US 31 Corridor Study

Existing Conditions Report

Prepared For:

Indiana Department of Transportation

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Corridor Description

The US 31 Corridor Study covers an area extending across the northern half of the State of Indiana. The study covers US 31 through Hamilton County, Tipton County, Howard County, Miami County, Fulton County, and Marshall County. The study excludes recently completed construction projects that upgraded the existing US 31 corridor to full freeway standards in Hamilton County from I-465 to SR 38; around Kokomo from CR 600N to CR 450N; and near South Bend from US 30 in Plymouth to US 20 in South Bend.

The main purpose of the Corridor Study is to determine the future of the US 31 corridor utilizing stakeholder involvement in an information gathering and decision making process. Since the stakeholder input tends to be organized by county (such as comprehensive plans), and counties often serve as jurisdictional boundaries between communities (such as school districts or emergency service providers), this Existing Conditions Report is segmented by county. Certainly, within each county there exist segments containing differing land use, geometric conditions, environmental concerns, and economic development potential. As the study progresses, smaller segments may emerge within counties, or may even cross county lines, so the county line segmentation will not control the outcomes of the study but instead serve as convenient discussion entities. Following are the corridor characteristics by county:

Hamilton County

Hamilton County is the southern-most county within the US 31 corridor study, and contains the most recently completed freeway segment of the Indianapolis to South Bend corridor. US 31 through the study limits is aligned north-south, and begins at the SR 38 interchange, traveling north to 296th Street for a total distance of approximately 8.0 miles.

Speed Limit:

The speed limit is 60 mph throughout the limits of the Hamilton County segment.

Driveway / Access issues:

Two gas stations have existing driveways with direct access onto US 31. 27 residences gain access to their property directly via US 31, while 7 businesses have driveways with direct access onto the corridor.

Intersection Treatments:

One signalized intersection exists at 236th Street. Ten additional unsignalized intersections exist within the study limits.

Tipton County

Tipton County lies between the completed freeway portions of the corridor, with the southern-most portion of the Kokomo bypass beginning just south of the Tipton/Howard County Line. US 31 through the study limits is aligned north-south, beginning at the County Line and ending at the US 31 / SR 931 interchange, for a total distance of approximately 11.5 miles within the County. An interchange was recently completed at SR 28 near Tipton, and a railroad overpass project on the corridor near CR 100S is under design.

Speed Limit:

The speed limit is 60 mph throughout the limits of the corridor study.

Driveway / Access issues:

57 residences gain access to their property directly via US 31, while 3 businesses have direct access onto the corridor within the study area.

Intersection Treatments:

Fourteen existing unsignalized intersections are located along the corridor within the study limits in Tipton County. An active railroad crossing also exists just north of the SR 28 interchange, but is scheduled to be converted to an overpass, with US 31 passing over the railroad.

Howard County

The majority of the corridor within Howard County has already been upgraded to a full-freeway and is excluded from this study. US 31, within the study limits in Howard County, is aligned north-south, beginning at the US 31 / SR 931 interchange and ending at the Miami County line, for a total distance of approximately 1.0 mile within the County.

End Study Exception

Speed Limit:

The speed limit is 60 mph throughout the limits of the corridor study.

Driveway / Access issues:

One residence and two businesses have direct access from their property to US 31 within the study limits. However, an additional 33 properties are accessed via frontage roads connected directly to US 31.

Intersection Treatments:

Six unsignalized intersections exist in the county within the study limits, although three of the intersections are solely for frontage road access serving adjacent properties.

Miami County

Miami County lies to the north of the completed US 31 bypass of Kokomo and contains the longest segment of the study area. US 31 through the study limits is generally aligned north-south, with the alignment shifting to the west by two miles just north of Peru. The study area runs for the entire length of the County, for a total distance of approximately 30.3 miles within the County. An interchange has already been constructed at US 24 as part of previous improvements to the US 24 corridor.

Speed Limit:

The speed limit is 60 mph throughout the limits of the corridor study.

Driveway / Access issues:

Direct access exists to US 31 to 40 residences and an additional 7 businesses within the study limits in the county. However, multiple residences have access from frontage roads that intersect US 31, and would lose access with a full-freeway configuration without additional frontage roads to nearby county roadways.

Intersection Treatments:

Four signalized and forty unsignalized intersections exist in the study limits within the county. This excludes intersections for frontage and access roadways to adjacent properties.

Fulton County

The entire portion of the US 31 corridor within Fulton County is included within the study area. US 31 has its largest east-west shift in alignment within the study area, and extends a total distance of approximately 14.2 miles within the county. An interchange exists at SR 25 near Rochester, as well as an overpass carrying SR 14 over US 31.

Speed Limit:

The speed limit is 60 mph throughout the limits of the corridor study.

Driveway / Access issues:

No direct driveways to US 31 exist within the County. A single residence has access via a frontage road, which would require an extension as part of a full-freeway alternative.

Intersection Treatments:

Nineteen unsignalized intersections exist in the county within the study limits.

Marshall County

Marshall County is the northern-most county within the study area, and contains the southern limits of the completed US 31 South Bend project. US 31 through the study limits is generally aligned north-south, beginning at the Fulton County Line and ending at the US 30 interchange, for a total distance of approximately 12.3 miles within the County.

Speed Limit:

The speed limit is 60 mph throughout the limits of the corridor study.

Driveway / Access issues:

Six properties have driveways with direct access onto the US 31 corridor.

Intersection Treatments:

Sixteen unsignalized intersections existing within the county in the study area.

Previous Studies Documentation

The US 31 corridor has been the focus of several recent studies. In addition to corridor wide studies performed for INDOT or the US 31 Coalition, each County has completed some level of study pertaining to the corridor. The following section provides a short summary of the recent planning efforts in each county along the corridor (mapping and links to available online resources can be found in Appendix A):

Hamilton County

Hamilton County provided a current version of the county comprehensive plan, the county thoroughfare plan, an exhibit depicting proposed potential interchange / overpass locations along US 31, and a county alternative transportation plan.

The County Comprehensive plan was completed in June, 2006, and covers the areas where Hamilton County has jurisdiction over land uses, which generally is the northwest and northeast portions of the county, including the US 31 corridor from 216th Street to the north. The US 31 corridor is proposed to contain adjacent commercial uses as part of the plan.

The County Thoroughfare plan was completed in July, 2007, and updates the thoroughfare plan for the entire County. The US 31 corridor is identified as an interstate / expressway and a Primary Arterial. Additionally, the plan calls for frontage roadways paralleling US 31 to provide local access routes through the area, reducing reliance on US 31 itself for local trips.

The County's exhibit for interchanges and overpasses proposes interchanges at 236th Street, 256th Street, 266th Street, and 276th Street. Overpasses are proposed at 216th Street and 226th Street.

The County Alternative Transportation plan was approved in October, 1995, and identifies a separated multi-use path along 236th Street and 296th Street, as well as shared roadway paths along 226th Street and 266th Street, all of which cross the US 31 corridor.

Tipton County

Tipton County provided a current version of the county comprehensive plan, and the City of Tipton provided their comprehensive plan.

Both comprehensive plans describe a need for a future interchange at US 31 and Division Road, as well as noting the proposed railroad bridge to eliminate the at-grade railroad crossing on US 31. The at-grade railroad crossing elimination project is currently under design.

Howard County

Howard County provided their comprehensive plan, which was amended after the US 31 bypass was completed. This plan set a vision for future land use around the bypass interchanges, limiting access to the cross roads within the vicinity of the interchange and limiting zoning along the bypass corridor. No updates were made to the area north of the bypass within the corridor study limits.

Miami County

Miami County provided the current comprehensive plan, dated June 2015. This plan provided a proposed transportation and circulation map depicting future realignments of local roadways. Additionally, a map providing recommendations for the US 31 corridor was included in the plan. This map shows locations where interchanges and overpasses are recommended based on land use, emergency service needs, and economic development potential. Spacing of interchanges are noted on the map, and special attention is drawn to prioritization of interchange locations.

Also, a more detailed study was undertaken on future improvements to the area near Grissom Air Reserve Base. This study identified interchange locations, local roadway realignments, and cost estimates for the project. It identified interchanges at SR 218 West and CR 800S, with access roadways serving local properties cut off from US 31.

Fulton County

The Fulton County comprehensive plan was updated in January 2008, and contains land use recommendations as well as a specific US 31 corridor transportation plan. This plan identifies recommended locations of interchanges and overpasses within the county, as well as reasoning behind the recommendations. Interchanges are proposed at CR 650S, CR 150S, CR 200N, and SR 110, while overpasses are recommended at CR 400S, Southway 31, CR 100N, CR 450N, and CR 700N.

Marshall County

The Marshall County comprehensive plan was amended in August 2013, and contains locations of recommended interchanges and overpasses along US 31 within the county, as well as future land use plans along the corridor. Recommended interchanges and overpasses include SR 110, 18th Road, 14th Road, and Michigan Road. Areas within municipal corporate boundaries are excluded from the thoroughfare plan.

Others

INDOT completed a study in 1998 of the US 31 corridor from Indianapolis to South Bend as part of its Major Corridor Investment Study. This study determined that upgrading to a freeway section in this area would provide a net benefit of $2.0 billion based on economic development and travel time savings.

The US 31 Coalition, with assistance from INDOT, completed an economic impact analysis in May 2015, covering the same study area as this Corridor Study. This study analyzed the remaining non-freeway segments of US 31 between Indianapolis and South Bend, quantifying the economic impact a full-freeway alternative would provide to the region. Based on this study, the ratio of benefits (reduced user costs as well as increased economic development) compared to costs (construction costs and maintenance of the roadway improvements) is 1.57 using current study methodologies. This result concludes that construction of a full-freeway option would have a net benefit to the economy.

Land Use Information

Land use along the corridor, both existing and proposed, will be a major driver in determining future improvements needed to the roadway. The below section notes major traffic generators existing adjacent or near the corridor, as well as any general development potential or specifically proposed locations.

Hamilton County

The majority of the Hamilton County portion of the study area is agricultural in use. Gas stations are present at 216th Street and 236th Street, which generally serve the passing motorists and generate minimal additional traffic. The two major entities generating traffic near the corridor are:

- Reynolds Farm Equipment at the 276th Street intersection
- Beck's Hybrids east of US 31 on 276th Street

For future development in the region, the continued northward spread of the Indianapolis metropolitan area will create further opportunities for development of the agricultural land. The nearby municipalities of Sheridan and Westfield will likely draw interest in development as well. While no specific developments adjacent to US 31 are presently noted, Hamilton County did indicate potential development of a National Guard facility east of US 31 near 276th Street that may increase traffic in the area.

Tipton County

Tipton County throughout the study area is agricultural in nature. The major entity generating traffic near the corridor is the Chrysler Transmission Plant in the northeast quadrant of the SR 28 interchange.

For future development in the region, the county's location between the Indianapolis and Kokomo metropolitan areas provides opportunity for future development. Additionally, Tipton lies to the east of the corridor. Industrial properties have been developed in an industrial park

between US 31 and the City limits, creating additional opportunities for traffic generation along the corridor.

Howard County

The small portion of Howard County that is within the US 31 study boundaries is suburban residential in nature. The small town of Cassville lies just east of US 31, and the associated residential development crosses the US 31 corridor.

Future development of the area within the county is likely to be residential in nature and have little overall impact to the corridor. Due to interchange spacing requirements, additional access within Howard County to a full-freeway alternative would be difficult.

Miami County

Miami County contains the longest US 31 segment within the study limits, and the existing land uses vary greatly across the county. The southern-most portion of the county is rural and agricultural in nature, with some commercial services at the SR 18 intersection. Moving to the north, the Grissom Air Reserve Base provides a much different land use and generates considerable regional traffic. With a mix of uses, including military, residential, commercial, industrial, and municipal, the land adjacent to the corridor generates a mix of traffic types throughout the day. Further north the corridor runs to the west of Peru, and associated development along Business US 31 and US 24 provides additional traffic generators. Finally, north of US 24, land use returns to mainly agricultural with sporadic industrial development.

Future land use in the county is similarly hard to generalize. Grissom and Peru will continue to be catalysts for economic growth, driving the need for improvements to the corridor from a safety and mobility aspect as well. That is not to discount the need for improvements elsewhere in the county, as additional needs from a safety standpoint are possible as the study progresses.

Fulton County

In Fulton County near Rochester, the corridor passes through the edge of the city in a suburban setting with residences and associated commercial areas nearby. South of Rochester the area is agricultural with a railroad line running parallel to the corridor. North of Rochester the land use is a mixture of agricultural and residential. An active landfill is present between SR 110 and CR 700N at the northern portion of the county. The Nickel Plate Trail runs parallel to the corridor on the east side of US 31 south of Rochester.

Given recent development patterns, it is likely that additional growth along the corridor resulting in increased traffic can be expected near Rochester.

Marshall County

The southern portion of Marshall County within the study limits is agricultural in nature. From roughly the SR 10 intersection to the north, the land use transitions from rural to suburban due to the nearby municipalities of Argos and Plymouth. This area also experiences an increase in traffic, as the incorporated areas generate traffic along the corridor. Future development is also likely to be centered around these already developed areas between Argos and Plymouth.

Existing Traffic Volumes and Operations

In order to determine needed improvements, traffic operations at key locations on the corridor were analyzed. First, recently completed traffic counts collected by INDOT were obtained throughout the corridor. Next, supplemental traffic counts were taken in locations throughout the study area that either were not available from INDOT or were outdated. Finally, the traffic volumes were input into operational analysis software to determine existing operations at intersections and on corridor segments.

The Average Annual Daily Traffic (AADT) volumes along the US 31 corridor are displayed in Figures 1-16. Starting at the southern project limit, the daily volume in Hamilton and Tipton Counties fluctuates from the low to high 20,000's. In Howard County and southern Miami County, the AADT is in the low 20,000's in the study area. North of Business Route US 31 into Peru, the US 31 traffic drops to approximately 15,000. Further north through Miami and Fulton County, the AADT continues to steadily decline to the low 10,000's until Rochester, where the volumes begin to increase to approximately 15,000 near the US 30 interchange in Marshall County.

The tables below quantify existing traffic operations based on Level of Service (LOS). These LOS ratings are measured in terms of average control delay, where delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. The term "control" refers to the inclusion of deceleration delay, queue move-up time, stopped delay, and acceleration delay in the final delay measure. LOS A is the best operating condition, with delays of less than ten seconds per vehicle, and LOS F is the worst operating condition with the longest delays experienced. LOS D or better is generally considered acceptable in urban areas during peak hour conditions, while LOS C is generally considered acceptable in rural areas. Table 1 provides the criteria for the various LOS ratings for both signalized and unsignalized intersections in terms of control delay (seconds/vehicle).

Table 1 - Level of Service Criteria for Intersections

Level of Service	Control Delay (Seconds per Vehicle)	
	Unsignalized	Signalized
A	≤ 10	≤ 10
B	> 10 and ≤ 15	> 10 and ≤ 20
C	> 15 and ≤ 25	> 20 and ≤ 35
D	> 25 and ≤ 35	> 35 and ≤ 55
E	> 35 and ≤ 50	> 55 and ≤ 80
F	> 50	> 80

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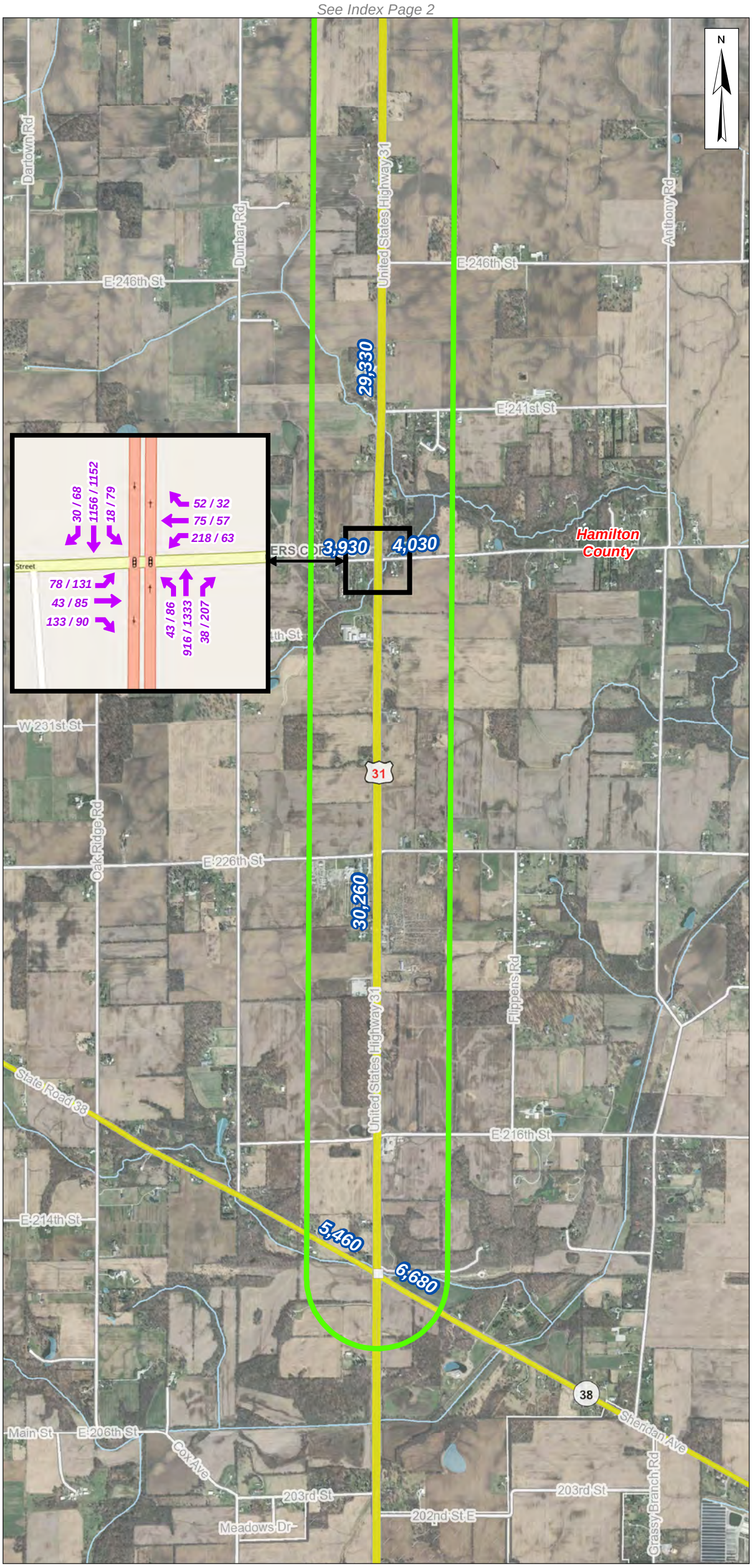

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Scale 1" =1500'

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Traffic Volume Summary

US Route 31 Corridor Study

Hamilton County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

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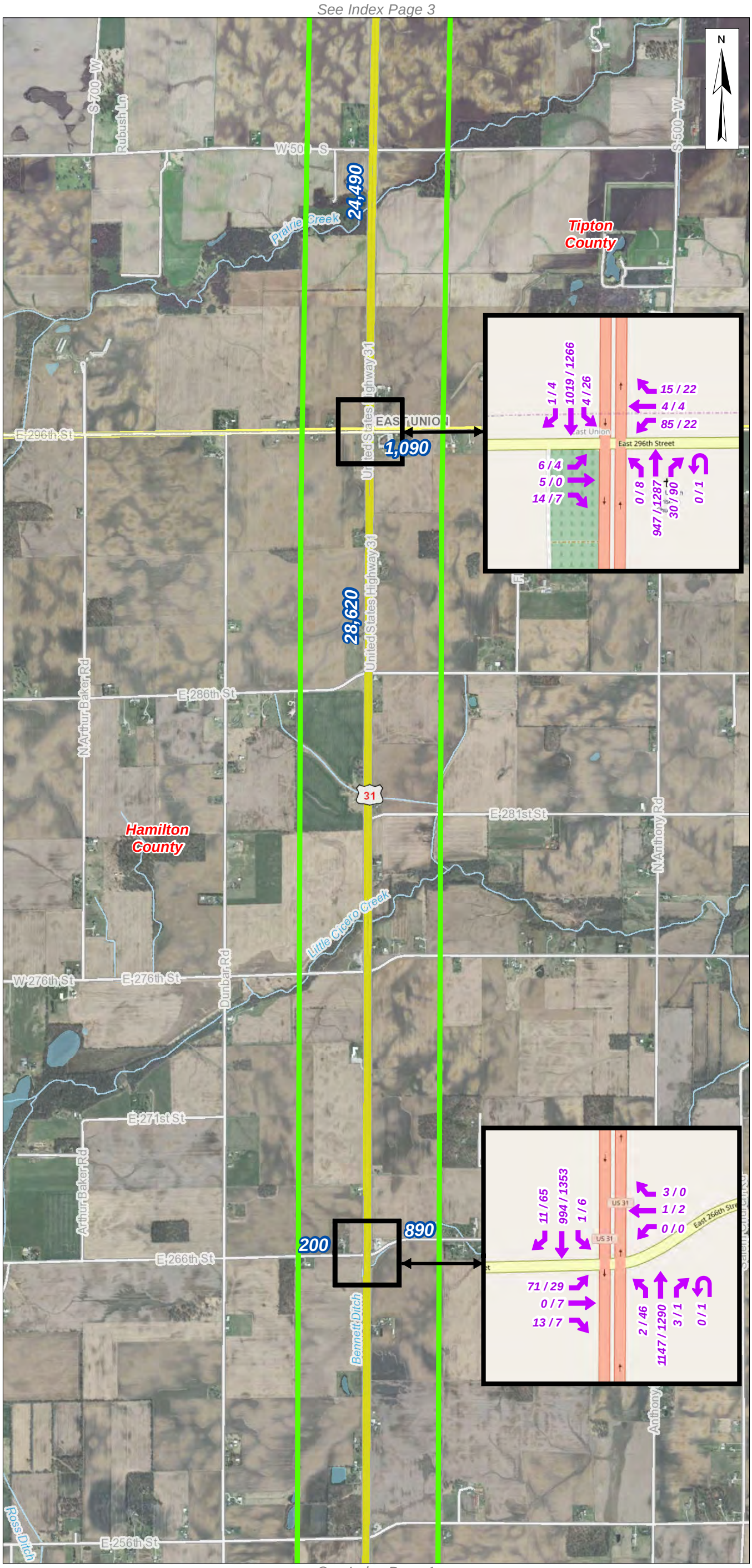

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Tipton & Hamilton County

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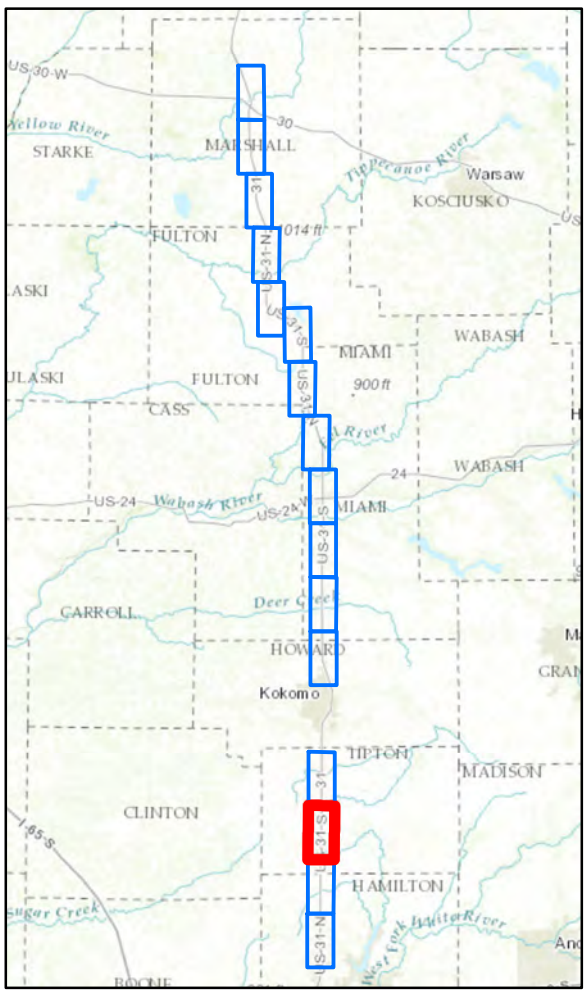

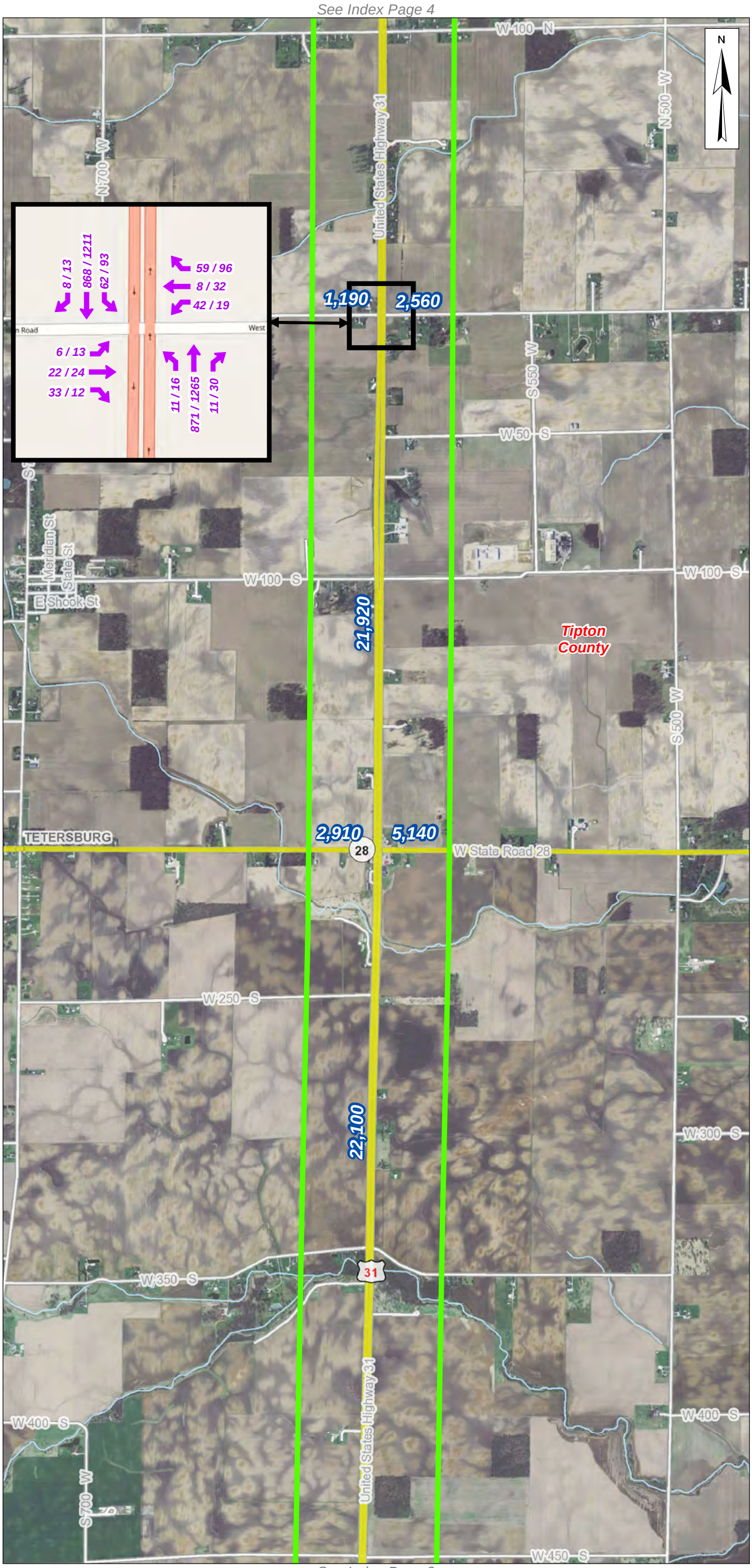

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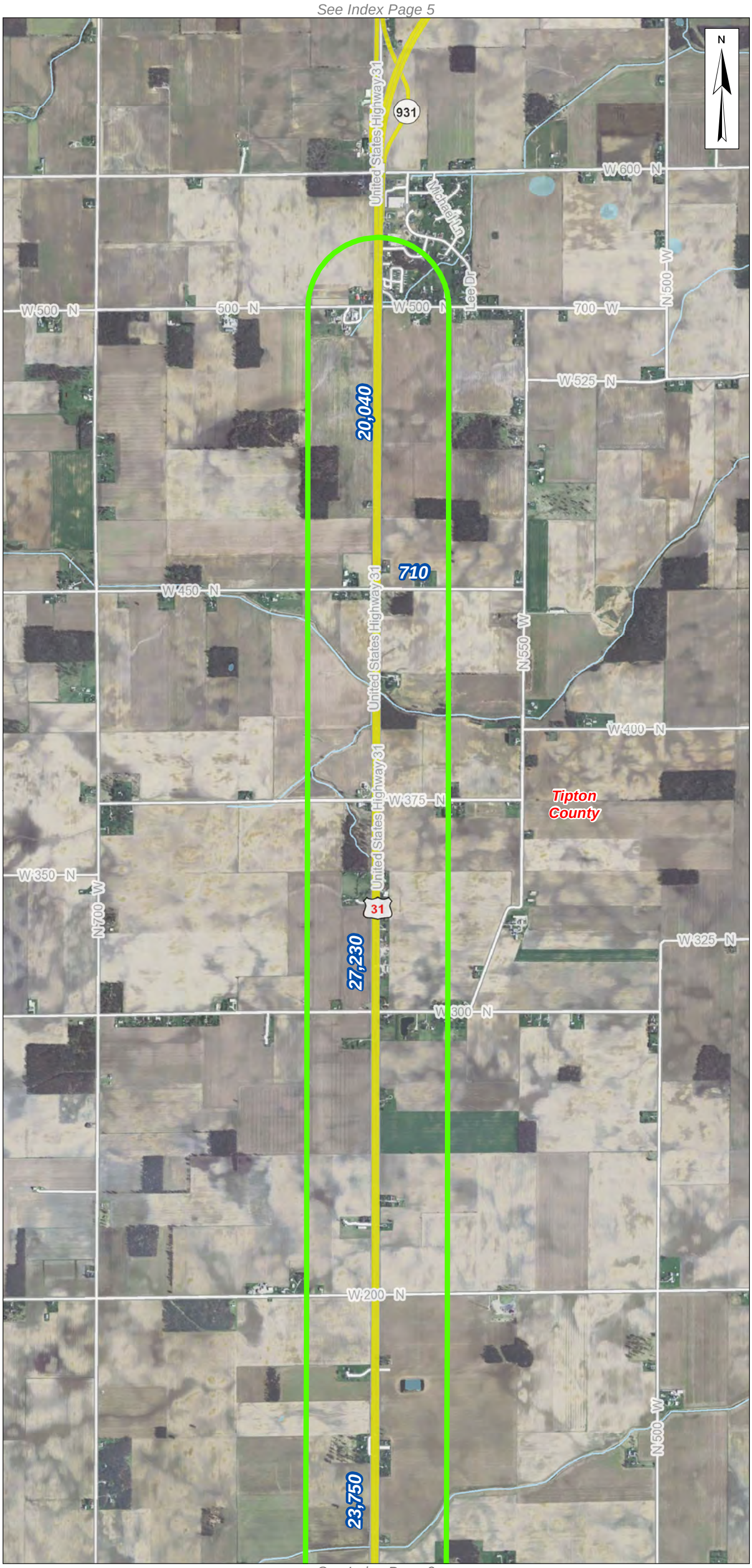

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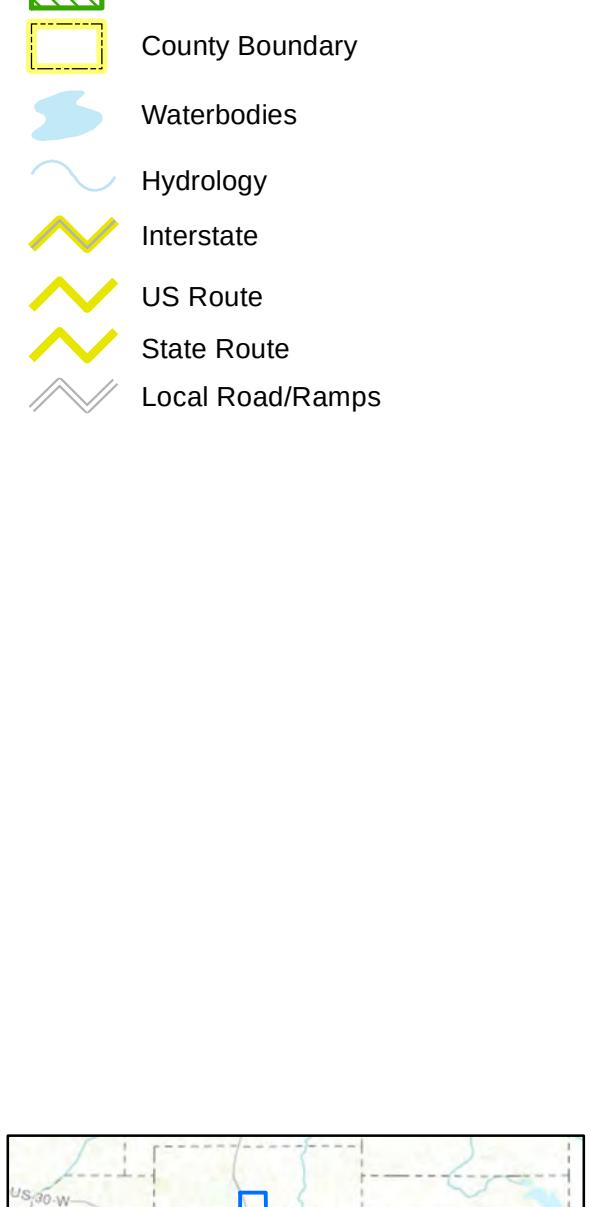

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Miami & Howard County

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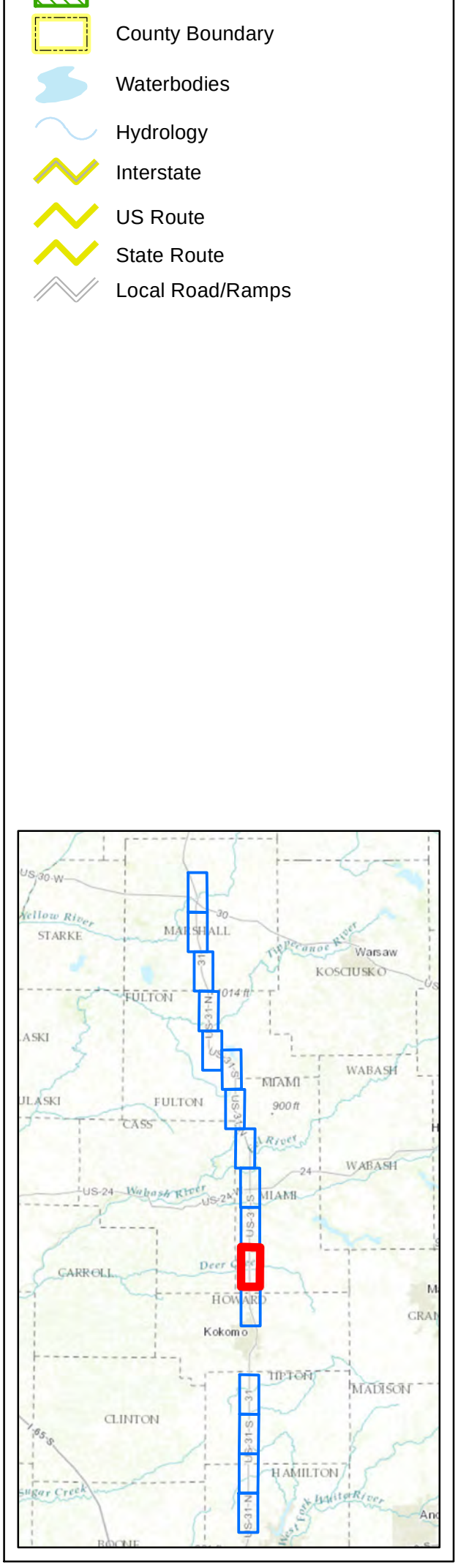

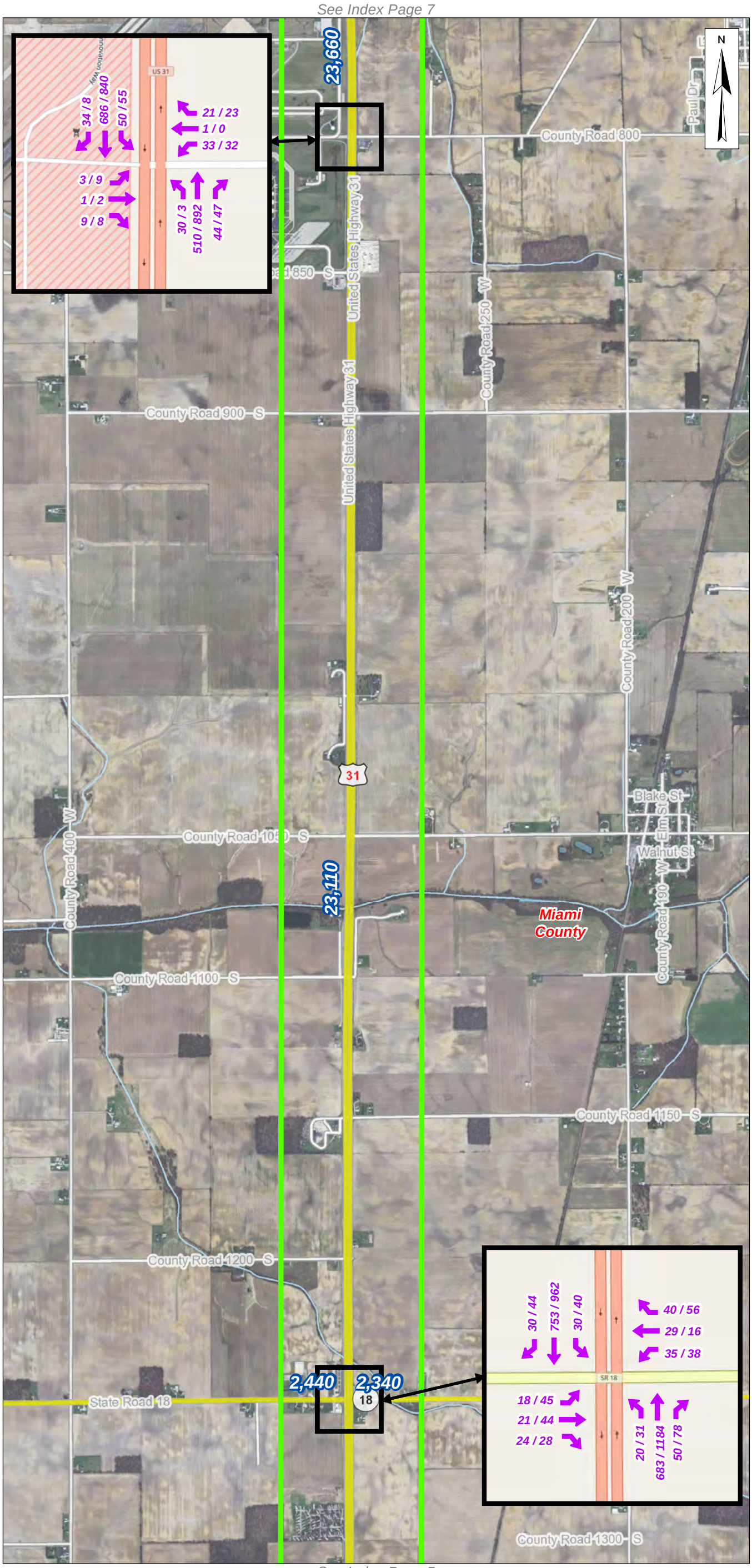

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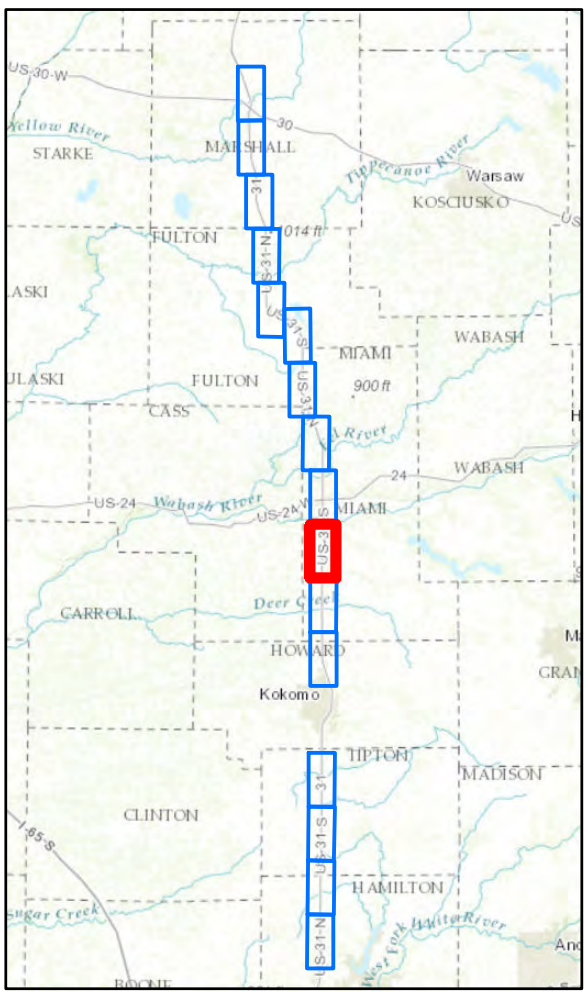

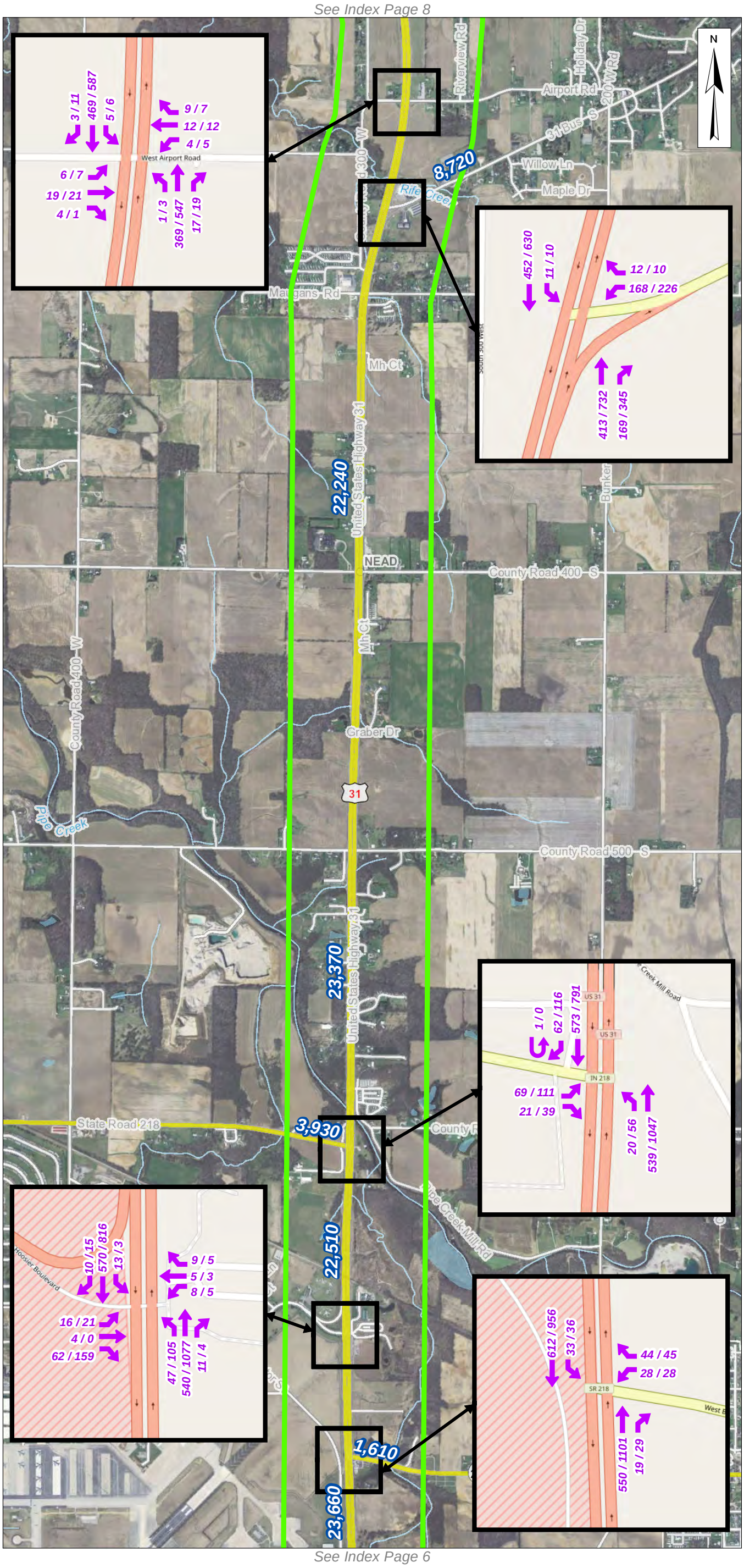

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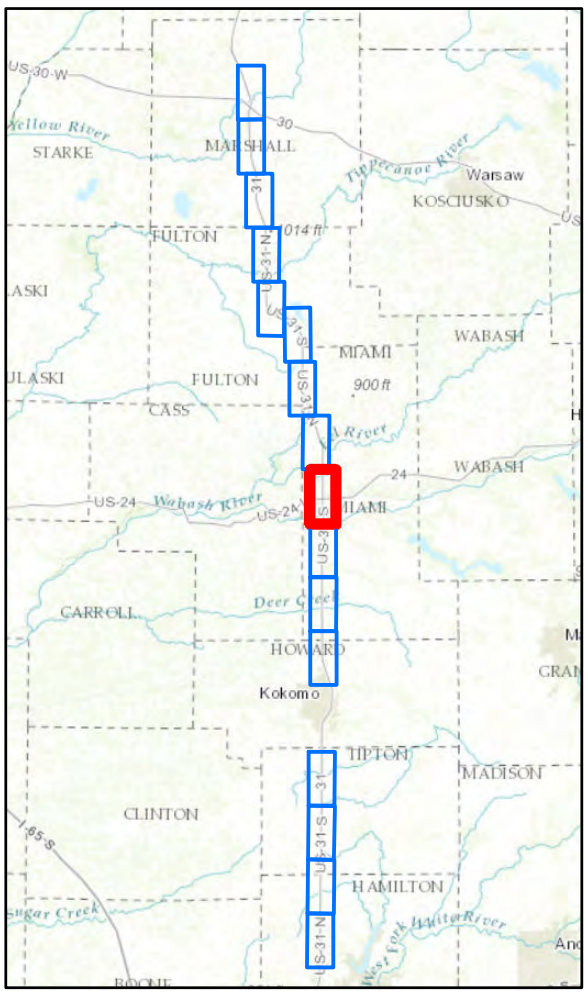

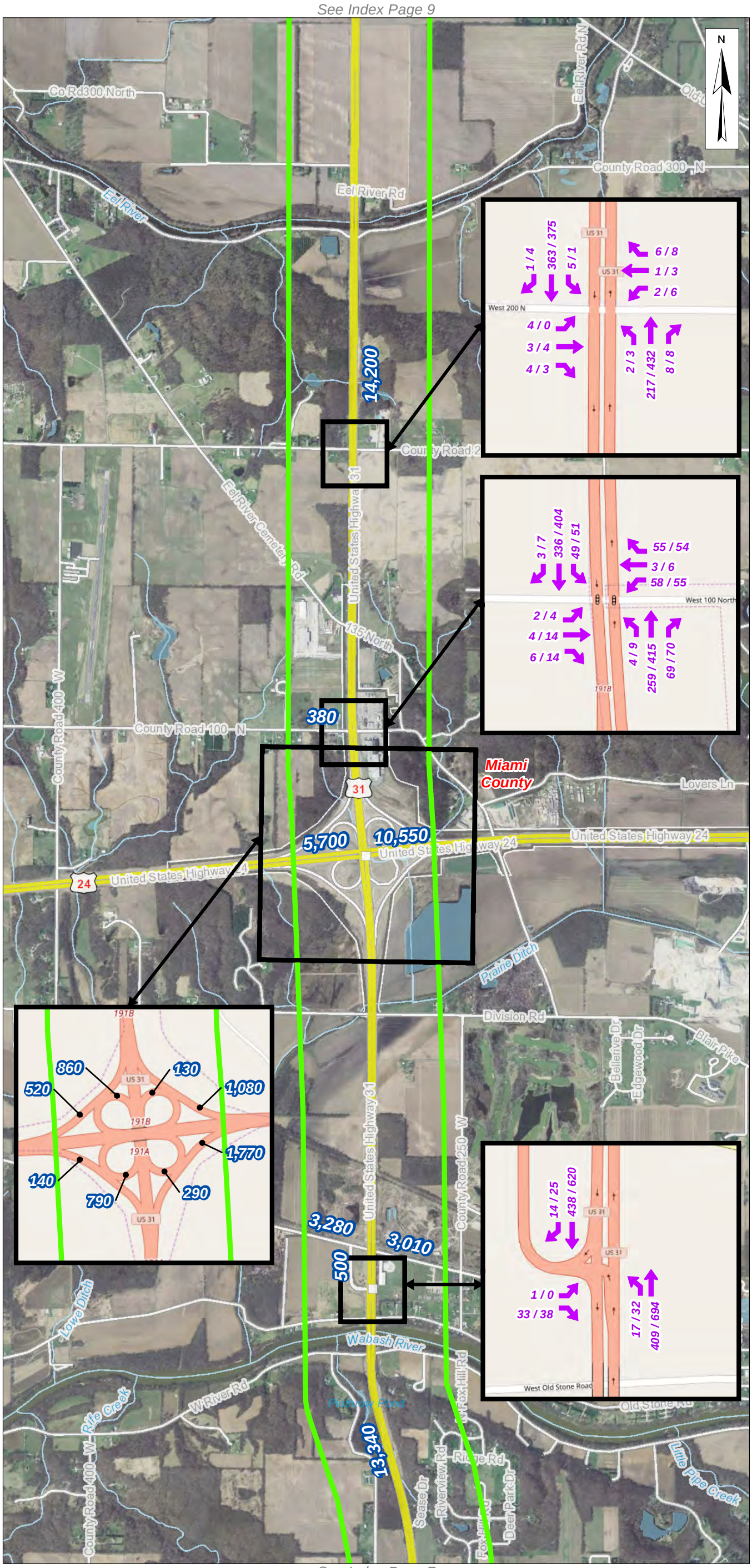

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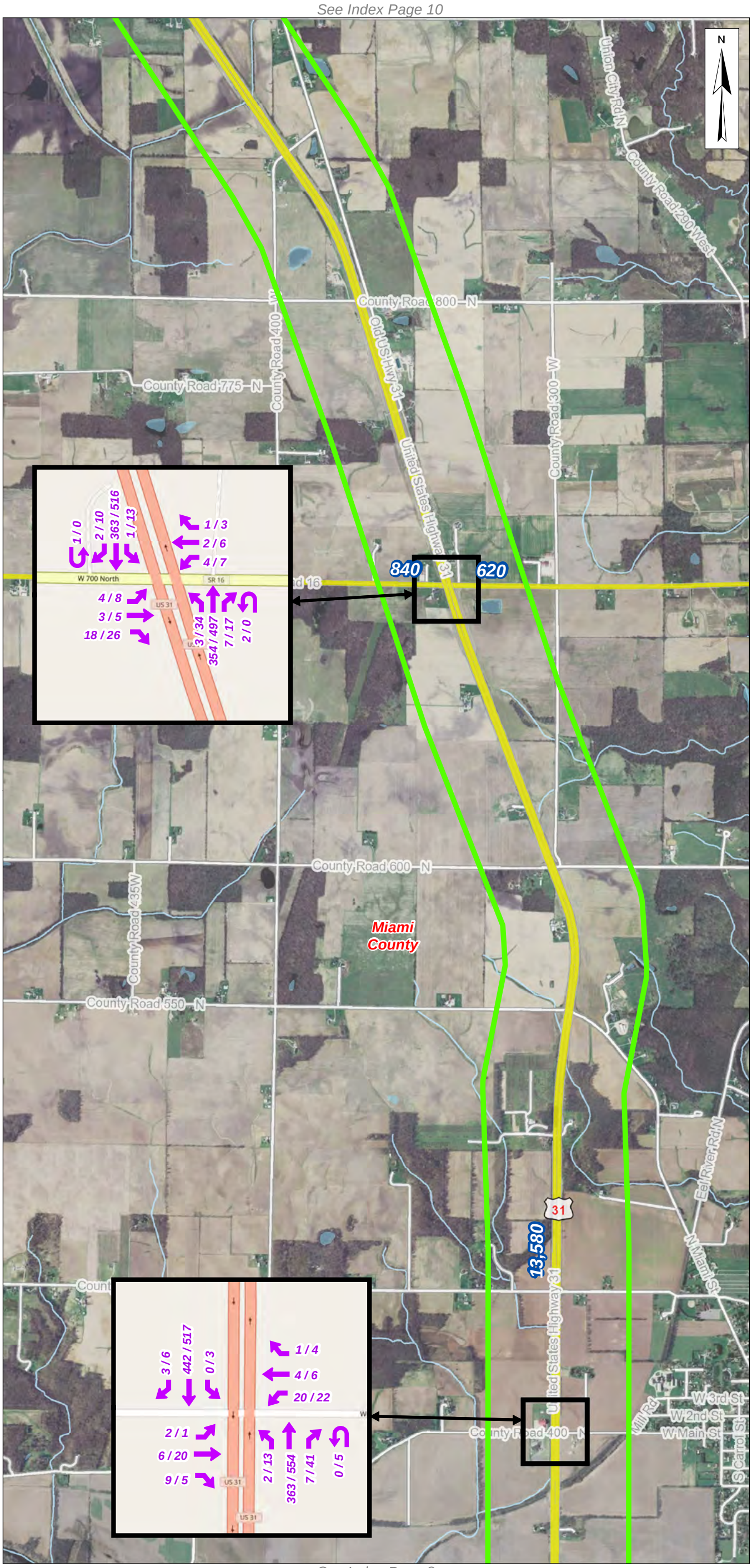

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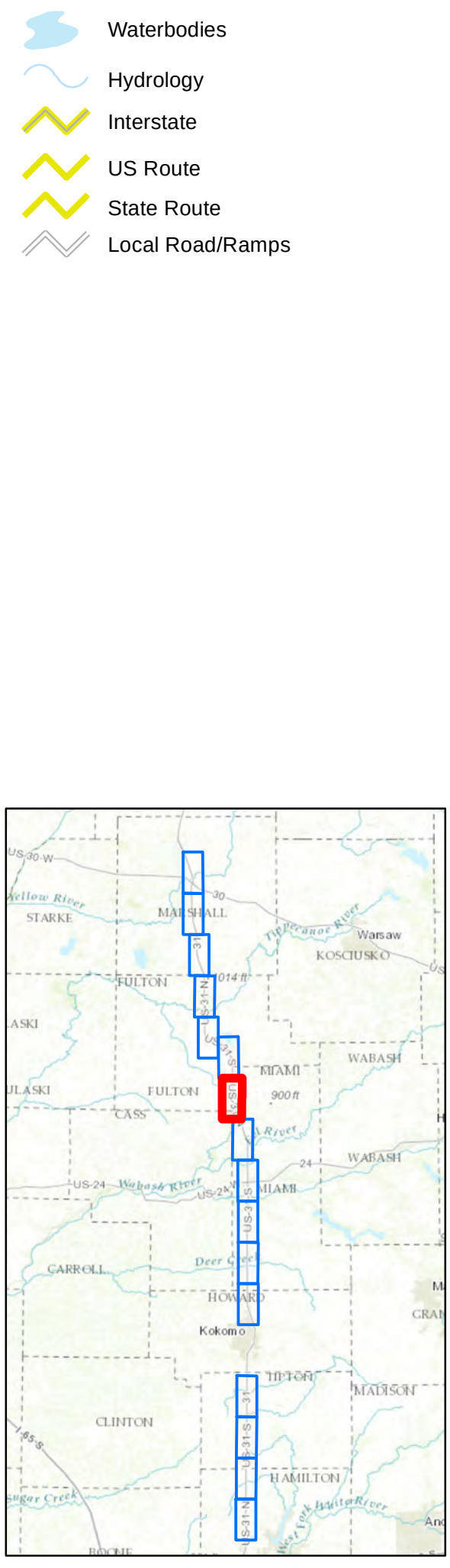
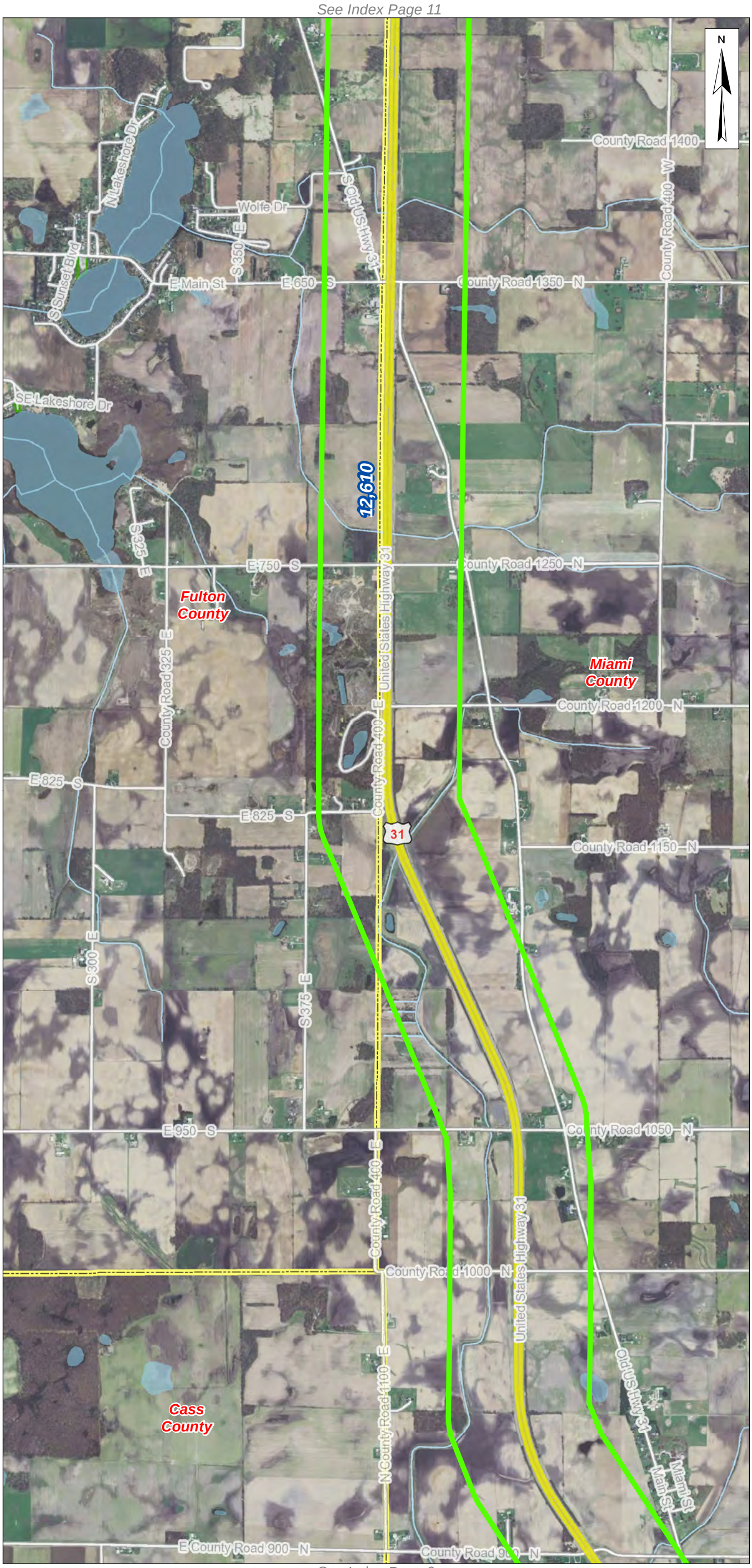
- 730 / 350 — Turning Volumes (AM Peak / PM Peak)
- 1,090 — AADT Traffic Volumes (Ramps & Roads)
- Project Area
- Half Mile Radius
- Incorporated Areas
- Public Lands
- County Boundary
- Waterbodies
- Hydrology
- Interstate
- US Route
- State Route
- Local Road/Ramps





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0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

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Traffic Volume Summary

US Route 31 Corridor Study

Miami, Fulton & Cass County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

Legend

- Turning Movements
- 730 / 350 — Turning Volumes (AM Peak / PM Peak)
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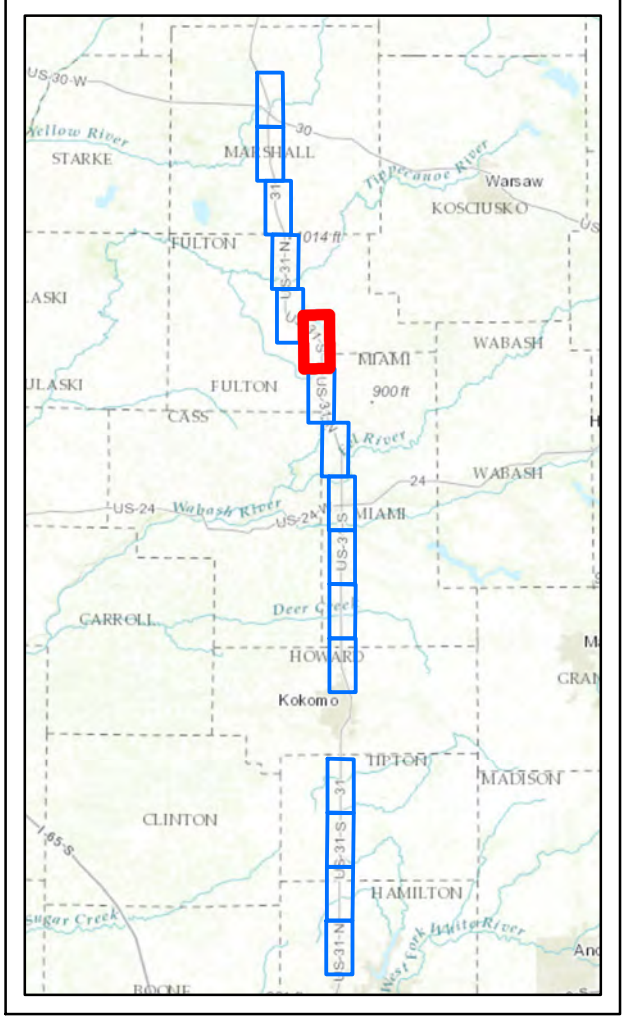

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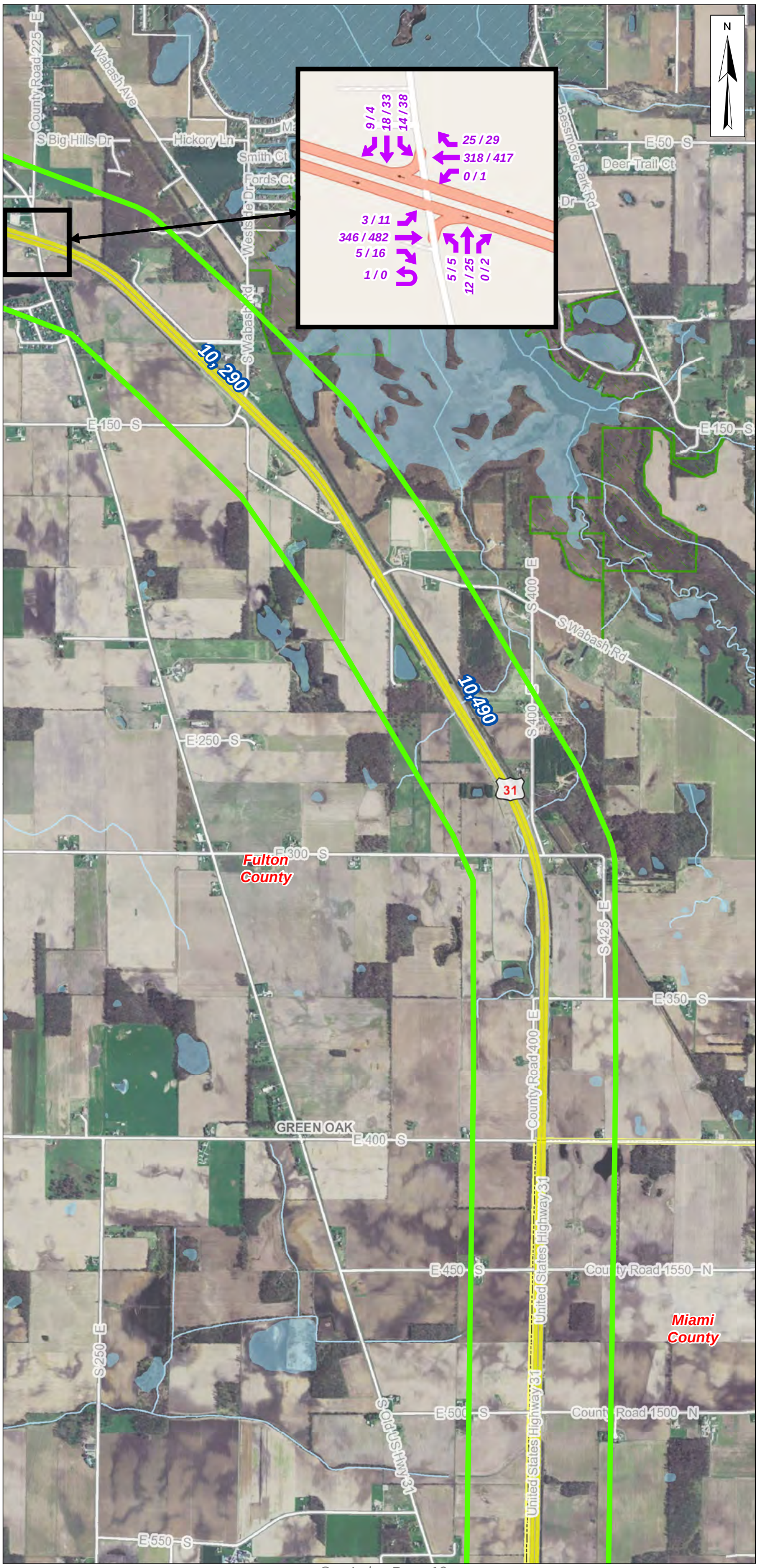

See Index Page 10

0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

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Traffic Volume Summary

US Route 31 Corridor Study

Fulton & Miami County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

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Legend

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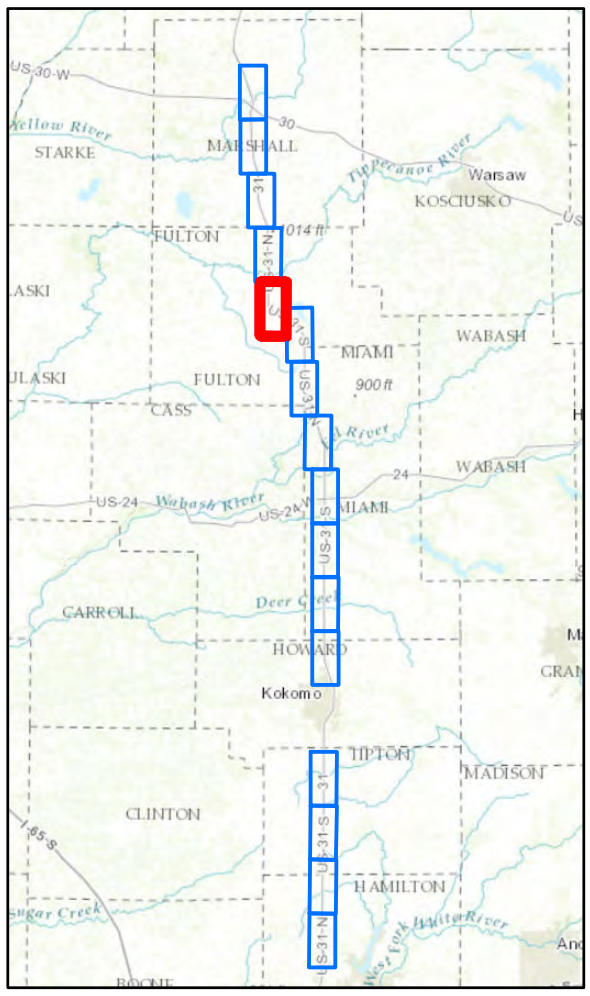

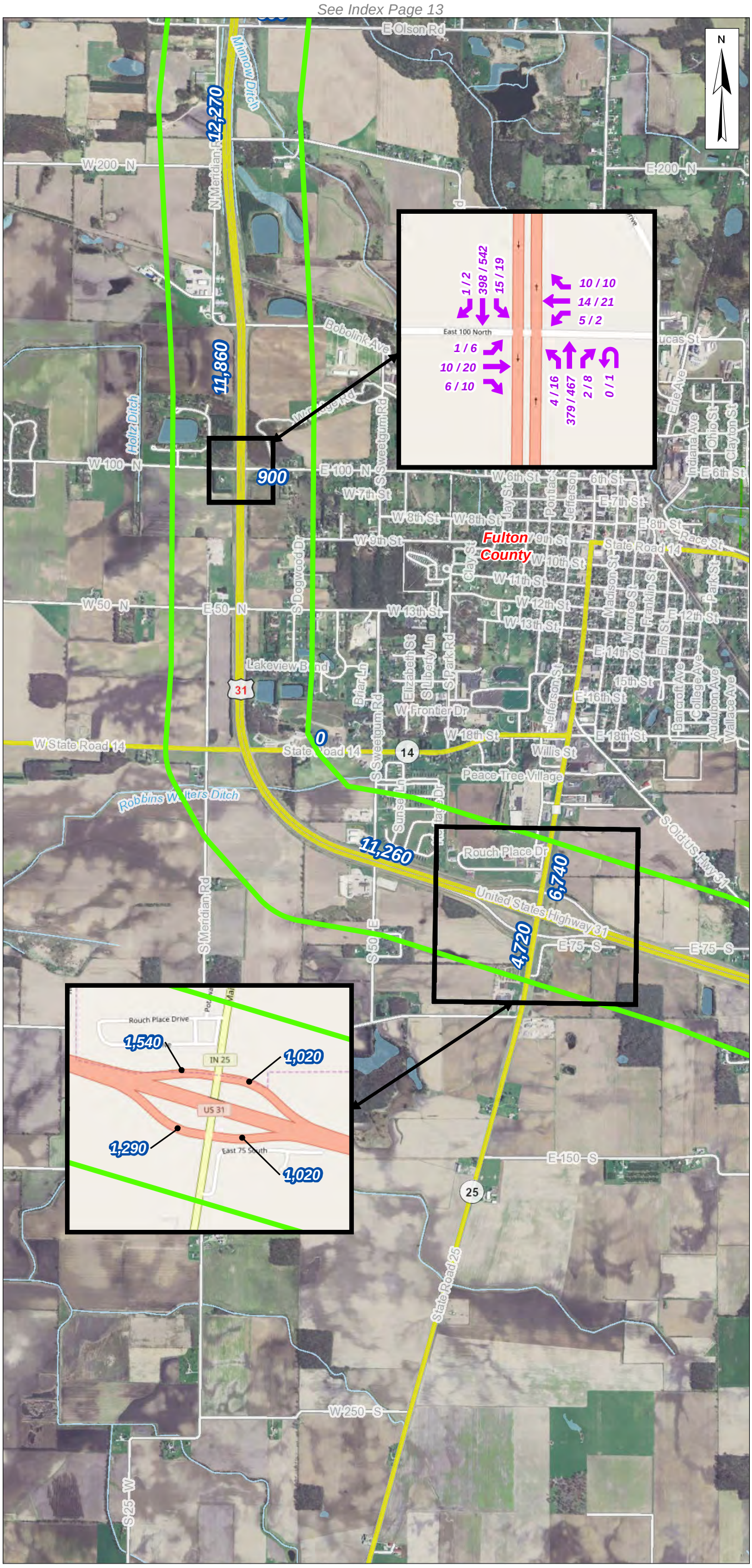

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Scale 1" =1500'

CHA design/construction solutions

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Traffic Volume Summary

US Route 31 Corridor Study

Fulton County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

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Legend

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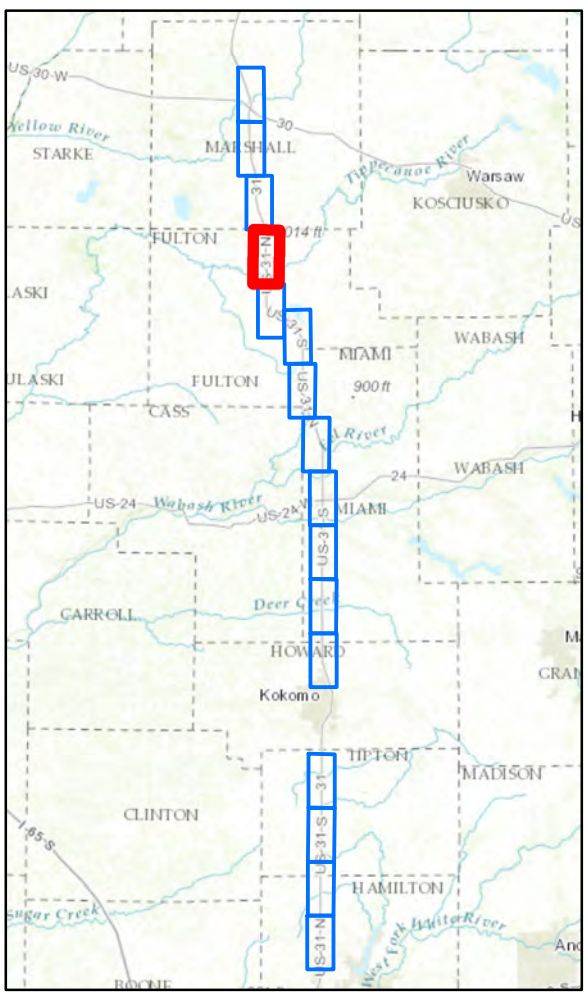

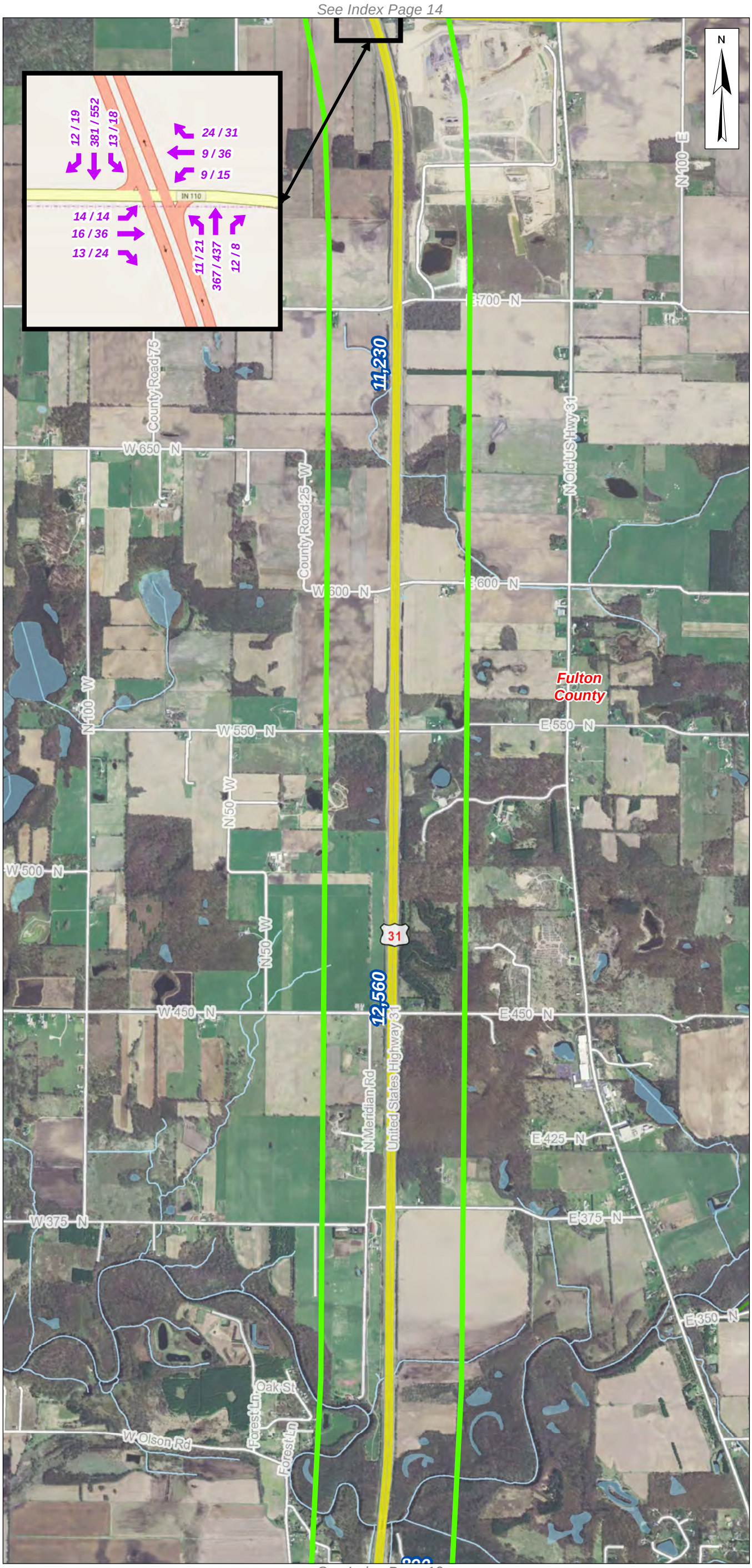

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0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

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Traffic Volume Summary

US Route 31 Corridor Study

Fulton County

Sources:

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Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

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Legend

- Turning Movements
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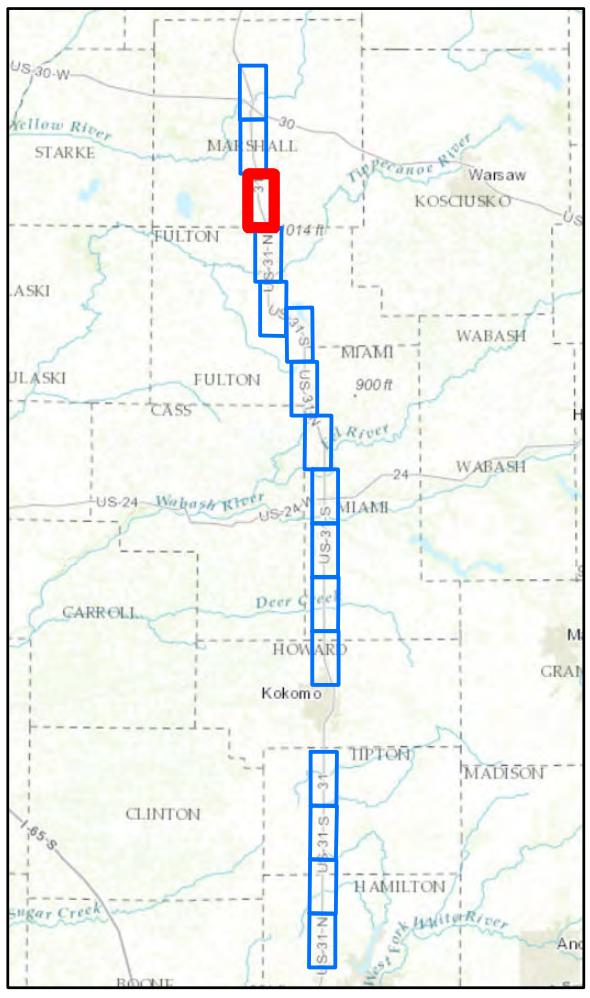

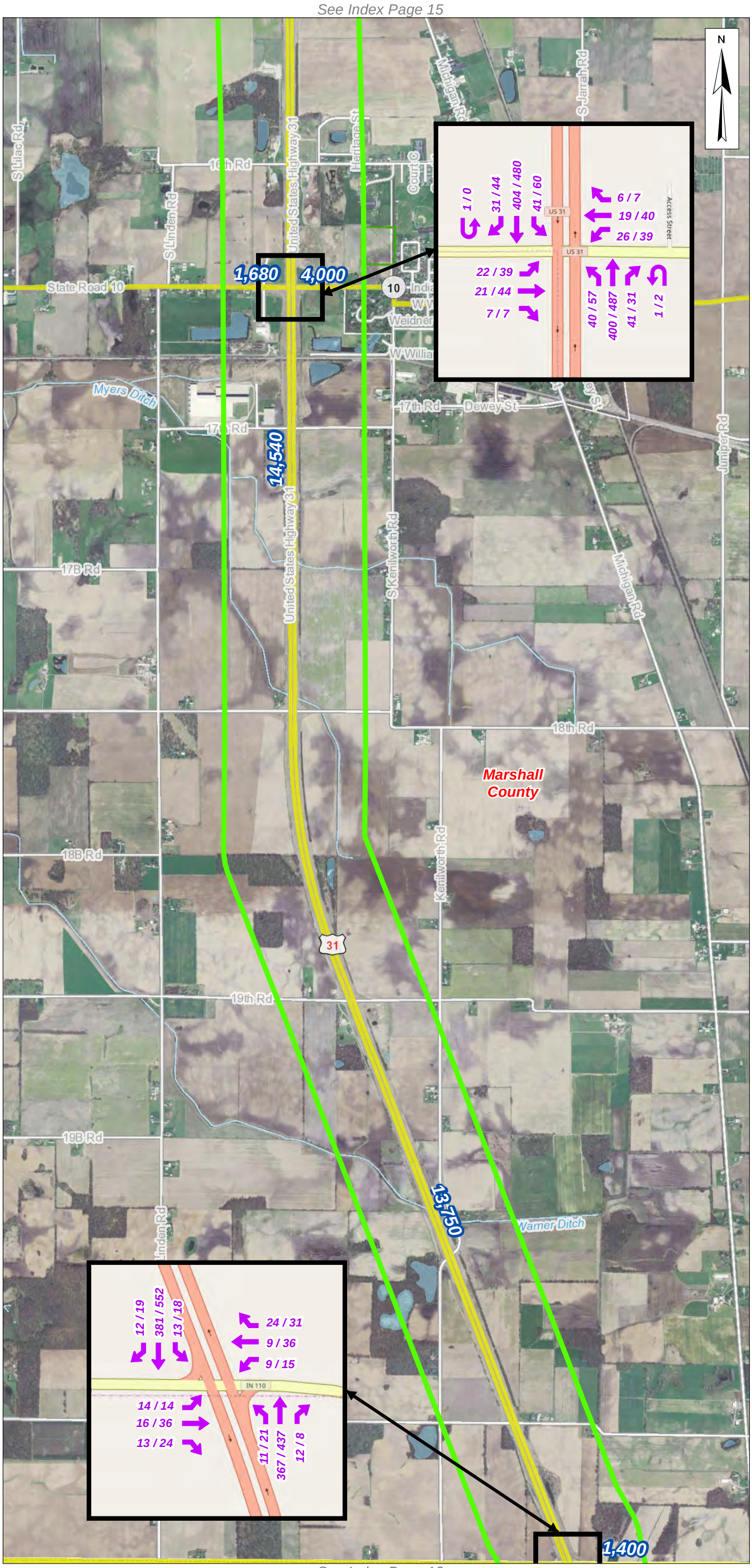

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Scale 1" =1500'

CHA design/construction solutions

This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

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Traffic Volume Summary

US Route 31 Corridor Study

Marshall County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

See Index Page 16

Legend

- Turning Movements
- 730 / 350 — Turning Volumes (AM Peak / PM Peak)
- 1,090 — AADT Traffic Volumes (Ramps & Roads)
- Project Area
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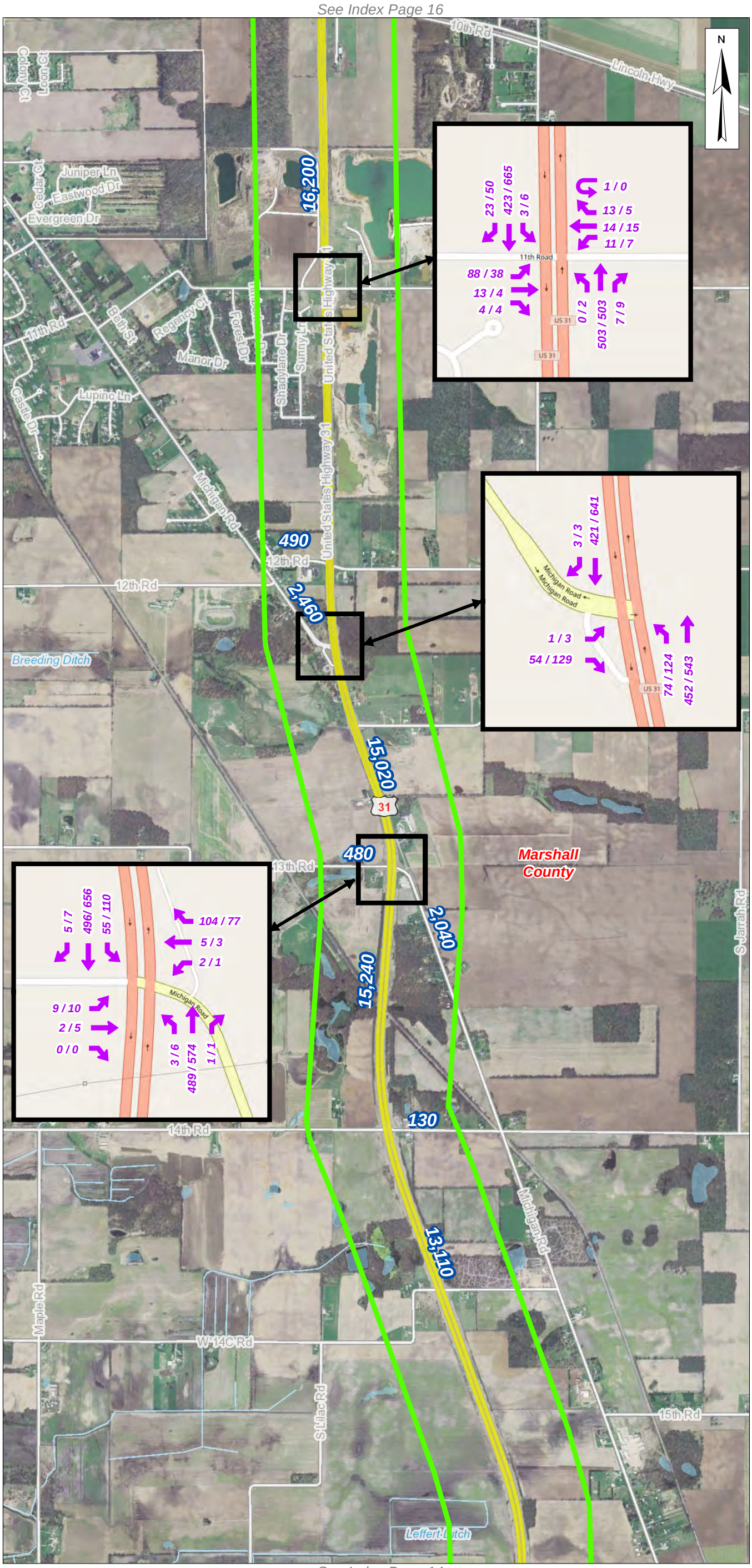

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Scale 1" =1500'

CHA design/construction solutions

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Traffic Volume Summary

US Route 31 Corridor Study

Marshall County

Sources:

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Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

Legend

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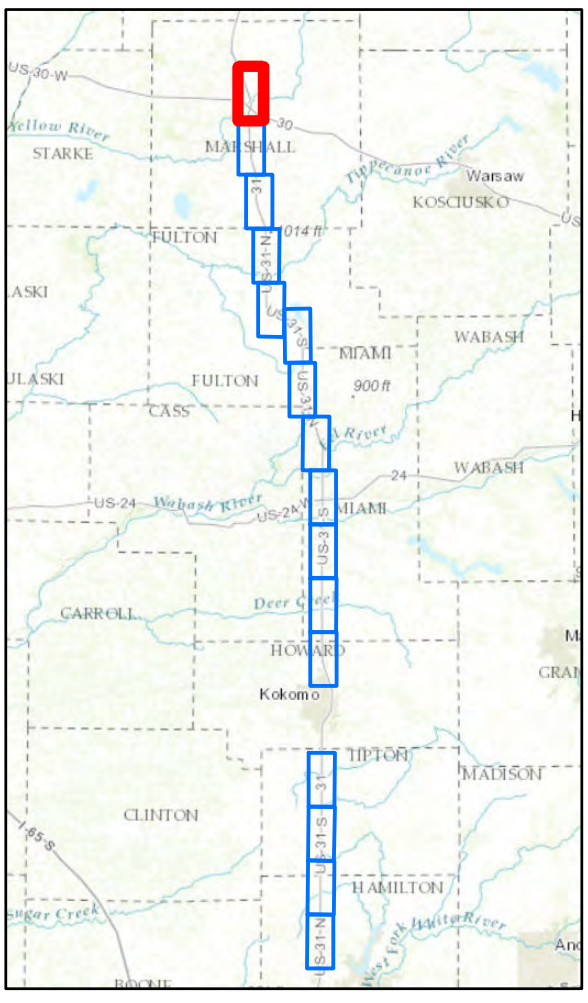

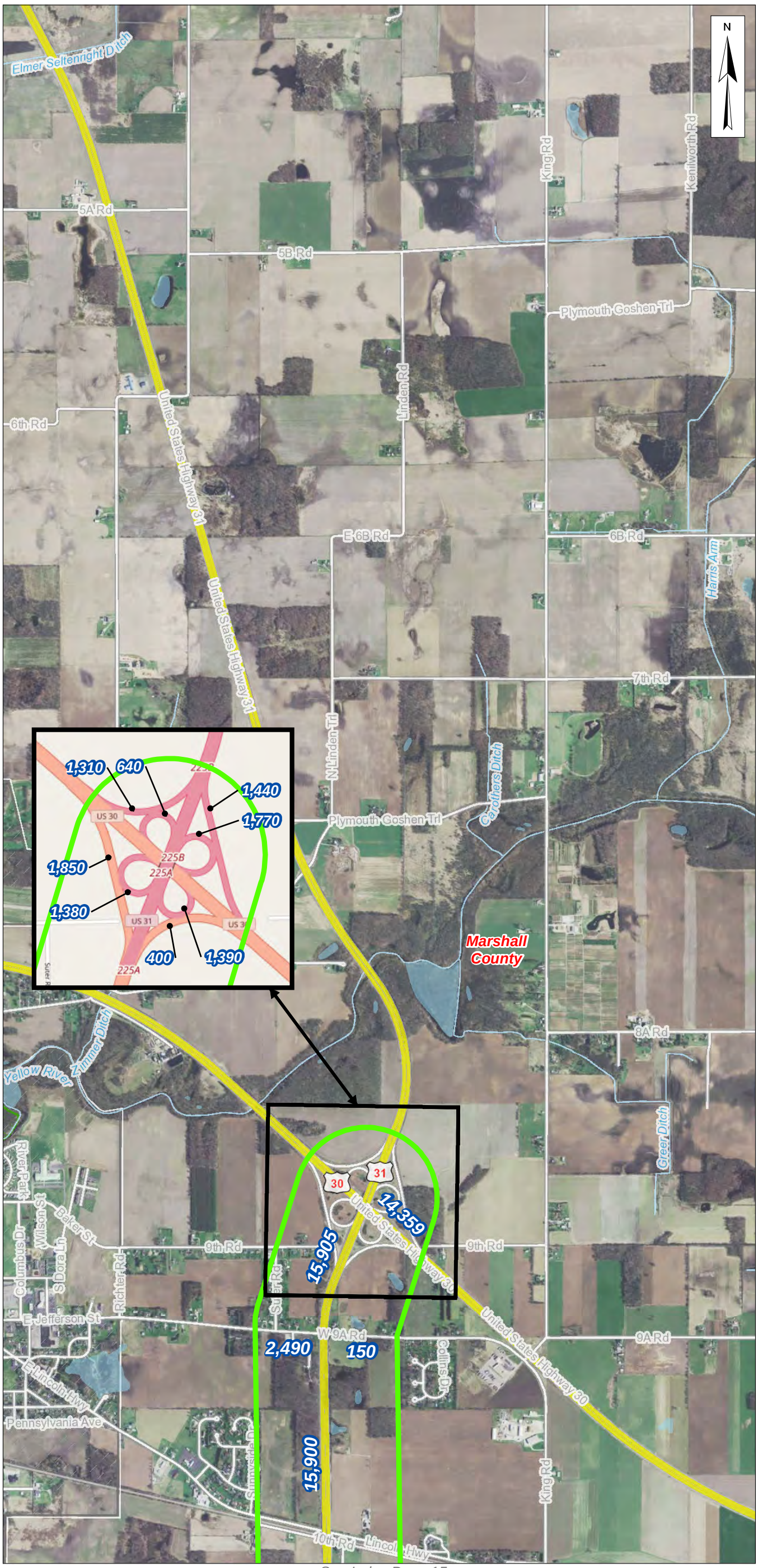

See Index Page 15

0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

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Traffic Volume Summary

US Route 31 Corridor Study

Marshall County

Sources:

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Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

Signalized Intersections

The turning movement volumes at major intersections are also presented in Figures 1-16. Both AM and PM peak hours are displayed. Most intersecting roadways are either State Routes or local roads that connect with nearby towns, cities and major traffic generators. The LOS of the signalized intersections on US 31 are presented in Table 2. Overall, the LOS for AM and PM peak hours are favorable.

Table 2 - Level of Service Summary for Signalized Intersections

Intersection	County	Level of Service	
		AM	PM
236th Street	Hamilton	C	C
Division Road	Tipton	B	B
State Road 18	Miami	B	B
State Road 218 West	Miami	A	B
US 31 Business (Peru)	Miami	A	A
County Road 100 North	Miami	B	B

Unsignalized Intersections

Level of Service for select unsignalized intersections are reported in Table 3. These intersections were of note due to higher volumes along the roadways, safety concerns based on crash history, or preliminary stakeholder input. LOS for these locations varied from LOS A to F, depending on location and time period analyzed. In general, poor operations are somewhat expected for unsignalized cross streets during peak hours, as priority is given to through movements along US 31. However, this may lead to safety issues as extended delay causes motorists to take more risks in accepting a gap in traffic to make their maneuver.

Table 3 - Level of Service Summary for Unsignalized Intersections

Intersection	County	Level of Service			
		AM		PM	
		EB	WB	EB	WB
266th Street	Hamilton	E	E	F	F
296th Street	Hamilton	D	F	C	F
State Road 218 East	Miami	--	B	--	C
Hoosier Boulevard	Miami	B	C	C	F
Southway 31 Road *	Fulton	C	B	C	C
State Road 110	Fulton	B	B	C	C
State Road 10	Marshall	C	C	E	B
Michigan Road North	Marshall	A	--	B	--

* EB = NB; WB = SB

US 31 Segments

For roadway segments, LOS is measured in density (passenger car/mile/lane) – the criteria for the various LOS ratings are shown in Table 4. Table 5 summarizes the LOS of US 31 segments within the study. The below segments represent the highest daily two-way traffic volume in each county. The LOS for multilane, free-flowing roadway segments varied from "B" in Hamilton, Tipton and Howard Counties to LOS "A" in Miami, Fulton and Marshall Counties.

The LOS are considered favorable throughout the study corridor during the PM peak hour, the highest or "worst-case" of the morning and afternoon peak hours.

Table 4 - Level of Service Criteria for Segments

Level of Service	Density (vehicles/mile/lane)
A	≤ 11
B	> 11 and ≤ 18
C	> 18 and ≤ 26
D	> 26 and ≤ 35
E	> 35 and ≤ 45
F	> 45

Table 5 - Level of Service Summary for US 31 Segments (PM Peak)

US 31 Segment	County	ADT	Peak Hour Volume (PM)	Density (pc/mi/ln)	Level of Service (LOS)
SR 38 to 236th St.	Hamilton	30,260	1,770	16.2	B
CR W450N to Kokomo Bypass	Tipton	27,230	1,240	11.6	B
Kokomo By-Pass to CR E 600N	Howard	22,190	1,220	11.0	B
CR W800S to SR 218 East	Miami	23,660	1,110	10.2	A
CR W100N to CR W200N	Miami	14,280	600	5.7	A
Olson Road to CR E375N	Fulton	12,560	480	4.6	A
11th Road to 9A Road	Marshall	16,200	730	7.1	A

Crash Report Information

Safety throughout the corridor is one of the key components of the US 31 study and will be a major factor in determining future improvement types and schedules. As part of the study, crash data for the past three years was gathered by INDOT and provided to the study team for analysis. The following discussion conveys the results of the crash analysis.

There were a total of 1,518 crashes that occurred on the US 31 corridor within the study limits. The crashes involved 2,189 vehicles and 210 semi-trailers. There were a total of 15 fatal crashes, 279 injury crashes and 1224 Property Damage Only (PDO) crashes. The 15 fatal crashes yielded 20 total fatalities and the 279 injury crashes yielded 457 total injuries. In Tables 6-17, a summary of crashes and type of crash by county are displayed. It should be noted that number of crashes is a rarely used metric in crash analysis, as the volumes and study area vary widely between the counties. While this information is presented on a county-by-county basis, it should not be used to compare safety concerns between counties. For the type of crash, only the top 10 types of crashes are displayed for each county. The rural nature of the US 31 corridor reflects the patterns seen in the type of crash. Crashes involving deer, driving too fast for weather conditions, unsafe speed and running off the road were common types of crash, typical for a rural highway. Following too closely, failing to yield right of way, and disregarding a traffic signal / sign occur more frequently near intersections.

Table 6 - Crash Summary for Hamilton County

Total Crashes: 152 Length: 8.5 mi.

Number of Cars	Number of Trailers	Number of Injuries	Number of Fatalities	Number of Deer
244	21	53	0	34
Vehicles/Crash		**Injuries/Crash**	**Fatalities/Crash**	**Deer/Crash**
1.74		0.35	0.00	0.22

Table 7 - Most Frequent Crash Types in Hamilton County

Type of Crash	Number of Crashes
ANIMAL/OBJECT IN ROADWAY	36
FOLLOWING TOO CLOSELY	26
FAILURE TO YIELD RIGHT OF WAY	21
SPEED TOO FAST FOR WEATHER CONDITIONS	16
RAN OFF ROAD RIGHT	16
DISREGARD SIGNAL/REG SIGN	9
UNSAFE SPEED	5
UNSAFE LANE MOVEMENT	5
IMPROPER LANE USAGE	5
OVERCORRECTING/OVERSTEERING	4

Table 8 - Crash Summary for Tipton County

Total Crashes: 244 Length: 11.7 miles

Number of Cars	Number of Trailers	Number of Injuries	Number of Fatalities	Number of Deer
366	29	72	5	25
Vehicles/Crash		**Injuries/Crash**	**Fatalities/Crash**	**Deer/Crash**
1.62		0.30	0.02	0.10

Table 9 - Most Frequent Crash Types in Tipton County

Type of Crash	Number of Crashes
SPEED TOO FAST FOR WEATHER CONDITIONS	75
ANIMAL/OBJECT IN ROADWAY	36
FOLLOWING TOO CLOSELY	22
RAN OFF ROAD RIGHT	20
FAILURE TO YIELD RIGHT OF WAY	15
UNSAFE SPEED	11
OVERCORRECTING/OVERSTEERING	10
UNSAFE LANE MOVEMENT	8
DRIVER DISTRACTED	6
DISREGARD SIGNAL/REG SIGN	6

Table 10 - Crash Summary for Howard County

Total Crashes: 16 Length: 0.8 miles

Number of Cars	Number of Trailers	Number of Injuries	Number of Fatalities	Number of Deer
20	2	3	0	7
Vehicles/Crash		**Injuries/Crash**	**Fatalities/Crash**	**Deer/Crash**
1.38		0.19	0.00	0.44

Table 11 - Most Frequent Crash Types in Howard County

Type of Crash	Number of Crashes
ANIMAL/OBJECT IN ROADWAY	5
SPEED TOO FAST FOR WEATHER CONDITIONS	2
RAN OFF ROAD RIGHT	1
FOLLOWING TOO CLOSELY	1
FAILURE TO YIELD RIGHT OF WAY	1
DRIVER DISTRACTED	1

Table 12 - Crash Summary for Miami County

Total Crashes: 567 Length: 30.4 miles

Number of Cars	Number of Trailers	Number of Injuries	Number of Fatalities	Number of Deer
841	70	193	12	149
Vehicles/Crash		**Injuries/Crash**	**Fatalities/Crash**	**Deer/Crash**
1.61		0.34	0.02	0.26

Table 13 - Most Frequent Crash Types in Miami County

Type of Crash	Number of Crashes
ANIMAL/OBJECT IN ROADWAY	153
SPEED TOO FAST FOR WEATHER CONDITIONS	77
FOLLOWING TOO CLOSELY	71
FAILURE TO YIELD RIGHT OF WAY	66
RAN OFF ROAD RIGHT	45
UNSAFE LANE MOVEMENT	24
OTHER (DRIVER)	13
OVERCORRECTING/OVERSTEERING	13
DISREGARD SIGNAL/REG SIGN	12
ROADWAY SURFACE CONDITION	10

Table 14 - Crash Summary for Fulton County

Total Crashes: 218 Length: 14.2 miles

Number of Cars	Number of Trailers	Number of Injuries	Number of Fatalities	Number of Deer
277	36	40	0	126
Vehicles/Crash		**Injuries/Crash**	**Fatalities/Crash**	**Deer/Crash**
1.44		0.18	0.00	0.58

Table 15 - Most Frequent Crash Types in Fulton County

Type of Crash	Number of Crashes
ANIMAL/OBJECT IN ROADWAY	127
FAILURE TO YIELD RIGHT OF WAY	38
RAN OFF ROAD RIGHT	19
FOLLOWING TOO CLOSELY	5
UNSAFE LANE MOVEMENT	5
SPEED TOO FAST FOR WEATHER CONDITIONS	4
OVERCORRECTING/OVERSTEERING	4
DRIVER ASLEEP OR FATIGUED	4
VIEW OBSTRUCTED	3
DISREGARD SIGNAL/REG SIGN	2

Table 16 - Crash Summary for Marshall County

Total Crashes: 321 Length: 12.6 miles

Number of Cars	Number of Trailers	Number of Injuries	Number of Fatalities	Number of Deer
441	52	96	3	83
Vehicles/Crash		**Injuries/Crash**	**Fatalities/Crash**	**Deer/Crash**
1.54		0.30	0.01	0.26

Table 17 - Most Frequent Crash Types in Marshall County

Type of Crash	Number of Crashes
ANIMAL/OBJECT IN ROADWAY	86
FAILURE TO YIELD RIGHT OF WAY	34
RAN OFF ROAD RIGHT	25
ROADWAY SURFACE CONDITION	24
SPEED TOO FAST FOR WEATHER CONDITIONS	23
OTHER (DRIVER)	20
DRIVER ASLEEP OR FATIGUED	10
OVERCORRECTING/OVERSTEERING	9
UNSAFE LANE MOVEMENT	4
IMPROPER TURNING	4

Most crashes occurred in the vicinity of intersections, both signalized and unsignalized, as Table 18 demonstrates. For the crash analysis of intersections, it was assumed that crashes as reported within 1,000 feet of an intersection, were in part influenced by the intersection. 1,000 feet was used since most auxiliary left and right-turn lanes on US 31 are approximately 500-600 feet in length. Another 500 feet is allotted on the approaches for vehicles changing lanes to get in turning lanes or to pass vehicles slowing down to turn at the intersection. Of the 1,518 crashes along the corridor, 1,312 occurred within 1,000-feet of intersections. From Table 18, over 80 percent of the crashes occurred in the vicinity of intersections including two thirds of fatal crashes.

Table 18 - Summary of Crashes within 1,000 feet of Intersections

County	Corridor Crashes				Crashes within 1,000 ft of Intersections			
	Total	Property Damage Only Crashes	Injury Crashes	Fatal Crashes	Total	Property Damage Only Crashes	Injury Crashes	Fatal Crashes
Marshall	321	270	48	3	233	192	38	3
Fulton	218	193	25	0	148	133	15	0
Miami	567	434	122	11	571	458	107	6
Howard	16	14	2	0	11	10	1	0
Tipton	244	191	52	1	195	157	37	1
Hamilton	152	122	30	0	154	129	25	0
Total	1,518	1,224	279	15	1,312	1,079	223	10
					Percentage of Total Crashes			
					86%	88%	80%	67%

High crash intersections are presented in Table 19 (no high crash segments exist based on the analysis). For this portion of the analysis, supplementary crash analysis was furnished by MACOG (Michiana Area Council of Governments). The standard safety analysis process involves the use of RoadHat 3.0 software to identify high crash locations. RoadHat compares candidate intersections or roadway segments to crash frequencies and crash costs collected on all Indiana roads. Facility type, traffic volumes and crash data are input to RoadHat.

There are four types of crash scenarios, described as follows:

1. Fatal Crashes where a fatality resulted from the crash.
2. Incapacitated Injury Crashes where motorists are injured such that they require to be taken to a hospital via an ambulance.
3. Non-Incapacitated Injury Crashes where motorists are injured but are treated at the scene and/or refuse treatment.
4. Property Damage Only (PDO) crashes and are those crashes that have no fatalities or injuries.

In order to determine the Incapacitated vs. Non-incapacitated injuries, typically a review of the crash report is required to determine if ambulance services were required. The individual crash

reports were not available as part of this study; however, the MACOG crash analysis did have access to the crash reports and provided a breakdown of injury types. The average rate of incapacitated vs. non-incapacitated from the MACOG study has been applied to the corridor study intersections outside of the MACOG study area (and noted as *Estimate in Table 19).

The RoadHat analysis yields two measures of safety for each location – the index of crash frequency (Icf) and the index of crash cost (Icc). The format of these indices are the number of standard deviations from the average crash condition for the same type of facility in Indiana. For example, an Icf of 1.0 means that the candidate location has a crash frequency of one standard deviation above the average conditions. An Icc of 2.0 means that the candidate location has a crash cost of two standard deviations above the average conditions. INDOT categorizes a high crash location as a candidate location that has at least one index (Icf or Icc) of 2.0 or higher. The results are found in Table 19. Three intersections satisfy INDOT's High Crash Location criteria: SR 10 in Marshall County, Southway 31 in Fulton County and CR 850 S in Miami County. The other intersections in Table 19 are of interest since they have indices in excess of 1.0. High crash locations are shown graphically along the corridor in Figures 17-32.

Table 19 - US 31 Corridor High Crash Location Summary

Intersection	County	Traffic Control	Crashes					RoadHat Results	
			Fatal	Injury		Property Damage Only	Total	Icf	Icc
				Incap.	Non-Incap.				
216th Street	Hamilton	2-way Stop	0	2*	3*	16	21	1.82	1.30
276th Street	Hamilton	2-way Stop	0	2*	2*	6	10	0.19	1.07
CR 100 S**	Tipton	2-way Stop	0	2*	2*	5	9	0.55	1.20
CR 850 S	Miami	2-way Stop	1	3	3	13	20	**2.23**	1.98
SR 218 East	Miami	Flasher	1	1	2	5	9	0.48	1.32
SR 218 West	Miami	Signal	1	1	4	19	25	1.77	1.33
CR 500 S	Miami	2-way Stop	0	2	3	9	14	1.25	1.27
CR 100 N	Miami	Signal	1	3	3	14	21	-0.1	1.36
SR 16	Miami	2-way Stop	0	3	3	1	7	0.18	1.53
Southway 31	Fulton	Flasher	0	1	3	14	18	**2.74**	1.23
SR 10	Marshall	Flasher	1	4	7	12	24	**2.69**	**2.39**
SR 110	Marshall	Flasher	0	3	4	7	14	1.10	1.58

***: Estimate**
****: Likely removed with the Railroad Grade Separation Project (On-going)**

See Index Page 2

Legend

- Icf and/or Icc in Excess of 2.0 (INDOT High Crash Location)
- Icf and/or Icc inbetween 1.0 and 2.0
- Project Area
- Half Mile Radius
- Incorporated Areas
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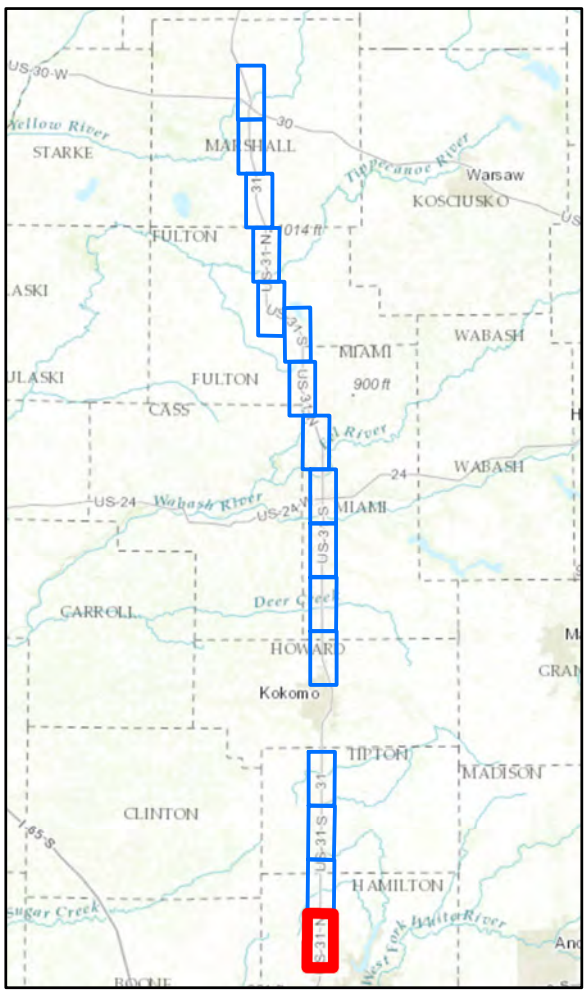
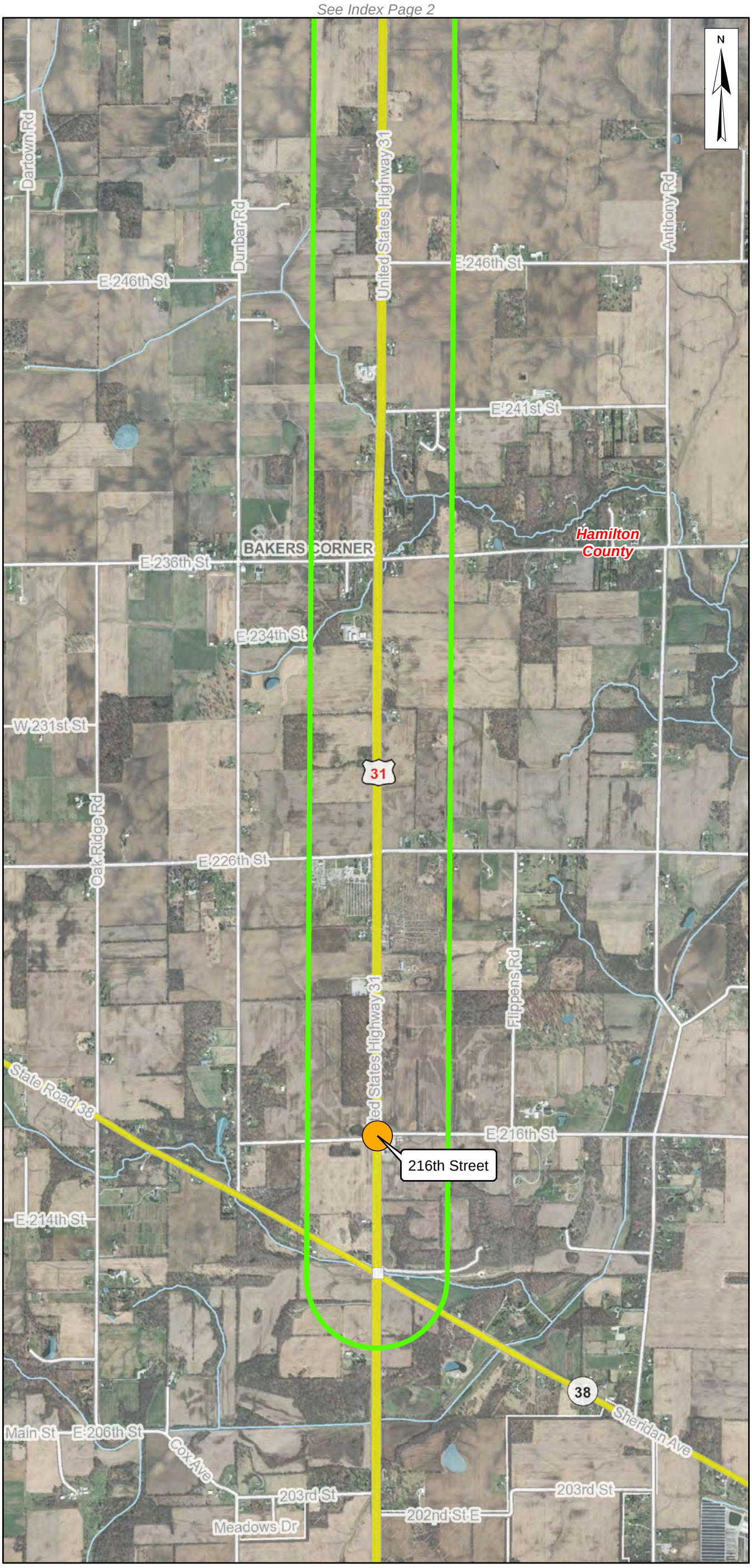
- Local Road/Ramps





0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

Index Page 1

High Crash Location Summary

US Route 31 Corridor Study

Hamilton County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

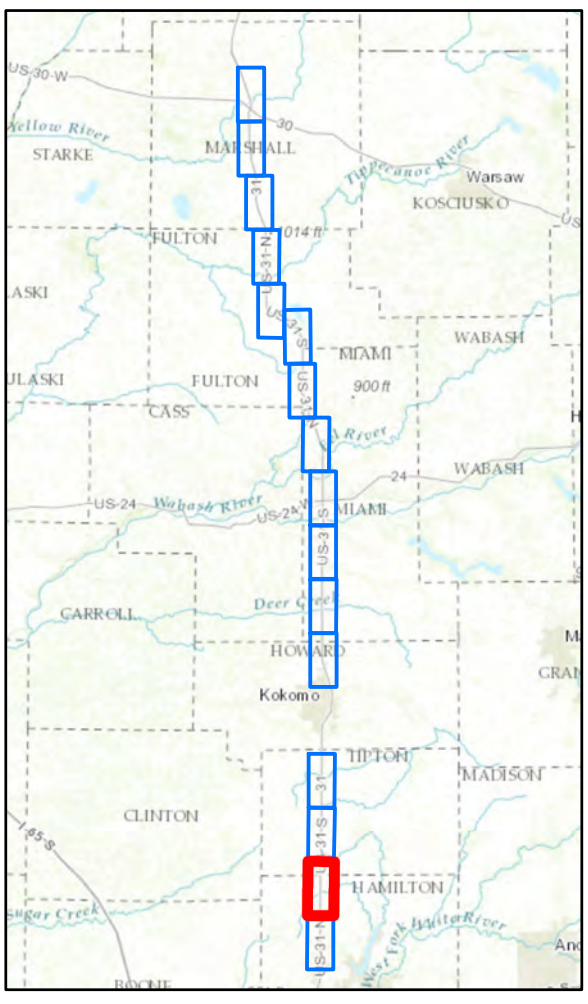
Map Projection: UTM Zone 16 N

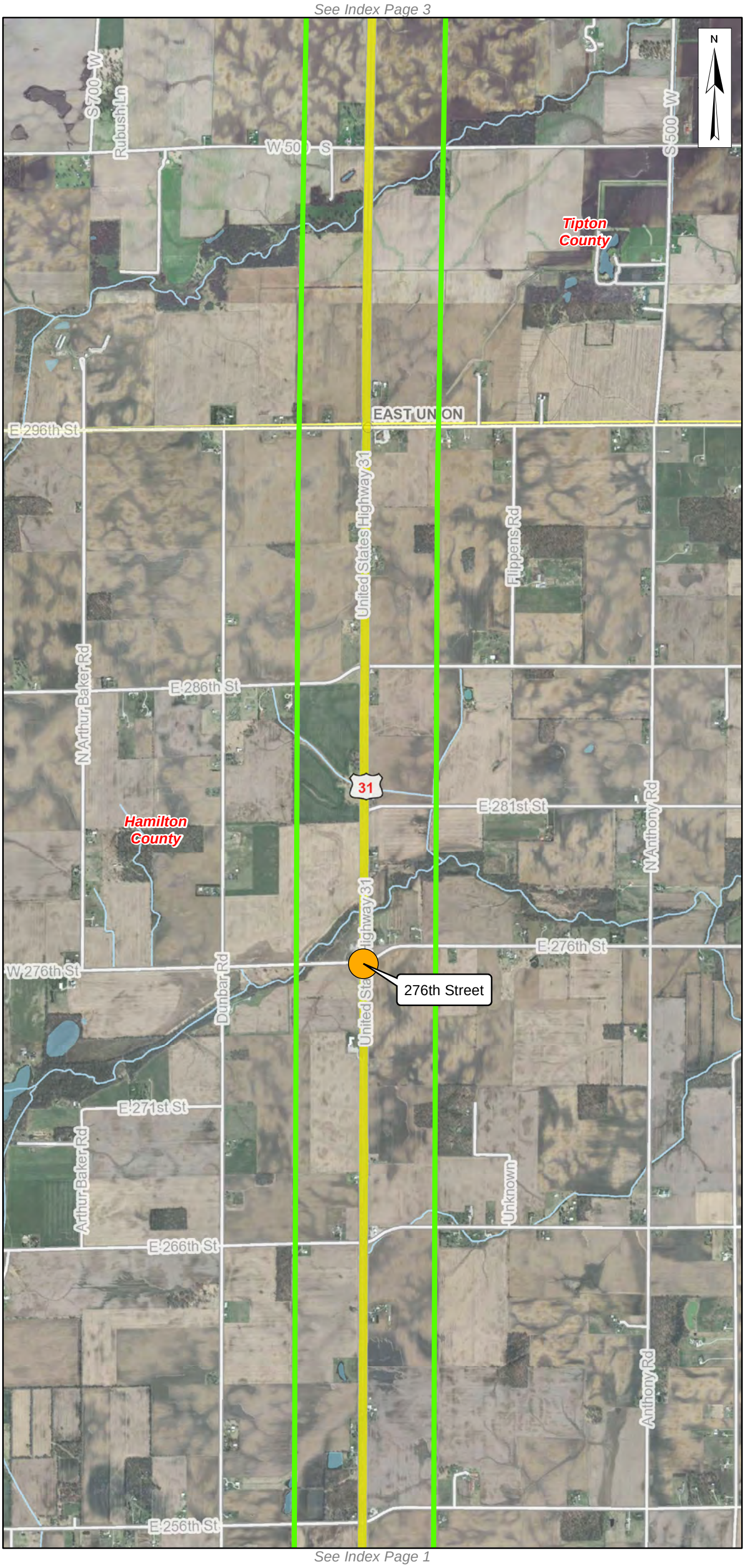
Map Datum: NAD83

See Index Page 3

Legend

- Icf and/or Icc in Excess of 2.0 (INDOT High Crash Location)
- Icf and/or Icc inbetween 1.0 and 2.0
- Project Area
- Half Mile Radius
- Incorporated Areas
- Public Lands
- County Boundary
- Waterbodies
- Hydrology
- Interstate
- US Route
- State Route
- Local Road/Ramps





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0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

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High Crash Location Summary

US Route 31 Corridor Study

Tipton & Hamilton County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

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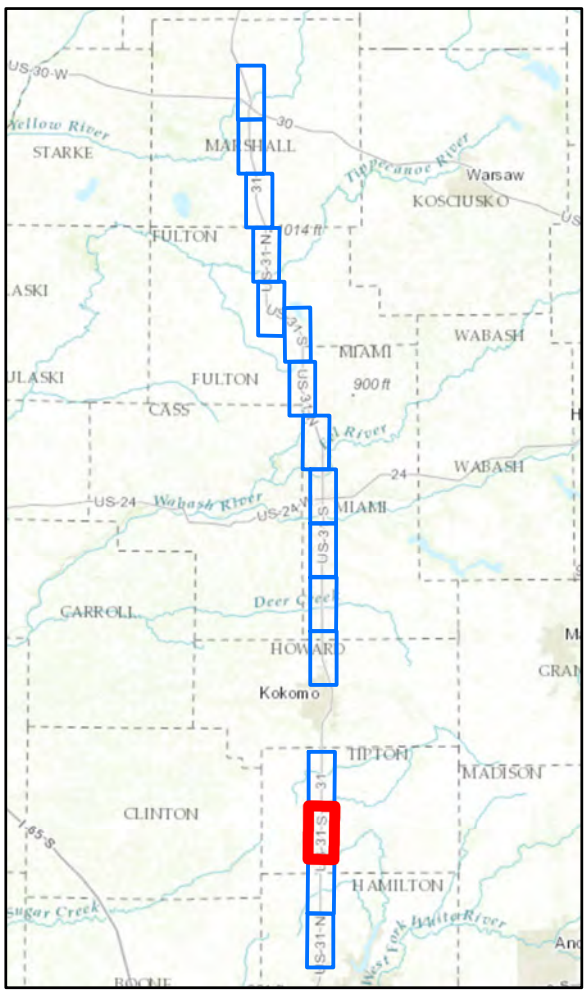
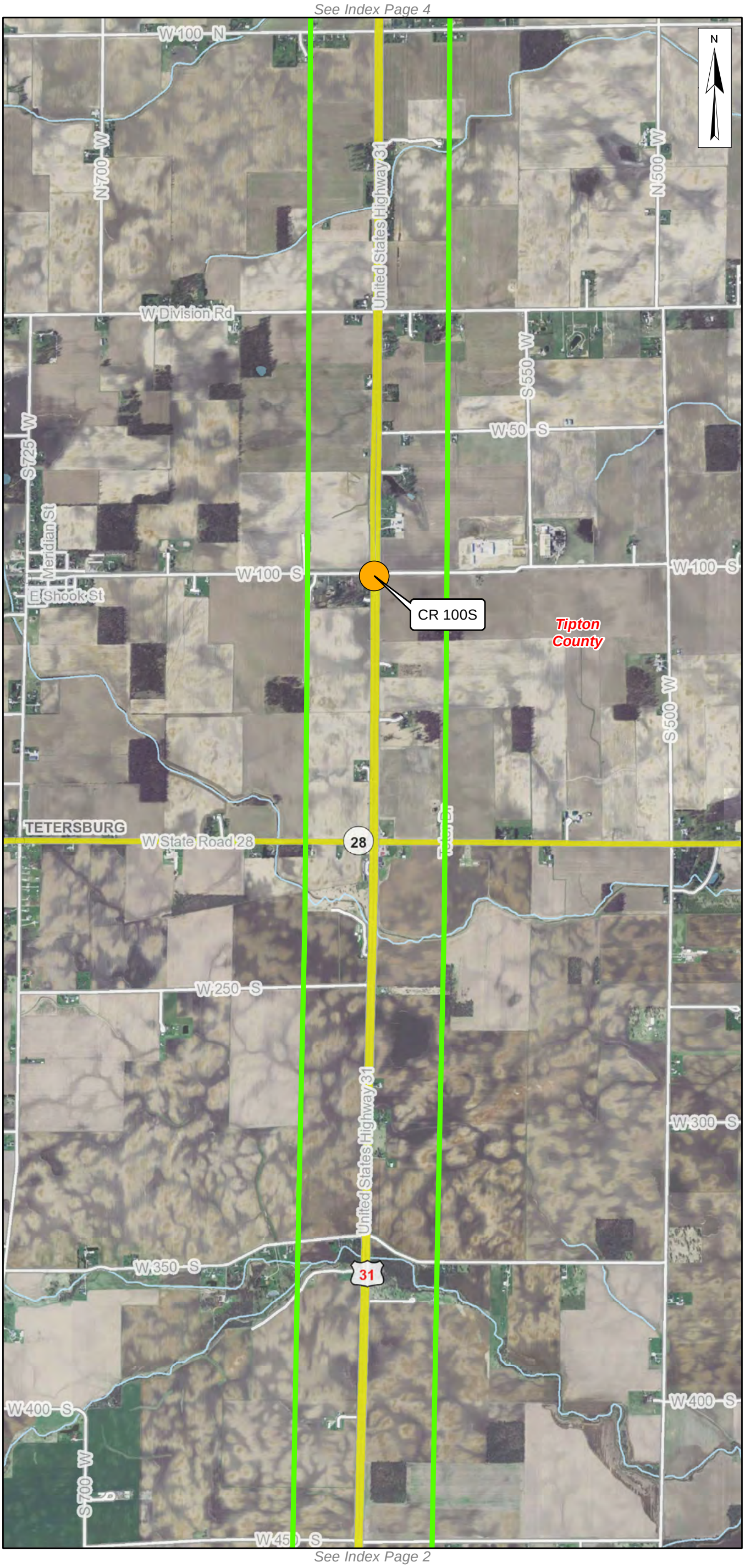
Legend

- Icf and/or Icc in Excess of 2.0 (INDOT High Crash Location)
- Icf and/or Icc inbetween 1.0 and 2.0
- Project Area
- Half Mile Radius
- Incorporated Areas
- Public Lands
- County Boundary
- Waterbodies
- Hydrology
- Interstate
- US Route
- State Route
- Local Road/Ramps





See Index Page 2

0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

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High Crash Location Summary

US Route 31 Corridor Study

Tipton County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

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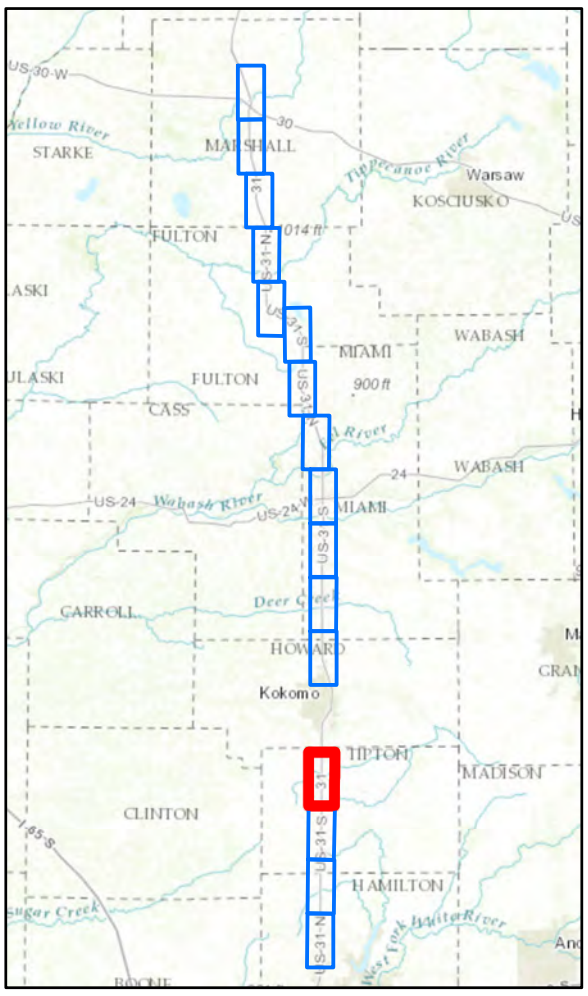
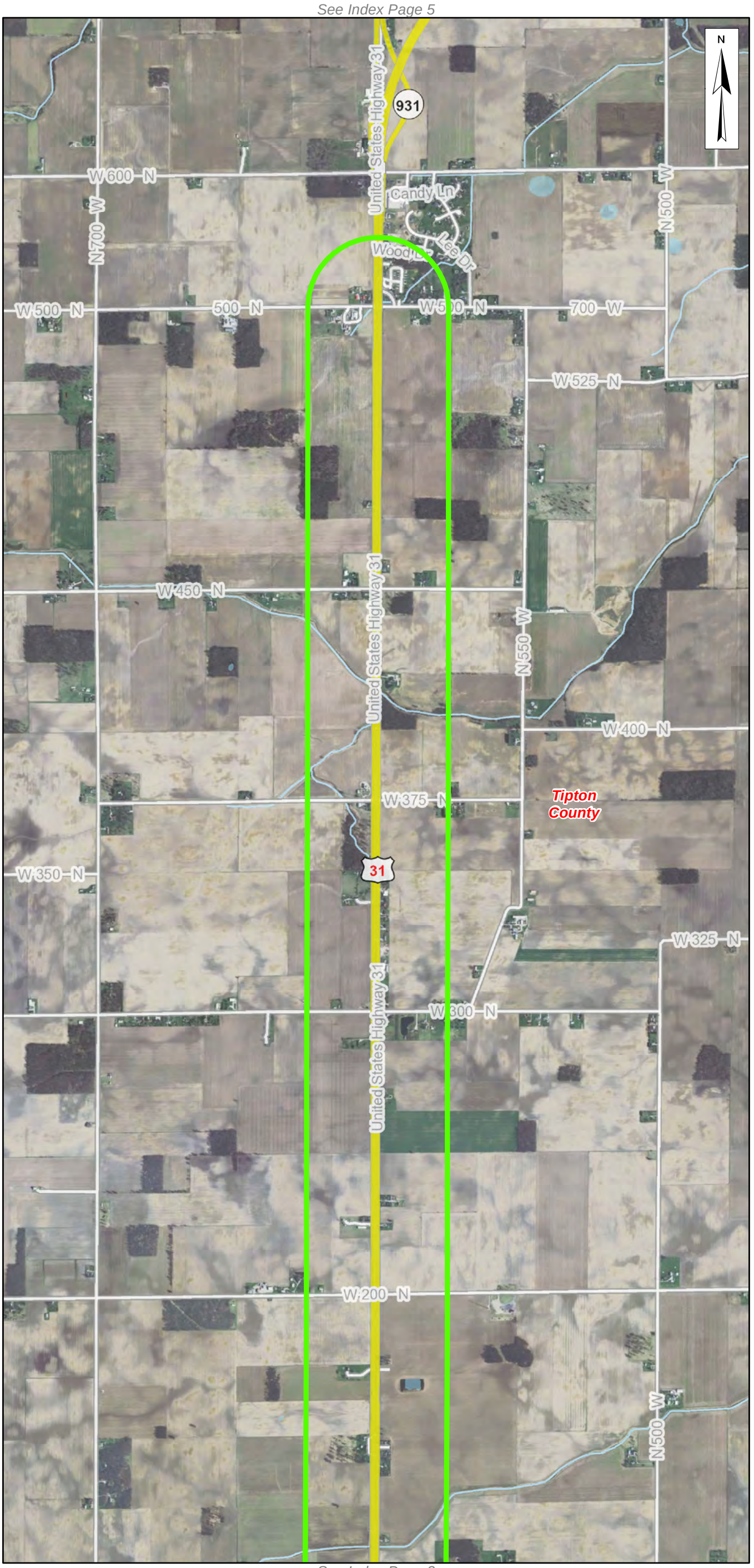
Legend

- Icf and/or Icc in Excess of 2.0 (INDOT High Crash Location)
- Icf and/or Icc inbetween 1.0 and 2.0
- Project Area
- Half Mile Radius
- Incorporated Areas
- Public Lands
- County Boundary
- Waterbodies
- Hydrology
- Interstate
- US Route
- State Route
- Local Road/Ramps





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0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

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High Crash Location Summary

US Route 31 Corridor Study

Tipton County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

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Legend

- Icf and/or Icc in Excess of 2.0 (INDOT High Crash Location)
- Icf and/or Icc inbetween 1.0 and 2.0
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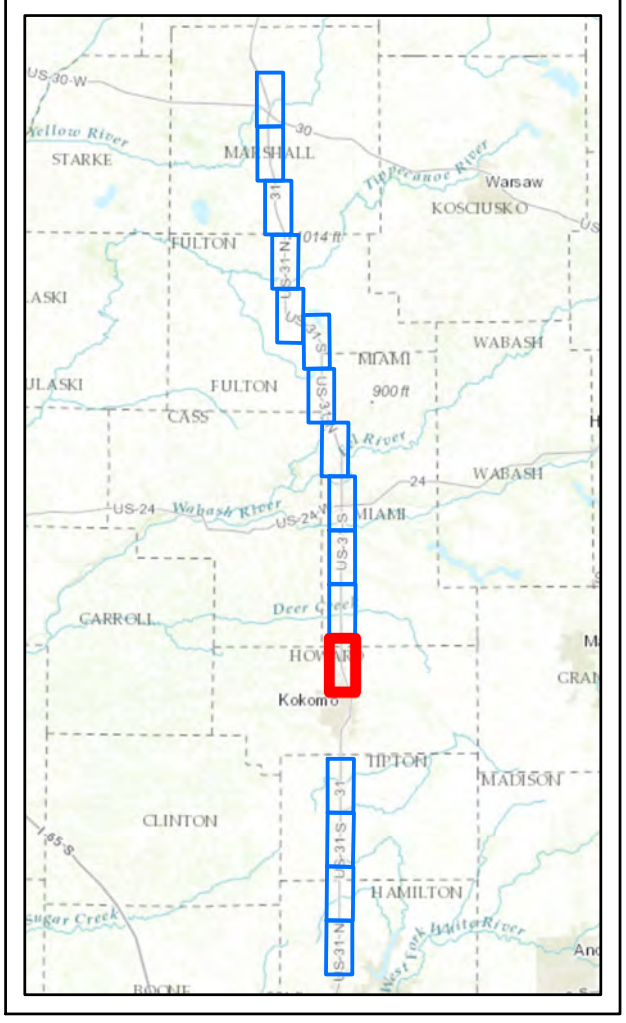
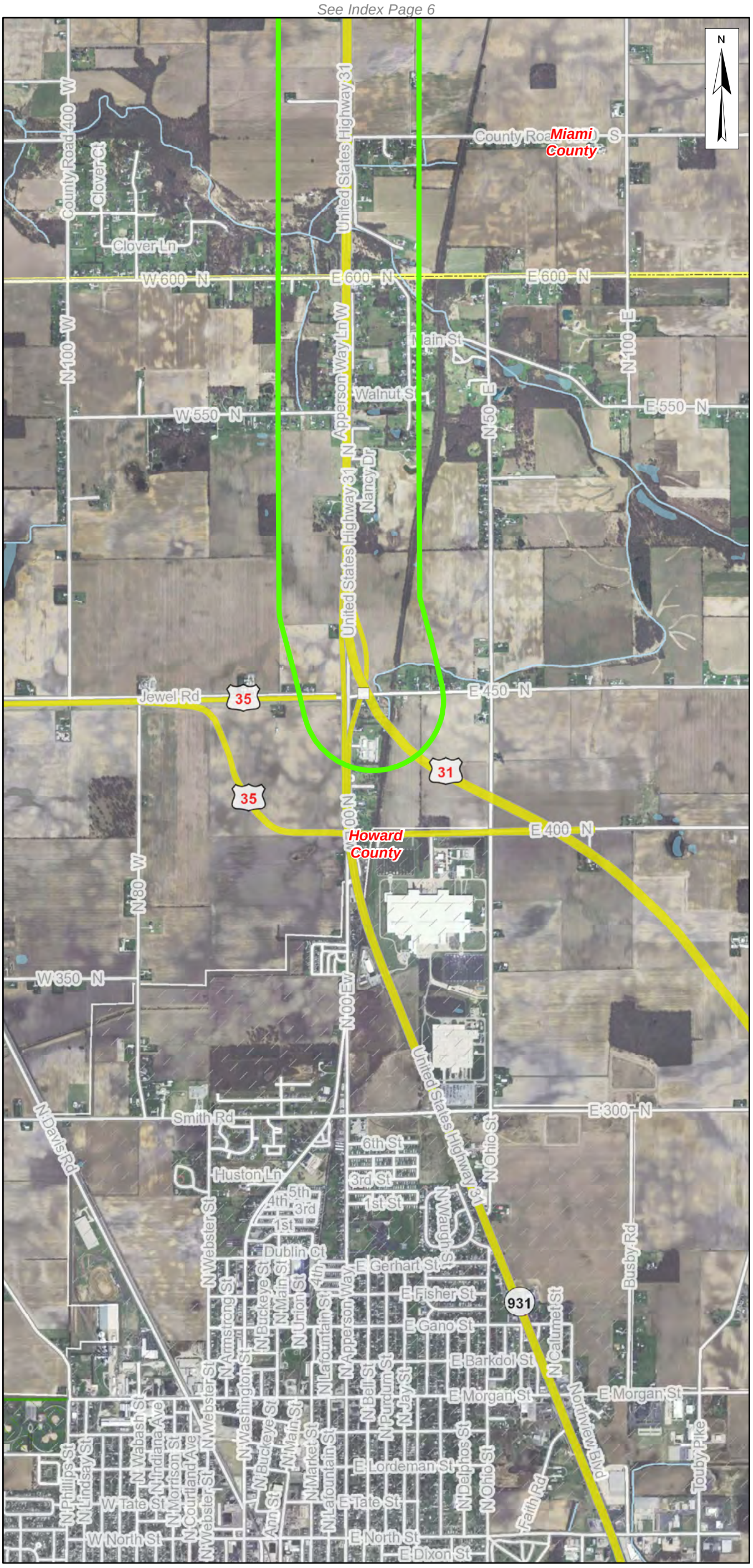
- Half Mile Radius
- Incorporated Areas
- Public Lands
- County Boundary
- Waterbodies
- Hydrology
- Interstate
- US Route
- State Route
- Local Road/Ramps





0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

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High Crash Location Summary

US Route 31 Corridor Study

Miami & Howard County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

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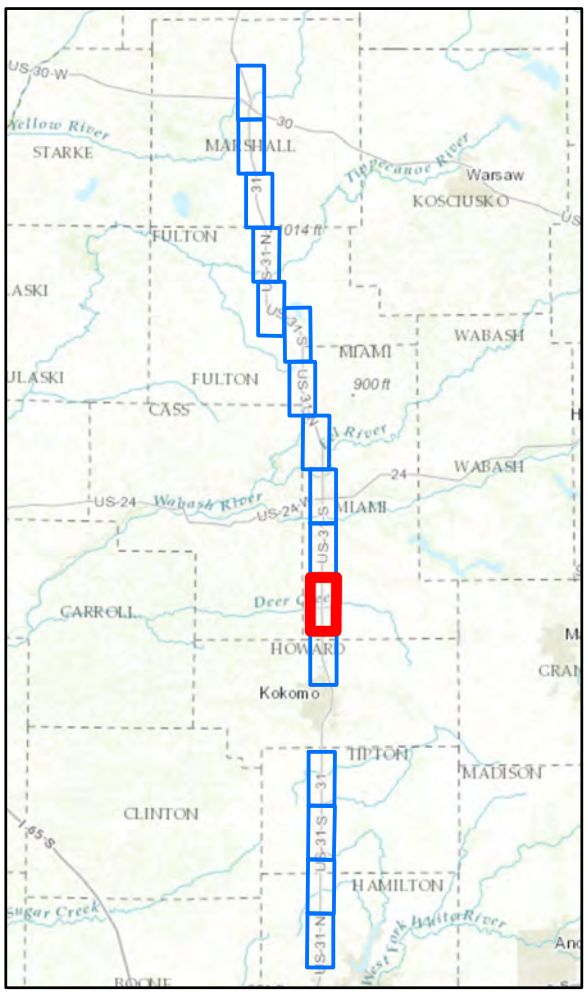
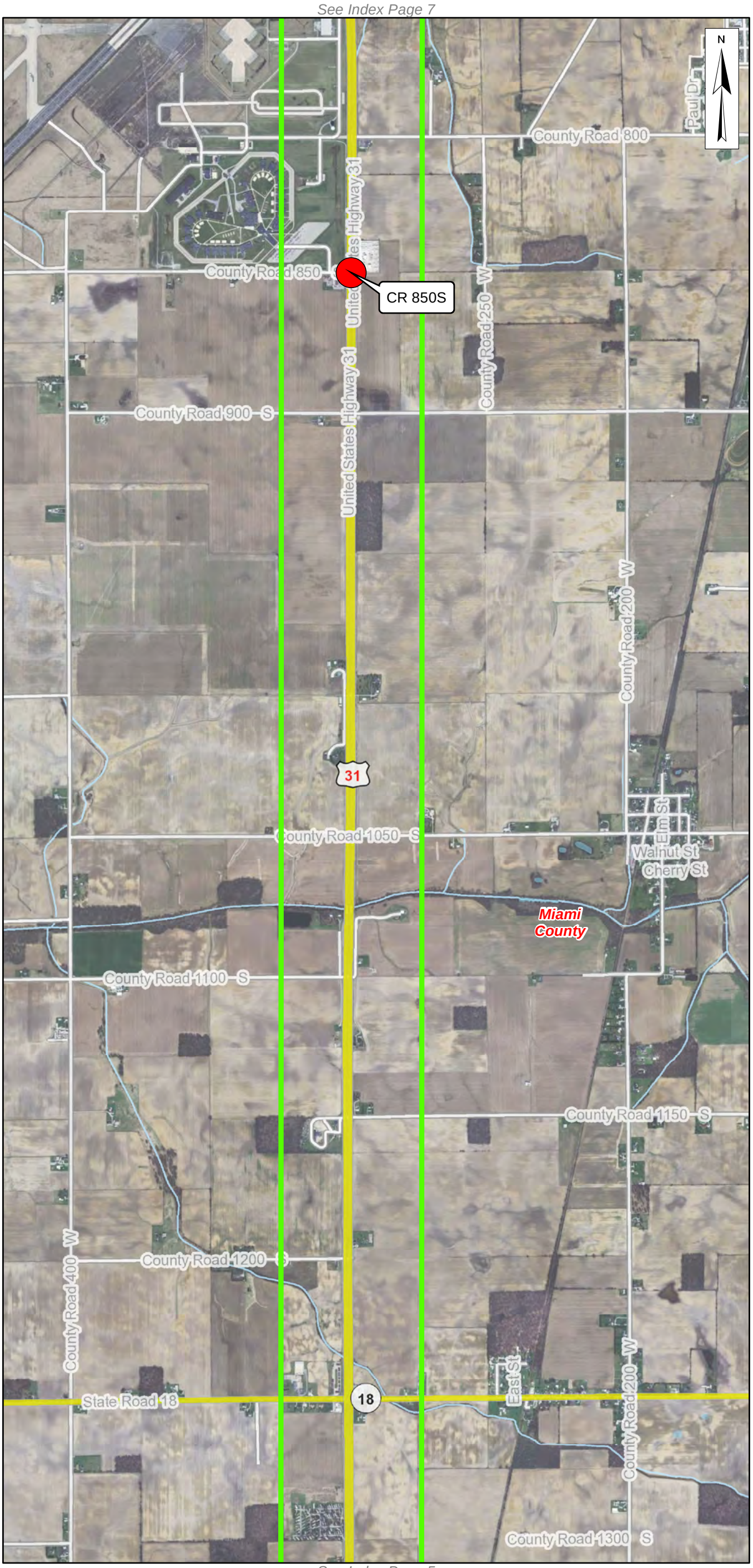
Legend

- Icf and/or Icc in Excess of 2.0 (INDOT High Crash Location)
- Icf and/or Icc inbetween 1.0 and 2.0
- Project Area
- Half Mile Radius
- Incorporated Areas
- Public Lands
- County Boundary
- Waterbodies
- Hydrology
- Interstate
- US Route
- State Route
- Local Road/Ramps





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0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

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High Crash Location Summary

US Route 31 Corridor Study

Miami County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

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Legend

- Icf and/or Icc in Excess of 2.0 (INDOT High Crash Location)
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- Incorporated Areas
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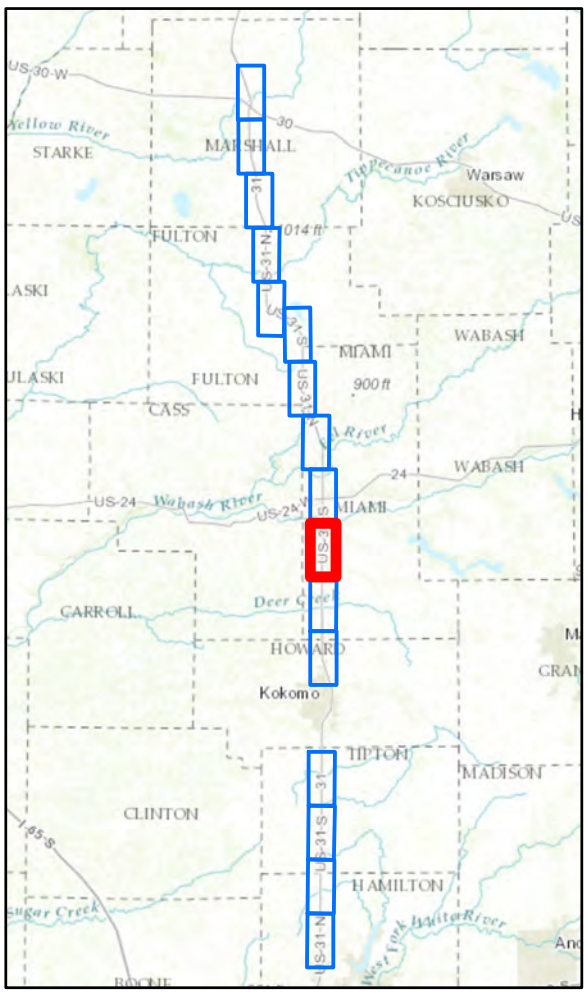
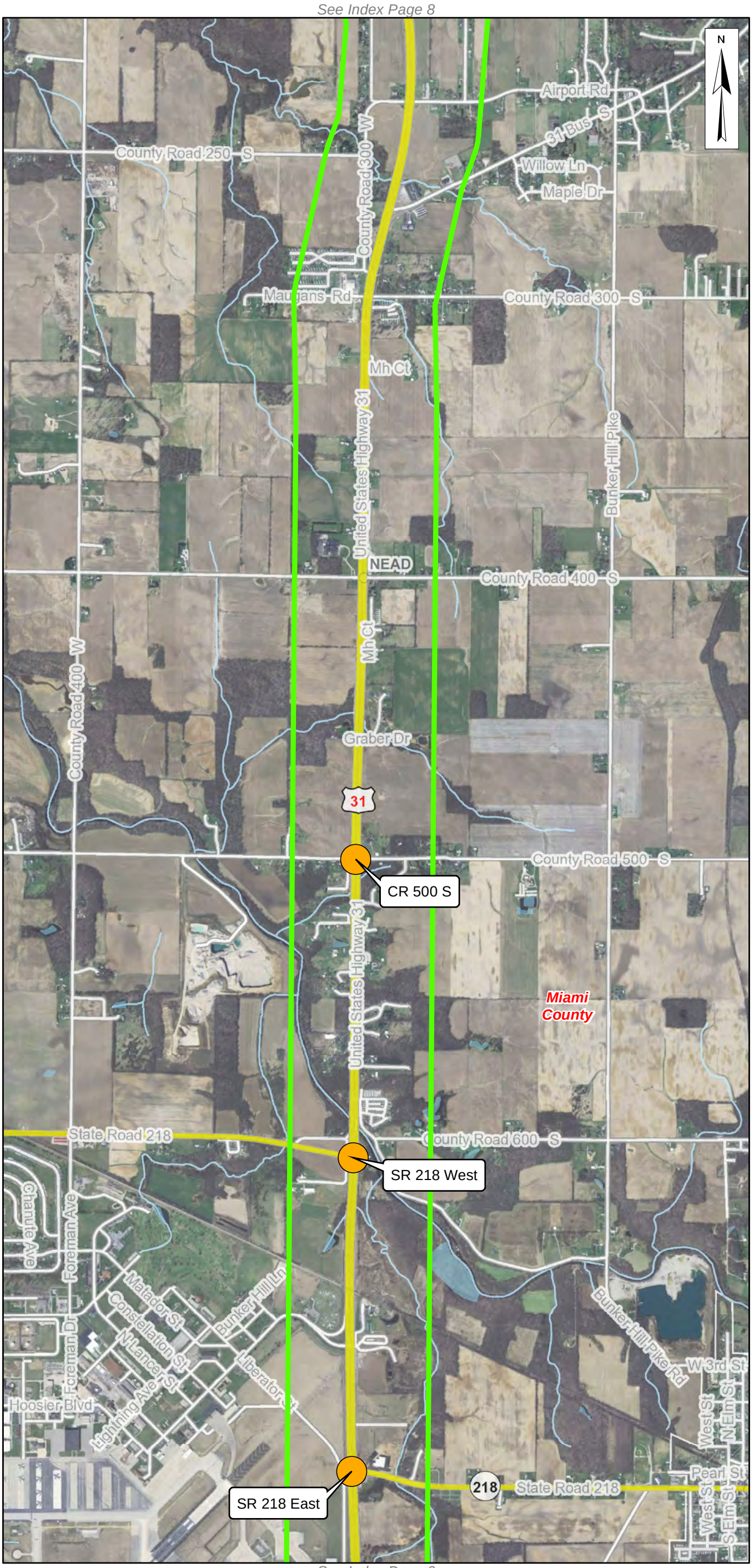
- County Boundary
- Waterbodies
- Hydrology
- Interstate
- US Route
- State Route
- Local Road/Ramps





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0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

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High Crash Location Summary

US Route 31 Corridor Study

Miami County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

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Legend

- Icf and/or Icc in Excess of 2.0 (INDOT High Crash Location)
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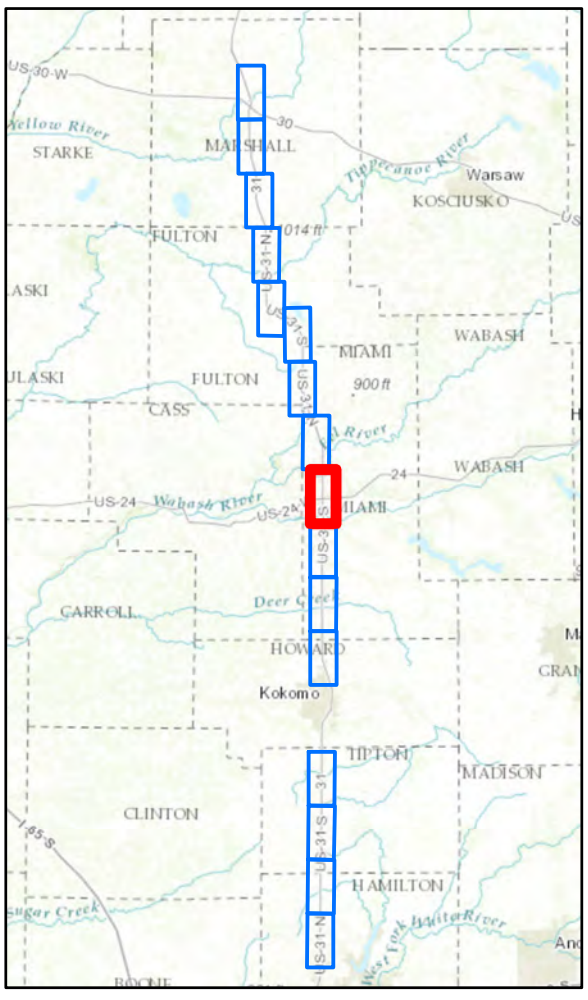
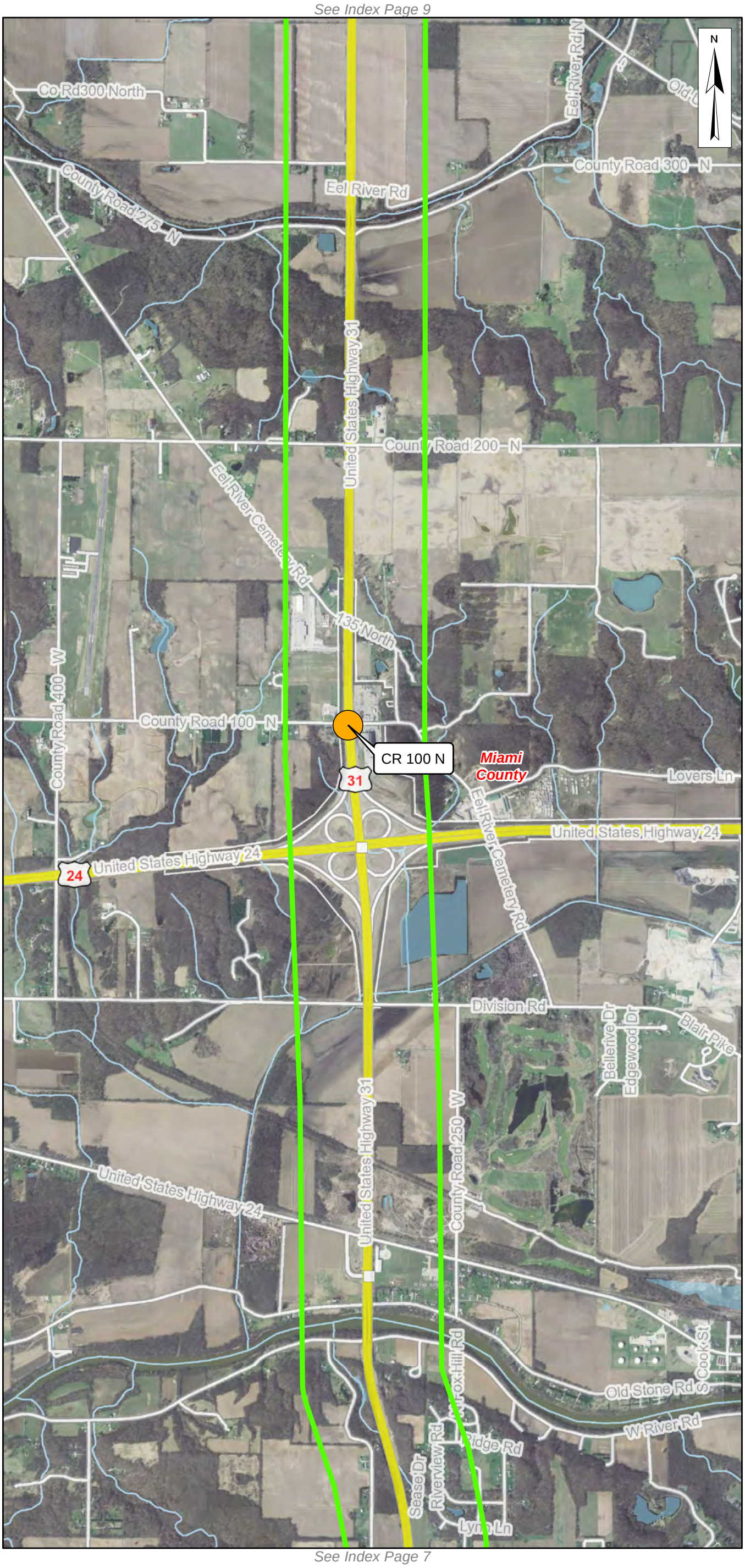
- Local Road/Ramps





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0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

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High Crash Location Summary

US Route 31 Corridor Study

Miami County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

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Legend

- Icf and/or Icc in Excess of 2.0 (INDOT High Crash Location)
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- Hydrology
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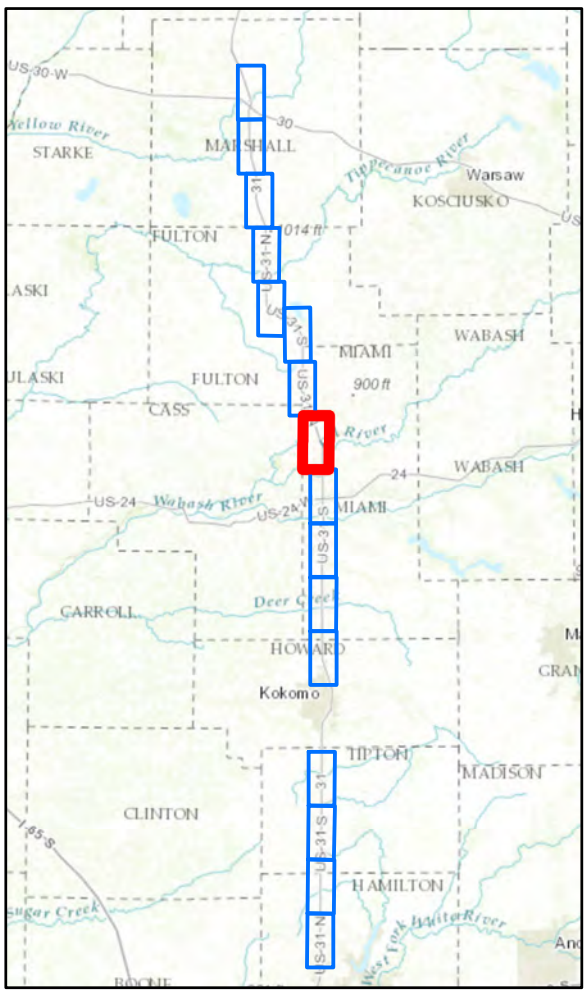

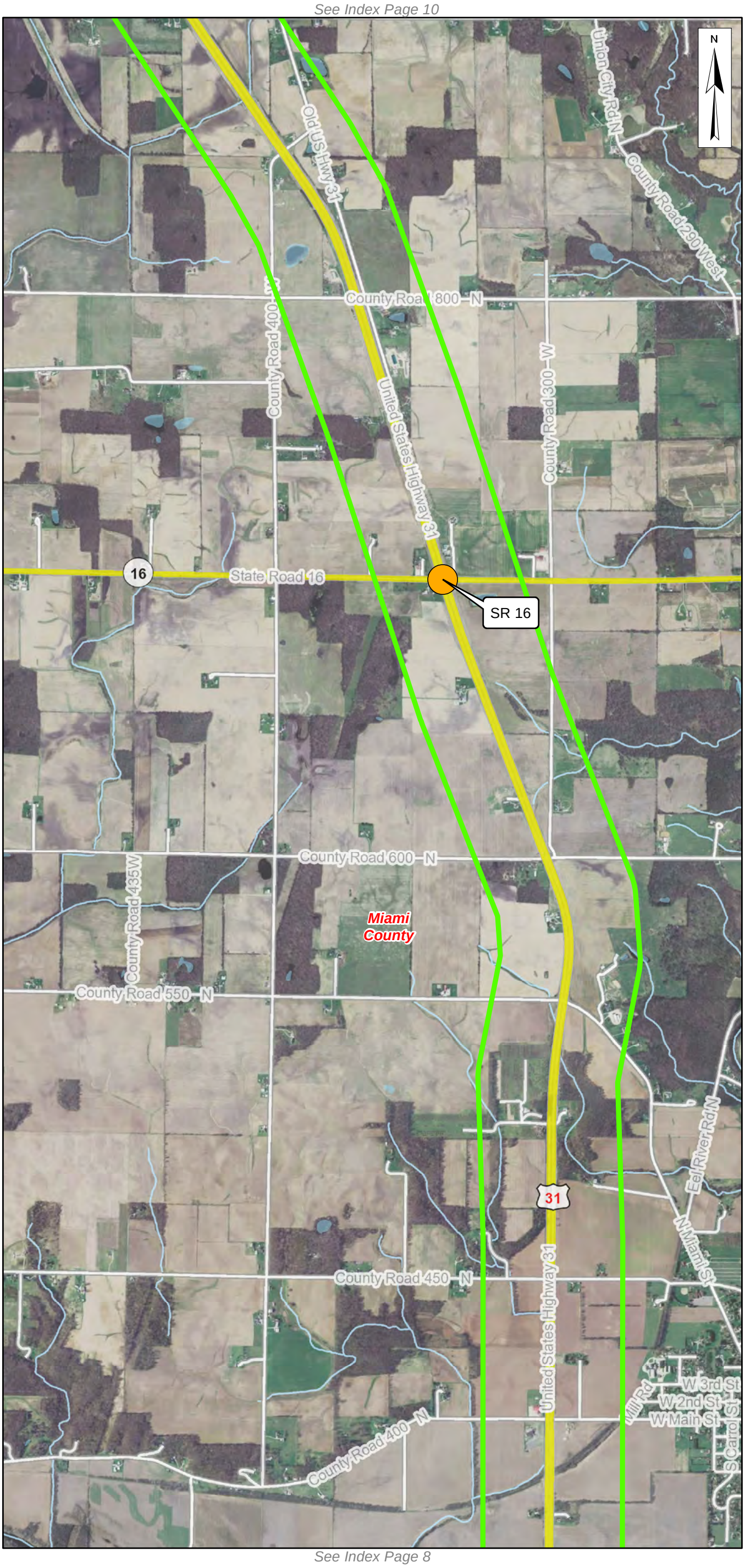

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0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

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High Crash Location Summary

US Route 31 Corridor Study

Miami County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

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Legend

- Icf and/or Icc in Excess of 2.0 (INDOT High Crash Location)
- Icf and/or Icc inbetween 1.0 and 2.0
- Project Area
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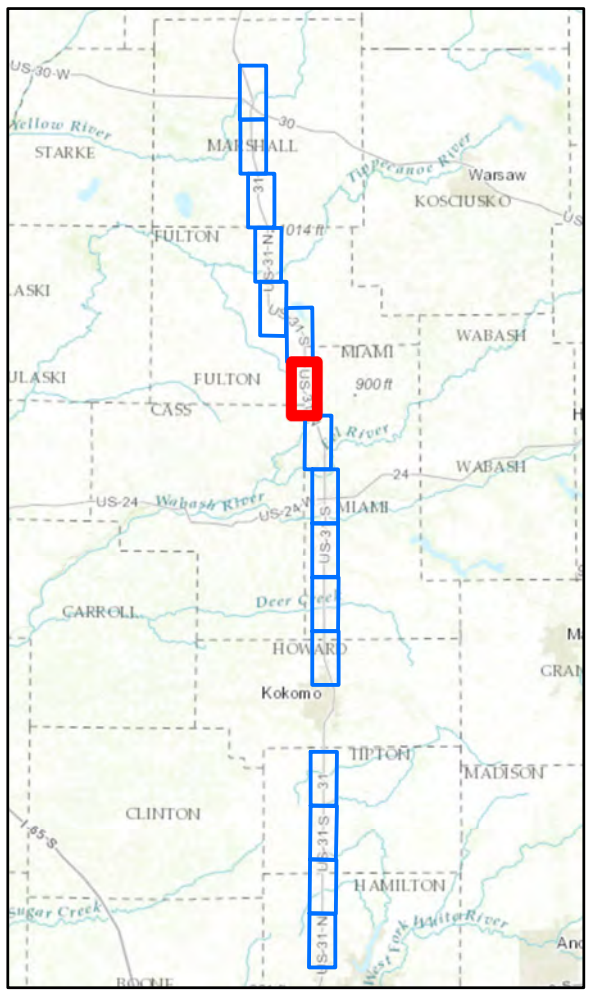
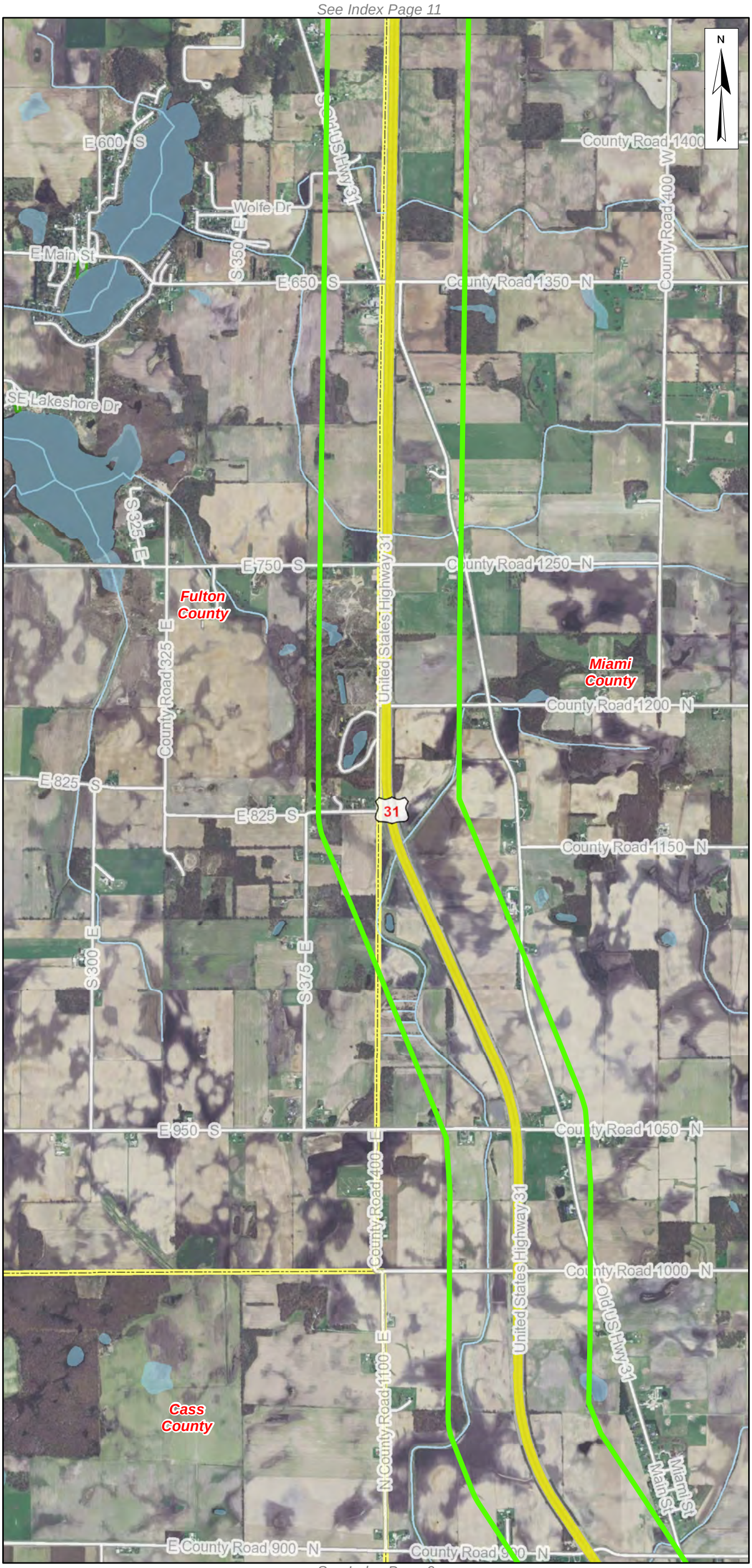
- Incorporated Areas
- Public Lands
- County Boundary
- Waterbodies
- Hydrology
- Interstate
- US Route
- State Route
- Local Road/Ramps





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0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

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High Crash Location Summary

US Route 31 Corridor Study

Miami, Fulton & Cass County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

Legend

- Icf and/or Icc in Excess of 2.0 (INDOT High Crash Location)
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- Project Area
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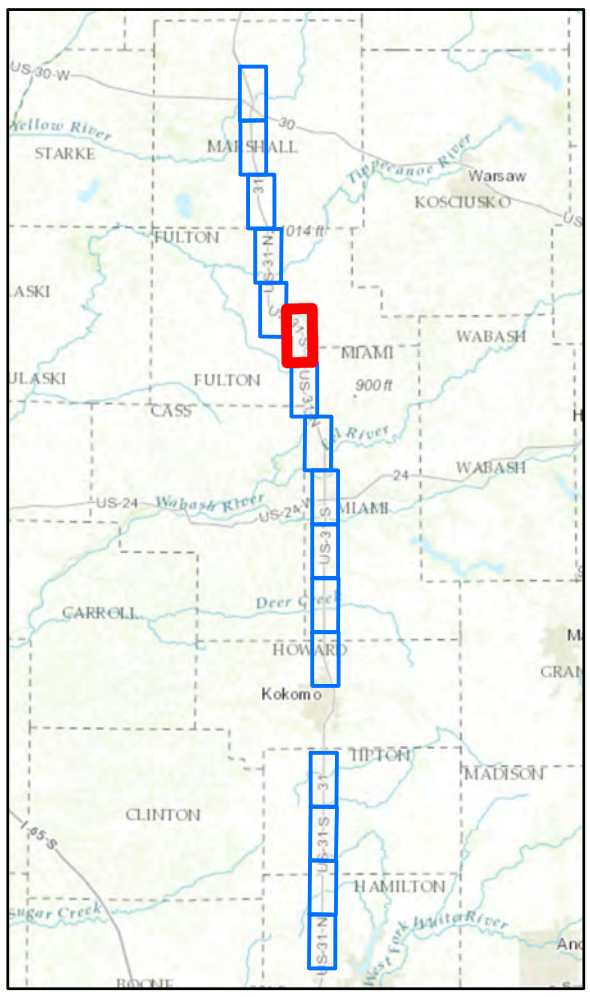
- Incorporated Areas
- Public Lands
- County Boundary
- Waterbodies
- Hydrology
- Interstate
- US Route
- State Route
- Local Road/Ramps



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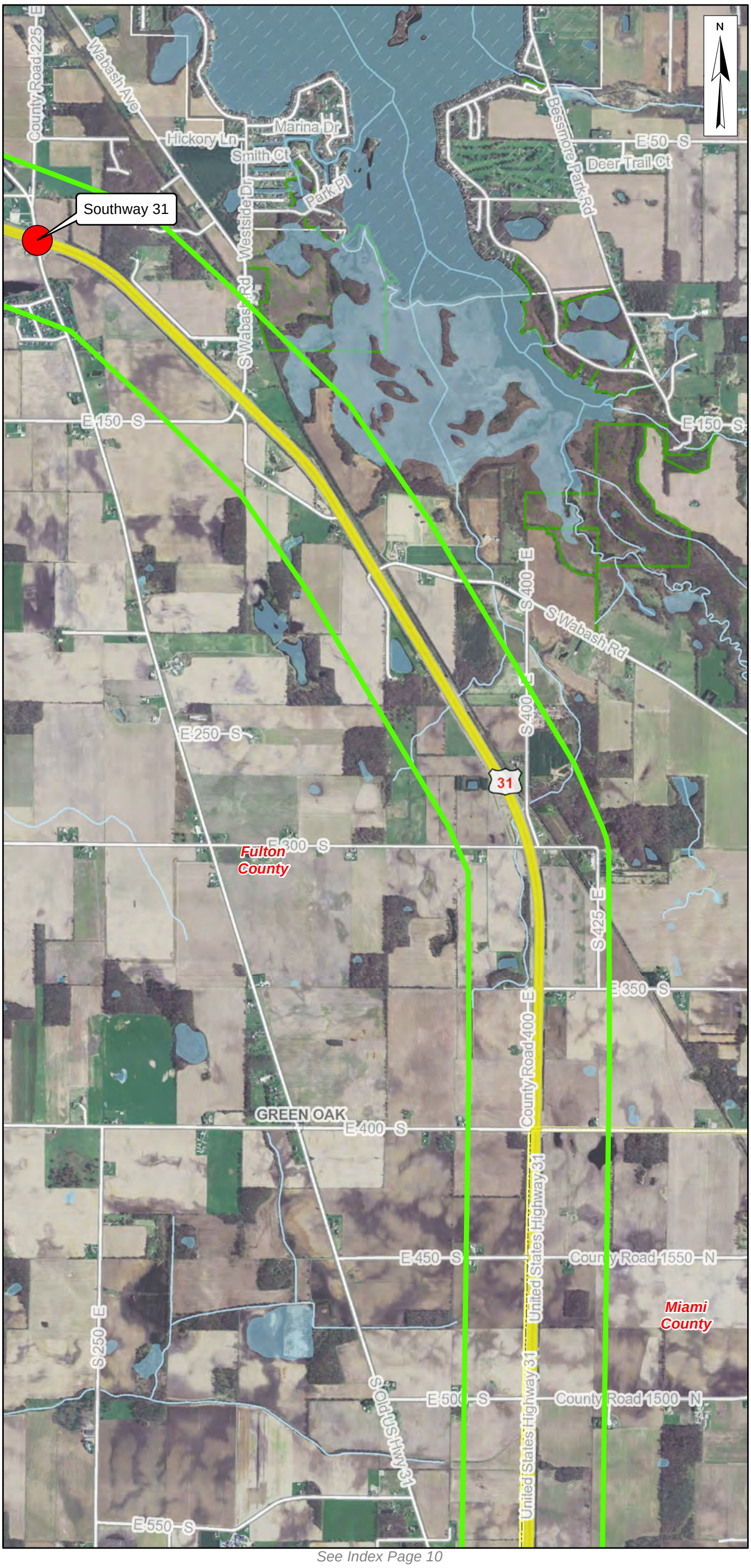

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0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

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High Crash Location Summary

US Route 31 Corridor Study

Fulton & Miami County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

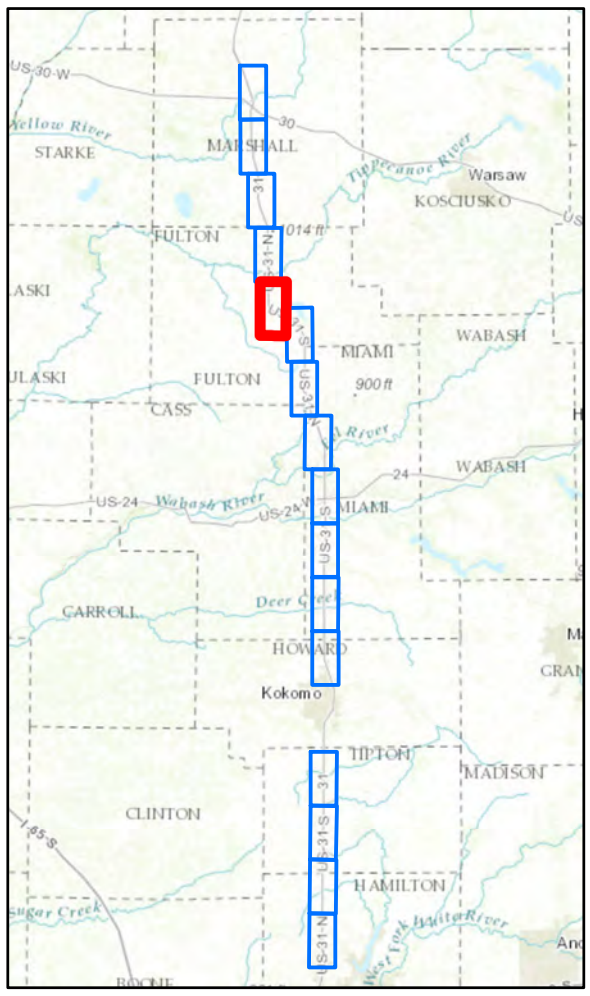
Map Projection: UTM Zone 16 N

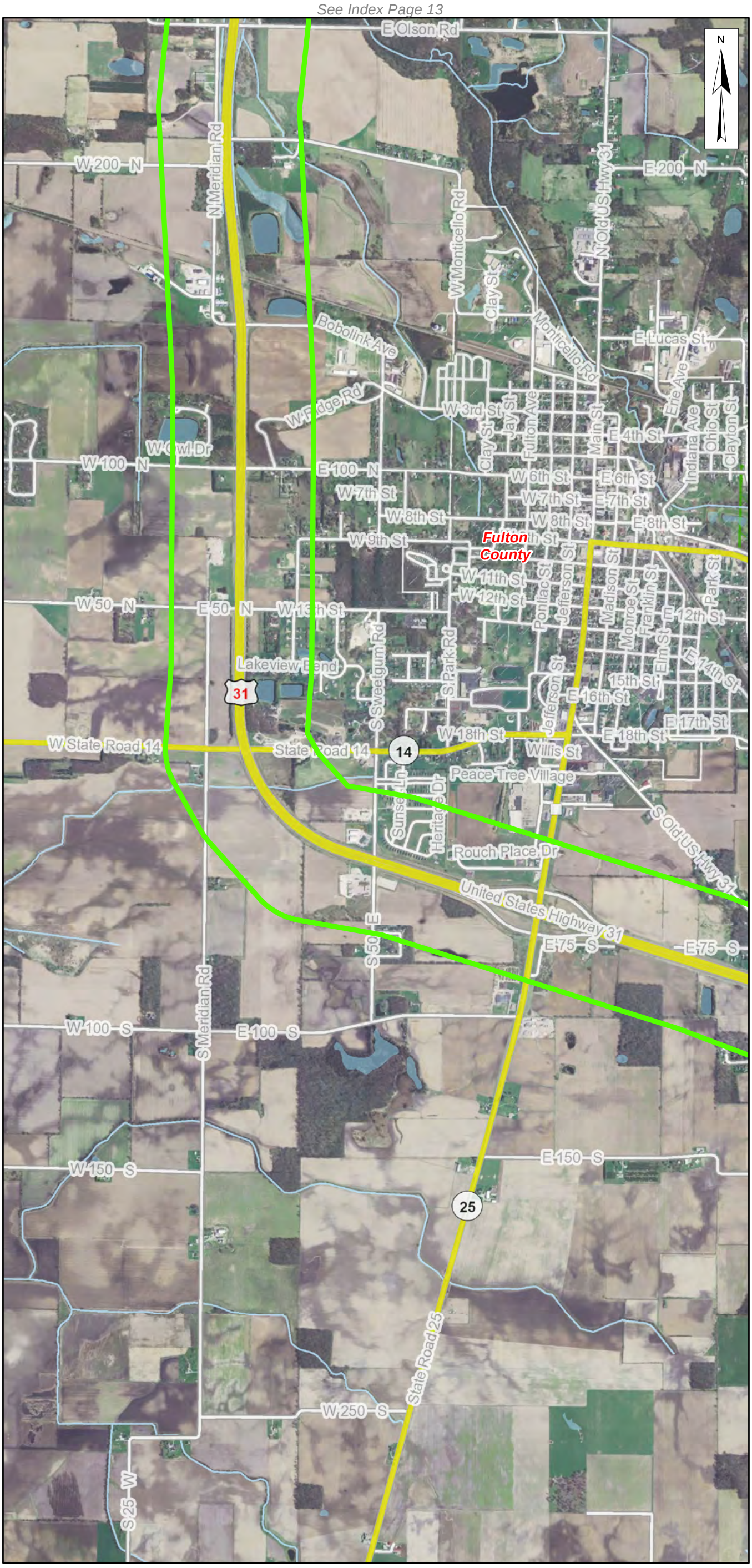
Map Datum: NAD83

See Index Page 13

Legend

- Icf and/or Icc in Excess of 2.0 (INDOT High Crash Location)
- Icf and/or Icc inbetween 1.0 and 2.0
- Project Area
- Half Mile Radius
- Incorporated Areas
- Public Lands
- County Boundary
- Waterbodies
- Hydrology
- Interstate
- US Route
- State Route
- Local Road/Ramps





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0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

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High Crash Location Summary

US Route 31 Corridor Study

Fulton County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

See Index Page 14

Legend

- Icf and/or Icc in Excess of 2.0 (INDOT High Crash Location)
- Icf and/or Icc inbetween 1.0 and 2.0
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- Incorporated Areas
- Public Lands
- County Boundary
- Waterbodies
- Hydrology
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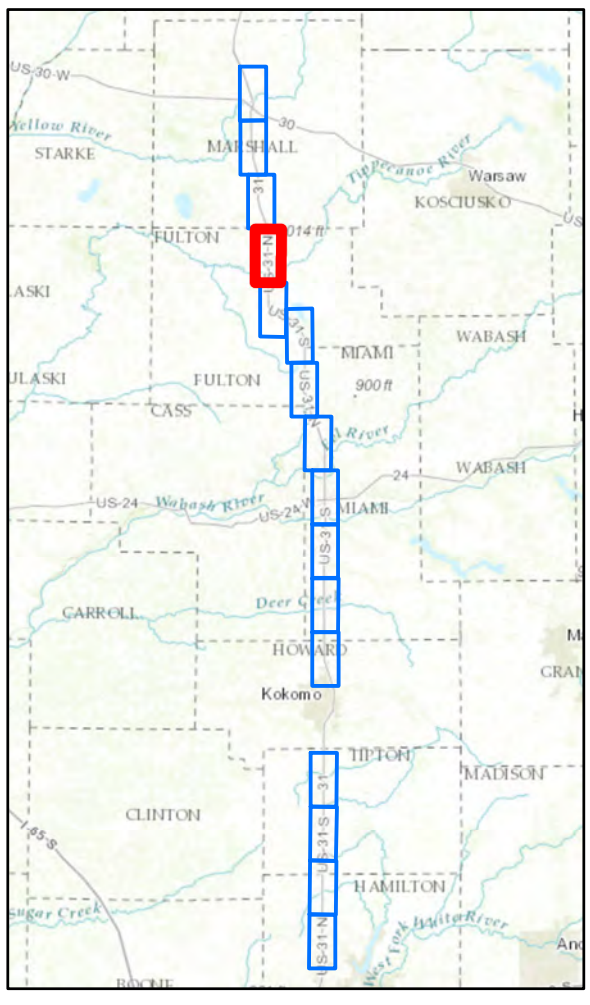
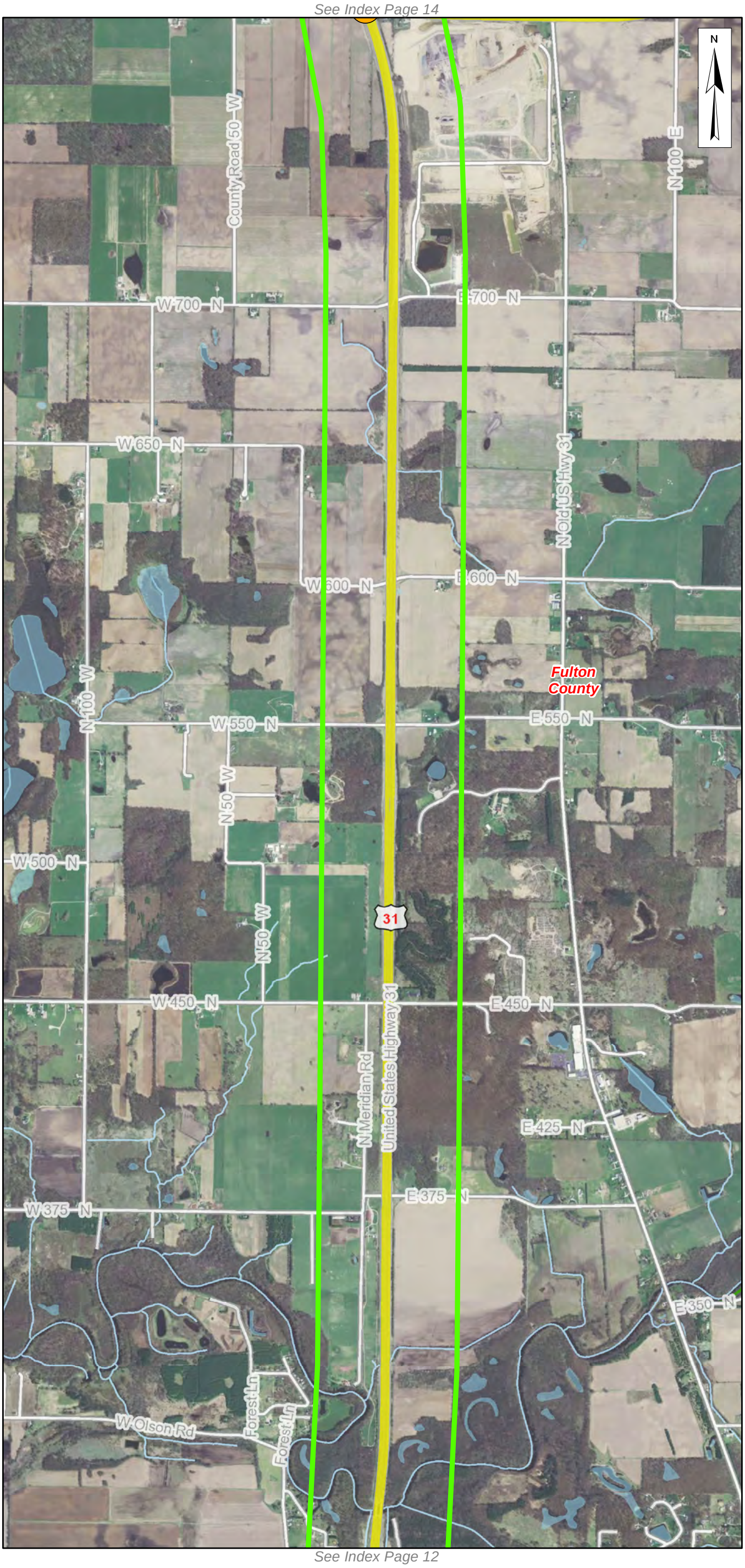
- US Route
- State Route
- Local Road/Ramps





See Index Page 12

0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

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High Crash Location Summary

US Route 31 Corridor Study

Fulton County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

See Index Page 15

Legend

- Icf and/or Icc in Excess of 2.0 (INDOT High Crash Location)
- Icf and/or Icc inbetween 1.0 and 2.0
- Project Area
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- Incorporated Areas
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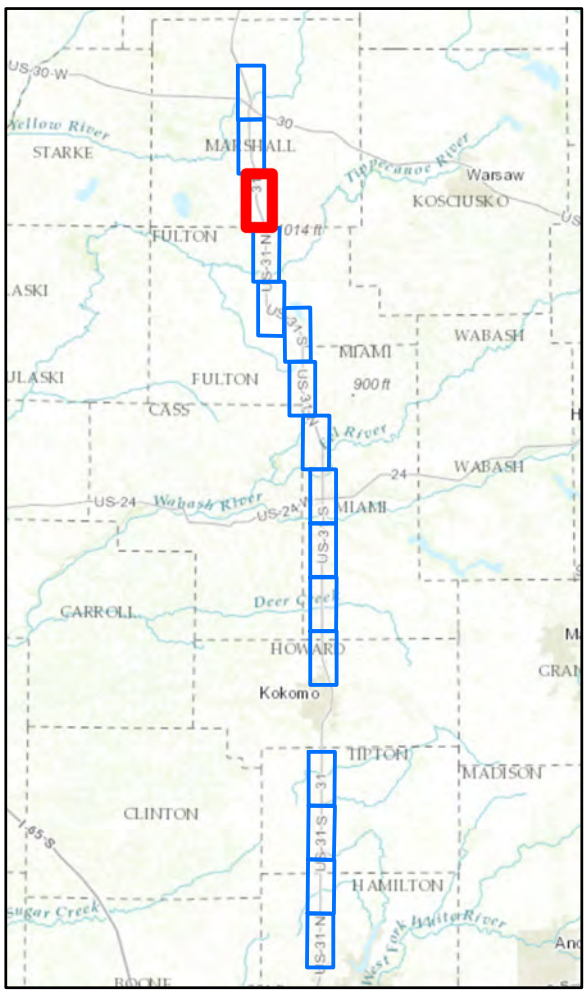
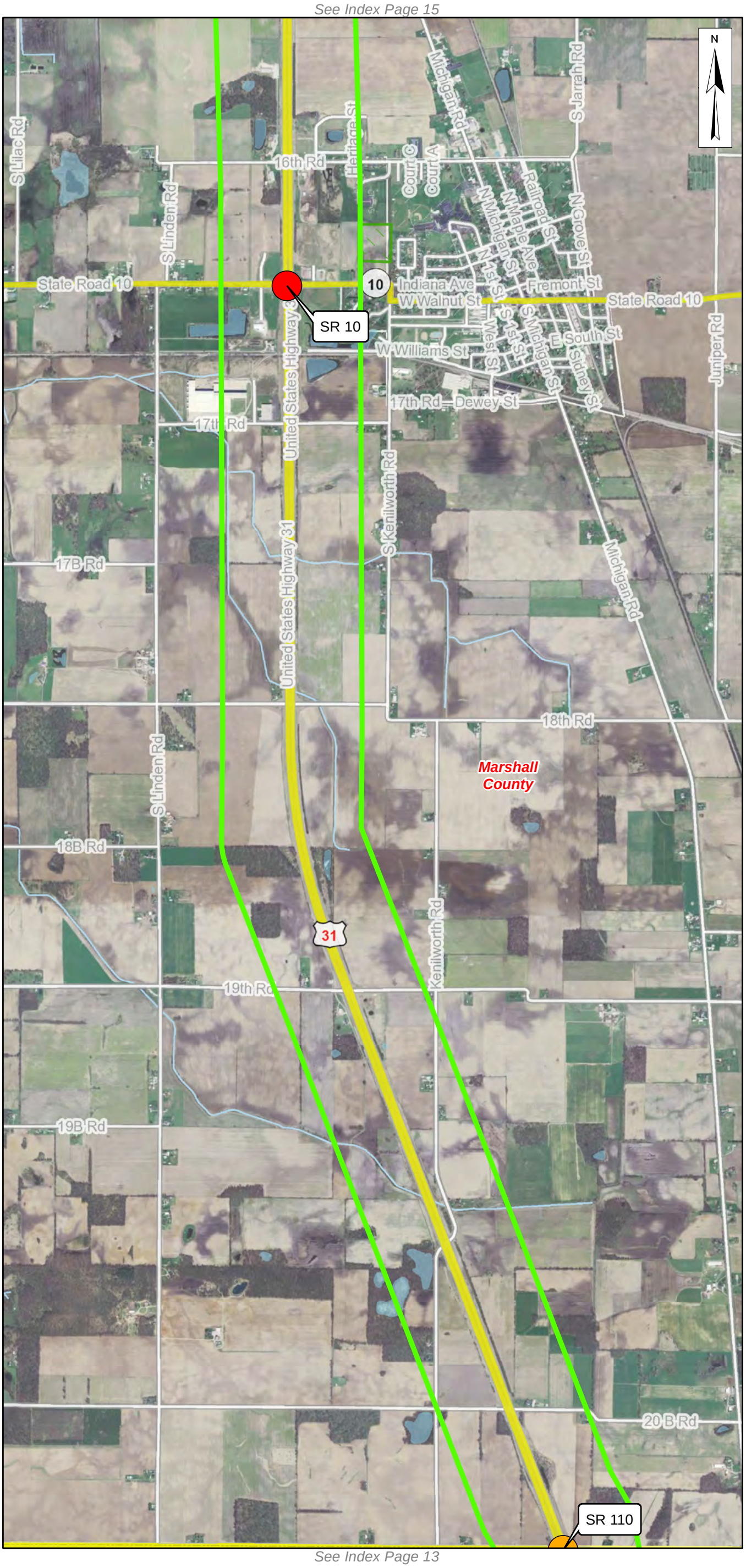
- Local Road/Ramps





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0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

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High Crash Location Summary

US Route 31 Corridor Study

Marshall County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

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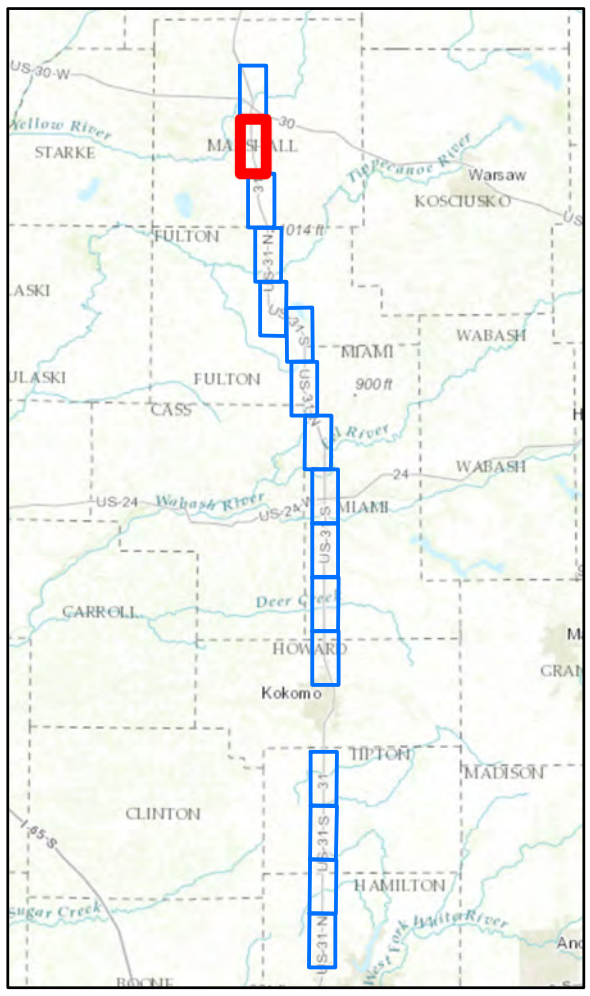
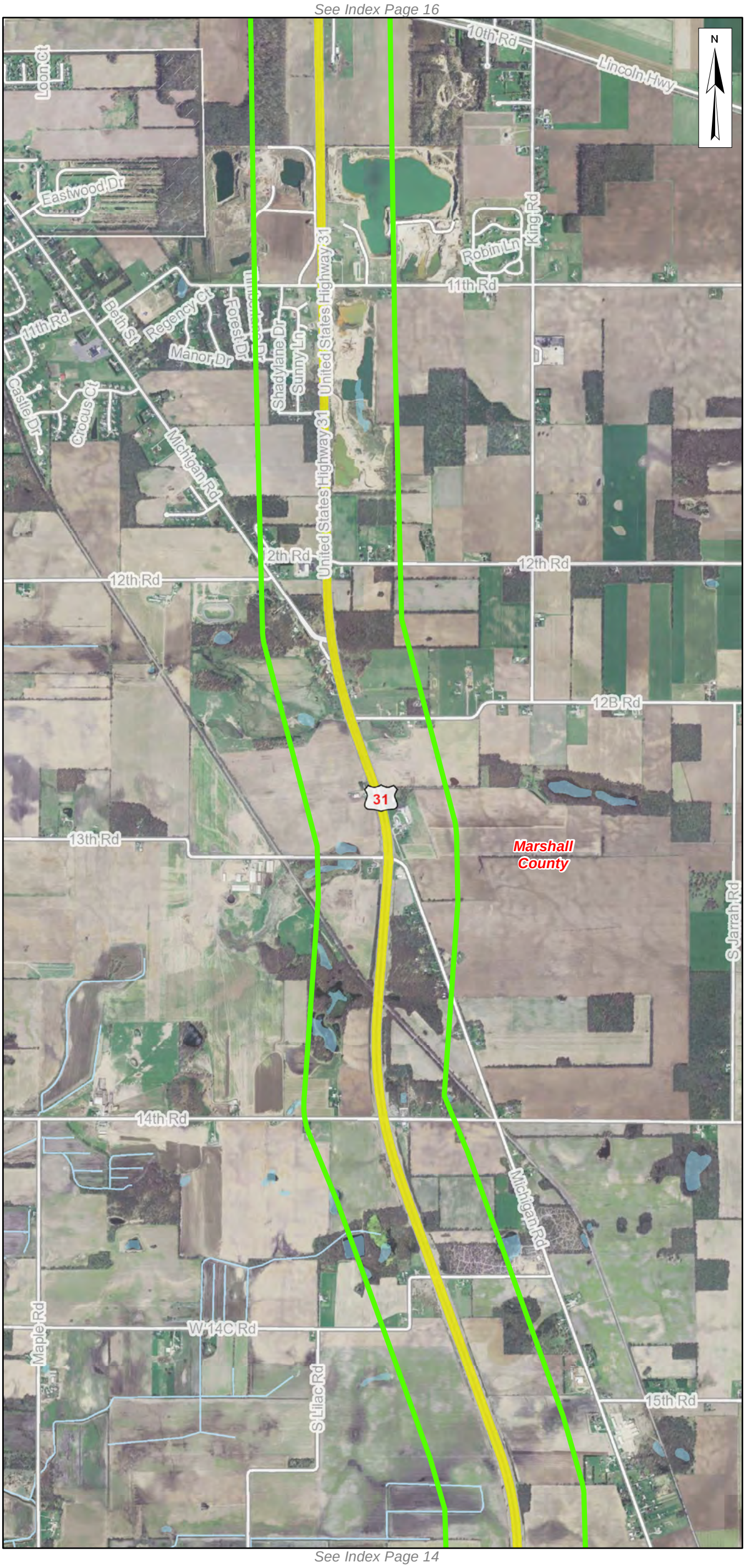
Legend

- Icf and/or Icc in Excess of 2.0 (INDOT High Crash Location)
- Icf and/or Icc inbetween 1.0 and 2.0
- Project Area
- Half Mile Radius
- Incorporated Areas
- Public Lands
- County Boundary
- Waterbodies
- Hydrology
- Interstate
- US Route
- State Route
- Local Road/Ramps





See Index Page 14

0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

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High Crash Location Summary

US Route 31 Corridor Study

Marshall County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

Legend

- Icf and/or Icc in Excess of 2.0 (INDOT High Crash Location)
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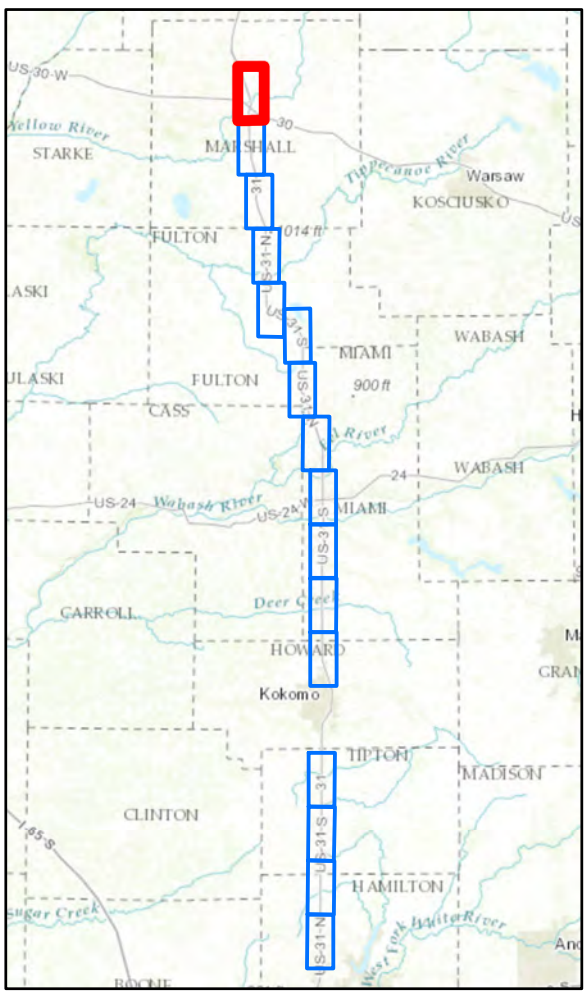

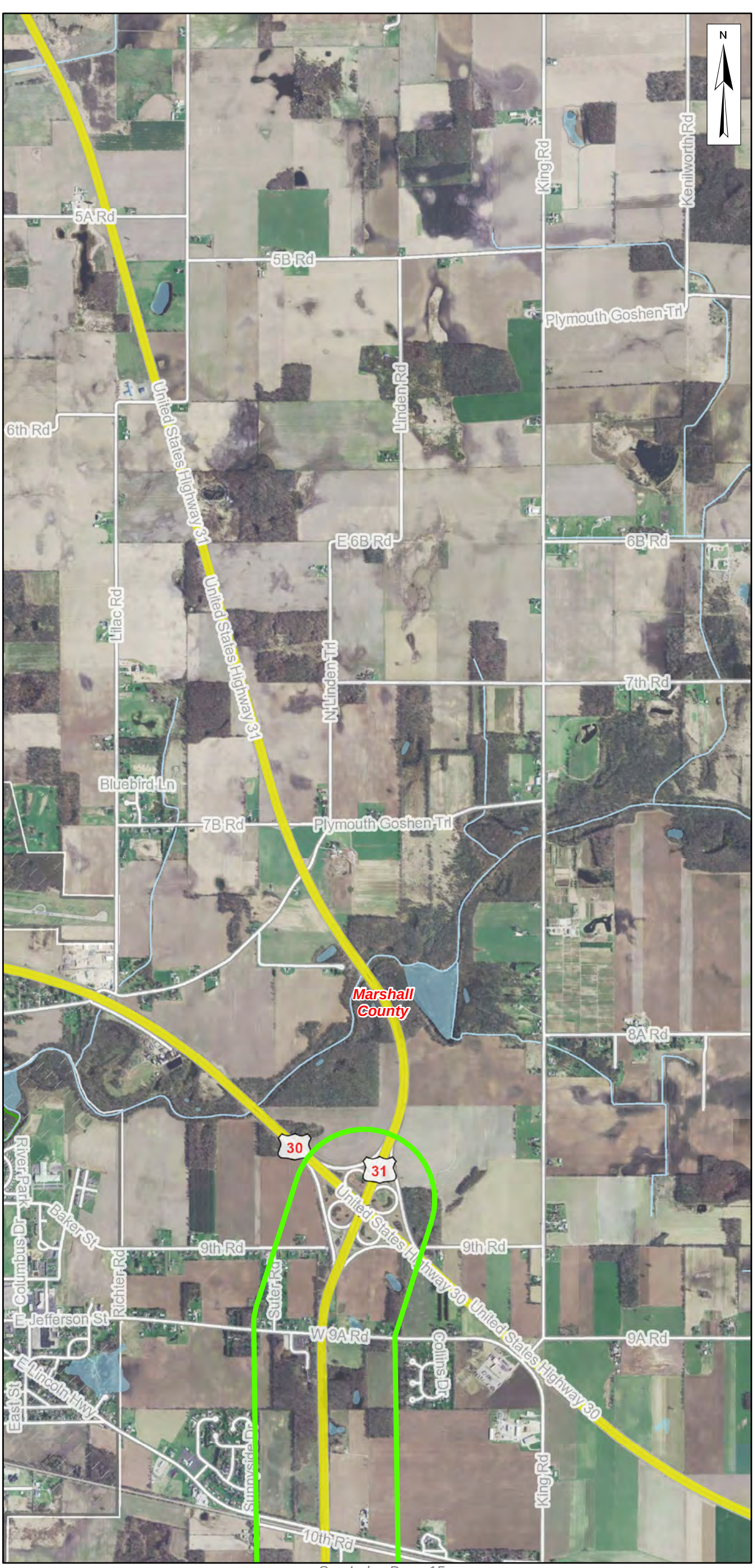

See Index Page 15

0 0.5 1 Miles

Scale 1" =1500'

CHA design/construction solutions

This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

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High Crash Location Summary

US Route 31 Corridor Study

Marshall County

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N

Map Datum: NAD83

Environmental Red Flag Analysis

In determining future improvements, environmental concerns should be noted to ensure projects do not affect culturally or environmentally sensitive areas. The first step in this process is to complete a "red flag" analysis that, as its name suggests, indicates locations within the study area that are red flags to project development. Some examples include historic properties, cemeteries, underground storage tanks, public parklands, and schools. For the corridor study, mapping was created that depicts the general location of each resource as well as a supplemental table that describes each location in more detail, all of which are located in Appendix D.

Five sets of maps were created for the corridor:

- Water Resources – includes wetlands, streams, floodplains, and karst features
- SHAARD – State historic resources, including historic buildings, districts, and bridges
- Hazardous Concerns – includes brownfields, underground storage tanks, and landfills
- Infrastructure – includes cemeteries, schools, pipelines, and hospitals
- Mining and Mineral Exploration – includes mines and oil wells

Based on these maps, the following areas are of particular concern:

- Cemetery just south of the Hamilton / Tipton County line and just north of the Howard / Miami County line
- Historic District at the SR 218 West intersection
- Historic properties (notable or outstanding)
    - South of 276th Street in Hamilton County
    - South of CR 350S in Tipton County
    - At CR 100N in Tipton County
    - At CR 500N in Tipton County
    - South of CR 600N in Howard County
- National Register site at Grissom Air Museum and Fulton County Historical Society
- Underground Storage Tanks – leaking (LUST) or non-leaking (UST)
    - 216th Street, 236th Street, 256th Street, and 266th Street in Hamilton County
    - CR 550N in Howard County
    - SR 18, CR 850S, SR 218 East, US 31 Business, CR 100N, and CR 200N in Miami County
    - CR 50S and CR 50N in Fulton County
    - 16th Road and Michigan Road in Marshall County
- Several pipeline crossings in Miami County and near Michigan Road in Marshall County

Existing Conditions Summary

In summary, this existing conditions report contains the baseline information necessary for completing the overall corridor study. The traffic operations, crash analysis, and environmental investigation will be combined with stakeholder input in order to determine problem areas and assess goals and objectives for the corridor. Given the importance of the corridor locally and regionally, as well as the previous improvements to several segments adjacent to the study area, the required steps needed to produce an ultimate goal of full freeway remains the focus of the study. Future analysis will take into account immediate needs and potential solutions to improve safety and mobility without compromising the long-term goal for the corridor.

Appendix A – Existing Corridor Planning Study Documents

Appendix B – Traffic Count Summaries

Appendix C – Traffic Operations Analysis Output

Appendix D – Crash Data and Analysis

Appendix E – Environmental Red Flag Maps and Data