Signage Project
EK # 0400.48.025

Dear Mr. Knoke:

Thank you for your interest in IndyGo's Shelters and Signage program. There are no immediate plans to install shelters on U.S. 31 between I-465 and the southern edge of Marion County. However, we are pleased to work with INDOT in considering the possibility of future shelters in the design of improvements along this corridor.

Pursuant to our discussion this morning, I have attached the ADA requirements for bus stops and shelter sites that we are using for our designs. We recommend that all bus stop designs be constructed to meet these ADA requirements. In addition, I have attached two sample shelter stop designs, which are pending approval.

To meet ADA requirements, a clear zone pad must be constructed at each site with dimensions 5' parallel to the curb and 8' perpendicular to the curb (see Figures 1, 2, 3 attached). This clear zone pad must be paved, clear of all obstructions, on a firm, stable surface with maximum 2% slope perpendicular to the roadway. This pad allows for the lowering of a ramp from the accessible bus fleet and space for a person using a wheelchair to board that ramp. The shelter cannot be placed within this 5' by 8' pad. A sidewalk may, however, run through the pad. Additionally, curb heights between 6" and 9" are necessary for safe deployment and boarding of the wheelchair ramps.