



## Chapter 2: Purpose and Need

A draft Purpose and Need Statement for the US 31 Improvement Project from Plymouth to South Bend in Marshall and St. Joseph counties, Indiana, was completed in March 2003. It was presented at a Community Advisory Committee (CAC) and a Public Information Meeting on April 10, 2003, and at an Interagency Review Meeting on May 15, 2003. The draft Purpose and Need Statement was subsequently revised with data for the year 2030 along with comments received. The following information reflects these revisions.

### 2.1 Project Purpose and Need Statement

#### 2.1.1 Project Need Statement

Transportation improvements to US 31 between US 30 and the US 20 Bypass are needed for the following reasons:

##### **Reduce Traffic Congestion**

- For the year 2002, three out of the four signalized intersections operate at unacceptable levels (LOS E or F) during the AM and/or PM peak hours (where LOS C is minimally acceptable for rural areas and LOS D is minimally acceptable for urban areas based on INDOT's current new construction/reconstruction design standards).
- In the year 2030, all currently signalized intersections will operate at an unacceptable LOS.
- For the year 2000, five out of eight segments of US 31 operate at an unacceptable LOS.
- In the year 2030, all segments of US 31 will operate at an unacceptable LOS, with the one exception being the segment between US 30 and Michigan Road.

##### **Improve Safety**

- Base and future total crash rates on US 31 exceed the statewide average on comparable facilities for about half the length of the 20-mile corridor, including sections from US 6 through LaPaz, through Lakeville, and from Lakeville to US 20.
- Base and future injury crash rates or fatal crash rates on US 31 exceed the statewide average for 40% of the corridor length.

##### **Consistency with Transportation Plans**

- Existing US 31 lacks even partial access control for 15 miles from Michigan Road to the US 20 Bypass, where about 480 private driveways exist.
- Existing US 31 also lacks adequate median width for left-turns through LaPaz and through Lakeville to the US 20 Bypass



## 2.1.2 Project Purpose Statement

Based on the identified transportation needs, three overall project purposes (goals) have been established for the US 31 Improvement Project:

- 1) **Purpose 1 (Congestion):** Reduce congestion on US 31 by providing the capacity to meet the forecasted travel demand for 2030 at an acceptable LOS.
- 2) **Purpose 2 (Safety):** Improve safety on US 31 between US 30 and US 20.
- 3) **Purpose 3 (Consistency with Transportation Plans):** Determine consistency with statewide (INDOT) and regional (MACOG) transportation plans.

Project Alternatives will not be required to meet the third item in order to satisfy purpose and need. As previously discussed, US 31 has been designated a Statewide Mobility Corridor by INDOT's 2000-2025 Long Range Transportation Plan, is part of the NHS, and represents the only continuous transportation link between Indianapolis and north-central Indiana (e.g., South Bend). As such, the objectives of the US 31 corridor are to provide safe, free-flowing, high-speed connections with characteristics consistent with the Statewide Mobility Corridor designation.

## 2.1.3 Evaluation Criteria for Meeting Purpose and Need

Specific objectives and performance measures have been developed for each of the three identified purposes. The three purposes of the project and the performance measures for each are listed below.

**Purpose 1 (Congestion): Reduce congestion on US 31 by providing the capacity to meet the forecasted travel demand for 2030 at an acceptable Level-of-Service (LOS).**

*Performance Measures:*

- Achievement of a LOS in rural and suburban areas of C (B more desirable) and in urban intermediate/built-up areas of no less than D (C is more desirable) on US 31 between US 30 and US 20.
- Reduction in the amount of congested vehicle-miles of travel and congested vehicle-hours of travel in the South Bend metropolitan area.

**Purpose 2 (Safety): Improve safety on US 31 between US 30 and US 20.**

*Performance Measures:*

- Reduction in the risk of fatal, injury, and property damage only (PDO) crashes to crash rate levels at or below statewide averages for this type of facility associated with travel on US 31 between US 30 and US 20.
- Reduction in fatal, injury, and PDO crashes to crash rate levels at or below statewide averages in the South Bend metropolitan area.

**Purpose 3 (Consistency with Transportation Plans): Determine consistency with the statewide (INDOT) and regional (MACOG) transportation plans.**



*Performance Measures:*

- Determine consistency with the INDOT 2000-2025 Long Range Transportation Plan for Statewide Mobility Corridors and consistency with the MACOG Transportation Plan. Project alternatives will not be required to meet this item in order to satisfy purpose and need.

The screening process involves testing each alternative to determine to what degree each meets the Purpose and Need Statement with respect to its associated objectives and performance measures.



## 2.2 Traffic Congestion

The majority of the US 31 corridor is presently experiencing high levels of congestion with unacceptable operating conditions (based on INDOT roadway design standards on level-of-service). As growth of the South Bend metropolitan area and Indiana fuels increasing traffic volumes, traffic flow conditions will further deteriorate along US 31 to an unacceptable level from the Michigan Road interchange (Old US 31, north of Plymouth) to the US 20 Bypass.

In order to be able to predict future traffic volumes within the study area for this project, a travel demand model was developed. The travel demand model developed for this project, the US 31 Corridor Travel Demand Model, began with the Indiana Statewide Travel Demand Model (INSTDM) that is utilized by INDOT to predict future traffic volumes on a statewide basis.

During the initial development of the INSTDM in 1998, the state was subdivided into travel analysis zones and origin-destination (OD) studies were performed. At that time, the INSTDM included only the State of Indiana and the abutting Chicago, Cincinnati, and Louisville metropolitan areas, with a base year of 1998, a future year of 2025, and included only the roadway system maintained by the state. For the I-69 Evansville to Indianapolis Tier 1 Environmental Impact Statement (EIS), the geographic area of the ISTDM was expanded to include major portions of surrounding states (I-57 in Illinois, Western Parkway and I-71 in Kentucky, I-94 in Michigan, and I-75 in Ohio). The modeled roadway network was also expanded in the 26 counties in southwest Indiana associated with the I-69 Tier 1 EIS to include all roadways classified as Rural Major Collectors or higher, regardless of maintenance responsibility. The I-69 version of ISTDM was validated in February 2001 and is documented in Appendix V of the I-69 Evansville to Indianapolis Tier 1 FEIS (December, 2003). The I-69 version of the ISTDM was next updated to include the results of the year 2000 Census while maintaining the modeled roadway network, the travel analysis zone structure, and the future year of 2025.

The US 31 Corridor Travel Demand Model expanded the INSTDM by:

- Adding to the INSTDM roadway network to include all roadway network contained in the MACOG metropolitan model for St. Joseph County and all roadways classified as Rural Minor Collectors or higher in Marshall County,
- Extrapolating the travel analysis zone forecasts from the year 2025 to the year 2030,
- Disaggregating the ISTDM travel analysis zones to:
  - Reflect the MACOG metropolitan zonal system north of the US 20 Bypass,
  - Create smaller zones than the MACOG zonal system south of the US 20 Bypass in St. Joseph County (approximating that of the previous US 31 St. Joseph/Marshall County Major Investment Study (MIS) traffic model), and
  - Create a new zonal system in Marshall County approximating Census Block Groups.

Modeling more roadway network with a higher number of smaller travel analysis zones generally results in a more accurate travel demand model that can provide data on a much smaller scale. This expanded travel demand model was developed to provide more detailed information within St. Joseph and Marshall counties while maintaining the



balance of the INSTDM outside of these two counties. The performance and accuracy of the US 31 Corridor Travel Demand Model was checked against actual traffic counts within the US 31 study area and its accuracy was validated when it was found to replicate those traffic volumes within 5%.

Following the development of a US 31 Corridor Travel Demand Model that accurately models the existing travel patterns, future population and employment data by travel analysis zone was inserted to predict future traffic conditions within the study area. The development of the future (Year 2030) traffic conditions utilized population growth and employment growth trends to establish county-wide control totals; then, the 30-year increment in growth by county was allocated to travel analysis zones based on development activity. Development activity information included population and employment change patterns from the MACOG Travel Demand Model, current land use and zoning, future land use patterns of local comprehensive plans, and marketing information on industrial, commercial and residential developments. The long range transportation plans and transportation improvement programs for MACOG and INDOT were reviewed to identify both the major roadway improvement projects completed since the year 2000 as well as those projects currently programmed for future completion. The addition of both the major roadway improvement projects completed since the Year 2000 as well as those projects currently programmed for future completion to the roadway network of the Year 2000 creates the existing-plus-committed roadway network. This existing-plus-committed roadway network represents the No Build Alternative for the future year 2030 that has served as the baseline when comparing the effectiveness and potential impacts of other alternatives throughout the study.

Traffic operating conditions are typically described through a level-of-service (LOS) rating of six levels from “A” through “F”. The LOS rating scale is a qualitative method for describing traffic conditions. The scale ranges from LOS “A”, which corresponds to free-flowing traffic and minimal delays at intersections, to LOS “F”, which corresponds to a complete breakdown in traffic flow. Based on INDOT new construction/reconstruction (4R) design standards outlined in the Indiana Design Manual, a LOS “C” is the minimum acceptable for rural and suburban areas, and LOS “B” is more desirable. In urban intermediate and built-up areas, a LOS “D” is the minimum acceptable, and LOS “C” is more desirable.

The United States Census Bureau has established a definition of urban and rural that is used uniformly through the nation and has been utilized for this project. An Urbanized Area (UA) or Urban Cluster (UC) consists of core Census Block Groups or Census Blocks with at least 1,000 persons per square mile and surrounding Census Blocks that have an overall density of at least 500 persons per square mile. All territory located outside UAs or UCs is classified as rural. This definition may be found on the US Census Bureau website under “Census 2000 Urban and Rural Classification”. Except for the segment from Miller Road (about three miles south of the US 20 Bypass) to the US 20 Bypass, the US 31 corridor is considered rural, where a LOS “C” is the minimum acceptable and any level below that is unacceptable.

The methods for calculating LOS are given in the Transportation Research Board’s (TRB) Highway Capacity Manual (HCM), and were revised in year 2000. US 31 and its major intersections were analyzed in accordance with this method to determine their LOS. Between Plymouth and South Bend, US 31 was analyzed in eight segments on the basis of traffic counts conducted in the year 2000, and a LOS was determined for each segment. A LOS was calculated for all four signalized intersections and six notable two-way stop-controlled intersections (stop control for the crossroad approaches) based on traffic counts conducted in the year 2002. Table 2.2.1 shows the base (year 2000) and future (Year 2030) LOS of the US 31 segments. Table 2.2.2 shows the base (year 2002) and future (year 2030) LOS at major intersections. Figure 2.2.1 shows segments and intersections failing to meet INDOT minimum design standards for LOS for the base and future years.



Table 2.2.1: Base and Future Years' Levels-Of-Service of US 31 Segments

Termini	Area Type	2000 Base Year				2030 Future Year			
		AADT*	Daily Vehicle Capacity	V/C Ratio	LOS	AADT	Daily Vehicle Capacity	V/C Ratio	LOS
US 30 - Michigan Rd.	Rural	16,989	39,800	0.43	B	23,500	39,800	0.59	C
Michigan Rd. – US 6	Rural	24,232	39,800	0.61	C	35,200	39,800	0.88	E
US 6 – Tyler Rd.	Rural	19,845	22,300	0.89	E	28,200	22,300	1.26	F
Tyler Rd. – Lake Trail	Rural	21,400	39,800	0.54	C	29,300	39,800	0.74	D
Lake Trail – SR 4	Rural	27,217	22,300	1.22	F	40,300	22,300	1.81	F
SR 4 – Miller Rd.	Rural	24,240	27,700	0.89	E	34,400	27,700	1.24	F
Miller Rd. - Roosevelt Rd.	Urban	26,419	27,700	0.95	E	37,500	27,700	1.35	F
Roosevelt Rd. - US 20	Urban	31,526	27,700	1.14	F	46,000	27,700	1.66	F

Note: Shading denotes failure to meet INDOT minimum design standards for LOS of C in rural areas and D in urban areas.

\* AADT is average annual daily traffic.

Table 2.2.2: Base and Future Years' Levels-of-Service for US 31 Intersections

	Area Type	2002 Base Year		2030 Future Year	
		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
<b>Signalized Intersections</b>					
US 6	Rural	E	F	F	F
SR 4	Rural	B	B	D	E
Kern Road	Urban	E	D	F	F
Johnson Road	Urban	E	D	F	F
<b>Major Unsignalized Intersections (Two-Way Stop-Controlled)</b>					
Plymouth-Goshen Trail	Rural	C	C	D	E
W 5A Road	Rural	B	C	C	C
Tyler Road	Rural	E	D	F	F
New Road	Rural	E	F	F	F
Madison Road	Urban	C	C	F	F
Roosevelt Road	Urban	D	D	F	F

Note: Shading denotes failure to meet INDOT minimum design standards for LOS of C in rural areas and D in urban areas.



Base LOS conditions are unacceptable for the following:

- In the year 2002, three out of four signalized intersections operate at unacceptable levels (LOS E or F) during the AM and/or PM peak hours.
- In the year 2002, two out of six major unsignalized intersections operate at unacceptable levels (LOS D, E, or F) during the AM and PM peak hours.
- In the year 2000, five out of eight US 31 segments operate at an unacceptable LOS. US 31, from US 6 through La Paz to Tyler Road, operates at a LOS E. US 31, from Lake Trail south of Lakeville to US 20, operates at a LOS E or F.

Future (year 2030) LOS conditions are unacceptable for the following:

- In the year 2030, four out of four signalized intersections operate at unacceptable levels (LOS “D”, “E”, or “F”) during the AM and PM peak hours.
- In the year 2030, five out of six major unsignalized intersections operate at unacceptable levels (LOS “D”, “E”, or “F”) during the AM and PM peak hours.
- In the year 2030, all US 31 segments operate at an unacceptable LOS, except the most southern one from US 30 to Michigan Road.

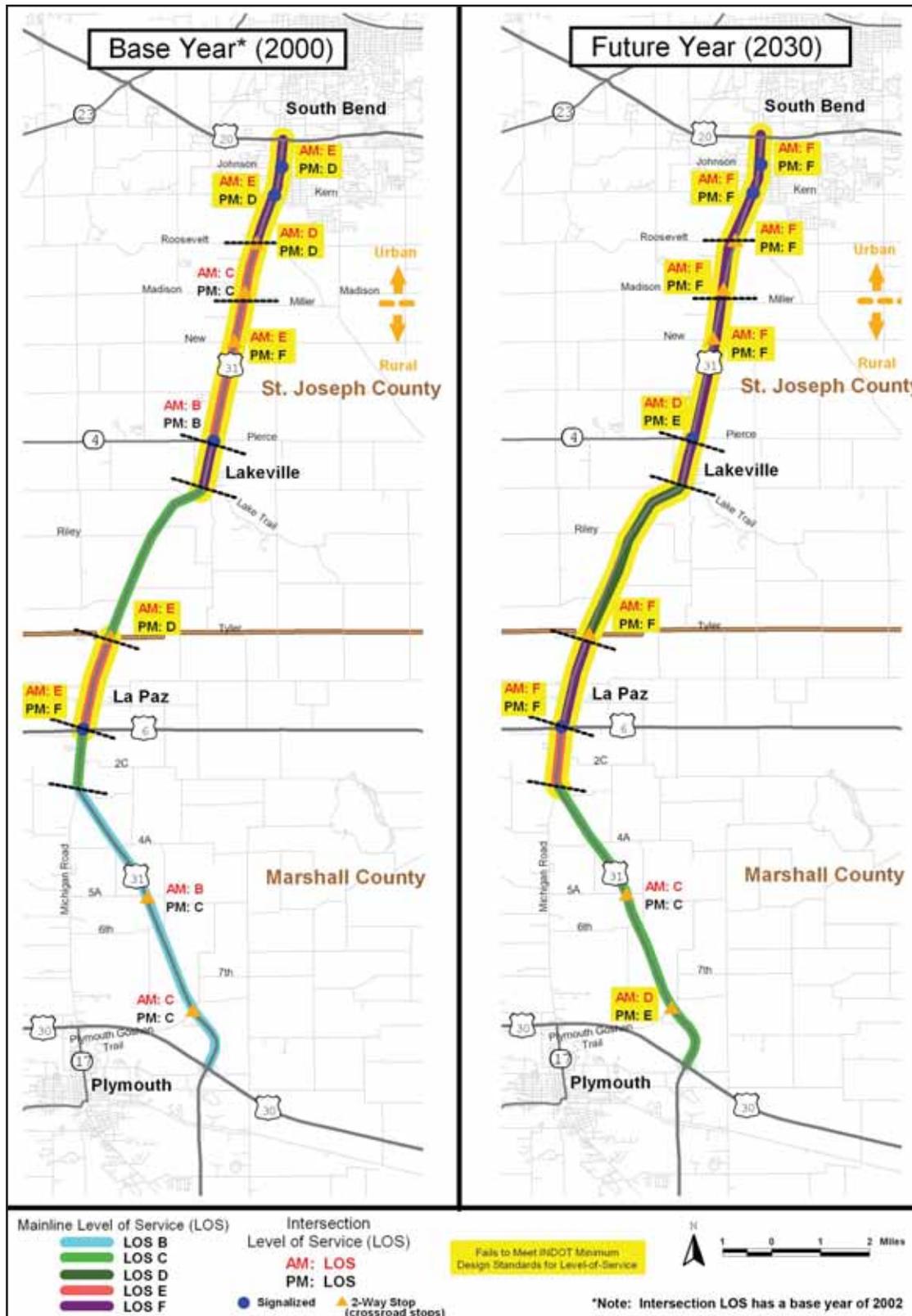


Figure 2.2.1: US 31 Segments and Intersections Failing to Meet INDOT Minimum Design Standards for Level-of-Service (LOS) (assuming no improvements to US 31)



## 2.3 Safety

Base and future crash rates on segments of US 31 were compared to the average statewide crash rates for rural principal arterials (the primary functional classification for US 31). Traffic crash data utilized for this project was provided by INDOT and contained statistics for the three-year period from 1997 to 1999. Traffic crash data available for analysis at any time period is generally a couple of years behind the time that the analysis is being performed. Traffic crash statistics for the three-year period from 1997 to 1999, the most recent data available at the time that the Purpose and Need for the project was developed, for US 31 between Plymouth and South Bend were analyzed and compared to Indiana statewide average crash rates for rural principal arterial roadways. The analysis found that US 31 through the corridor has accident rates above Indiana statewide averages on comparable facilities for both injury accidents and fatal accidents. These findings reveal that crash rates on US 31 exceed those of comparable facilities throughout the state. Table 2.3.3 below shows the contrast between crash rates for US 31 and both the average rates for rural principal arterials in Indiana and rural principal arterials nationwide.

Route	Injury Crashes (1997-1999)	Injury Crash Rate*	Fatal Crashes ** (1997-1999)	Fatal Crash Rate*
US 31 Plymouth-South Bend	204	50.39	9	2.22
Indiana Rural Principal Arterials	8,485	47.15	353	1.96
U.S. Rural Principal Arterials <sup>1</sup>	349,047	50.87	15,128	2.12

Notes: \* Per 100 million annual vehicle-miles of travel; the crashes used in this chart are investigated crashes only. Fatal Crash Rate reflects the number of fatal crashes, not the number of fatalities.

\*\* Total number of fatal crashes, not the number of fatalities.

Source: For US 31, Bernardin, Lochmueller & Associates, Inc. analysis of INDOT Division of Program Development Crash Location Report for St. Joseph and Marshall counties; for Indiana and U.S. Rural Principal Arterials, INDOT Division of Program Development Indiana Motor Vehicle Fatalities and Injuries, 1997-1999. Averages were revised January 22, 2002.

Crash rates are equal to fatal and personal injury crashes plus property damage only (PDO) crashes per 100 million annual vehicle-miles of travel. Fatal crashes represent the number of fatal crashes and not the number of fatalities. The statewide average crash rate for rural principal arterials is 186.57 accidents per 100 million annual vehicle miles of travel. Base and future total crash rates on US 31 exceed the statewide average from US 6 through La Paz, through Lakeville, and from Lakeville to US 20 as shown in Table 2.3.4. Figure 2.3.2 shows the areas of US 31 where crash rates on comparable facilities exceed the statewide rates for the years 1997-1999 and are projected for 2030.

<sup>1</sup> National injury crash data estimated based on 1997 data alone, as 1998 and 1999 data is unavailable.



Segments	Injury Crashes*	Injury Crash Rate**	Fatal Crashes*	Fatal Crash Rate**	PDO Crashes*	PDO Crash Rate**	Total Crashes*	Total Crash Rate**
Existing Conditions (averaged annually) for Years 1997 to 1999								
US 30 to LaPaz	8	17.33	0.7	1.51	33	75.34	42	94.17
through LaPaz	1	45.60	0.3	11.40	6	193.81	7	250.82
LaPaz to Lakeville	2	8.76	0.0	0.00	10	36.28	12	45.04
through Lakeville	11	120.60	0.0	0.00	30	335.43	41	456.04
Lakeville to US 20	46	86.69	2.0	3.77	79	149.52	127	239.98
Rural Principal Arterials	2,828	47.15	118	1.96	8,244	137.45	11,190	186.57
Future Conditions in Year 2030***								
US 30 to LaPaz	12	17.33	1.1	1.51	50	75.34	64	94.17
through LaPaz	1	45.60	0.4	11.40	9	193.81	11	250.82
LaPaz to Lakeville	3	8.76	0.0	0.00	15	36.28	18	45.04
through Lakeville	17	120.60	0.0	0.00	47	335.43	64	456.04
Lakeville N to US 20	70	86.69	3.1	3.77	121	149.52	194	239.98
Rural Principal Arterials	3,791	47.15	158	1.96	11,052	137.45	15,002	186.57
Notes: * Average annual number of crashes for the three year period studied. ** Per 100 million annual vehicle-miles of travel; the crashes used in this chart are investigated crashes only. Shading denotes rates exceeding Indiana statewide average for rural principal arterials. *** Future crashes were projected by the application of existing rates to projected vehicle-miles of travel. Source: For US 31, Bernardin, Lochmueller & Associates, Inc. analysis of INDOT Division of Program Development Crash Location Report for St. Joseph and Marshall counties; for Indiana Rural Principal Arterials, INDOT Division of Program Development Indiana Motor Vehicle Fatalities and Injuries, 1997-1999 Averages, revised January 22, 2002.								

<sup>2</sup> All crash rates are given per 100 million annual vehicle-miles of travel. Crash totals and rates reflect investigated crashes only. US 31 is classified as a rural principal arterial on all of the segments except from north of Miller Road to the US 20 Bypass, where US 31 is classified as an urban principal arterial.

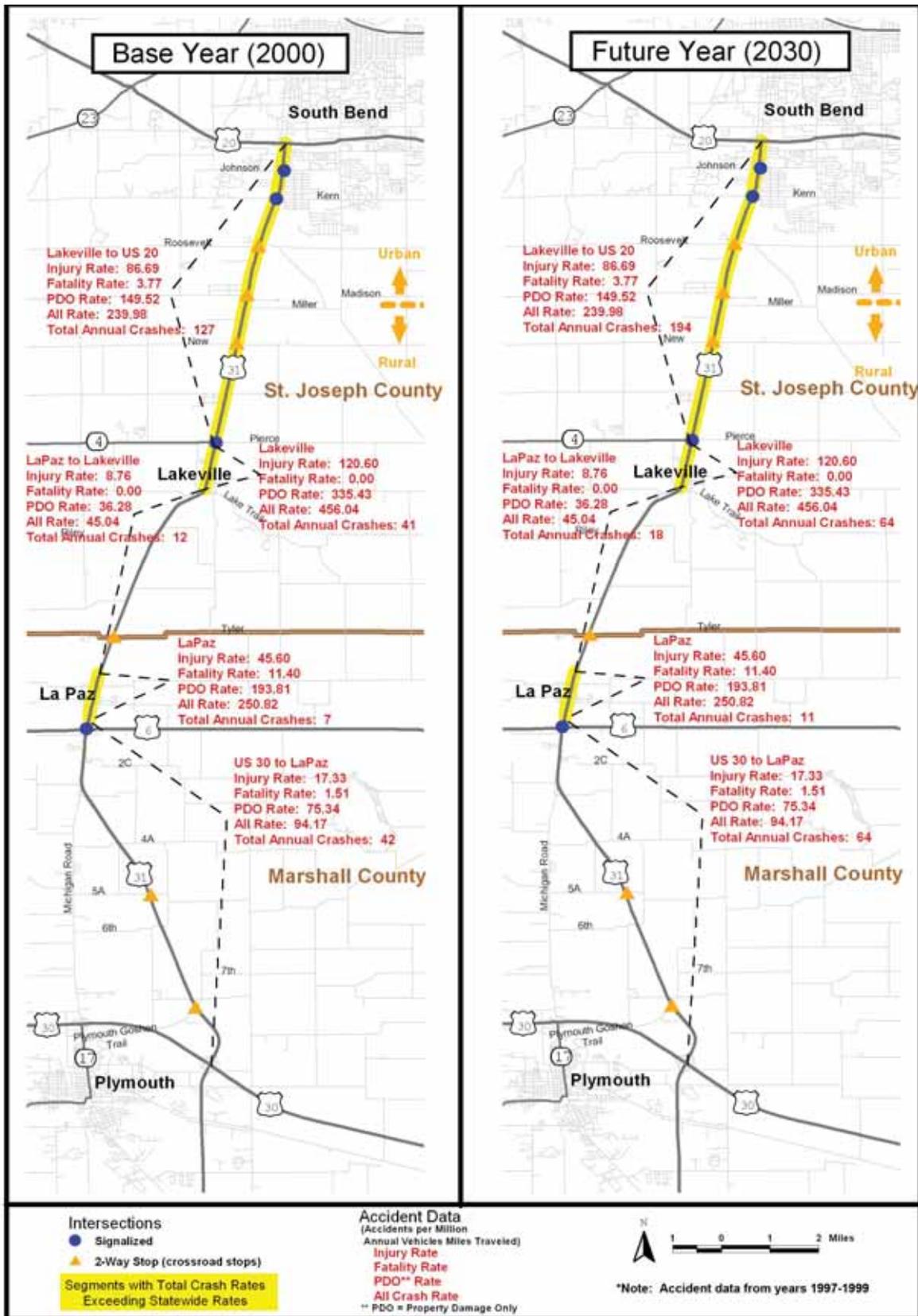


Figure 2.3.2: US 31 Segments with Crash Rates Exceeding Statewide Rates (Assuming no improvements to US 31)



## 2.4 Consistency with Transportation Plans

US 31 is designated a Commerce Corridor and a Statewide Mobility Corridor in the INDOT 2000-2025 Long Range Transportation Plan. The Indiana General Assembly in 1991 passed legislation directing INDOT to establish Commerce Corridors. A Commerce Corridor connects major population concentrations to the National Highway System, and provides good connectivity to major manufacturing and trade service concentrations. It also improves access to tourism and recreation areas, economic concentrations, and those areas with demonstrated and anticipated potential growth. The Commerce Corridor designation is more restrictive than the Statewide Mobility Corridor designation. It consists of Interstates plus select arterials with full or partial access control that are identified as having significant importance to statewide and national transportation. When compared to other Commerce Corridors, US 31 lacks good connectivity without even partial access control along most of the corridor, and provides poor mobility due to congestion.

A Statewide Mobility Corridor is the highest tier of INDOT's three-tiered planning-level corridors. Such corridors have upper level design standards, high speeds, minimal travel delay, free-flowing conditions, and no less than partial access control. Attainment of these minimum characteristics for US 31 requires reduced congestion, increased speeds, reduced travel times, and establishment of at least partial access control. Other characteristics typically associated with a Statewide Mobility Corridor include: serves long-distance trips, large through traffic volumes of traffic, and heavy commercial vehicle flows; carries longer distance commuter traffic; is generally multi-lane divided, full access control desirable, railroad and highway grade separation desirable, and desirable to bypass congested areas; has no non-motorized/pedestrian interaction; and has major river crossings.<sup>3</sup>

The Michiana Area Council of Government's (MACOG) Transportation Plan identified the need to improve existing US 31. The 2025 Transportation Plan published by MACOG for the South Bend Metropolitan Area also called specifically for the improvement of US 31 as a result of traffic operational failures identified in the Level-of-Service analysis of the plan. Failures were identified along segments of US 31 from US 20 to Kern Road and New Road to Pierce Road in years 2005 through 2025. Therefore, the MPO's plan proposed that US 31 should be improved to "a new limited access road with interchanges at several locations and would continue south from US 20 in St. Joseph County to US 30 in Marshall County."<sup>4</sup> This recommendation to improve US 31 from US 20 to US 30 was reiterated in March of 2002, in MACOG's 2025 Transportation Plan Update.<sup>5</sup> Therefore, it is desirable that alternatives to improve US 31 be consistent with the improvements called for in MACOG's 2025 Transportation Plan for the South Bend Metropolitan Area.

---

<sup>3</sup> INDOT *Statewide 2000-2025 Long Range Transportation Plan (2001 Update)*, pages 82 and 83.

<sup>4</sup> *2025 Transportation Plan for South Bend/Elkhart/Goshen Transportation Management Area*; Michiana Area Council of Governments (MACOG); April 1999; pages 45-49 and 98.

<sup>5</sup> *2025 Transportation Plan Update*; Michiana Area Council of Governments (MACOG); March 18, 2002; page 39.