Pleasant Street Feasibility Study

New Bridge Crossing of the White River in Noblesville, Hamilton County

Prepared For:

Hamilton County Highway Department

City of Noblesville

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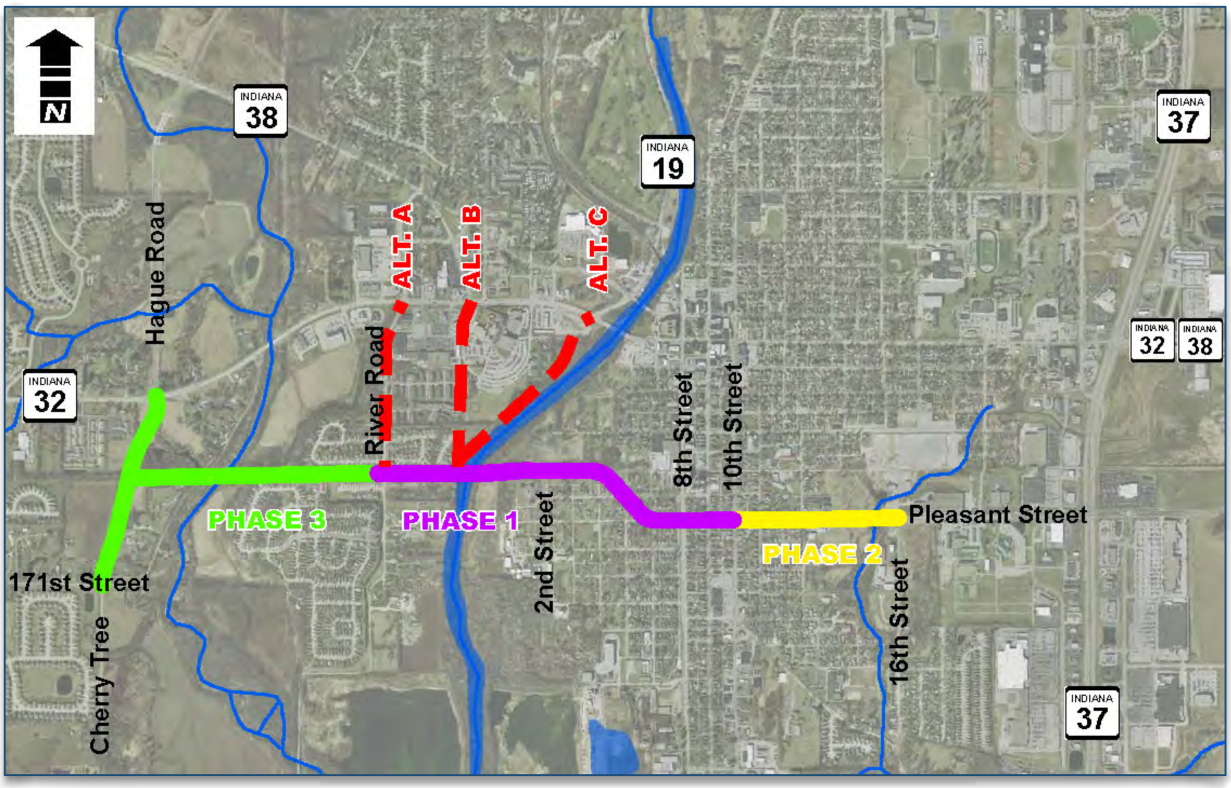
Executive Summary

The purpose of this project is to provide a viable east-west corridor, paralleling SR 32/SR 38 to the south, to relieve traffic congestion in downtown Noblesville. This corridor would also provide an alternate truck route to relocate non-essential truck traffic from downtown Noblesville. This study reviews the findings of the ***Pleasant Street Bridge Analysis*** report, previously prepared by A&F Engineering in 2008, and makes recommendations for implementing a phased Pleasant Street corridor improvement. **Figure ES-1** illustrates the proposed project phasing.

Figure ES-1 | Phases and Alternatives Map



There are a number of principles that guide the direction of this study.

1. The abandoned railroad corridor, in approximate alignment with Pleasant Street, is the only viable location for a new White River crossing. Providing a crossing further south would not draw enough traffic away from the SR 32/SR 38 corridor to serve the project need.

2. The residential parcels near the wastewater treatment plant, recently purchased by the City of Noblesville using Federal Emergency Management Agency (FEMA) funding, have deed restrictions preventing any construction other than an open-space park. There is a narrow

available corridor between these FEMA parcels; however, it is only wide enough for an urban 3-lane roadway section.

3. A 3-lane section provides the ability to pull left turning vehicles out of the mainline traffic, so that the two through lanes operate efficiently. A 3-lane section would provide congestion relief for SR 32/SR 38 and provide an alternate route for trucks without creating a “bypass” situation that could potentially create unintended consequences for downtown businesses. A 3-lane Pleasant Street improvement between 8th Street and 16th Street can also be constructed without requiring total acquisition of all properties along one side or the other.

4. Phase 1 (**Figure ES-1**) is the most critical phase because it allows access between SR 38/SR 32 west of the White River and Pleasant Street, Greenfield Avenue, and Allisonville Road. This provides access to the commercial areas along SR 37 as well as trips associated with the greater Indianapolis area. Phase 1 is the top priority.

5. Phase 2 is the second highest priority. It provides additional benefit for downtown congestion relief and improves access to the commercial areas along SR 37.

6. Phase 3 is a more long-term improvement. While it does not provide as much immediate benefit of reducing congestion in downtown Noblesville, it does provide east-west and north-south connectivity on the west side of Noblesville, and completes the Pleasant Street corridor concept. Alternatives to Phase 3 were also studied (**Figure ES-1**).

Table ES-1 summarizes the planning level costs for each phase.

Table ES-1 | Estimated Costs

Item	Phase 1	Phase 2	Phase 3
Roadway Items	$ 6,600,000	$ 3,600,000	$ 6,900,000
Bridge over White River	$ 2,410,000	N/A	N/A
Bridge over Cicero Creek	N/A	N/A	$ 1,400,000
Utility Relocations	$ 1,350,000	$ 540,000	$ 1,250,000
Subtotal	$ 10,360,000	$ 4,140,000	$ 9,550,000
P.E. and Construction Engineering	$ 2,080,000	$ 830,000	$ 1,910,000
Subtotal	$ 12,440,000	$ 4,970,000	$11,460,000
Right-of-Way Acquisition	$ 4,200,000	$ 1,800,000	$ 1,300,000
Total	**$ 16,700,000**	**$6,800,000**	**$ 12,800,000**

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1.0 Introduction

1.1 Goal of the Study

This study is being developed by Hamilton County, Ind., in coordination with the city of Noblesville. The goal of this study is to review the findings of the ***Pleasant Street Bridge Analysis*** report, previously prepared by A&F Engineering in 2008, and to make recommendations for implementing a Pleasant Street corridor improvement, thereby reducing traffic congestion along the SR 32/SR 38 corridor, especially in downtown Noblesville. This report achieves this goal by:

1. Utilizing TransCAD travel demand modeling to test various phases and/or alternatives to determine how much traffic would potentially be drawn to the Pleasant Street corridor away from the SR 32/SR 38 corridor;
2. Preparing schematic exhibit layouts of the recommended phases;
3. Estimating planning level costs for the recommended phases; and,
4. Prioritizing the order in which to implement the recommended phases.

1.2 Purpose and Need

The town of Noblesville has seen tremendous growth over the past three decades and is the 14th largest community in Indiana (based on 2010 data). U.S. Census data reports that Noblesville had an approximate population of 12,250 in 1980; 17,650 in 1990; and, 51,970 in 2010. Growth has been both residential and commercial in nature. The downtown Noblesville area experiences traffic congestion, primarily along the SR 32/SR 38 corridor.

The purpose and need of the project is to relieve congestion along the SR 32/SR 38 corridor through downtown Noblesville by providing an additional east-west corridor to the south that crosses White River. This corridor would also serve as a truck route. There are currently two White River crossings in downtown Noblesville — one at SR 32/SR 38 and the other at Logan Street. The SR 32/SR 38 river crossing provides two through lanes in each direction and the Logan Street river crossing provides one through lane in each direction. These routes go through the core of downtown, and there is no feasible opportunity to widen these corridors to provide additional traffic capacity. These existing White River crossings, and the SR 32/SR 38 corridor through downtown Noblesville, currently experience congestion and delay during peak periods, and capacity is anticipated to worsen over time.

1.3 Project Location

Figure 1-1, on the following page, illustrates the project location within Noblesville, northeast of Indianapolis, Indiana.

Figure 1-1 | Project Location Map

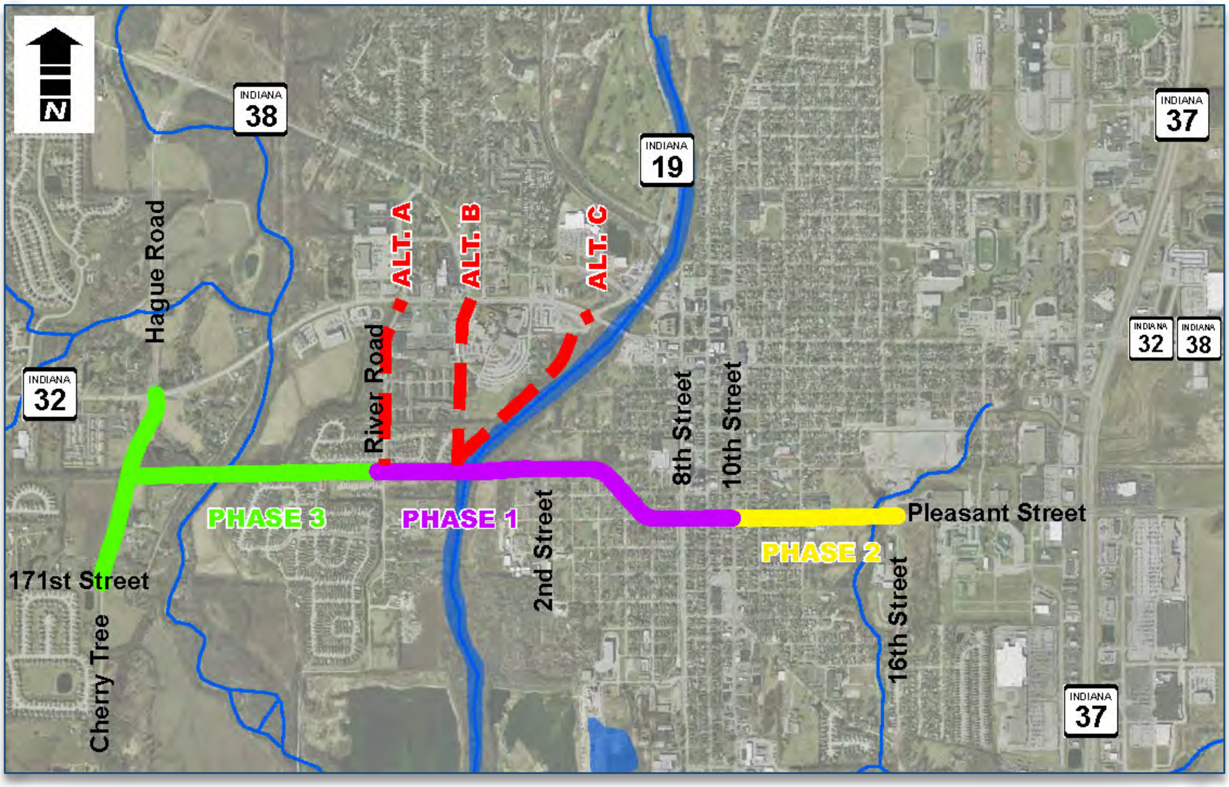
2.0 PHASES AND ALTERNATIVES CONSIDERED

As previously mentioned, the goal of the subject report was to take the various previously studied alternatives from the ***Pleasant Street Bridge Analysis*** report, prepared by A&F Engineering in 2008, and prioritize them based on their ability to reduce traffic along the SR 32/SR 38 corridor in conjunction with their potential impacts and costs.

The No-Build condition, as well as multiple build conditions consisting of three phases and three alternatives, are considered in the subject report. Phases 1, 2, and 3 represent, in prioritized order, the build conditions that are being carried forward for further study and development. Alternatives A, B, and C represent additional north-south corridors on the west side of White River that potentially could provide benefits similar to Phase 3. These have been named as alternatives instead of being named as a phase because they are being eliminated from further consideration for reasons explained later in this report. **Figure 2-1** illustrates the phases and alternatives considered. **Appendix A** contains a map on aerial background of the phases and alternatives investigated in this report.

- **Phase 1:** New-terrain Pleasant Street from River Road to 10th Street including new bridge over White River;
- **Phase 2:** Widening of Pleasant Street between 10th Street and 16th Street from two lanes to three lanes;
- **Phase 3:** New-terrain Hague Road from 171st Street/Cherry Tree intersection to SR 32 and new-terrain Pleasant Street (Phase 1) from Hague Road to River Road, including new bridge over Cicero Creek;
- **Alternative A:** New-terrain Cicero Road along west side of White River from new-terrain Pleasant Street (Phase 1) to the SR 32/SR 38/Cicero Road intersection;
- **Alternative B:** New-terrain north-south connector through hospital parking from new-terrain Pleasant Street (Phase 1) to existing SR 32/SR 38 intersection; and,
- **Alternative C:** Widening of existing two-lane (with turn lanes) River Road to a four-lane (with turn lanes) facility from new-terrain Pleasant Street (Phase 1) to its intersection with SR 32.

Figure 2-1 | Phases and Alternatives Map



2.1 No-Build

The No-Build condition represents the existing condition with no roadway or bridge improvements made to the existing network. The No-Build condition serves as a baseline for comparison of the six build conditions — the three phases and three alternatives — investigated in this report. For any phase or alternative to be viable, it must show an improvement over the No-Build condition and fulfill the purpose and need of the project.

2.2 Phase 1: New-Terrain Pleasant Street from River Road to 10th Street including New Bridge over White River

Phase 1 includes constructing a new terrain two-lane roadway connecting River Road on the west side of White River to 10th Street on the east side of White River. A roundabout is proposed for the west terminus of Phase 1 to promote free-flow along the Pleasant Street corridor. It may be desirable to construct a traditional intersection at the western terminus, until a time when Phase 3 is constructed. More detailed decision-making can be made during the next stage of Phase 1 development.

Phase 1 also includes the construction of a new bridge over White River. The existing narrow, city-owned abandoned railroad right-of-way can be used for the new-terrain Pleasant Street through this section. There is an existing abandoned railroad steel through truss bridge crossing White River at this location. This existing railroad bridge is proposed to be used for a pedestrian pathway as part of an overall greenways plan. While INDOT's Statewide Historic Bridge Inventory does not show the abandoned rail bridge as listed in or eligible for listing in the National Register of Historic Places (NRHP), further study is needed during any National Environmental Policy Act (NEPA) stage of Phase 1 development, which is a requirement if federal funds are used to develop the project. For the purpose of the subject study, it was assumed that the new Pleasant Street Bridge over White River would be constructed adjacent to the existing abandoned railroad bridge and that the railroad bridge would handle all pedestrian traffic.

The portion of Phase 1 east of the new bridge over White River consists of a new-terrain two-lane roadway, with left-turn lanes at public road approaches, on a reverse curve to the south connecting into the existing Pleasant Street/10th Street intersection. This study assumes the new-terrain Pleasant Street intersection with 8th Street would be a traditional signalized intersection, and not a roundabout, due to the close spacing of the public road approaches in this urban-grid area and the existing north-south railroad line along the west side of 8th Street. However, more detailed decision-making can be made during the next stage of Phase 1 development. Some of the existing neighborhood roads in the reverse curve section would be dead-ended. Any existing roads that retain access to the new-terrain Pleasant Street would have two-way stop sign control on the minor street, allowing Pleasant Street to remain free-flow. The reverse curve section would follow an alignment through the neighborhood on the east side of the river, east and southeast of the treatment plant, requiring multiple residential relocations. This section traverses area where the city of Noblesville purchased flood-impacted parcels using Federal Emergency Management Agency (FEMA) funds. The deeds for these FEMA parcels restrict any building, other than open-space parkland, on the parcels. This restriction, and the narrow available right-of-way resulting from it, is why Phase 1 is limited to a two-lane facility instead of a four-lane facility. Further discussion regarding the FEMA flood-purchased parcels can be found in Section 3 of this report. **Appendix B** contains a schematic plan and profile view of Phase 1.

2.3 PHASE 2: WIDENING OF PLEASANT STREET BETWEEN 10TH STREET AND 16TH STREET

Phase 2 consists of the widening of Pleasant Street from 10th Street to 16th Street. Pleasant Street would be widened from two lanes to three lanes, with separate left-turn lanes at the approaches to the intersections from 10th Street to 13th Street and a continuous two-way left-turn lane (TWLTL) between 13th Street and 16th Street. An urban cross-section consisting of combined curb and walk is proposed for the Pleasant Street widening. The widening of Pleasant Street would require some commercial relocations and partial acquisition from other commercial properties. Precise impacts will not be known until the next stage of project development for Phase 2.

The eastern terminus of Phase 2 connects into the proposed new roundabout at Pleasant Street and 16th Street, being constructed with Congestion Mitigation and Air Quality (CMAQ) funding. Widening of Pleasant Street from 16th Street to SR 37 was originally considered; however, this section of Pleasant Street is already three lanes with a TWLTL and additional turn lanes at the SR 37 approach. Any additional widening at the approach to SR 37 should be done as part of an SR 37 corridor upgrade project.

While a three-lane cross section impacts the adjacent properties along Pleasant Street, it does not require the relocation of an entire row of properties along one side of the corridor as a four-lane section would. Four-lane sections, with two lanes in each direction, tend to underperform from a mobility standpoint because any left turning vehicle tends to block the inside through lane of traffic. A three-lane section, with all left-turn lanes pulled out of the through traffic lane, provides almost as much capacity as a four-lane urban section. If left-turn lanes were added to the four-lane section at each public road intersection, the resulting cross-section would resemble a five-lane section, due to the close spacing of the public road side streets. For these reasons, and because new-terrain Pleasant Street is restricted to a two-lane facility in Phase 1 because of the narrow gap between FEMA parcels, this report assumes a three-lane section for Phase 2. **Appendix B** contains a schematic plan and profile view of Phase 2.

2.4 Phase 3: New-Terrain Hague Road from 171st Street to SR 32 and New-Terrain Pleasant Street from Hague Road to River Road including New Bridge over Cicero Creek

Phase 3 consists of an east-west piece and a north-south piece. The east-west piece is the westernmost portion of the new-terrain Pleasant Street that would follow the abandoned railroad corridor and city-owned abandoned railroad right-of-way from new-terrain Hague Road to River Road. The city-owned right-of-way is narrow at 30 feet, and additional right-of-way is required that would result in the relocation of multiple residences immediately west of River Road. Phase 3 also requires a new bridge over Cicero Creek with a geometrically challenging intersection with Cherry Tree Road. The Cicero Creek floodway is relatively wide at this location requiring a long bridge. Similar to Phase 1, there is a potentially historic abandoned railroad steel through truss bridge along the corridor crossing Cicero Creek, requiring additional investigation during the NEPA stage of project development. The north-south piece of Phase 3 consists of new-terrain roadway extending Hague Road from the 171st Street/Cherry Tree Road intersection to SR 32.

Even though Phase 3 is forecast to draw significantly less traffic to the Pleasant Street corridor, away from the SR 32/SR 38 corridor as discussed later in this report, it is being carried forward for further study and implementation. It is more of a long-range improvement than Phases 1 and 2. As the area on the west side of Noblesville continues to develop in the upcoming decades, Phase 3 provides east-west and north-south connectivity for the area. Phase 3 also provides connectivity between the Pleasant Street corridor and the SR 32 corridor on the west side of Noblesville, in a similar fashion as the recently constructed Pleasant Street and Union Chapel Road improvements east of SR 37 provide connectivity to the SR 32/SR 38 corridor on the east side of Noblesville. Phase 3 completes a “southern corridor” paralleling SR 32.

2.6 Alternative A (Eliminated): New-Terrain Cicero Road along West Side of White River

Alternative A consists of a new-terrain north-south roadway along the west side of White River, beginning from a new intersection with the new-terrain Pleasant Street (Phase 1) on the west side of the proposed White River bridge to the existing intersection of SR 32/SR 38 with SR 19 near Riverview

Hospital. Alternative A was eliminated from further consideration due to: 1) environmental impacts and costs associated with constructing longitudinally along the White River floodplain and floodway; 2) challenging intersection geometrics with new-terrain Pleasant Street; and, 3) lack of Alternative A's ability to pull traffic from SR 32/SR 38 through downtown Noblesville, as discussed later in this report.

2.6 Alternative B (Eliminated): New-Terrain North-South Connector through Hospital Parking

Alternative B consists of a new-terrain north-south roadway connecting the new-terrain Pleasant Street (Phase 1) directly to the intersection of SR 32 and SR 38. This alternative cuts through the Riverview Hospital parking and circulation drive and would require significant planning coordination with the hospital's long-range master planning efforts. Alternative B also impacts commercial and residential development and requires a challenging intersection with the new-terrain Pleasant Street within the floodplain at the west end of the new bridge over White River. Even though Alternative B is forecast to perform well, as discussed later in this report, in attracting traffic to the Pleasant Street corridor away from the SR 32/SR38 corridor, it is being eliminated from further consideration due to its impacts to the hospital.

2.7 Alternative C (Eliminated): Widening Existing River Road from New-Terrain Pleasant Street to SR 32

Alternative C consists of widening existing River Road from new-terrain Pleasant Street (Phase 1) to SR 32. Existing River Road consists of two lanes with left-turn lanes or passing blisters at the majority of public road approaches. Alternative C consists of widening River Road to a four-lane section with turn lanes. Alternative C does not perform as well as Phase 3 in attracting traffic to the Pleasant Street corridor and away from the SR 32/SR 38 corridor, as discussed later in this report, and is therefore being eliminated from further consideration. With Phase 3 being a long-range option, Alternative C could become a viable option at a future time if funding for Phase 3 is not available.

3.0 Traffic and Travel Demand Modeling

The previously produced ***Pleasant Street Bridge Analysis*** report, prepared by A&F Engineering in 2008, collected traffic data in the field and prepared traffic capacity analysis for key intersections in the study area. The goal of the subject report is not to re-collect traffic data or redo the capacity analysis of the A&F study; but rather, to re-evaluate and prioritize the various phases and alternatives based on their viability and their ability to draw traffic to the Pleasant Street corridor and away from the SR 32/SR 38 corridor, using industry-accepted travel demand modelling techniques.

3.1 Travel Demand Modeling

This report uses the Indianapolis Metropolitan Planning Organization's (MPO's) regional TransCAD travel demand model, covering the nine-county metropolitan area, as the base for all modeling efforts. The travel demand model contains roadway network information such as existing traffic volumes, number of lanes, posted speed limits, etc. It also contains socio-economic geographic data such as population, land use and zoning information, and employment data. The travel demand model is broken into traffic analysis zones (TAZ), each with its own socio-economic information, and each connected to the overall roadway network. The travel demand model then uses origin-destination (OD) matrices to identify, on a very broad scale, where people reside and were they travel to in order to populate the modelled roadway network with vehicles. Forecasts from the travel demand model are based on the premise that motorists are attracted to the route that requires the least amount of travel time. Travel time is based on travel distance and corridor mobility. Typically, shorter distance trips require less time; however, if there is a longer trip with less congestion, the travel demand model will divert a portion of traffic to that route. There is a point of equilibrium.

The power of the travel demand model is its ability to test various alternatives. A link, such as a new Pleasant Street extension with a new bridge across the White River, can be quickly added to the model to forecast how much traffic would divert from their existing route to use the new route. New links can be added and tested individually or in tandem. This allows the user to look at a long-range corridor, but identify and prioritize individual phases within that corridor, so that funding can be obtained for projects of independent utility to be constructed in a logical manner that provides the most benefit to the motoring public for the cost.

It is important to note that the travel demand model does have limitations. It is common for an end user to see a forecasted traffic volume from a travel demand model and think that this is a precise number that they can base detailed decisions on. It is not, but it is the best tool available for forecasting how a roadway network will perform when new links are added. For example, there currently is no Pleasant Street Bridge over White River. How else, other than through the use of a travel demand model, could the amount of traffic that would be drawn to a new bridge, and drawn away from SR 32/SR 38 through downtown Noblesville, be estimated? Without a travel demand model, the only method would be for a traffic engineer to make educated assumptions regarding how much traffic would divert to a new bridge. In an isolated area with few roadway options, this could be an appropriate approach; however, this would be very difficult to do in a location such as Noblesville, with a well-developed roadway network and regional significance.

3.2 Model Network

The following paragraphs discuss the phases and alternatives tested in the travel demand modelling effort for this study. **Figure 3-1** illustrates the existing base network in the model and represents the "No-Build" condition. **Figure 3-2** illustrates the build options, which include some new roadway links such as the new-terrain option for Pleasant Street from River Road to 10th Street including a new bridge over White River, as well as improvements to some existing roadways such as the widening of Pleasant Street from 10th Street to 16th Street from two lanes to three lanes. Some phases were tested in the travel demand model as stand-alone projects and some were tested in tandem. **Table 3-1** summarizes the forecasted amount of traffic drawn to the tested phase or alternative and drawn away from SR 32/SR 38 in downtown Noblesville. A more detailed summary of projected traffic volumes for all of the links for each option is contained in **Appendix C**. The exhibits in **Appendix C** can be compared side-by-side to help understand how each build option could affect the traffic patterns in the area. All results in this report represent daily traffic for the current year.

Figure 3-1 illustrates the existing roadway network used in the travel demand modelling for this project, which assumes no improvements to existing roads and no new construction. **Figure 3-2** illustrates all of the build options that were tested in the travel demand model – Phase 1, Phase 2, Phase 3, Alternative A, Alternative B, and Alternative C.

Figure 3-1 | No-Build Model Network

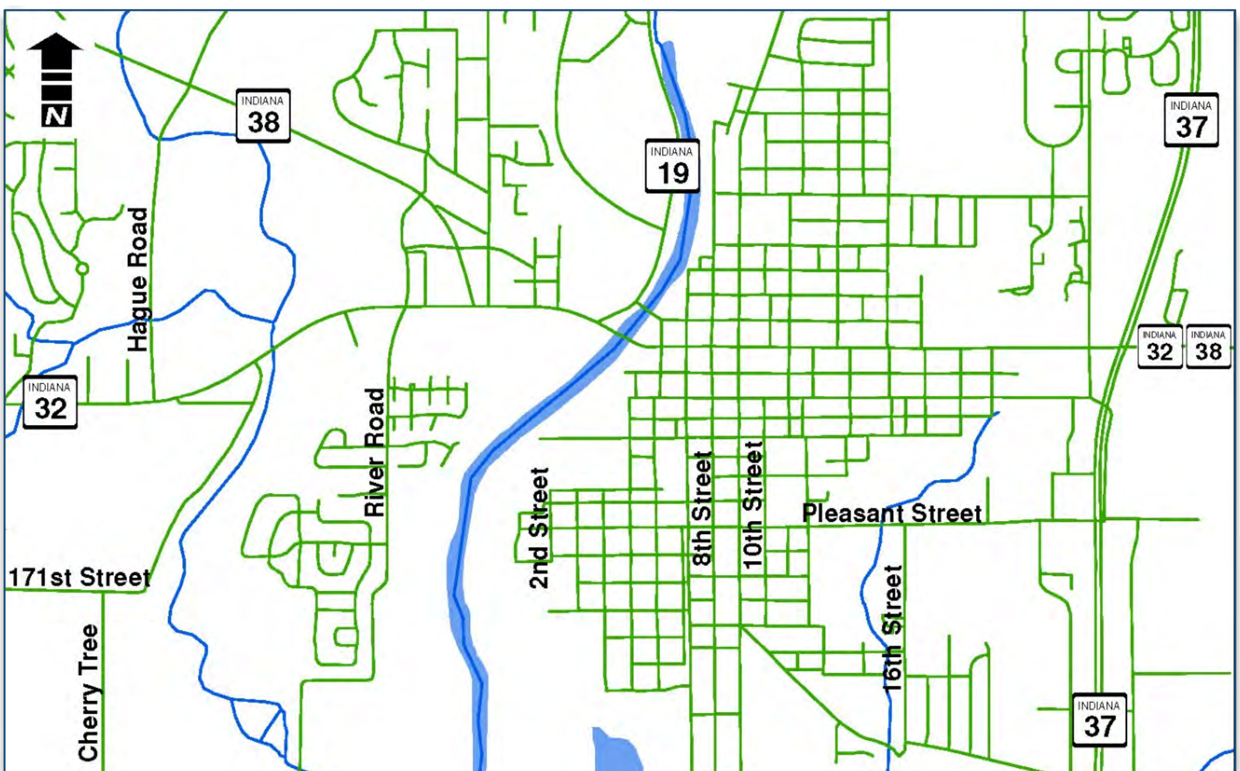
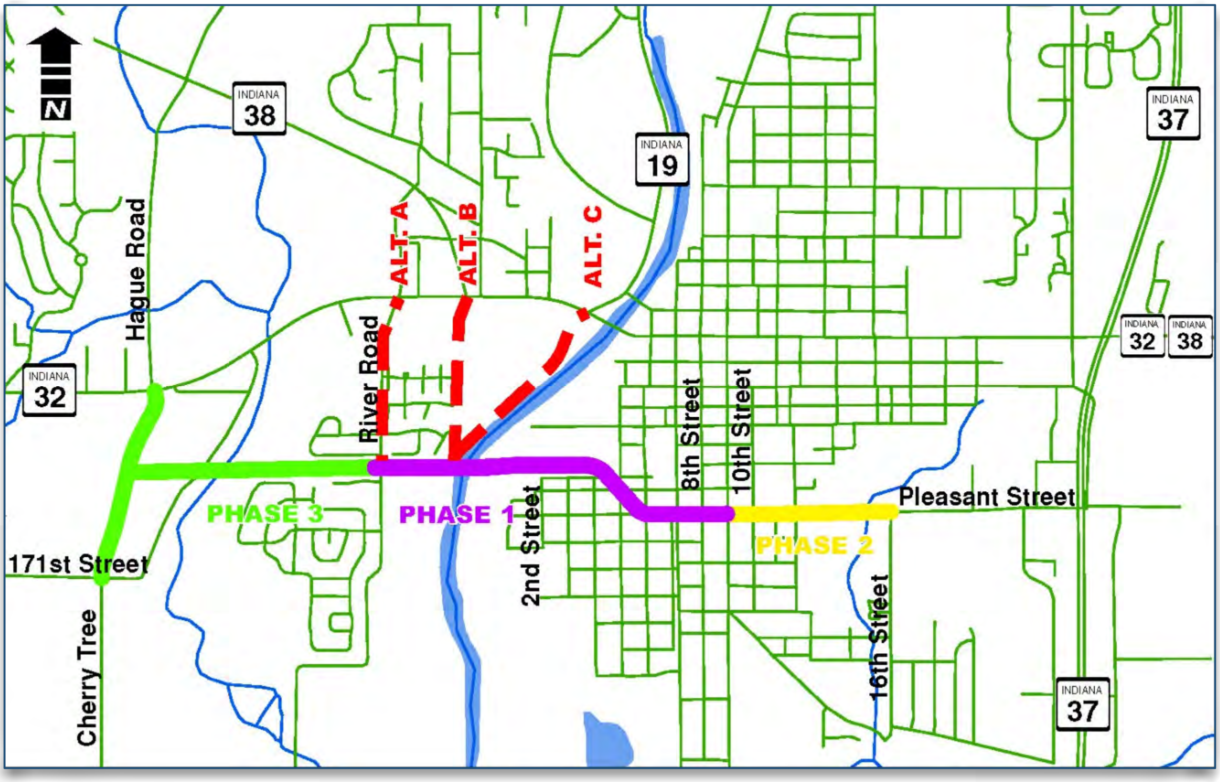


Figure 3-2 | Build Model Network



3.3 Summary of Model Results

Table 3-1 summarizes the travel demand model forecasts of the current year daily traffic volumes for the various phases and alternatives at key locations so that quick comparisons can be made. Each row below the No-Build row represents an individual phase or a combination of phase(s) and/or alternative(s) that can be compared either with the No-Build or with another combination of phase(s) and/or alternative(s). **Appendix C** provides significantly more information than **Table 3-1** and contains forecasted traffic volumes for all of the travel demand model network links for all of the combinations of phase(s) and/or alternative(s) tested. The maps in **Appendix C** can be viewed side-by-side to better understand how each of the phase(s) and/or alternative(s) impacts the traffic forecasts throughout the network.

Row 1, the No-Build row in the table, represents the existing road network and serves as a baseline for the other modelled phase(s) and/or alternative(s). The rows for Phases 1 and 2 represent the forecasts if each of those phases were constructed in isolation, not in tandem. This allows a quick comparison of the benefits of Phase 1 versus Phase 2 to determine which phase to prioritize in the overall construction schedule. Row 4 represents Phases 1 and 2 constructed together. There is no row for the construction of Phase 3 in isolation. This is because Phase 3, by itself, would not reduce traffic on SR 32/SR 38 from downtown Noblesville to SR 37 because Phase 3 is on the west side of White River with no river crossing. Phase 3 is represented in row 5 in tandem with Phases 1 and 2. Rows 6 through 8, below the thick blue line, represent all of the alternatives that were modelled. These alternative all provide a north-south connector between new-terrain Pleasant Street and SR 32, on the west side of White River, and represent potential replacements for Phase 3. All three alternatives modelled are assumed to be constructed in tandem with Phase 1 and Phase 2, for consistency's sake, so that comparisons among Alternatives A, B, and C can be made.

Table 3-1 | Travel Demand Model Forecast Summary

Options	Travel Demand Model Forecasts for Various Phases and Alternatives Current Year Daily Traffic Volumes						
	Pleasant Street					SR 32/SR 38	
	(White River)	(8th to 10th)	Change	(10th to 16th)	Change	(White River)	Change
No-Build	N/A	5,430	N/A	1,580	N/A	28,050	N/A
Phase 1	6,230	8,300	+ 53%	1,750	+ 11%	22,390	- 20%
Phase 2	N/A	12,260	+ 126%	3,020	+ 91%	28,460	+ 1%
Phases 1, 2	8,390	15,700	+ 189%	3,660	+ 132%	21,750	- 22%
Phases 1, 2, 3	10,090	16,170	+ 198%	4,000	+ 153%	19,980	- 29%
Phases 1, 2 w/ Alt. A	7,470	15,910	+ 193%	3,560	+ 125%	22,910	- 18%
Phases 1, 2 w/ Alt. B	14,010	16,710	+ 208%	3,740	+ 137%	16,170	- 42%
Phases 1, 2 w/ Alt. C	9,330	15,780	+191%	3,650	+ 131%	20,690	- 26%

Columns 2 through 6 of **Table 3-1** represent forecasts for Pleasant Street, for the various combinations of phases and alternatives, in three locations: 1) new bridge over White River; 2) widened section between 8th Street and 10th Street; and, 3) and widened section between 10th Street and 16th Street. The two columns to the right of the thick blue line, represent forecasts for SR 32/SR 38 across the White River in downtown Noblesville. Each of the columns, excluding the Pleasant Street over White River, has an associated column to its immediate right that summarizes the forecasted percent increase or decrease for that particular segment of roadway resulting from the phase(s) and/or alternative(s) being modelled. A key goal of the modelling was to test the various phase(s) and/or alternative(s) to determine how much traffic would be attracted to Pleasant Street and how much traffic would potentially divert from SR 32/SR 38. The Pleasant Street over White River column does not have an associated percent increase column because it is new-terrain construction with no existing traffic. It is important to understand that the percent increase is much higher for Pleasant Street than is the percent decrease for SR 32/SR 38 because there is less existing traffic on Pleasant Street and more existing traffic on SR 32/SR 38. Adding a moderate amount of traffic to a low-volume road would result in a higher percent increase than removing a moderate amount of traffic from a high-volume road. For comparing the Pleasant Street forecasted traffic change to SR 32/SR 38 forecasted traffic changes, it may be best to look at overall forecast volumes. The percentages are more useful when comparing how various phase(s) and/or alternative(s) impact either Pleasant Street in isolation or how they impact SR 32/SR 38 in isolation.

3.4 KEY TAKEAWAYS FROM MODEL RESULTS

There are a number of key takeaways from **Table 3-1**.

1. Phase 1, in isolation, is the most effective project to reduce traffic on SR 32/SR 38 (approximate 20% decrease). There are combinations of phase(s) and/or alternative(s) that are forecast to reduce SR 32/SR38 traffic in downtown Noblesville greater than 20 percent; however, these come with additional costs and impacts because they are much bigger projects. The first step to reducing traffic on SR 32/SR 38 through downtown is to construct Phase 1.

2. Phase 2, in isolation, is the most effective project to increase traffic on existing Pleasant Street; however, Phase 2's impact, in isolation, on increasing Pleasant Street traffic is not as dominant as Phase 1's impact, in isolation, on decreasing SR 32/SR 38 traffic. Phases 1 and 2 work well in tandem, with Phase 1 being a higher priority than Phase 2.

3. The travel demand model shows a significant bump in forecasted volumes along Pleasant Street, between 8th Street and 10th Street. Eighth Street and 10th Street are both north-south connectors between downtown Noblesville and the neighborhoods north of Noblesville to Allisonville Road and Greenfield Avenue which provide southerly access to SR 37, I-69, I-465, and the greater Indianapolis area.

4. Because of the observation in Item #3 above, Phase 1 extends east to 10th Street instead of ending at 8th Street, at the point where the new terrain alignment connects into the existing road network.

5. Alternative A is the worst performer of the three alternatives, from a traffic forecasting standpoint. This is likely because it requires backtracking from northeast at the SR 32/Cicero Road intersection southwest along the west bank of White River. This creates a longer trip distance and a longer travel time. Alternative A was eliminated from further consideration.

6. Alternative B performs better than Phase 3 and Alternatives A and C. This is likely because Alternative B provides a direct connection to the SR 32/SR 38 intersection; however, Alternative B was eliminated for reasons previously discussed in Section 2 of this report.

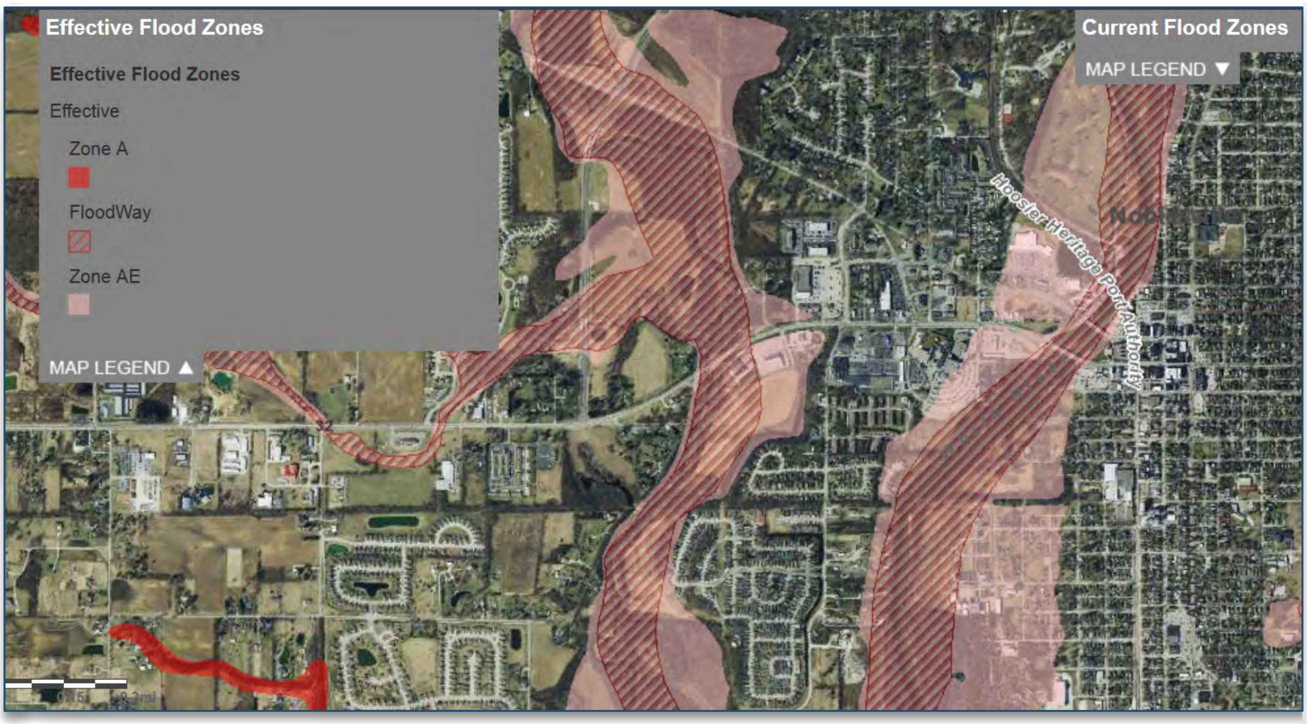
7. Alternative C does not perform as well as Phase 3 and was eliminated from further consideration because it does not provide the same regional connectivity and serve the same long-range needs as Phase 3. However, if Phase 3 is unable to obtain future funding, Alternative C could be reconsidered because it would be feasible to construct with minimal impacts and does provide some overall project benefit.

4.0 Potential Environmental Challenges

4.1 Flood Zones Associated with White River and Cicero Creek

Figure 4-1 illustrates the flood zones associated with White River and Cicero Creek. Construction in Floodway (CIF) permits, containing detailed hydraulic modeling, will need to be obtained from the Indiana Department of Natural Resources (IDNR). Regulatory agencies tend to dislike alternatives that traverse floodways and floodplains in a longitudinal manner. Perpendicular crossings are preferred.

Figure 4-1 | City of Noblesville Flood Zone Map



4.2 FEMA Flood Parcels

As research was conducted for this project, it was discovered that the proposed alignment for Phase 1 traverses a neighborhood where several parcels were purchased by the city of Noblesville using FEMA funding. Coordination with FEMA and the administrator of their statewide program, the Indiana Department of Homeland Security, along with visits to the courthouse, determined that FEMA is extremely unlikely to allow new infrastructure construction on any parcel that was purchased with FEMA funding. Upon further investigation, it was discovered that deed restrictions are also in place on these FEMA parcels preventing any construction other than an open-space park use.

A subconsultant was hired to perform title research at the county courthouse to determine and verify exactly which parcels in this area were purchased by the FEMA flood purchase program. The results of the title search indicate that several parcels in this vicinity (east of the treatment plant) were indeed purchased with FEMA money; therefore, a new terrain roadway alignment cannot traverse these parcels. The proposed new terrain alignment was then reassessed and the curve radii of the reverse curve were tightened up to a 40 mph design speed. This is an appropriate posted speed for the area, and it allows the roadway to be constructed without impacting any of the FEMA flood parcels. The schematic exhibits in Appendix B illustrate the location of the FEMA parcels.

4.3 Potentially Historic Railroad Bridges

There are two abandoned through truss bridges along the abandoned Conrail Railroad corridor that are impacted by this study. One of the abandoned railroad bridges crosses White River and the other crosses Cicero Creek. These two bridges have been investigated for their historical significance, and details for both structures are listed below. This data was obtained from **http://bridgehunter.com/**. Neither of these bridges are listed in the INDOT *Statewide Historic Bridge Inventory*; however, formal Section 106 historic properties investigation should be initiated during the NEPA stage, if federal funding is used to implement Phase 1 or Phase 3. If either of the bridges are determined to be eligible for listing in the NRHP, Section 106 and Section 4(f) procedures must be followed to assess impacts and negotiate appropriate mitigation measures.

4.3.1 Abandoned Through Truss Bridge over White River


Photo Credit: www.bridgehunter.com

The abandoned through truss bridge along the abandoned Conrail Railroad corridor crossing White River was built in 1893. The railroad was abandoned in 1982 and the tracks have been removed. The right-of-way along the railroad corridor was purchased by the Indiana Transportation Museum 1986, who had plans to rebuild the line one day. In 1991, the City of Noblesville purchased the old rail line. The bridge approach slabs were removed several years ago. Although this bridge is abandoned, it is intact. Consideration should be given to repurposing the bridge, which can be relocated, and then could serve as a bridge crossing along an existing or future pedestrian trail. Additional information about this structure can be found at: http://bridgehunter.com/in/hamilton/bh42650/.

4.3.2 Abandoned Through Truss Bridge over Cicero Creek


Photo Credit: www.bridgehunter.com

The abandoned through truss bridge along the abandoned Conrail Railroad corridor crossing Cicero Creek was built in ca. 1890s. The railroad was abandoned in 1982, and the tracks have been removed. The right-of-way along the railroad corridor was purchased by the Indiana Transportation Museum 1986, who had plans to rebuild the line one day. In 1991, the City of Noblesville purchased the old rail line. The bridge approach slabs were removed several years ago. Although this bridge is abandoned, it is intact. Consideration should be given to repurposing the bridge, which can be relocated, and then could serve as a bridge crossing along an existing or future pedestrian trail. Additional information about this structure can be found at: http://bridgehunter.com/in/hamilton/bh42651/.

5.0 NEW BRIDGE OPTIONS

5.1 New Bridge over White River

Table 5-1 summarizes the three options investigated for new-terrain Pleasant Street over White River.

Table 5-1 | White River Bridge Options

Option	Spans	Girder Type	Girder Height	Structure Width	Structure Plan Area	Cost ($ per Sq. Ft.)	Total Cost
1	(2) - 155'	Built-up Steel I Girder	57"	41'	12,710	$210	$2,700,000
2	(2) - 155'	Concrete Bulb Tee 66"x49"	66"	41'	12,710	$190	$2,410,000
3	(3) - 105'	Concrete Bulb Tee 48"x49"	42"	41'	12,915	$190	$2,450,000

Each of the three options have a structure width of 41 feet and an approximate length of 310 feet. Option 1 is a two-span built-up steel I girder structure. With only one pier, this option would have similar impact to White River as compared to the existing railroad structure. This is the most expensive of the three options at $2.70 million. Option 2 has a similar span arrangement as compared to Option 1 but utilizes pre-stressed concrete girders instead. This is the least expensive of the three options at $2.41 million. Option 3 is a three-span pre-stressed concrete girder structure. This option would require additional impacts to White River with the second pier. This option is slightly more expensive than Option 2 at $2.45 million due to the addition substructure unit. Considering the lower cost and minimal impacts to the waterway, Option 2 is recommended.

5.2 New Bridge over Cicero Creek

Table 5-2 summarizes the three options investigated for new-terrain Pleasant Street over Cicero Creek.

Table 5-2 | Cicero Creek Bridge Options

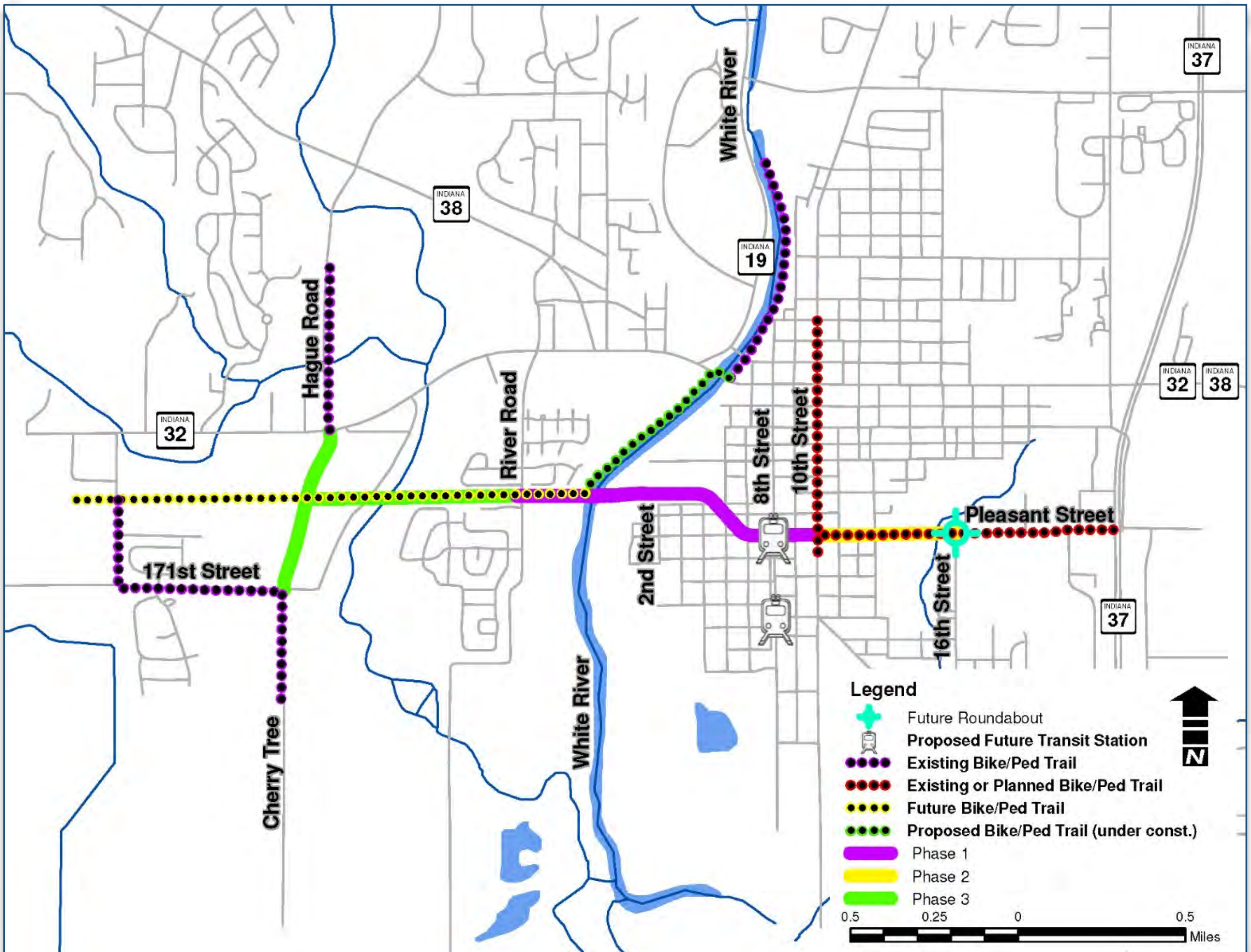
Option	Spans	Girder Type	Girder Height	Structure Width	Structure Plan Area	Cost ($ per Sq. Ft.)	Total Cost
1	(1) - 175'	Built-up Steel I Girder	70"	41'	7,175	$210	$1,510,000
2	(2) - 90'	Concrete AASHTO Type IV	54"	41'	7,380	$200	$1,480,000
3	(2) - 90'	Concrete Bulb Tee 42"x49"	42"	41'	7,380	$190	$1,400,000

Each of the three options have a structure width of 41 feet and an approximate length of 180 feet. Option 1 is a single-span built-up steel I girder structure. Without a center pier, this option would have minimal impacts to Cicero Creek. This is the most expensive of the three options at $1.51 million. Option 2 is a two-span pre-stressed concrete girder structure. With only one pier, this option would have similar impact to White River as compared to the existing railroad structure. This option is slightly more expensive than Option 3 at $1.48 million due to addition girder lines. Option 3 is similar to Option 2, but uses a more structurally efficient concrete girder which translates to cost savings. This is the least expensive of the three options at $1.40 million. Considering the lower cost and minimal additional impacts to the waterway, Option 3 is recommended.

6.0 Other Planned Projects in the Area

Figure 6-1 illustrates the other planned projects in and near the study area. This does not include any potential SR 37 upgrade.

Figure 6-1 | Other Planned Projects in the Area



7.0 PLANNING LEVEL COST ESTIMATES

The costs in Table 7-1 are planning level estimates. Roadway costs are based on per-lineal-foot unit costs for two-lane and three-lane developed from roadway items including excavation, subgrade treatment, aggregate, asphalt layers, sidewalk, curb and gutter, pipe, inlets, and manholes. A 20 percent contingency was then applied to these typical road items, and additional costs for signalized intersections, roundabouts, building demolition, and MSE walls were added. Bridge costs are based on a unit cost per square foot of bridge deck, based in the type of structure. Utility relocation costs are difficult to estimate during the planning phase; therefore, an assumed 15 percent of construction cost amount was assumed for each phase. The 15 percent is a typical assumed amount for roadway construction in an urban setting.

Right-of-way costs are also difficult to estimate during the planning phase. True impacts will not be known until the design phase, and final offer amounts will not be known until appraisals are complete. For this report, right-of-way costs were estimated by taking the assessed value from the Hamilton County Geographic Information System (GIS) for each impacted parcel and bumping it up 20 percent to estimate a replacement value. This is a straight-forward method for total acquisitions. For partial acquisitions, this value was prorated based on the approximate percentage of that parcel being acquired. An additional cost of $25,000 was assigned to each impacted parcel to cover land acquisition services such as deed research, appraising, and buying.

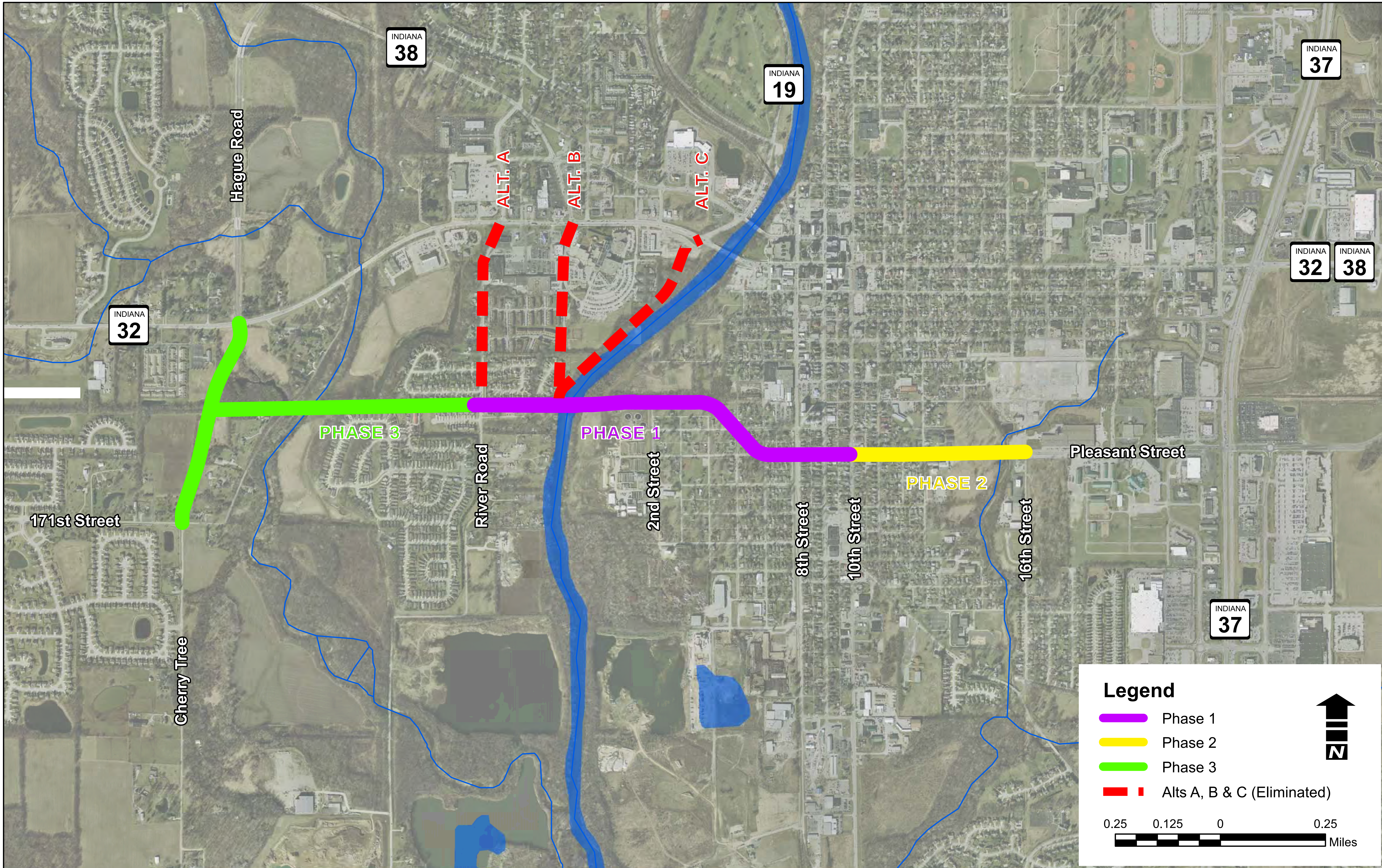
Preliminary Engineering, including survey and design, and construction engineering, including construction inspection, were an assumed 20 percent of the total combined construction cost, utility relocations, and right-of-way acquisition costs.

Table 7-1 | Estimated Costs

Item	Phase 1	Phase 2	Phase 3
Roadway Items	$ 6,600,000	$ 3,600,000	$ 6,900,000
Bridge over White River	$ 2,410,000	N/A	N/A
Bridge over Cicero Creek	N/A	N/A	$ 1,400,000
Utility Relocations	$ 1,350,000	$ 540,000	$ 1,250,000
Subtotal	$ 10,360,000	$ 4,140,000	$ 9,550,000
P.E. and Construction Engineering	$ 2,080,000	$ 830,000	$ 1,910,000
Subtotal	$ 12,440,000	$ 4,970,000	$11,460,000
Right-of-Way Acquisition	$ 4,200,000	$ 1,800,000	$ 1,300,000
Total	**$ 16,700,000**	**$6,800,000**	**$ 12,800,000**

APPENDIX A

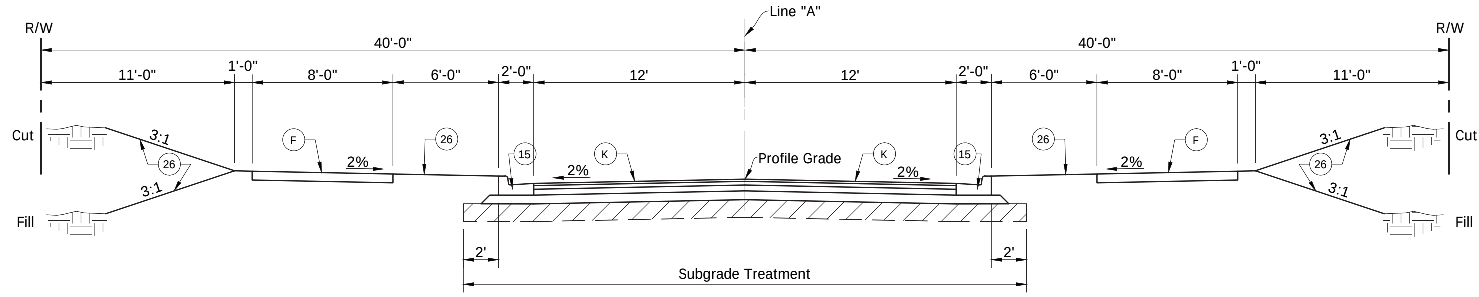
Mapping



INDIANA 38
INDIANA 19
INDIANA 37
INDIANA 32
INDIANA 32
INDIANA 38
INDIANA 37
Hague Road
ALT. A
ALT. B
ALT. C
PHASE 3
PHASE 1
PHASE 2
Pleasant Street
171st Street
River Road
2nd Street
8th Street
10th Street
16th Street
Cherry Tree
Legend
Phase 1
Phase 2
Phase 3
Alts A, B & C (Eliminated)
N
0.25 0.125 0 0.25
Miles

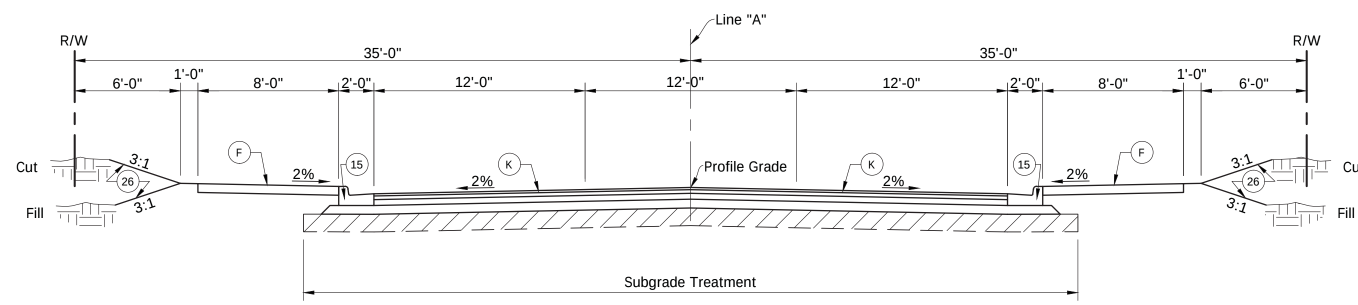
APPENDIX B

Preliminary Plan and Profiles



TYPICAL TWO LANE SECTION

Scale: 1" = 5'



TYPICAL THREE LANE SECTION

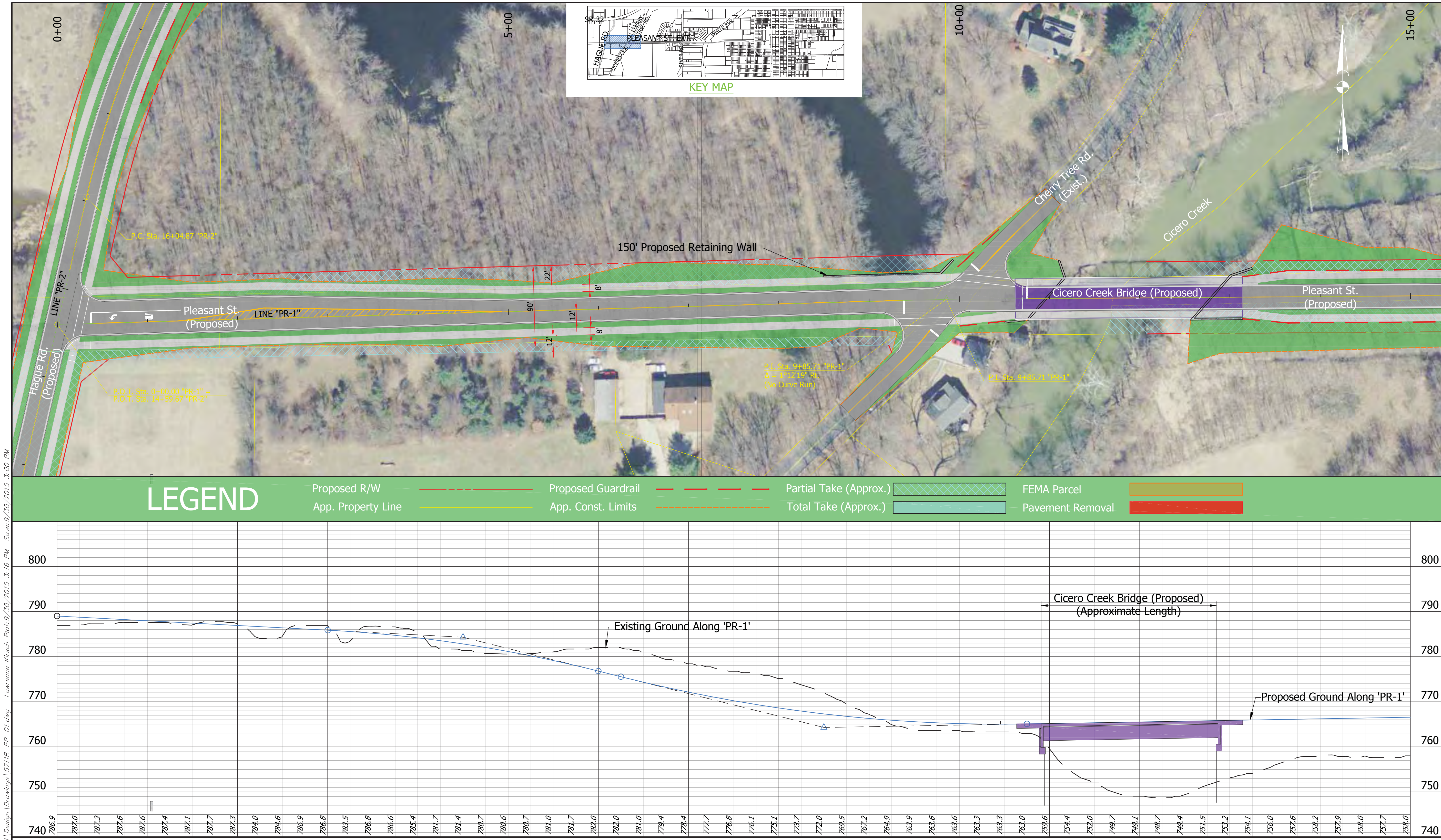
Scale: 1" = 5'

LEGEND

- F Asphalt Path, 8'-0"
- K HMA Pavement: Subgrade Treatment Type
- 15 Combined Conc. Curb & Gutter, Type II
- 26 Nursery, Sodding

RECOMMENDED FOR APPROVAL: DESIGN ENGINEER DATE	PLEASANT STREET CORRIDOR STUDY TYPICAL SECTIONS	HORIZONTAL SCALE: AS NOTED VERTICAL SCALE: N/A	BRIDGE FILE DESIGNATION
DESIGNED: KW DRAWN: LK CHECKED: ACE CHECKED: ACE	Headquarters 8450 WESTFIELD BLVD., SUITE 300 INDIANAPOLIS, IN. 46240-8302 TEL 317-713-4615 FAX 317-713-4616 www.BFSEngr.com BF&S Butler Fairman Seufert CIVIL ENGINEERS Branch Locations: FORT WAYNE 260-459-1532, LOUISVILLE 502-593-1996, LAFAYETTE 765-423-5602, MERRILLVILLE 219-769-2333, PLAINFIELD 317-839-3242	SURVEY BOOK CONTRACT	SHEET 01 OF 10 PROJECT

BFS NO. 5711



RECOMMENDED FOR APPROVAL:	DESIGN ENGINEER	DATE
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CHECKED:	CHECKED:	

PLEASANT STREET CORRIDOR STUDY
LINE 'PR-2'
PLAN & PROFILE

Headquarters
8450 WESTFIELD BLVD., SUITE 300
INDIANAPOLIS, IN. 46240-8302
TEL 317-713-4615
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FORT WAYNE	260-459-1532
JEFFERSONVILLE	812-285-0590
LAFAYETTE	765-423-5602
MERRILLVILLE	219-769-2333
PLAINFIELD	317-830-3242

HORIZONTAL SCALE	BRIDGE FILE
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VERTICAL SCALE	DESIGNATION
1" = 10'	
SURVEY BOOK	SHEET 1 OF 10
CONTRACT	PROJECT 5711

BFS NO. 5711

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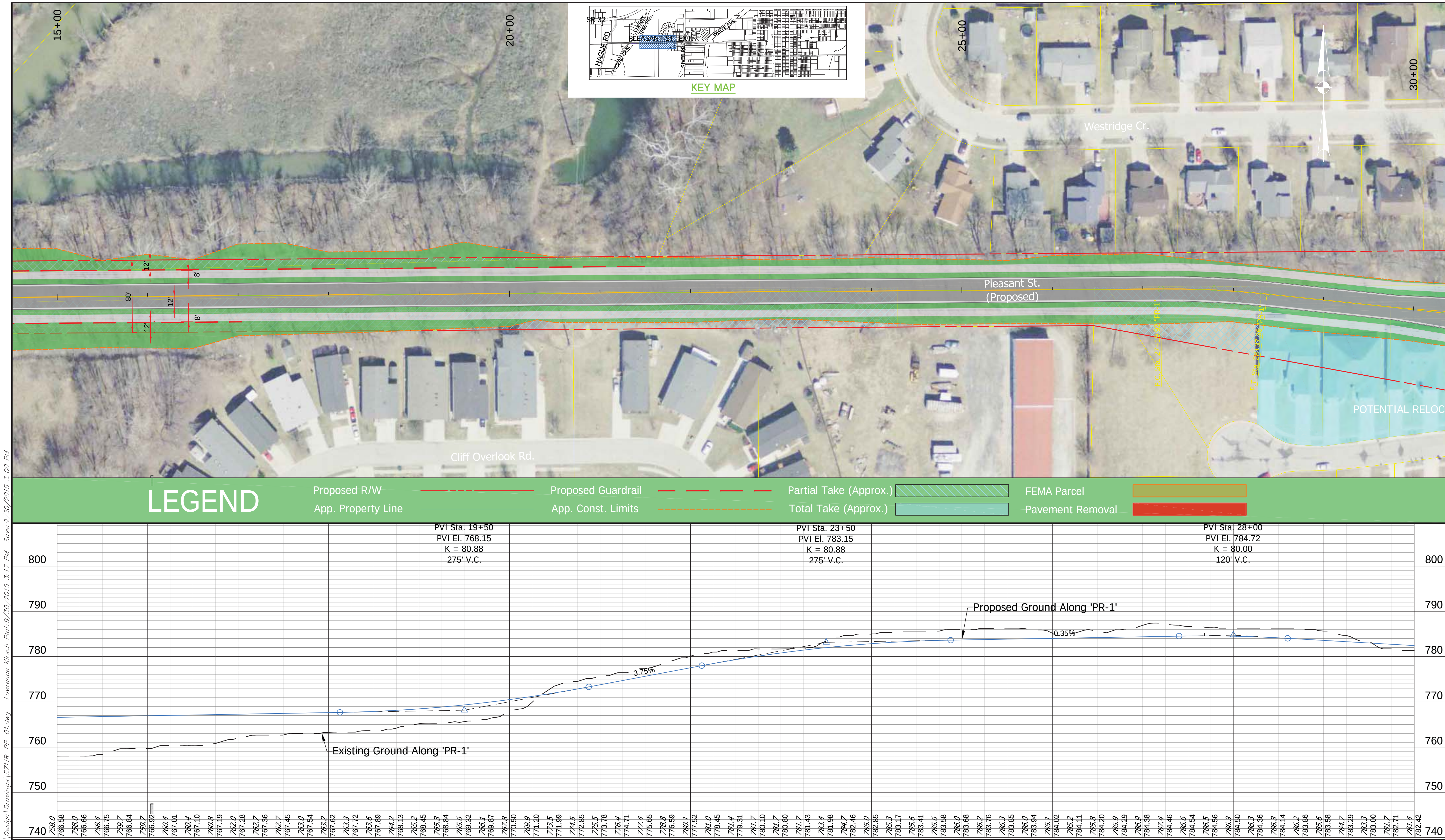

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DESIGNED: DRAWN: LPK CHECKED: CHECKED:	Headquarters 8450 WESTFIELD BLVD., SUITE 300 INDIANAPOLIS, IN. 46240-8302 TEL 317-713-4615 FAX 317-713-4616 www.BFSEngr.com Butler Fairman Seufert CIVIL ENGINEERS Branch Locations FORT WAYNE 260-459-1532 JEFFERSONVILLE 812-285-0590 LAFAYETTE 765-423-5602 MERRILLVILLE 219-769-2333 PLAINFIELD 317-839-3242	SURVEY BOOK CONTRACT	SHEET 2 OF 10 PROJECT 5711

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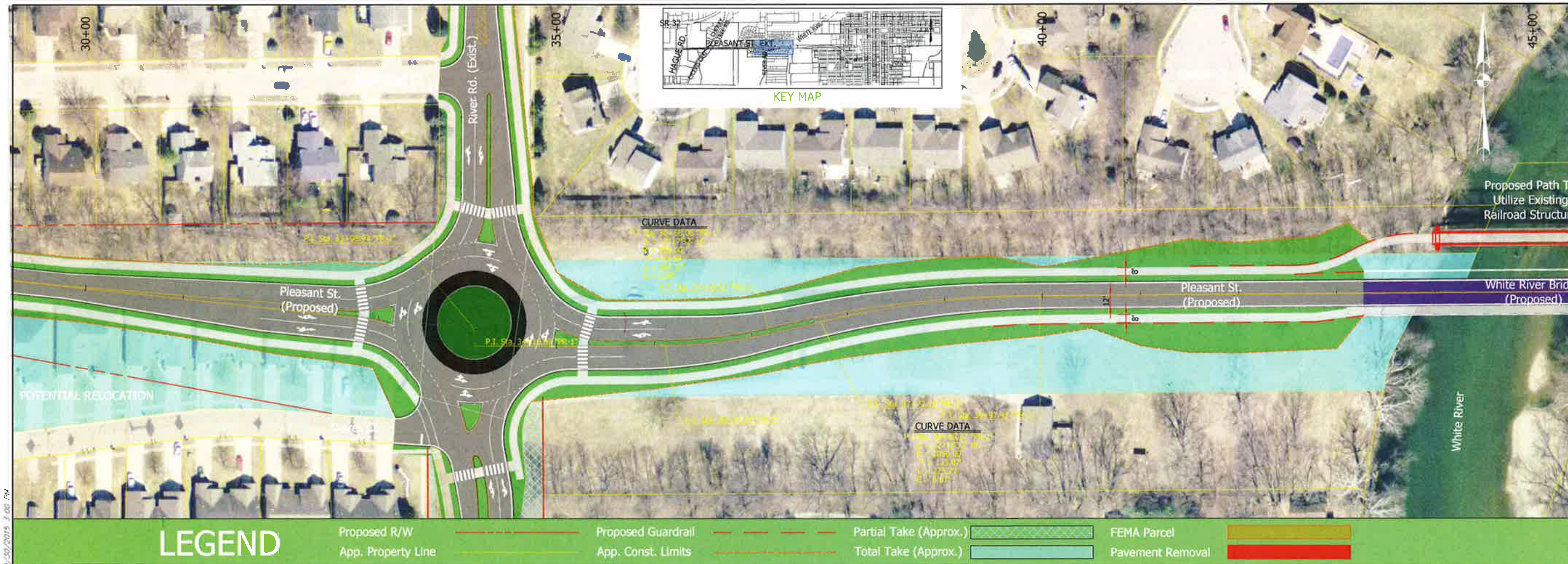

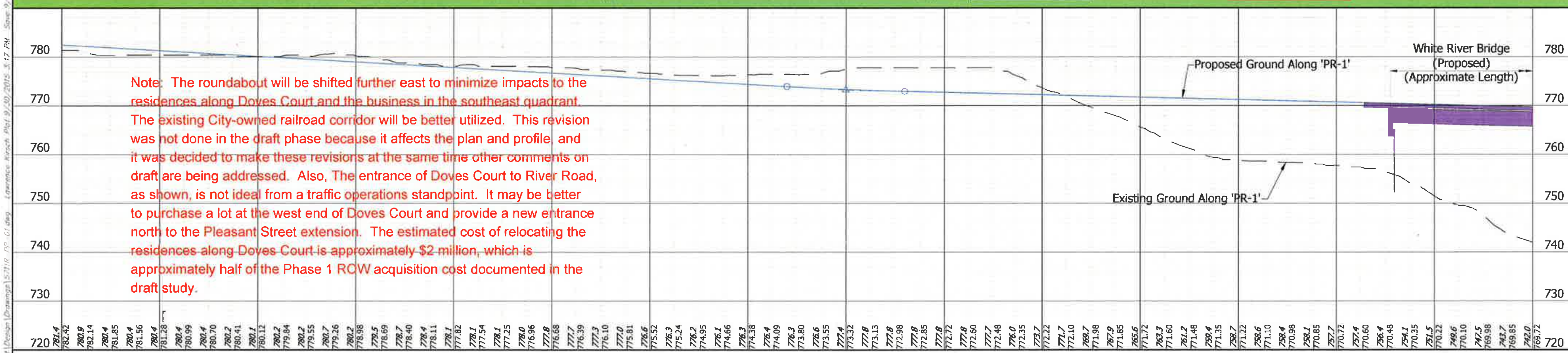

Note: The roundabout will be shifted further east to minimize impacts to the residences along Doves Court and the business in the southeast quadrant. The existing City-owned railroad corridor will be better utilized. This revision was not done in the draft phase because it affects the plan and profile, and it was decided to make these revisions at the same time other comments on draft are being addressed. Also, The entrance of Doves Court to River Road, as shown, is not ideal from a traffic operations standpoint. It may be better to purchase a lot at the west end of Doves Court and provide a new entrance north to the Pleasant Street extension. The estimated cost of relocating the residences along Doves Court is approximately $2 million, which is approximately half of the Phase 1 ROW acquisition cost documented in the draft study.

RECOMMENDED FOR APPROVAL: DESIGN ENGINEER DATE

DESIGNED: DRAWN: LPK

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PLEASANT STREET CORRIDOR STUDY
LINE 'PR-2'
PLAN & PROFILE

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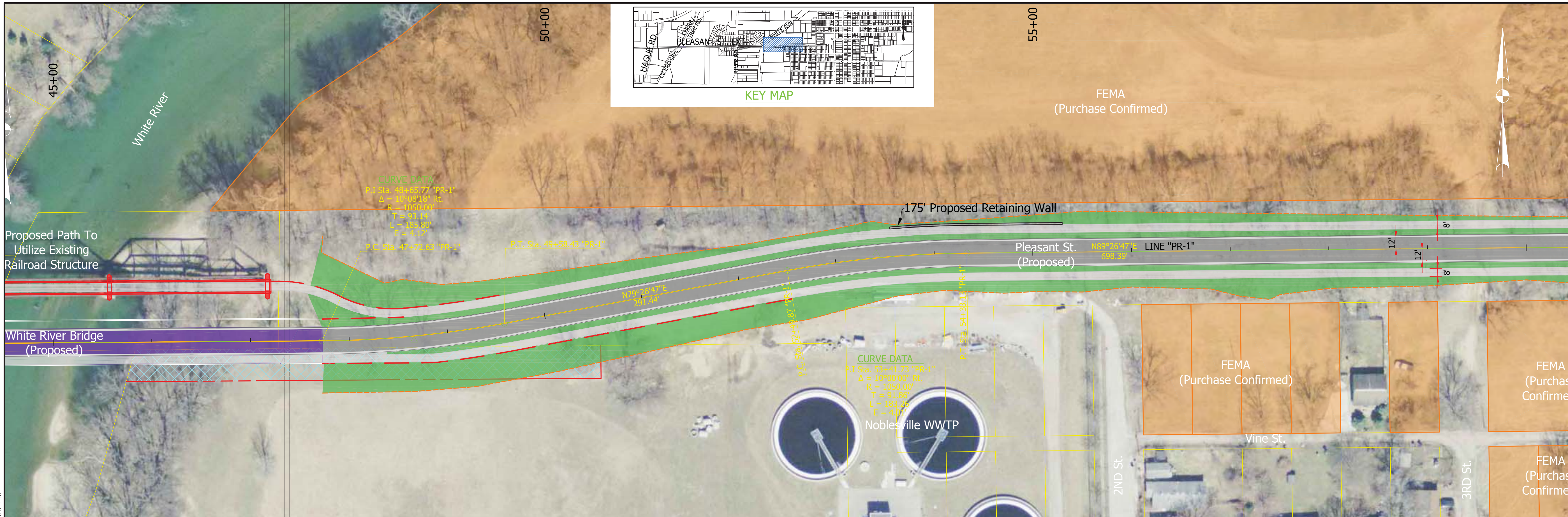
HORIZONTAL SCALE 1" = 50'	BRIDGE FILE
VERTICAL SCALE 1" = 10'	DESIGNATION
SURVEY BOOK	SHEET 3 OF 10
CONTRACT	PROJECT 5711

BFS NO. 5711



LEGEND

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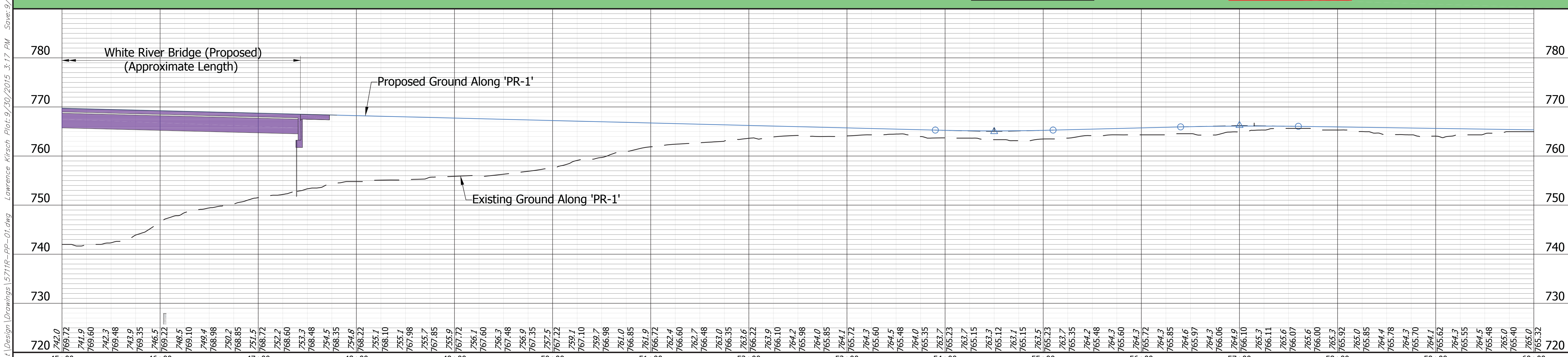
App. Property Line		App. Const. Limits		Total Take (Approx.)		Pavement Removal	



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PLEASANT STREET CORRIDOR STUDY
LINE 'PR-2'
PLAN & PROFILE

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HORIZONTAL SCALE	1" = 50'	BRIDGE FILE	
VERTICAL SCALE	1" = 10'	DESIGNATION	
SURVEY BOOK		SHEET	4 OF 10
CONTRACT		PROJECT	5711

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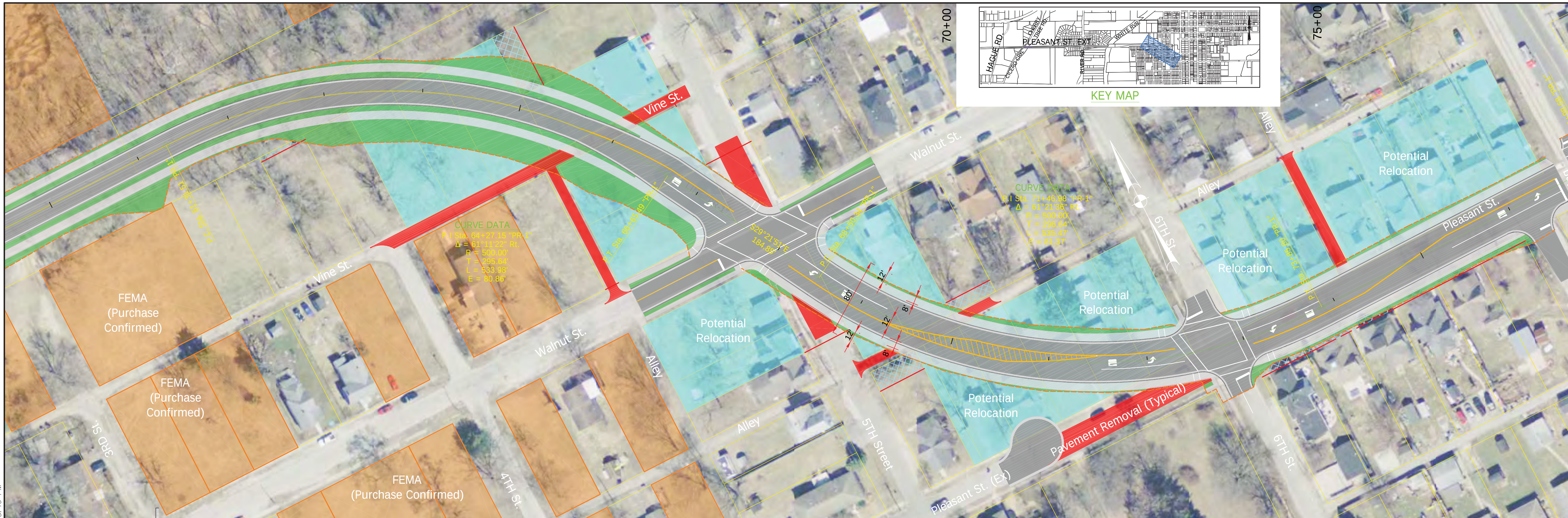

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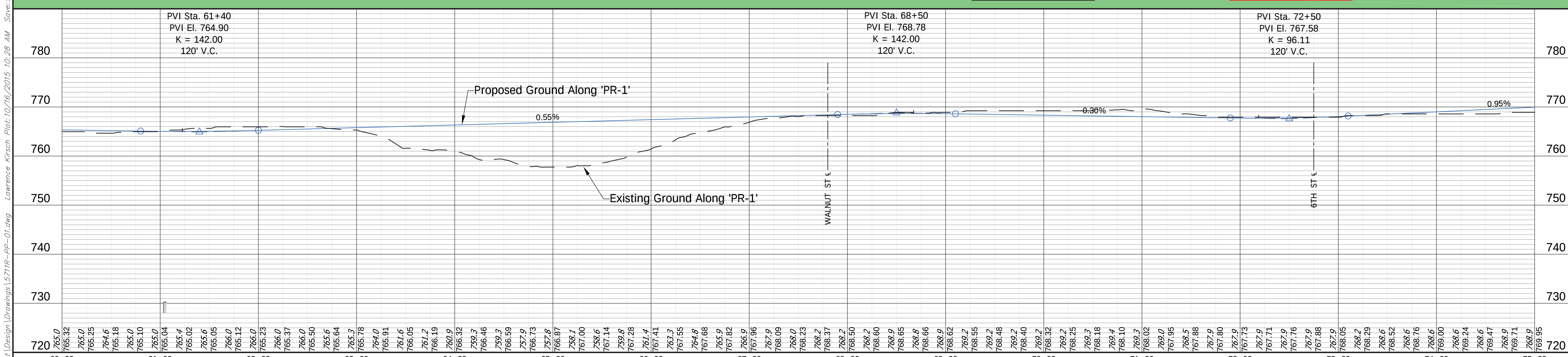
Proposed R/W	Proposed Guardrail	Partial Take (Approx.)	FEMA Parcel
App. Property Line	App. Const. Limits	Total Take (Approx.)	Pavement Removal



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DESIGNED: DRAWN: LPK CHECKED: CHECKED:	Headquarters 8450 WESTFIELD BLVD., SUITE 300 INDIANAPOLIS, IN. 46240-8302 TEL 317-713-4615 FAX 317-713-4616 www.BFSEngr.com Butler Fairman Seufert CIVIL ENGINEERS Branch Locations FORT WAYNE 260-459-1532 JEFFERSONVILLE 812-285-0590 LAFAYETTE 765-423-5602 MERRILLVILLE 219-769-2333 PLAINFIELD 317-839-3242	SURVEY BOOK / SHEET 5 OF 10 CONTRACT / PROJECT 5711

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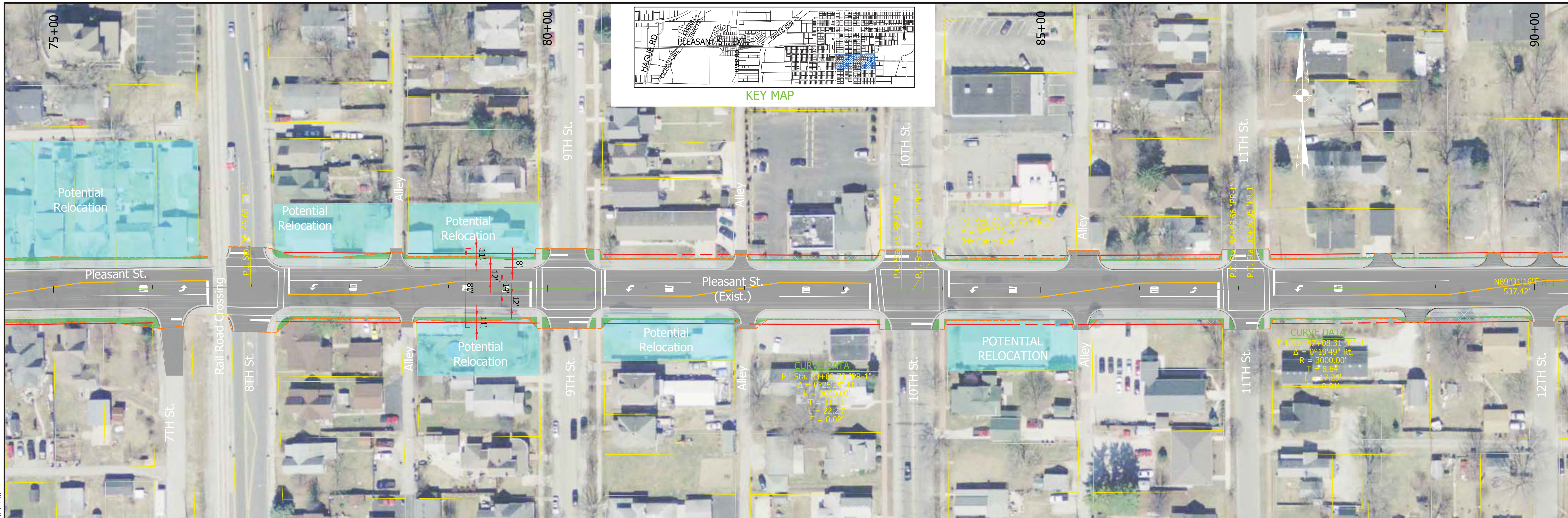

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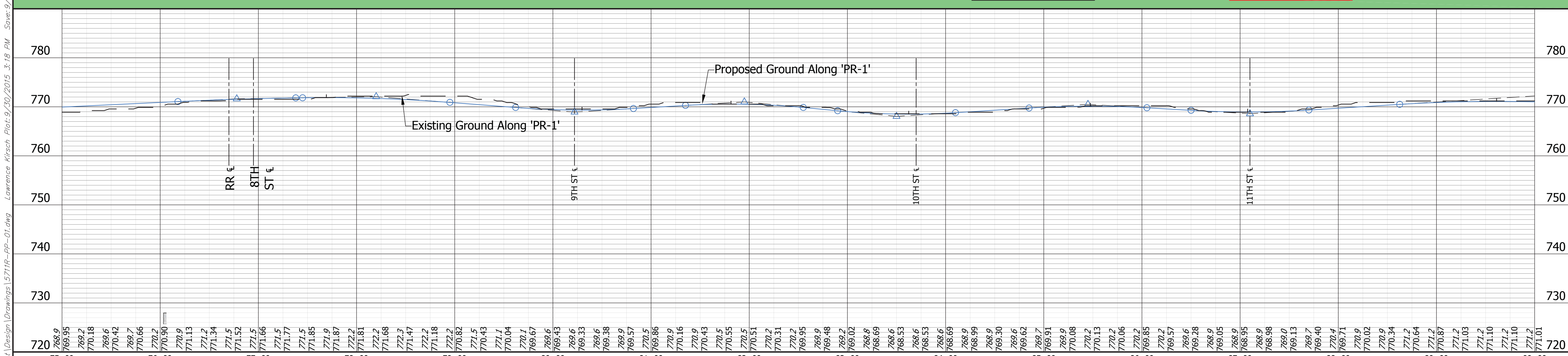

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		VERTICAL SCALE 1" = 10'	DESIGNATION
DESIGNED: DRAWN: LPK	Headquarters 8450 WESTFIELD BLVD., SUITE 300 INDIANAPOLIS, IN. 46240-8302 TEL 317-713-4615 FAX 317-713-4616 www.BFSEngr.com	SURVEY BOOK	SHEET 6 OF 10
CHECKED: CHECKED:	Butler Fairman Seufert CIVIL ENGINEERS	CONTRACT	PROJECT 5711

Branch Locations
FORT WAYNE 260-459-1532
JEFFERSONVILLE 812-285-0590
LAFAYETTE 765-423-5602
MERRILLVILLE 219-769-2333
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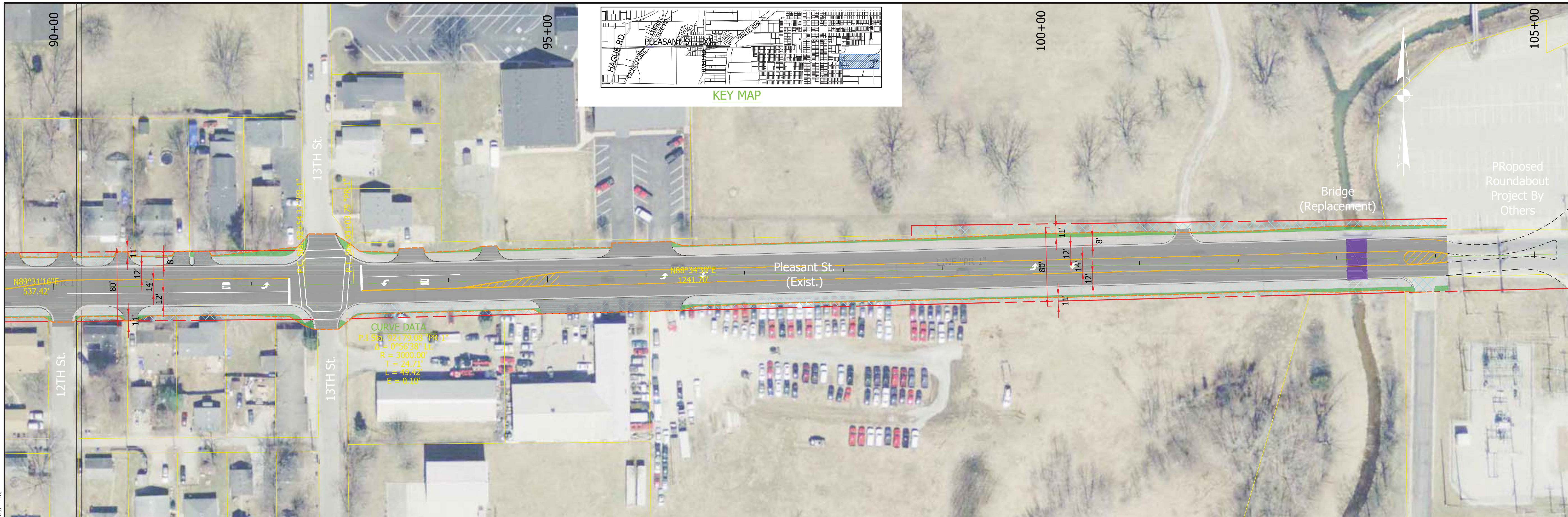

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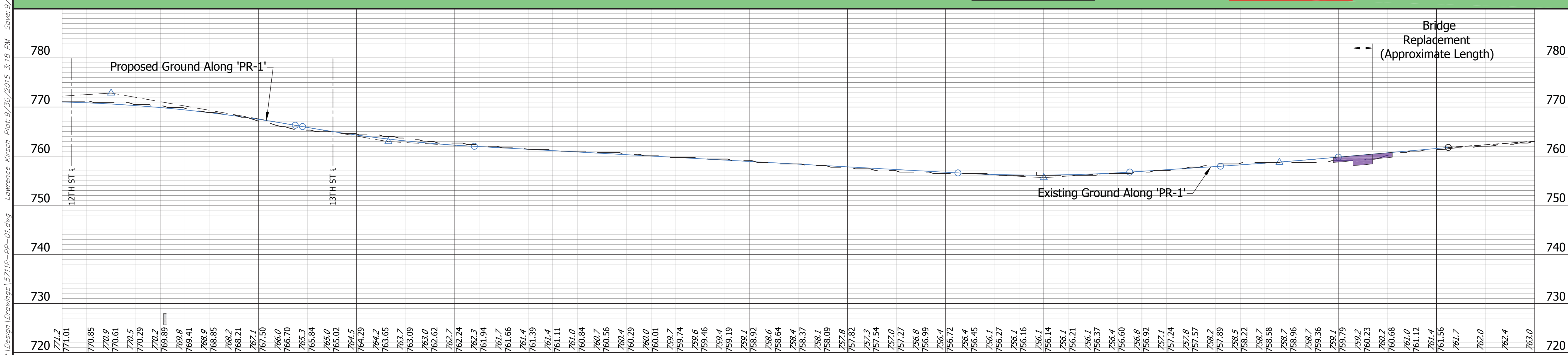
Proposed R/W	Proposed Guardrail	Partial Take (Approx.)	FEMA Parcel
App. Property Line	App. Const. Limits	Total Take (Approx.)	Pavement Removal



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PLEASANT STREET CORRIDOR STUDY
LINE 'PR-2'
PLAN & PROFILE

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HORIZONTAL SCALE	BRIDGE FILE
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VERTICAL SCALE	DESIGNATION
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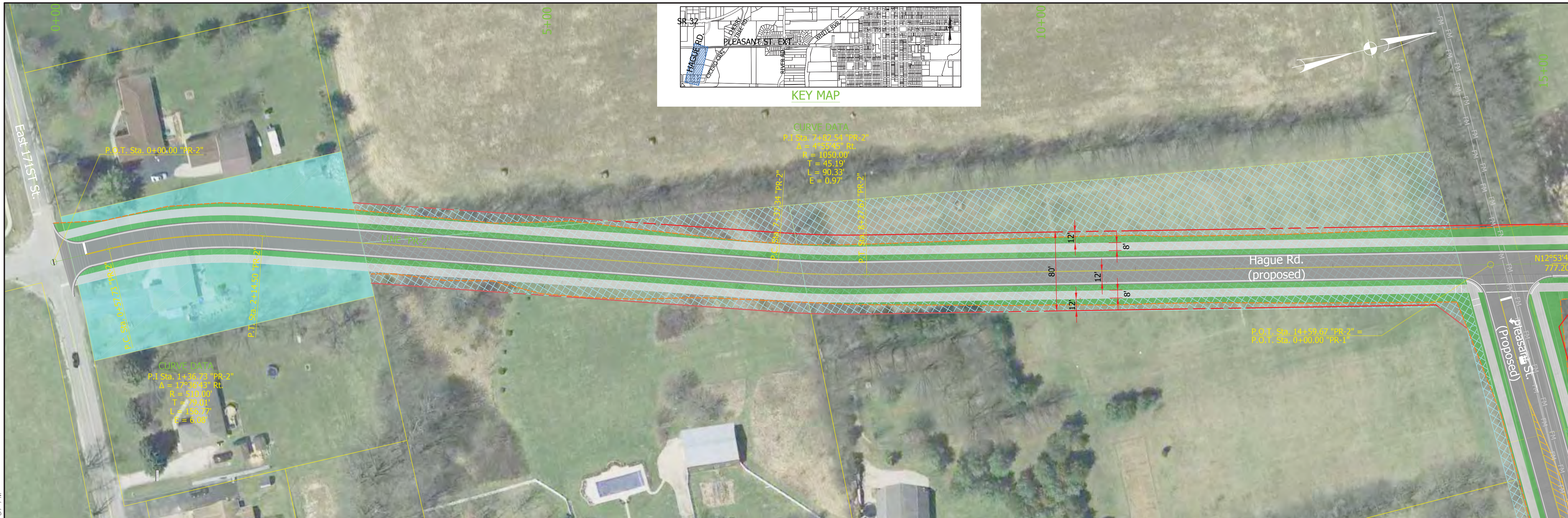
SURVEY BOOK	SHEET 7 OF 10
CONTRACT	PROJECT 5711



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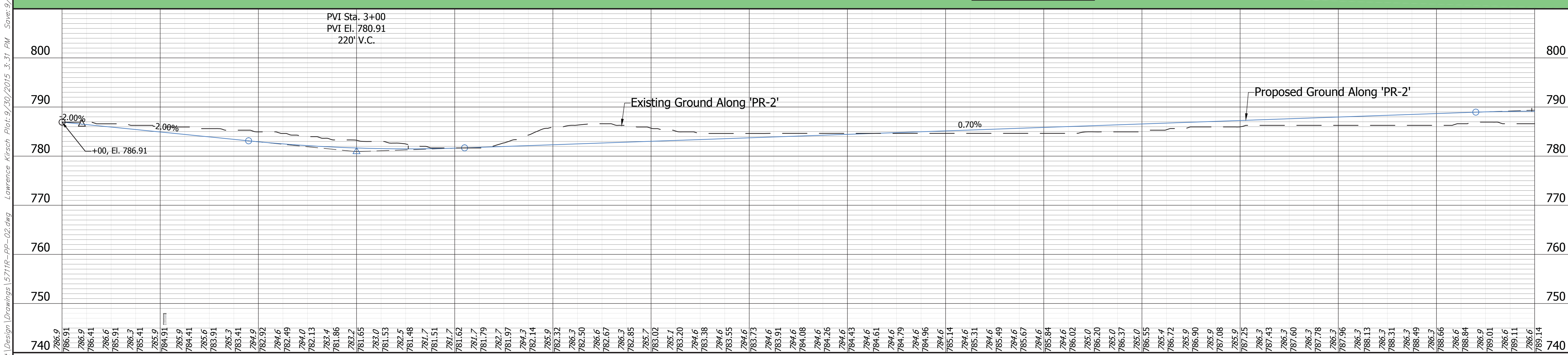

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DESIGNED: DRAWN: LPK CHECKED: CHECKED:	Headquarters 8450 WESTFIELD BLVD., SUITE 300 INDIANAPOLIS, IN. 46240-8302 TEL 317-713-4615 FAX 317-713-4616 www.BFSEngr.com BF&S Butler Fairman Seufert CIVIL ENGINEERS Branch Locations FORT WAYNE 260-459-1532 JEFFERSONVILLE 812-285-0590 LAFAYETTE 765-423-5602 MERRILLVILLE 219-769-2333 PLAINFIELD 317-839-3242	SURVEY BOOK / CONTRACT — SHEET 09 OF 10 / PROJECT 5711

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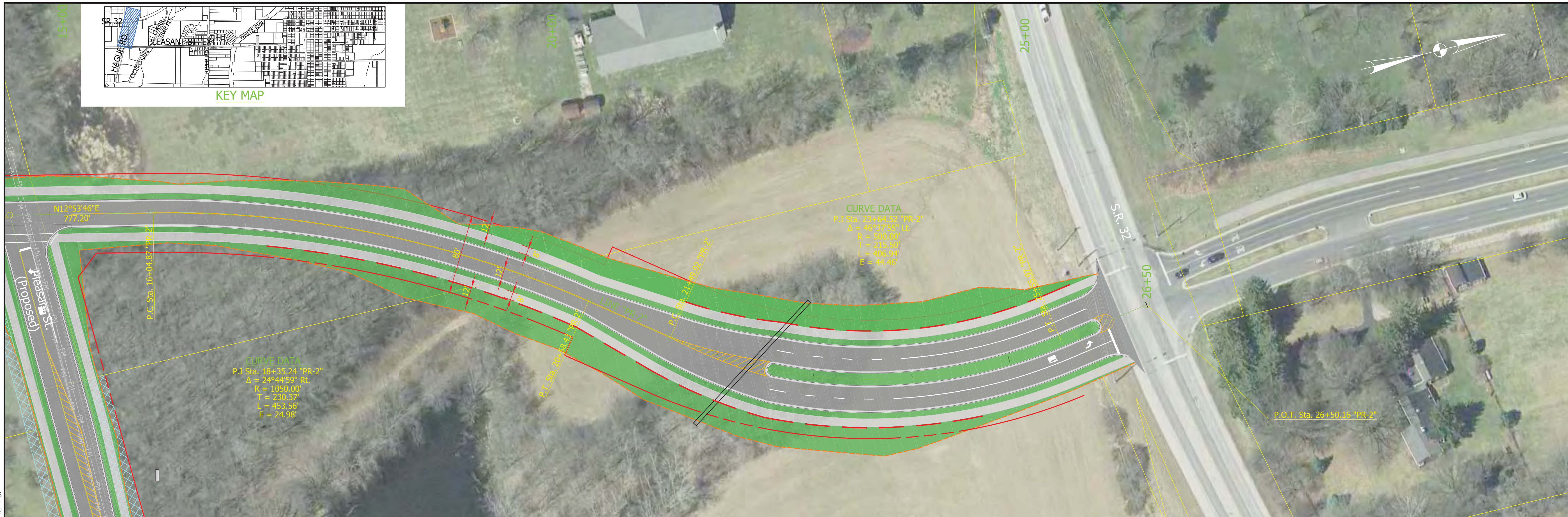

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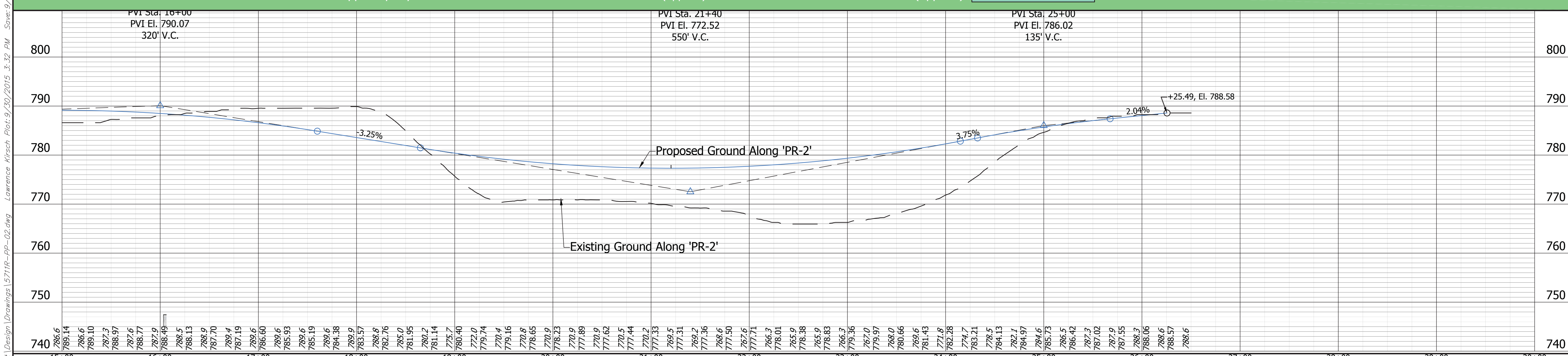

RECOMMENDED FOR APPROVAL:	DESIGN ENGINEER / DATE
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PLEASANT STREET CORRIDOR STUDY
HAGUE ROAD EXTENSION
PLAN & PROFILE

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INDIANAPOLIS, IN. 46240-8302
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Branch Locations

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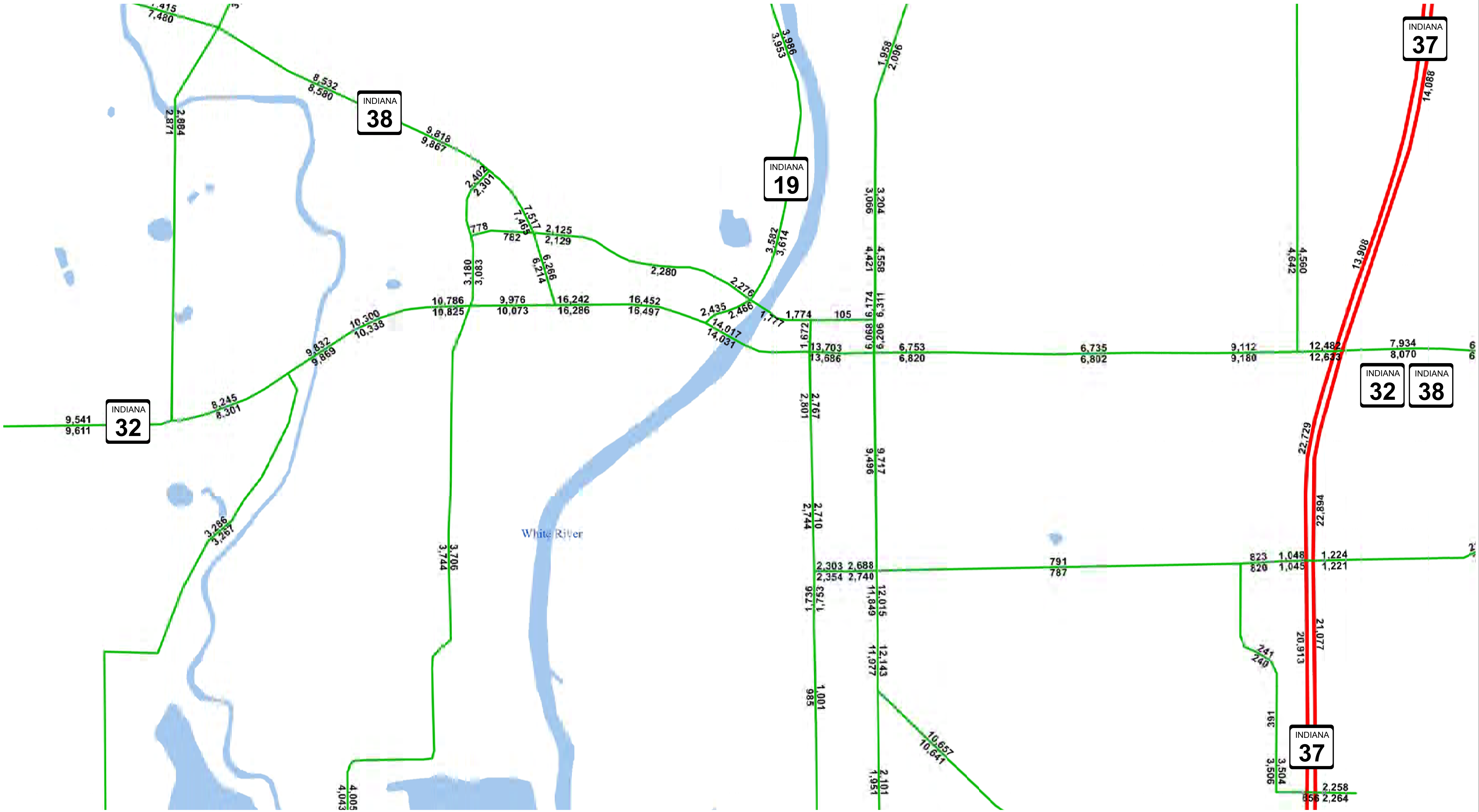
JEFFERSONVILLE	812-285-0590
LAFAYETTE	765-423-5602
MERRILLVILLE	219-769-2333
PLAINFIELD	317-839-3242

HORIZONTAL SCALE	BRIDGE FILE
1" = 50'	
VERTICAL SCALE	DESIGNATION
1" = 10'	
SURVEY BOOK	SHEET 10 OF 10
CONTRACT	PROJECT 5711

BFS NO. 5711

APPENDIX C

Travel Demand Modeling Forecasts



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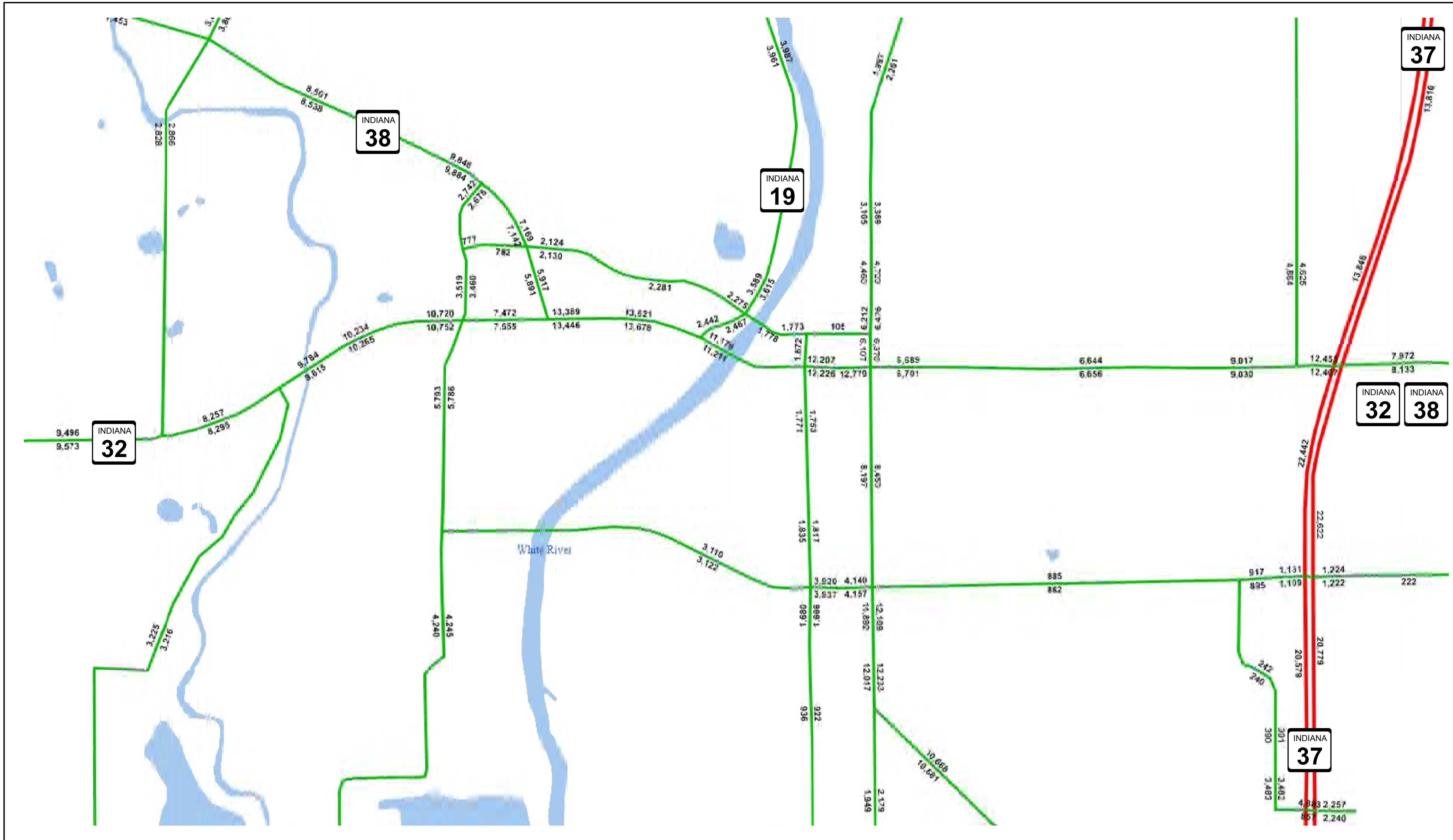
RECOMMENDED FOR APPROVAL	DESIGN ENGINEER	DATE
DESIGNED:	DRAWN:	
CHECKED:	CHECKED:	

PLEASANT STREET
CORRIDOR STUDY

NO-BUILD ALTERNATIVE

CONTRACT	PROJECT NO.
SCALE	DESIGNATION NO.
	SHEET 01 OF 08



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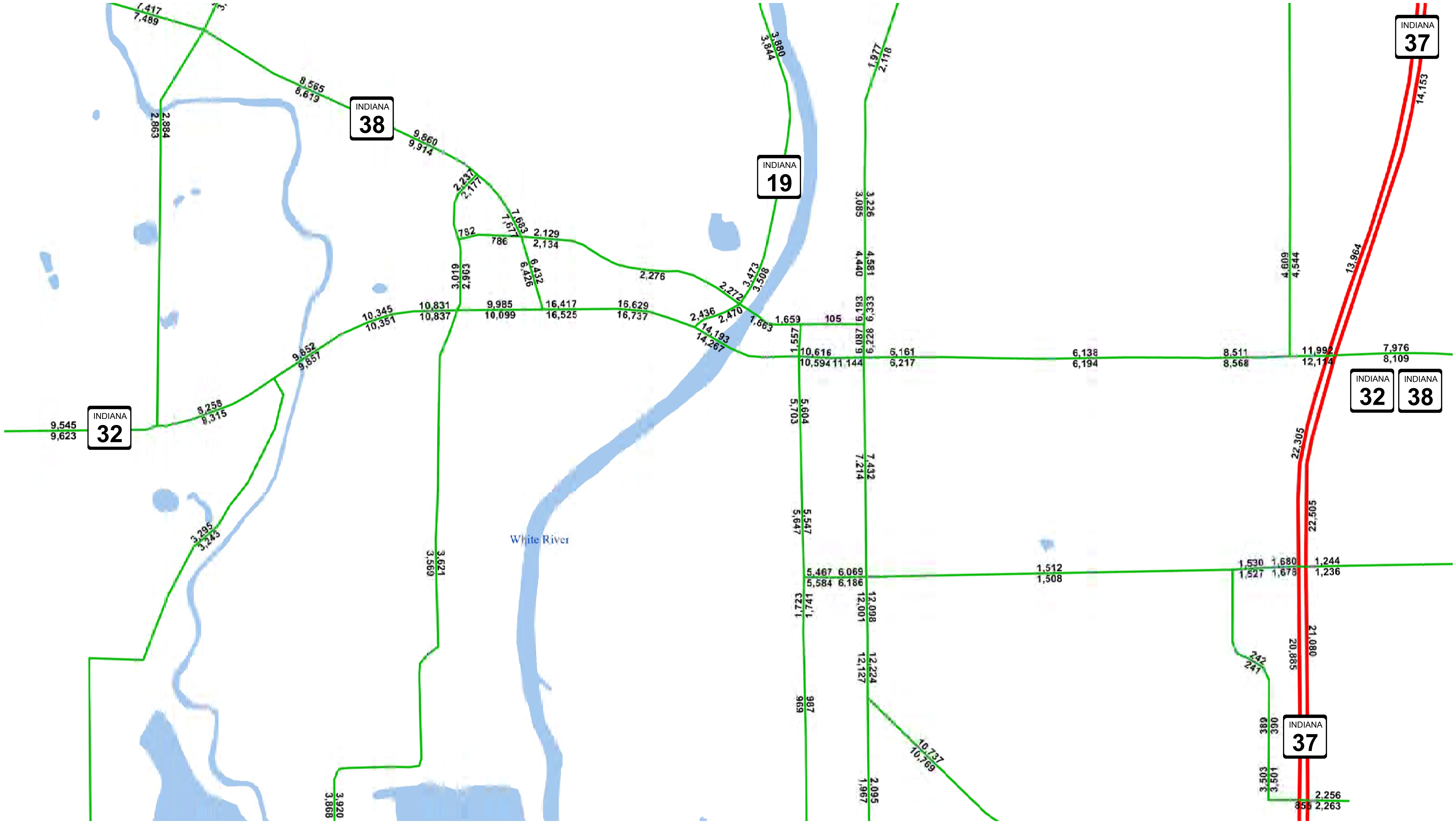

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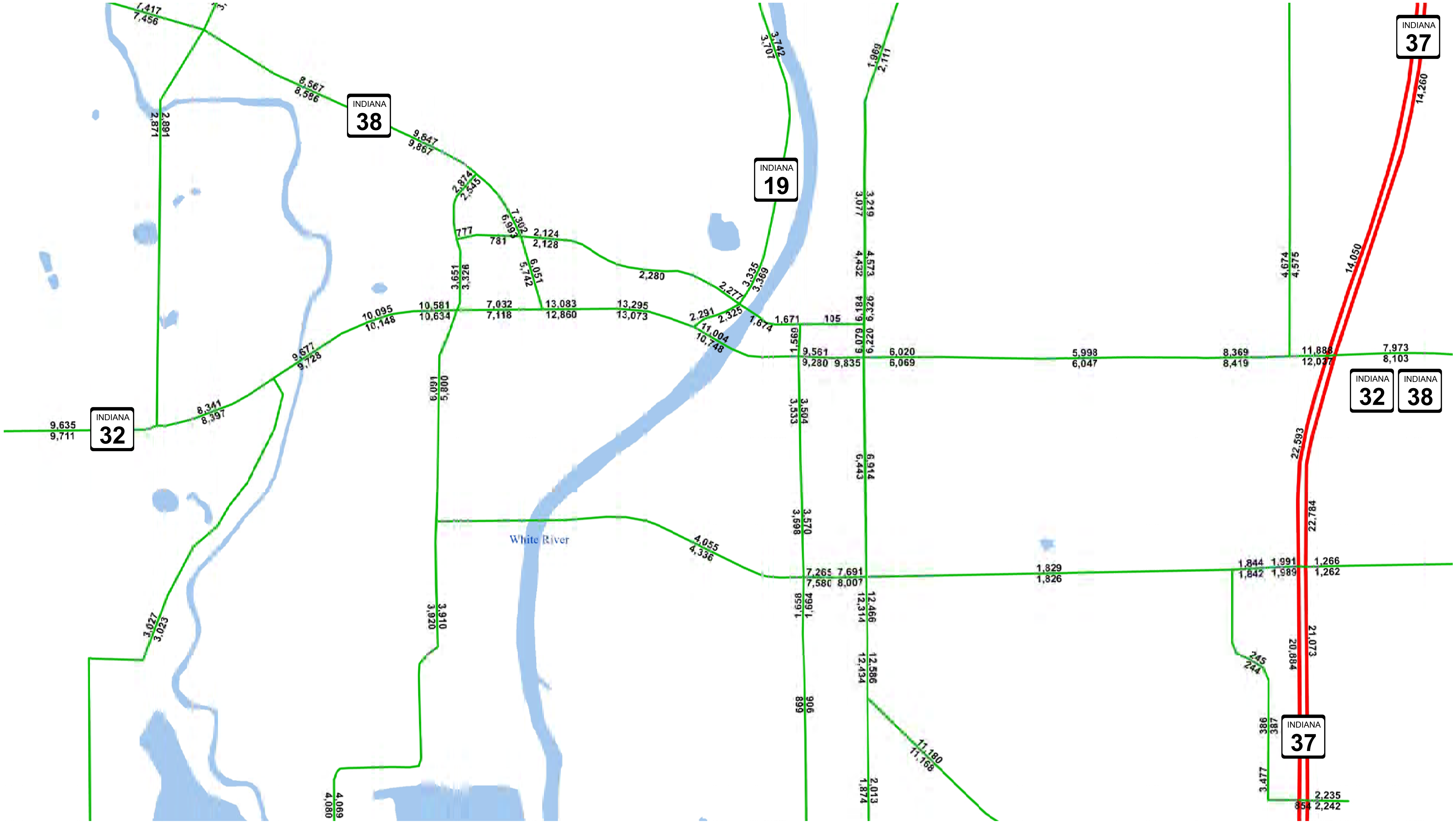
		SCALE	DESIGNATION NO.
DESIGNED: ______ DRAWN: ______	PHASE 2		SHEET 03 OF 08
CHECKED: ______ CHECKED: ______			

F:\4270 Pleasant Street\GIS\Johnny Traffic Model Graphics Jpegs\03_PHASE 2_(Alt 0 & Pleasant St Upgrade).mxd
October 18, 2015, 5:20:11 PM, JBowers, TCG-IND-0470



RECOMMENDED FOR APPROVAL ______ DESIGN ENGINEER DATE	PLEASANT STREET CORRIDOR STUDY	CONTRACT	PROJECT NO.
		SCALE	DESIGNATION NO.
DESIGNED: ______ DRAWN: ______	PHASES 1 & 2		SHEET 04 OF 08
CHECKED: ______ CHECKED: ______			

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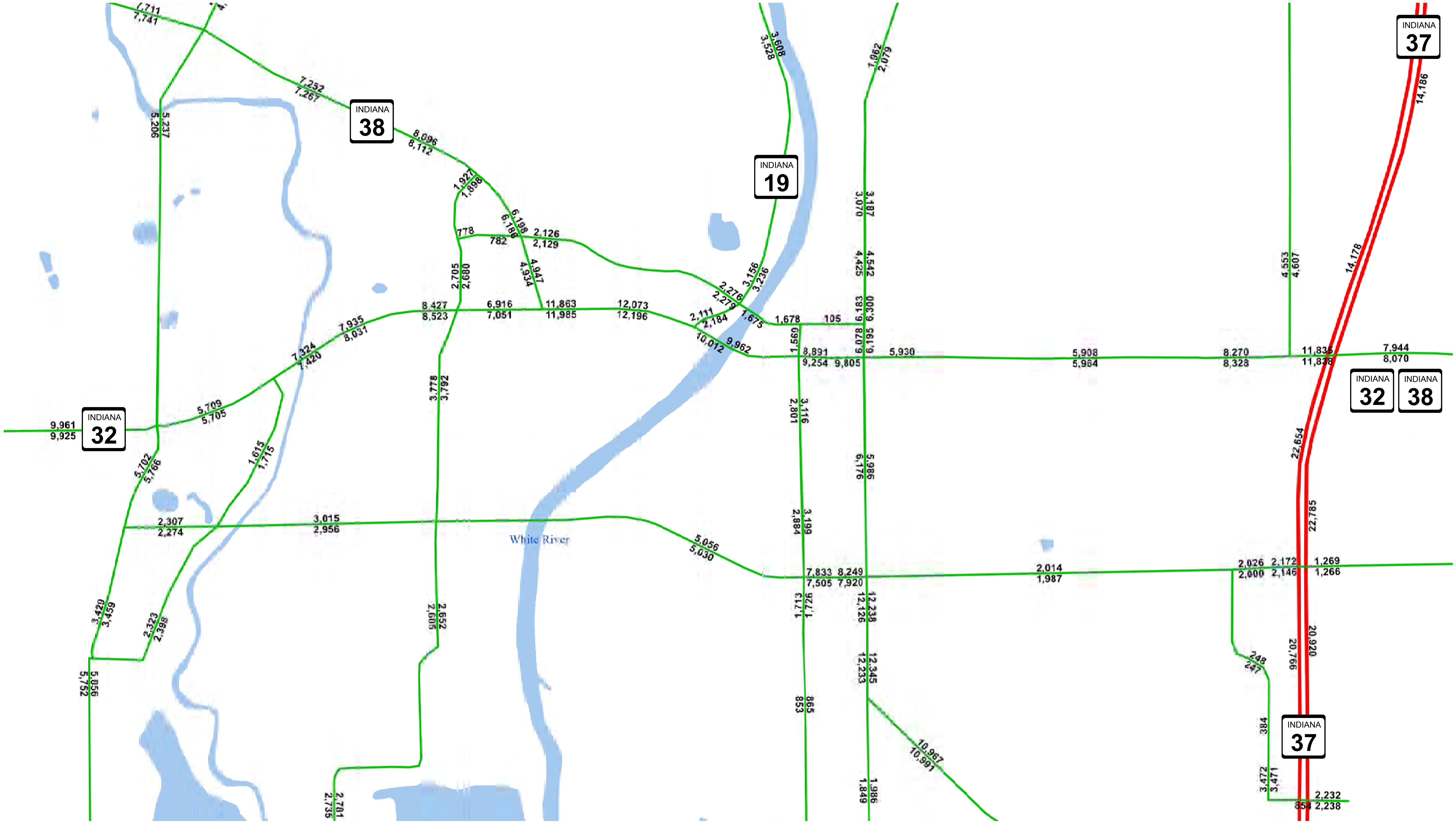

RECOMMENDED FOR APPROVAL ____ DESIGN ENGINEER DATE	PLEASANT STREET CORRIDOR STUDY
DESIGNED: ____ DRAWN: ____	PHASES 1, 2 & 3
CHECKED: ____ CHECKED: ____	

CONTRACT	PROJECT NO.
SCALE	DESIGNATION NO.
	SHEET 05 OF 08

F:\4270 Pleasant Street\GIS\Johnny Traffic Model Graphics Jpegs\05_PHASES 1_2_3_(Alt 1+2+4).mxd
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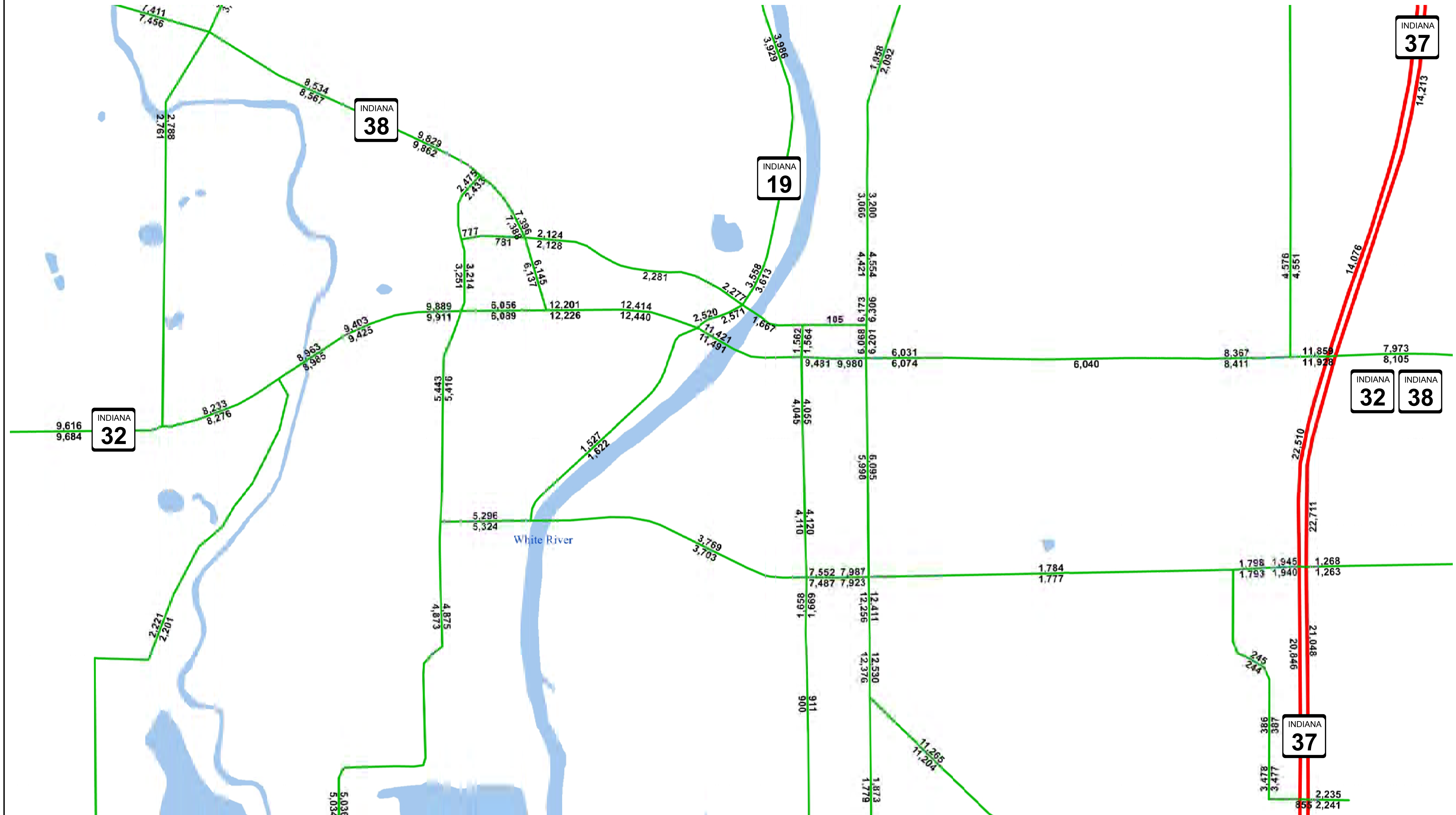

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			SCALE	DESIGNATION NO.
	DESIGNED: ______ DRAWN: ______	PHASES 1 & 2 w/ ALTERNATIVE A		SHEET 06 OF 08
	CHECKED: ______ CHECKED: ______			

F:\4270 Pleasant Street\GIS\Johnny Traffic Model Graphics Jpegs\06_PHASES 1_2 W_ALT A_(Alt 1+2+3).mxd
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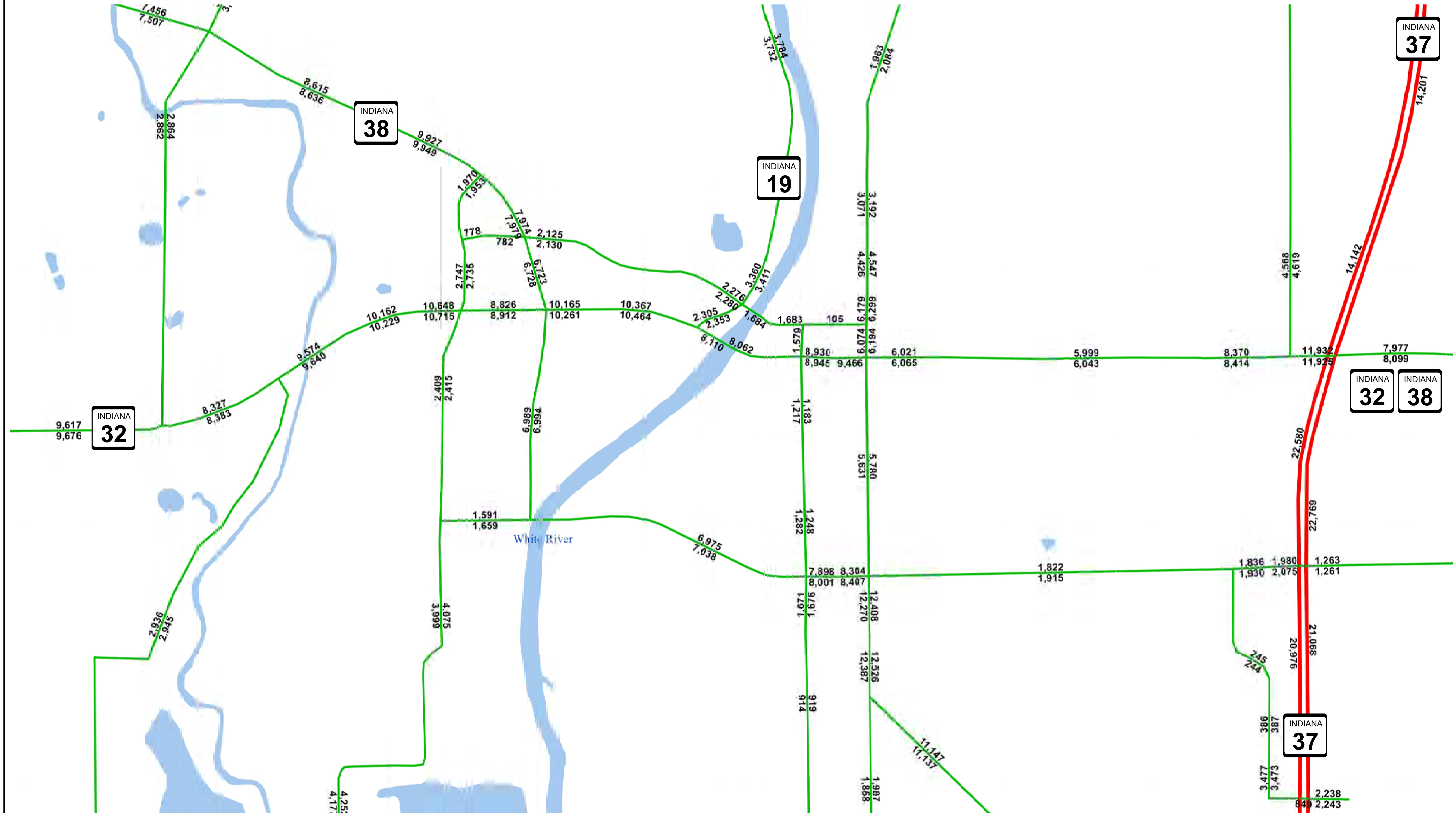

RECOMMENDED FOR APPROVAL ______ DESIGN ENGINEER ______ DATE

DESIGNED: ______ DRAWN: ______

CHECKED: ______ CHECKED: ______

PLEASANT STREET CORRIDOR STUDY

PHASES 1 & 2 w/ ALTERNATIVE B

CONTRACT	PROJECT NO.
SCALE	DESIGNATION NO.
	SHEET 07 OF 08

F:\4270 Pleasant Street\GIS\Johnny Traffic Model Graphics Jpegs\07_PHASES 1_2 W_ALT B_(Alt 1+2 & SR 38 Ext).mxd
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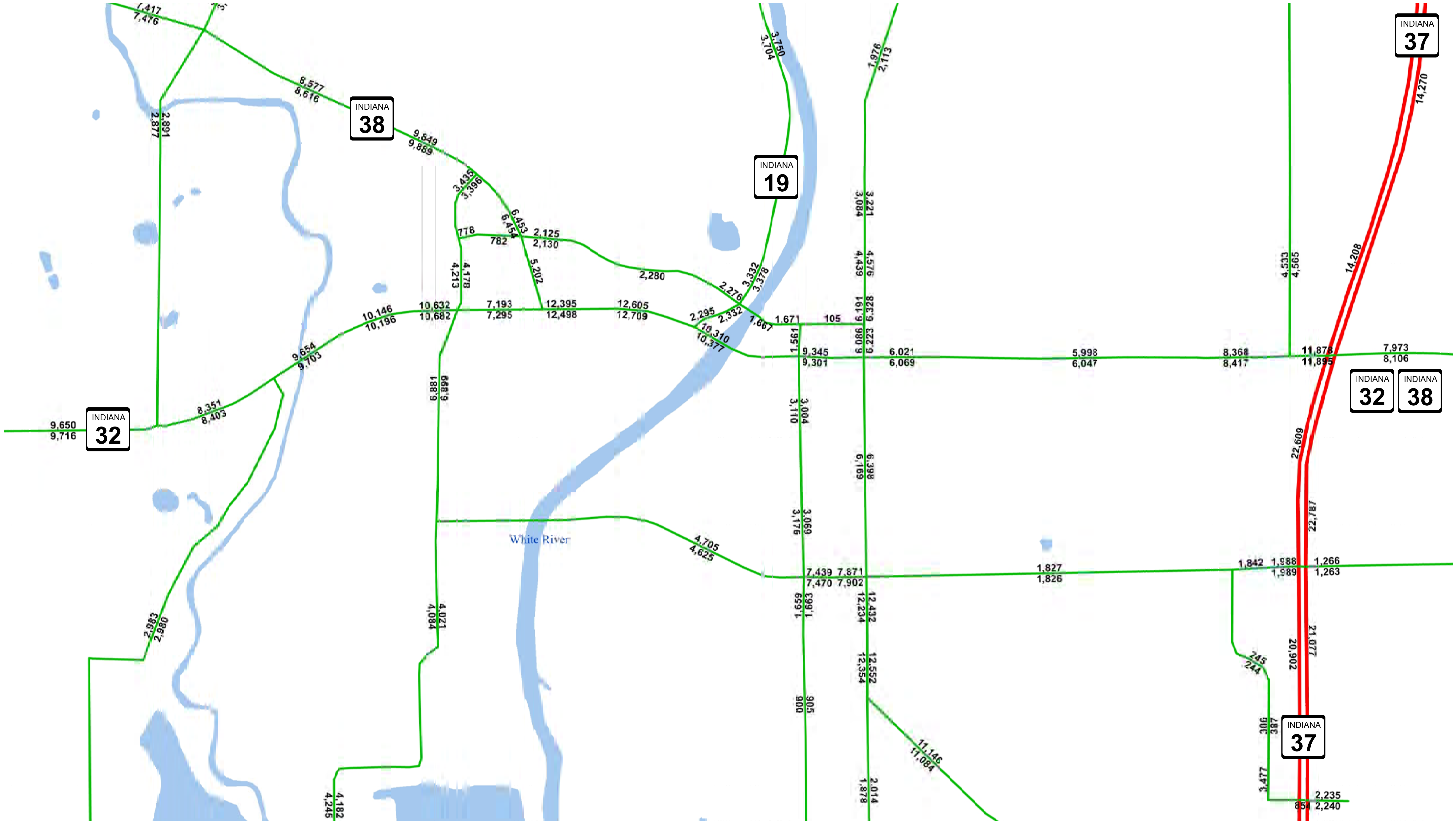

RECOMMENDED FOR APPROVAL ______ DESIGN ENGINEER DATE	PLEASANT STREET CORRIDOR STUDY	CONTRACT / PROJECT NO. / SCALE / DESIGNATION NO.
DESIGNED: ______ DRAWN: ______ CHECKED: ______ CHECKED: ______	PHASES 1 & 2 w/ ALTERNATIVE C	SHEET 08 OF 08

F:\4270 Pleasant Street\GIS\Johnny Traffic Model Graphics Jpegs\08_PHASES 1_2 W ALT C_(Alt 1+2 & River Rd 4ln).mxd
October 18, 2015, 5:23:57 PM, JBowers, TCG-IND-0470