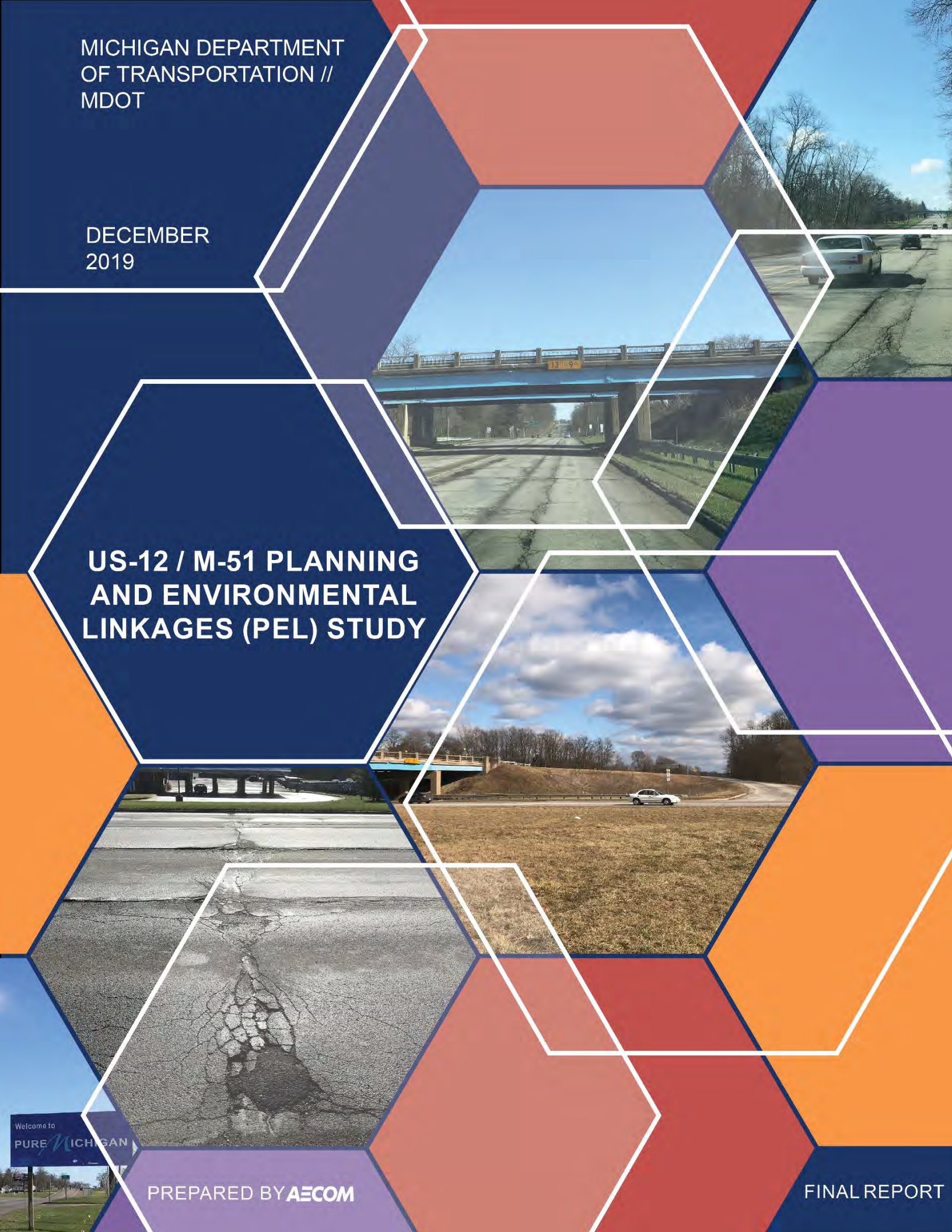
MICHIGAN DEPARTMENT OF TRANSPORTATION // MDOT

DECEMBER 2019

US-12 / M-51 PLANNING AND ENVIRONMENTAL LINKAGES (PEL) STUDY



PREPARED BY AECOM

FINAL REPORT

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Introduction

The US-12/M-51 Planning and Environmental Linkages (PEL) study in Niles Charter Township was sponsored by the Michigan Department of Transportation (MDOT). The study began in 2018 with the selection of consulting firm AECOM to lead the project. The consultant team and MDOT formed the study team. The Federal Highway Administration (FHWA), Niles Charter Township, and other stakeholders were involved throughout the study.

The M-51 at US-12 interchange is located in Niles Charter Township in southeast Berrien County (**Figure 1**). The limits of the project along M-51 extended from the Indiana State Line to M-60BR in the City of Niles. The limits of the US-12 study area extended from west of 3rd Street to the US-12/M-60 interchange near the Berrien County/Cass County line.

Figure 1: Study Area

Purpose and Need

This PEL study identifies transportation improvements that address the deterioration of the existing bridges and pavement, consider long-term life-cycle costs, accommodate existing and future operational needs, size the infrastructure appropriately, and provide a safe and connected facility for all users while minimizing environmental impacts within the study area.

The study is needed due to the deteriorated US-12 bridges over M-51 that require replacement, outdated existing geometric features within the US-12/M-51 interchange, excess capacity provided by the interchange, a lack of safe and accessible pedestrian facilities along M-51, and deteriorated pavement conditions along M-51 within the study area.

Public Coordination

A series of stakeholder meetings and public open houses were held throughout the study. An initial stakeholder meeting was held to discuss existing issues and concerns, and to review potential alternatives for the US-12/M-51 interchange. The alternatives were further developed and presented to the public at Public Open House #1. A second stakeholder meeting was held to discuss the results of the first public open house. The public had concerns related to the operation and safety of the US-12/3rd Street intersection, particularly since the intersection is located just west of the US-12/M-51 interchange. The majority of the comments received at the first public open house did not like the roundabout option and preferred a grade-separated solution.

Based on the results of Public Open House #1, the study limits along US-12 were expanded west to include 3rd Street, the roundabout option was eliminated, and a comprehensive data-driven safety analysis was undertaken to compare the remaining alternatives from a safety perspective. The refined alternatives and the results of the analysis were presented to stakeholders at a third stakeholder meeting and at Public Open House #2.

Alternative #2 (At-Grade Signal with Indirect Left-Turns) was presented at Public Open House #2 as the Leading Alternative. Alternative #2 was chosen as the Leading Alternative as it best met the project's purpose and need.

Following Public Open House #2, additional refinements were made to the Leading Alternative to address issues and concerns brought up by truck operators and Niles Township. A meeting with Niles Township officials and fuel tanker operators that use 3rd Street was held on June 3, 2019 to understand their concerns related to Alternative #2. Their concerns were related to the operation of indirect left-turns, fuel tanker operations, and pedestrian safety. MDOT reviewed these concerns and presented additional modifications to the Township and truck operators that addressed these concerns on July 22, 2019. The Township and fuel tanker operators were receptive to these final modifications to Alternative #2.

Alternatives

Multiple alternatives for removing or replacing the US-12 bridges over M-51 were developed for review by stakeholders and the public. The alternatives included:

- **Alternative #0 – Rebuild the Existing Interchange.** The interchange would be replaced in-kind, with new bridges and upgraded geometrics where possible within the existing right-of-way.
- **Alternative #1 – Grade-Separated Diamond Interchange.** The existing US-12 bridges over M-51 would be replaced, keeping the interchange at different grades, while the interchange layout would be converted to a diamond configuration with diagonal ramps connecting M-51 and US-12.
- **Alternative #2 – At-Grade Signal with Indirect (Michigan) Left-Turns.** The existing US-12 bridges over M-51 would be removed and not replaced. US-12 and M-51 would be brought to grade (made level with each other) as a signalized intersection. Left-turn movements would be made at median turn-arounds located along US-12 on each side of M-51. The US-12/3rd Street intersection, located just west of M-51, would likewise be modified such that left-turns would be made with median crossovers along US-12 on each side of 3rd Street.
- **Alternative #3 – At-Grade Roundabout.** The existing US-12 bridges over M-51 would be removed and not replaced. US-12 and M-51 would be brought to grade (made level with each other) as a multi-lane roundabout.
- **Alternative #4 – At-Grade Signal with Direct Left-Turns.** The existing US-12 bridges over M-51 would be removed and not replaced. US-12 and M-51 would be brought to grade (made level with each other) as a signalized intersection. Vehicles would be able to turn left directly at the signalized US-12/M-51 intersection, mirroring the existing operation of the US-12/3rd Street intersection.

For all alternatives, sidewalk along M-51 would be added through the interchange area with sidewalk ramps and marked pedestrian crossings.

Screening

Evaluation criteria to better compare the alternatives were developed by the study team and vetted with stakeholders at Stakeholder Meeting #2. The alternatives were evaluated based on:

- **Travel Delay.** All alternatives provided sufficient capacity with minimal travel delays.
- **Pedestrian Safety.** All alternatives provided improved pedestrian mobility and safety, although the grade-separated alternatives would make it easier for pedestrians along M-51 to pass beneath US-12 compared to at-grade solutions.
- **Motorist Safety.** The data-driven predictive safety analysis revealed that the Leading Alternative (Alternative #2) would result in the fewest number of predicted crashes, a direct result of having the fewest number of potential conflict points between US-12 and M-51 traffic streams.
- **Geometry.** Each alternative would be designed to the latest geometric standards, although Alternative #4 (At-Grade Signal with Direct Left-Turns) contains “buried” direct

left-turns along the US-12 approaches. This is an allowable design treatment for left-turns where the roadway is median-separated, but the treatment is not preferable.

- **Social and Environmental Impact.** Each of the alternatives is anticipated to have similar levels of impact to the environment. Alternative #0 and Alternative #1 received lower scores because they required more resources to construct (i.e. steel for bridge beams) than the at-grade alternatives.
- **Cost and Future Maintenance.** A cost comparison shows the grade-separated alternatives are costlier to construct and maintain than the at-grade alternatives.
- **Constructability.** Constructability was considered slightly more difficult for Alternative #0 and Alternative #1 due to the need for temporary sheet piling required for the replacement of the US-12 bridges over M-51.
- **Right-Sizing.** Alternatives #2 thru 4 provide the necessary traffic operations and safety without the need to replace the bridges. These at-grade alternatives fit the boulevard context of US-12 within the Niles area.

Leading Alternative

MDOT selected Alternative #2 (At-Grade Signal with Indirect (Michigan) Left Turns) as the Leading Alternative, which was presented to the public at Public Open House #2 (**Figure 2**).

Figure 2: Leading Alternative – At-Grade Signal with Indirect (Michigan) Left-Turns

The rationale for selection of Alternative #2 as the Leading Alternative is based on:

- **Safety.** The data-driven safety analysis indicated that Alternative #2 should result in the fewest number of crashes compared to the other alternatives.
- **Acceptable Capacity.** Alternative #2 provides sufficient capacity for future-year traffic.
- **Corridor Consistency.** Removal of the M-51 grade separation and construction of directional median crossovers along US-12 at 3rd Street and M-51 extends the boulevard

character of the US-12 corridor from US-31 through M-51. The existing US12/M-51 interchange is “out of place” given the traffic volumes it serves.

- **Fiscal Responsibility.** Alternative #2 is more fiscally responsible than the grade-separated alternatives in terms of both construction and maintenance.

1. Background

The US-12 interchange at M-51 is located in Niles Charter Township in southeast Berrien County. The existing bridges that carry US-12 over M-51 need replacement and the pavement along M-51 from the Indiana State Line to M-60BR (Main Street) in the City of Niles is in poor condition. This led the Michigan Department of Transportation (MDOT) to study the corridor as a whole. The study process was completed in accordance with the FHWA Planning and Environmental Linkages (PEL) process, so that any subsequent transition into the National Environmental Policy Act (NEPA) process, if necessary, can be streamlined. The limits of this PEL study include US-12 from west of 3rd Street to the Cass County Line in Niles Charter Township, and M-51 from the Indiana State Line to M-60BR in the City of Niles, as illustrated in **Figure 3** on the following page.

The purpose of this PEL study is to develop and examine future capacity and geometric improvement alternatives at the US-12/M-51 interchange, including options that eliminate the grade separation entirely. The goal is to determine a Leading Alternative that can be constructed as part of other pavement improvements along M-51.

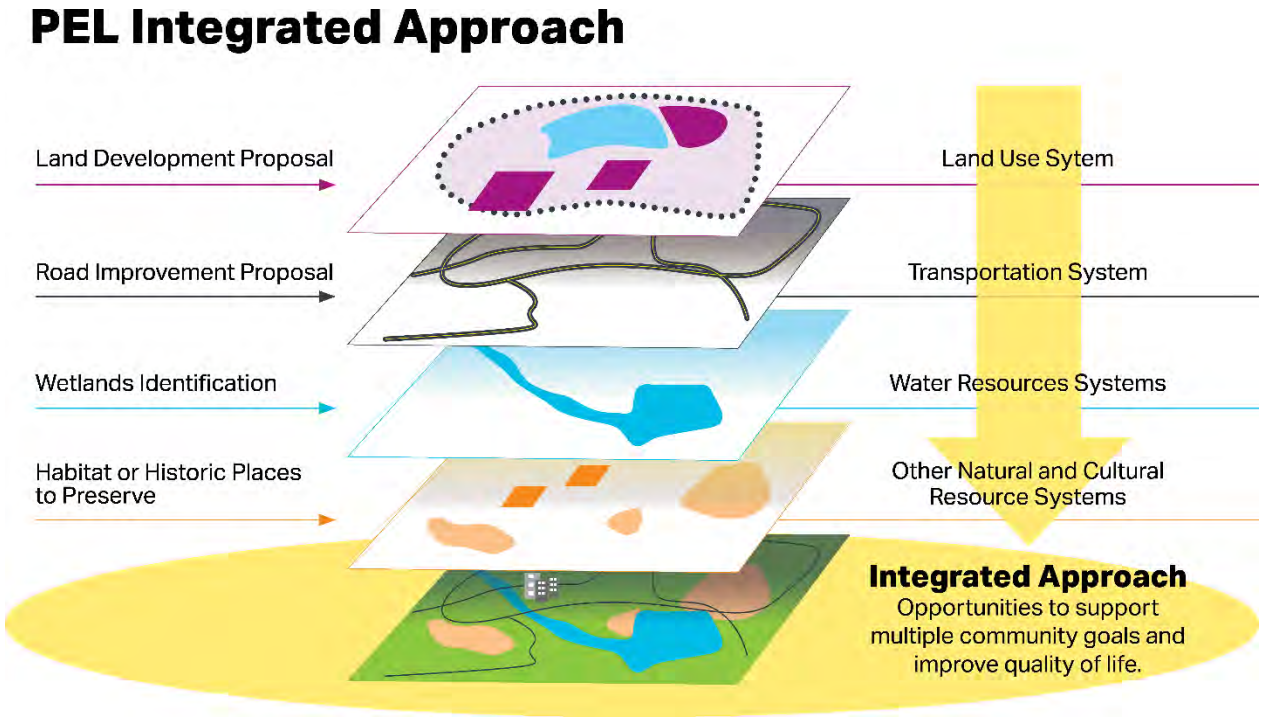
A comprehensive public coordination process was undertaken to understand the key issues and concerns associated with the existing interchange and brainstorm potential solutions to any safety or capacity issues that were identified. Multiple alternatives were generated and examined in detail.

Figure 3: Project Study Area Limits

2. Methodology

A PEL Study represents an approach that fosters a collaborative and integrated transportation decision-making process. These studies are generally executed early in the transportation planning process when decision-makers consider environmental, community, and economic goals. Having established these goals, they can be carried through to the project development and environmental review process, and ultimately, through design, construction and maintenance. The goal of a PEL study is to create a seamless decision-making process that minimizes duplication of effort, promotes environmental stewardship, and reduces delay from planning through project implementation.

Figure 4: PEL Process



3. Existing Conditions

All analyses documented in this report were performed in accordance with MDOT, FHWA, and American Association of State Highway and Transportation Officials (AASHTO) practices, guidelines, policies, and standards, including the 2010 Highway Capacity Manual (HCM), A Policy on Geometric Design of Highways and Streets (AASHTO, 2012) and the Michigan Manual of Uniform Traffic Control Devices (MMUTCD, 2011).

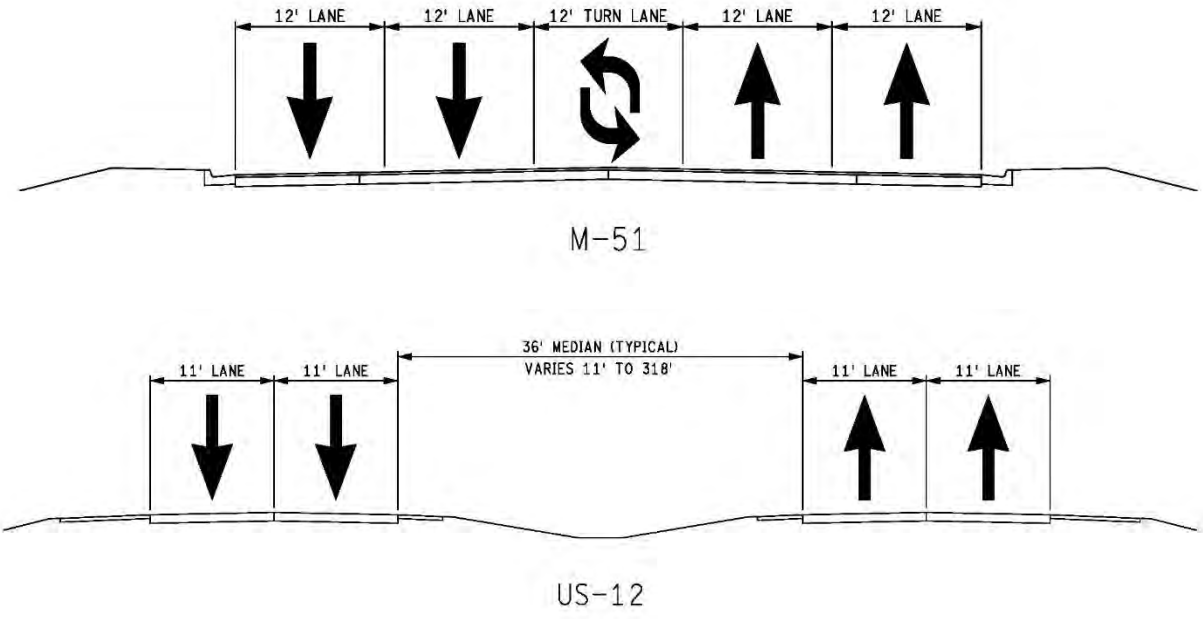
3.1 Study Area Roadways

The study area includes the following facilities:

M-51 is a north-south arterial trunkline that passes under US-12 with a 50 MPH. M-51 extends south into Indiana where it becomes State Road 933 and provides access to the Indiana Toll Road (I-80). M-51 extends north through the City of Niles, ultimately ending at I-94 in Van Buren County. M-51 has two 12-foot-wide travel lanes in each direction and a 12-foot-wide center turn lane. There are intermittent sidewalks along M-51 with none through the US-12 interchange. The Annual Average Daily Traffic (AADT) of M-51 is approximately 19,000 vehicles per day north of US-12 and 25,000 vehicles per day south of US-12. Approximately 2% of traffic carried by M-51 is commercial.

US-12 is a four-lane east-west boulevard through the study area with bridges over M-51 and a speed limit of 55 MPH. US-12 extends west into Indiana and east to downtown Detroit where it terminates. In the study area, US-12 provides a high-capacity bypass along the south side of the City of Niles with two 11-foot wide travel lanes in each direction and a median that varies in width from 11 feet at 3rd Street to 36 feet east of M-51. The AADT of US-12 is approximately 12,000 vehicles per day in the study area with 9% commercial traffic west of M-51. The AADT of US-12 east of M-51 is approximately 14,000 vehicles per day with 9.5% commercial traffic.

Figure 5: Existing Laneage on M-51 and US-12

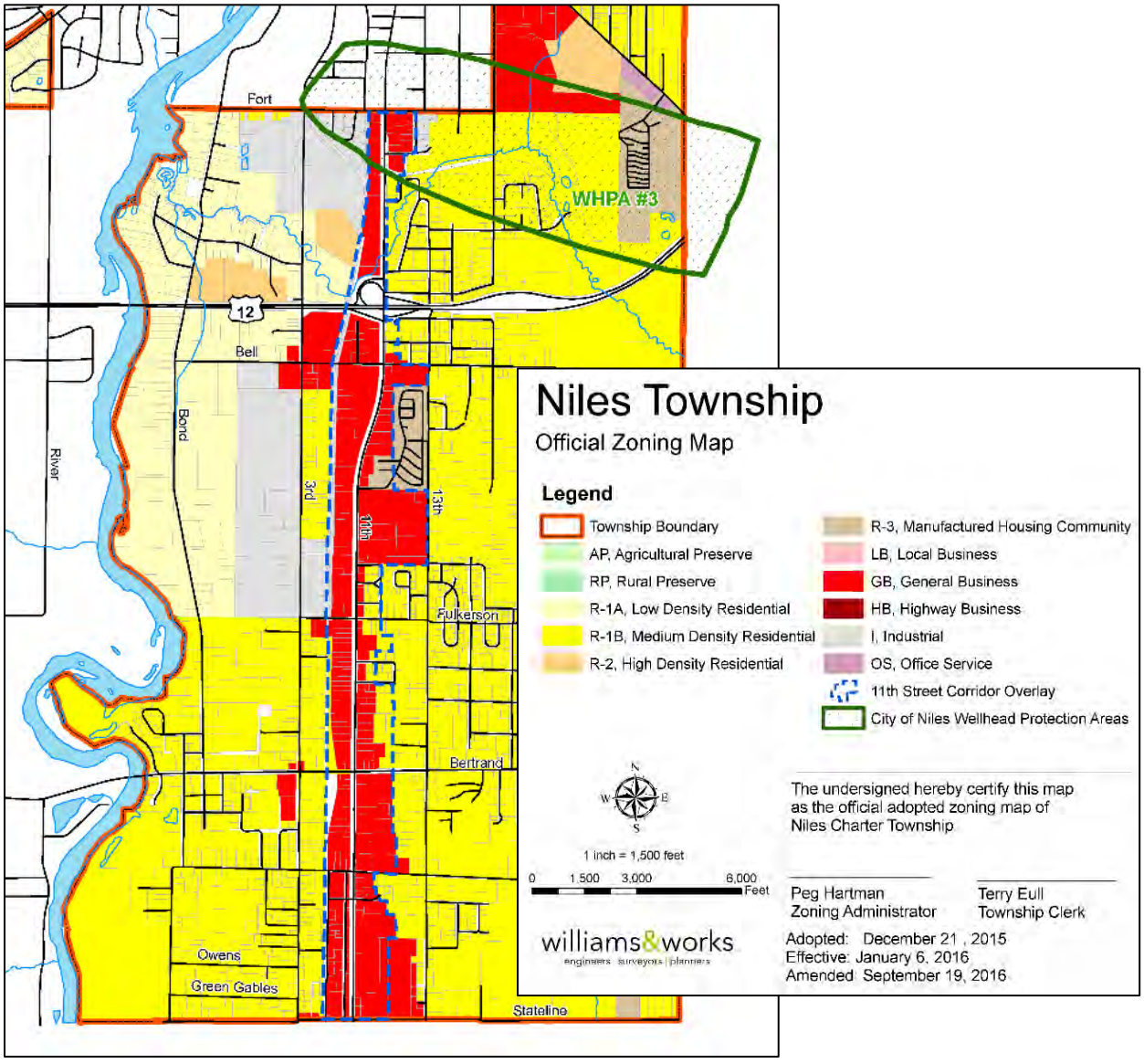


3rd Street is a north-south county road that parallels M-51 to the west and has a 40 MPH. The intersection of US-12 at 3rd Street is signalized with dedicated left-turn lanes on all four approaches and protected left-turn signal phasing for the US-12 approaches. 3rd Street carries approximately 4,500 vehicles per day north of US-12 and 8,000 vehicles per day south of US-12. Approximately 9.5% of traffic along 3rd Street south of US-12 is commercial, related to a collection of petroleum distribution terminals. Fuel tanker trucks are loaded with fuel before heading north on 3rd Street with most of their destinations to the west. There is a pedestrian crossing of the east leg of the US-12/3rd Street intersection for the Indiana-Michigan River Valley Trail. There are no sidewalks along 3rd Street.

3.2 Land Use Characteristics and Surrounding Environment

Land uses along both US-12 and M-51 are largely industrial or commercial, while the edges of the study area are characterized by residential development (**Figure 6**).

Figure 6: Study Area Land Use



Industrial land uses in the area include the Modineer manufacturing plant located on the east side of 3rd Street between Fort Street and US-12 and the Marathon Petroleum and Buckeye Fuel terminals located on both sides of 3rd Street, south of US-12 just north of Fulkerson Road.

Commercial land uses in the area consist of a variety of stores, restaurants, and other businesses—both chain and local. An example of the typical land use can be seen in **Figure 7**.

Most residential land uses in the area are single family homes. The section of the study area along M-51 from US-12 to Fulkerson Road is the most built-out with a Lowe's and Walmart. Dense single-family residential development is located throughout the M-51 study area from the Indiana state line to M-60BR.

Regarding the surrounding environment, US-12 crosses the St. Joseph River to the west of the project, as well as Brandywine Creek to the east of the project.

Figure 7: Study Area Typical Land Uses

3.3 M-51 Pavement

The pavement along M-51 in the study area is in poor condition and due for upgrade in the near future. The pavement is cracking and rutting in some locations and potholes have developed in much of the corridor. The study investigation determined that repairs, cold milling, and hot mix asphalt resurfacing is an acceptable fix type for the M-51 pavement. A rehabilitation project is currently under way from the Michigan/Indiana state line to south of Chestnut Lane. Rehabilitation work extending from Chestnut Lane to M-60BR is programmed to occur in the year 2023 in the same contract with US-12 bridge removal and interchange reconstruction. The M-51 corridor is in disrepair and is programmed for replacement from the Michigan/Indiana state line to south of Chestnut Lane in 2019, and from south of Chestnut Lane to M-60BR in 2023.

Existing Pavement Condition along M-51

3.4 Bridges

The bridges carrying US-12 over M-51 need replacement, which was the primary driver of the study. These structures were originally constructed in 1955. Each bridge is comprised of three spans. Other than general maintenance, the bridges are using their original components. Each bridge carries two lanes with narrow shoulders. The vertical clearance is posted at 13'-8" which has resulted in hits by trucks that were too tall to clear the bridges. The minimum required vertical clearance over a state trunkline route like M-51 is 16'-0" (16'-3" preferred).

The existing bridge piers have exposed rebar and cracking concrete, the surface of which is flaking off. The deck surfaces of the bridges are also in poor condition, with both cracking and leaking. More than 50% of the deck surfaces are in deteriorated condition. The underside of the bridge deck has minor rust stains on the permanent metal decking and a false bottom to catch crumbling concrete.

The beams have section loss with pack rust on most beams, as well as heavy pack rust at the pin and hangers. The paint on the beams is also in poor condition. The bridge railing has exposed rebar and cracking concrete whose surface is flaking off, and the bridge approaches are subject to settlement, pavement cracking, and patch deterioration.

Based on the condition of the bridge decks and other bridge components, it is no longer cost-effective to maintain the existing bridge structures. They must be replaced or removed.

Bridge Pier

Bridge Deck Surface

Bridge Deck Underside

Bridge Beam

Bridge Railing and Approach

3.5 Existing (2018) Traffic Analysis

An existing conditions capacity analysis of the freeway/ramp junctions and the unsignalized ramp terminal intersections was completed for the US-12/M-51 interchange using traffic data provided by MDOT. The existing (2018) peak-hour volumes at the US-12/M-51 interchange are displayed in **Table 1** for the morning and afternoon peak hours.

Level-of-Service (LOS) is a qualitative statement of the acceptability of traffic conditions based on delay. Levels of Service range from "A" to "F", similar to an alphabetic grading system, with each level describing a different set of operational characteristics. LOS "A" describes operational performance under light traffic volumes (freeway/ramp junctions) or with minimal delay (at signalized intersections). LOS "F" describes high densities of traffic at freeway/ramp junctions and intersection failure with extensive delays and long vehicular queues. LOS D is considered acceptable for peak-hour traffic operation of freeway/ramp junctions, and at unsignalized intersections in urbanized areas according to MDOT.

The existing peak-hour Levels of Service for the various freeway/ramp junctions at the US-12/M-51 interchange are depicted in **Table 1**. As shown in the table, each freeway/ramp junction at the US-12/M-51 interchange operates at LOS "A" or better during existing peak hours.

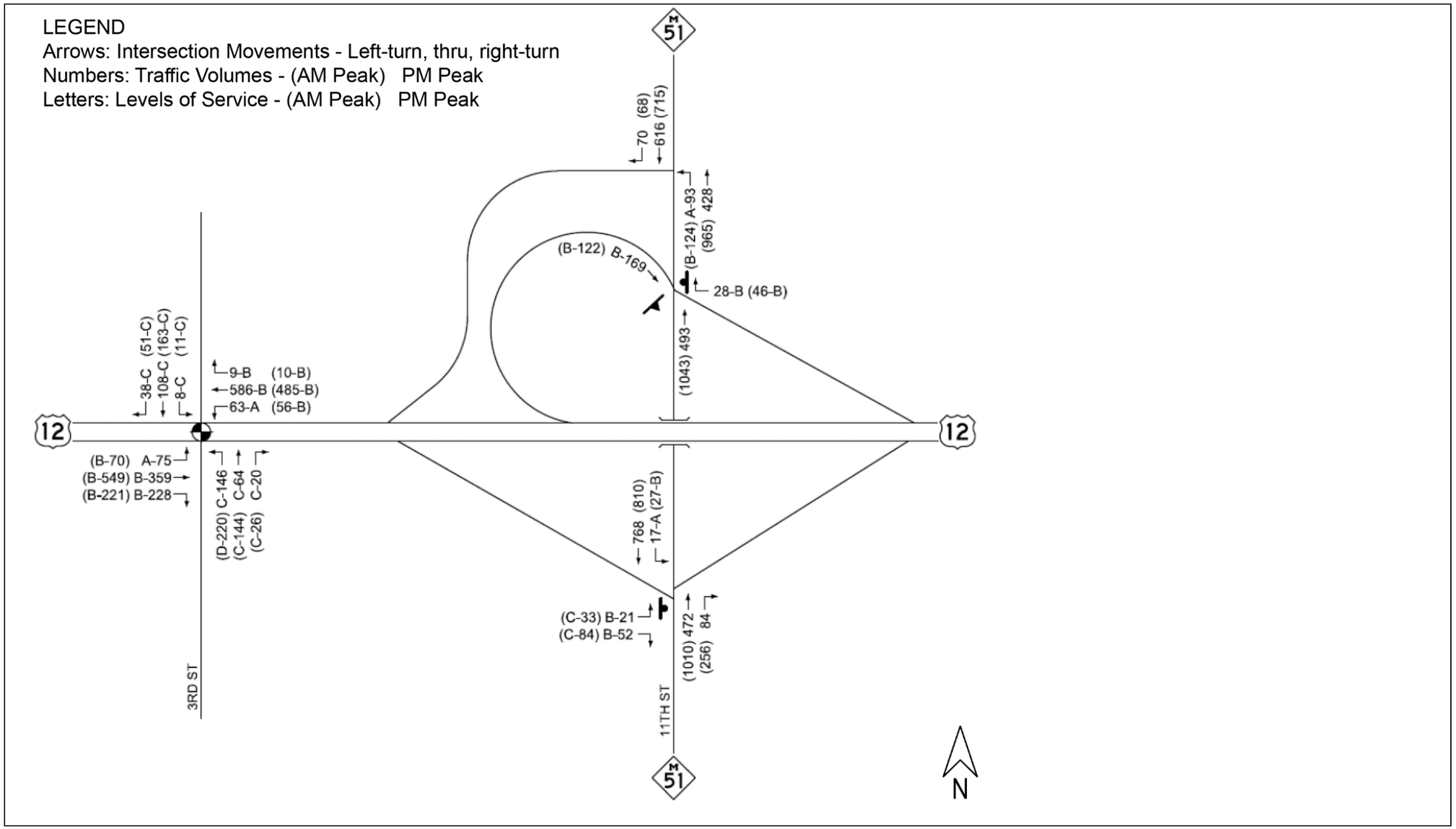
Table 1: Existing (2018) Peak-Hour Levels of Service at the US-12/M-51 Interchange – Freeway/Ramp Junctions

Freeway/Ramp Junction	2018 AM Peak Hour			2018 PM Peak Hour		
	Ramp Volume	Density (pc/mi/ln)*	LOS	Ramp Volume	Density (pc/mi/ln)	LOS
1. Eastbound US-12 Off-ramp	73	6.7	A	117	8.6	A
2. Eastbound US-12 On-ramp	101	5.7	A	283	8.5	A
3. Westbound US-12 Off-ramp	28	9.7	A	46	8.1	A
4. Westbound US-12 Loop-Off	169	9.7	A	122	8.0	A
5. Westbound US-12 On-ramp	163	6.5	A	192	5.6	A

*-pc/mi/ln = passenger cars per mile per lane
Source: AECOM, May 2018

Figure 8 depicts the Level of Service for each individual turn movement at the unsignalized US-12 ramp terminal intersections with M-51 and the signalized intersection of US-12 at 3rd Street. A review of **Figure 8** reveals that all individual turn movements operate at LOS "C" or better at the existing ramp terminals for those movements that must yield the right-of-way. Each movement at the US-12/3rd Street intersection operates at LOS "C" or better, except for the northbound-to-westbound left-turn, which operates at LOS "D" during the PM-peak hour.

Figure 8: Existing (2018) Peak-Hour Volumes and Levels of Service



3.6 Crash Analysis

Traffic crash data along M-51 and US-12 was reviewed for the three-year period from January 1, 2015 to December 31, 2017. A breakdown of all study area crashes by crash type is depicted in **Table 2** and **Table 3**. Intersections or ramp terminals denoted in bold had above-average crash rates compared to intersections with similar lane arrangements and similar traffic volumes. Intersections or ramp terminals denoted in italics are unsignalized.

As shown in the tables, a total of 260 crashes were reported at the eight M-51 intersections that were studied, 46 crashes were reported at the three ramp terminal intersections, and 39 crashes were reported at the US-12/3rd Street intersection in the three-year period covering 2015 through 2017.

No fatalities were reported over the three-year period. No “A” injury crashes were reported at the M-51 intersections, while three “A” level injury crashes were reported at the unsignalized US-12/M-51 interchange ramp terminals. “A” level injury crashes include individuals who sustained incapacitating injuries, such as broken limbs or paralysis. A summary of the crashes at each intersection is included in **Appendix F**.

Table 2: M-51 Crashes (2015-2017)

Crash Type/ M-51 Intersection	TOTAL	Single Veh	Ped	Bike	Head-On	Head On-LT	Angle	Rear-End	Side Swipe	Other	"A" Inj's	Total Entering ADT	Crash Rate**	Average Crash Rate	% +/- Avg Crash Rate
M-51 (Main)/M-60BR (Main) @ M-51 (12th)	**9**	1	0	0	0	0	2	4	2	0	0	20,815	0.39	0.96	-59%
M-51 (11th) @ Silverbrook	**51**	1	0	0	0	2	18	22	7	1	0	27,254	1.71	0.96	**78%**
M-51 (11th) @ Fort*	***34***	*0*	*1*	*0*	*1*	*2*	*15*	*3*	*8*	*4*	*0*	*23,189*	*1.34*	*0.37*	**262%**
M-51 (11th) @ Bell	**50**	2	0	0	0	3	10	23	7	5	0	29,512	1.55	0.96	**61%**
M-51 (11th) @ Chestnut	**47**	3	0	0	1	4	11	18	7	3	0	26,285	1.63	0.96	**70%**
M-51 (11th) @ Fulkerson	**16**	1	0	0	1	1	2	8	2	1	0	23,368	0.63	0.96	-35%
M-51 (11th) @ Bertrand	**31**	1	0	0	1	1	5	15	4	4	0	22,640	1.25	0.96	**30%**
M-51 (11th) @ Ontario	**22**	3	0	0	0	1	6	6	4	2	0	22,306	0.90	0.96	-6%
TOTAL	**260**	**12**	**1**	**0**	**4**	**14**	**69**	**99**	**41**	**20**	**0**				
Percent	**100%**	**4%**	**0%**	**1%**	**2%**	**5%**	**27%**	**38%**	**16%**	**7%**					

Table 3: US-12 Crashes (2015-2017)

Crash Type/ US-12 Intersection or Ramp Terminal	TOTAL	Single Veh	Ped	Bike	Head-On	Head On-LT	Angle	Rear-End	Side Swipe	Other	"A" Inj's	Total Entering ADT	Crash Rate**	Average Crash Rate	% +/- Avg Crash Rate
EB US-12 Off-ramp/ On-ramp @ M-51	***21***	*5*	*0*	*0*	*0*	*1*	*3*	*9*	*1*	*2*	*0*	*24,667*	*0.78*	*0.37*	***110%***
WB US-12 Off-ramp @ M-51	***15***	*4*	*0*	*0*	*0*	*0*	*1*	*4*	*3*	*3*	*1*	*21,400*	*0.64*	*0.37*	***73%***
WB US-12 On-ramp @ M-51	***10***	*5*	*0*	*0*	*0*	*1*	*1*	*2*	*1*	*0*	*2*	*20,889*	*0.44*	*0.37*	*-5%*
US-12 @ 3rd St	**39**	8	0	1	0	4	10	12	1	3	0	22,289	1.60	0.96	**66%**
TOTAL	**85**	**22**	**0**	**1**	**0**	**6**	**15**	**27**	**6**	**8**	**3**				
Percent	**100%**	**20%**	**0%**	**3%**	**0%**	**10%**	**26%**	**31%**	**3%**	**8%**					

*- Overhead flashing beacon

**- Crashes per 1 million entering vehicles (MEV). Higher than average crash rate locations depicted in bold. *Unsignalized locations denoted in*

Note: No fatal crashes were reported at any of the above locations during the three-year study period.

Source: Crash Data - Traffic Crash Analysis Tool 2.0, Traffic Improvement Association.

Source: Average Crash Rates - Crash Analysis Process, Southeast Michigan Council of Governments, Appendix F, Table 1.4, January 2016.

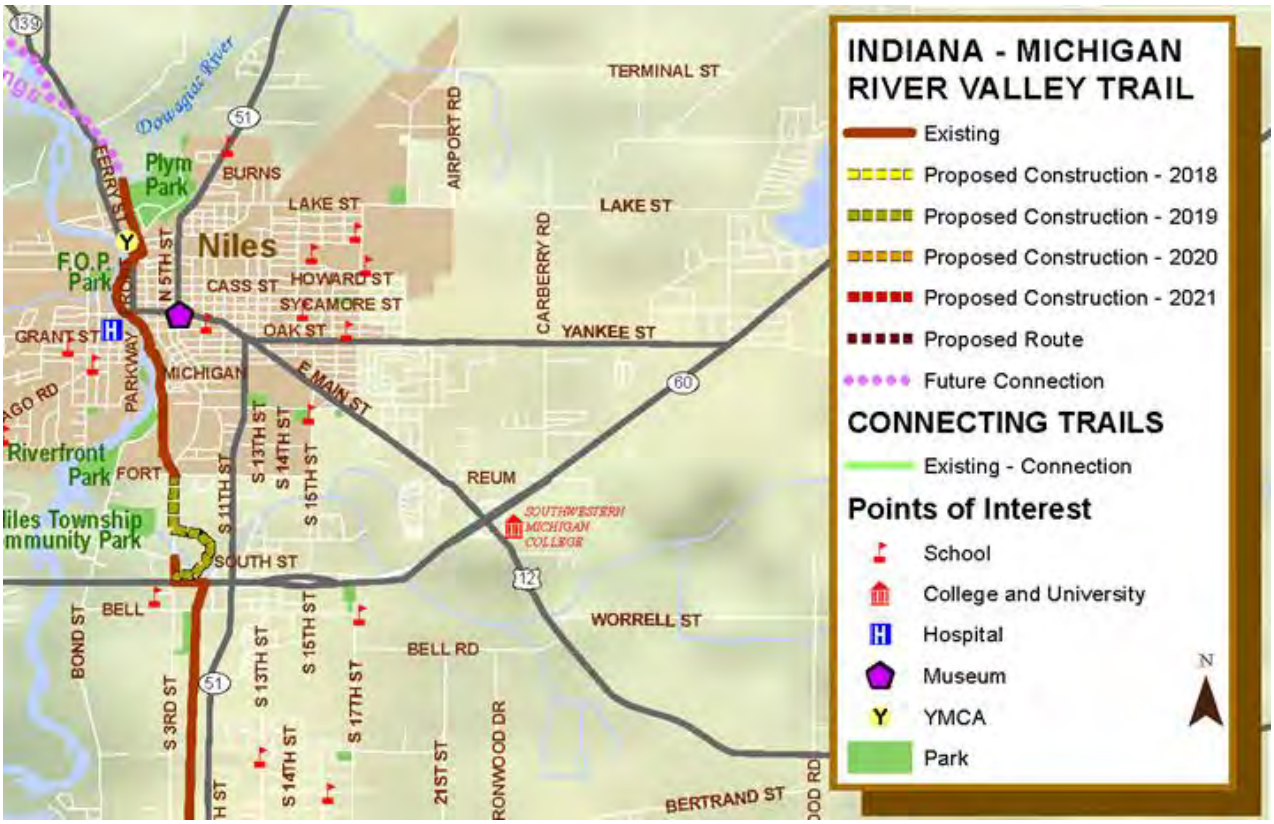
** Intersections or ramp terminals denoted in bold had above-average crash rates compared to intersections with similar lane arrangements and similar traffic volumes.

3.7 Pedestrian Accommodations

Walkability is a significant concern within the study area. While sidewalks are lacking along M-51, pedestrians are still using the corridor, as demonstrated by the worn paths visible along M-51. Future plans include adding sidewalks along M-51 through the US-12/M-51 interchange area. Sidewalk ramps and marked crosswalks will also be added at the Fulkerson and Bertrand intersections along M-51.

A portion of the Indiana-Michigan River Valley Trail is located in the study area and currently runs from just north of US-12 at 3rd Street south to the Michigan-Indiana State Line. The entire trail is planned to be 34 miles long, connecting Niles, Michigan to Mishawaka, Indiana through downtown Roseland and South Bend. The portion of the trail connecting to the existing northern trail in Niles is under construction (see **Figure 9**). There is no direct connection from the trail to M-51.

Figure 9: Indiana-Michigan River Valley Trail Map



3.8 Drainage

The existing drainage system for the study area is a mixture of open and enclosed drainage features and is comprised of open ditch, culverts and storm sewers. Based on site reviews and record plans that were available, the M-51 corridor can be broken into five distinct watersheds and the US-12 corridor can be broken in two watersheds. Each of these watersheds are summarized in **Appendix B**.

4. Purpose and Need Statement for the PEL Study

The Purpose and Need of a PEL study should focus on the primary transportation challenges to be addressed, stating the transportation problem but not a specific solution. The Purpose and Need should be specific enough to generate alternatives that may potentially yield real solutions to the problem at-hand.

4.1 Draft Purpose and Need

An initial Purpose and Need Statement was developed by the study team. The draft statement was then reviewed and presented to stakeholders and the public.

The draft study purpose was to identify a transportation improvement that will address the deterioration of the existing infrastructure which considers long-term life-cycle costs, existing and future operational needs, as well as safety and connectivity for all users; while minimizing environmental impacts within the study area.

The draft study need addressed the need to improve the deteriorated bridges and outdated existing geometric conditions of the US-12/M-51 interchange within the study area. The proposed project also needs to improve the deteriorated pavement conditions along M-51 and the current lack of safe, accessible pedestrian facilities.

4.2 Final Purpose and Need

The draft purpose and need statements were only modified slightly after Public Open House #1. The final study purpose was amended to include the desire to size the infrastructure appropriately, while the final study need was amended to include the need to address the excess capacity that the US-12/M-51 interchange provides. As a result, the Leading Alternative, which was presented at the second round of stakeholder meetings and public open houses, addresses:

- Deteriorated infrastructure including pavement and bridges.
- Enhanced operation of the US-12/M-51 interchange and corrected geometric deficiencies.
- Improved safety for all users of the study area (motorists, pedestrians, and bicyclists) in the most cost-effective way.
- Minimized impacts on the natural environment.

- Right-sized infrastructure to meet the needs of all users (added after Public Open House #1)

5. Coordination with Resource Agencies

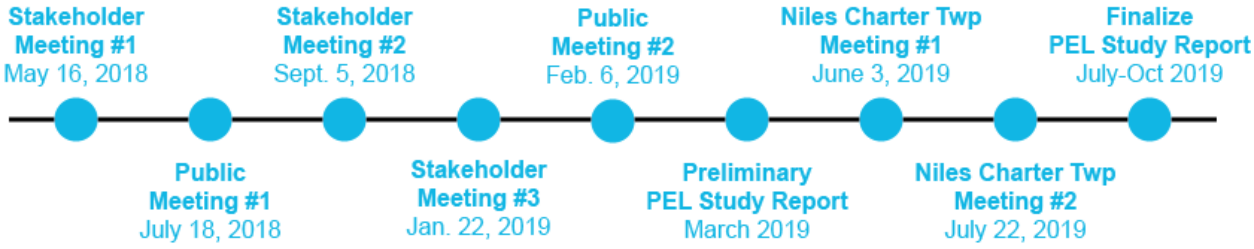
Resource agencies have specific technical expertise and regulatory oversight on various environmental issues and potential impacts associated with the study. The US-12/M-51 PEL Study included an outreach plan which actively engaged and coordinated with these agencies throughout the study. The US-12/M-51 PEL study team itself had representatives from MDOT and FHWA, and early in the planning process, the study team established the stakeholder group to serve as the primary means of agency coordination (see **Section 6: Public Coordination**).

In addition, the Michigan Economic Development Corporation was another resource agency which was sent e-mail notifications for the public input sessions as well as e-mails stating the website location for viewing the conceptual design alternatives.

6. Public Coordination

It is important to understand the ideas, perspectives, and needs of those who live and work in the study area. Efforts were made to engage both stakeholders and the public throughout the PEL study. Three stakeholder meetings were held in addition to two public open houses, as shown in **Figure 10** below. Materials for each meeting and open house can be found in **Appendix D**. After Public Meeting #2 in February 2019, additional coordination with Niles Township and fuel tanker operators along 3rd Street was completed, pushing back the date to finalize the PEL Study Report to autumn of 2019.

Figure 10: Public Coordination Schedule for the PEL Study



6.1 Stakeholder Meetings

Stakeholder involvement is a key component of the PEL process. The goal is to solicit feedback from the community on steps such as the purpose and need statement, alternatives developed, and the alternatives evaluation process. Stakeholders invited to each meeting are shown in **Table 4**.

Table 4: Study Stakeholders

Government Agencies
Bertrand Township
Niles Charter Township
City of Niles
Berrien County
Southwest Michigan Planning Commission (SWMPC)
Michigan State Police – Niles Post
Schools and Community Organizations
Niles Community Schools
Niles-Buchanan YMCA
Niles Senior Center
Four Flags Area Chamber of Commerce
Brandywine Community Schools
Southwestern Michigan Economic Growth Alliance
Lakeland Hospital

6.1.1 Stakeholder Meeting #1 – May 16, 2018

The study team met with stakeholders to discuss issues associated with the study area and brainstorm ideas regarding how to address the interchange area. Many of the conceptual alternatives were developed as a result of this meeting.

6.1.2 Stakeholder Meeting #2 – September 5, 2018

The stakeholder group reconvened to discuss the outcomes and comments from Public Open House #1 (see **Section 6.2.1**), consider updated alternatives for the US-12/M-51 interchange, and receive an update on the study's progress as it related to the analysis of the M-51 pavement condition. In addition, the stakeholder team provided information on issues of safety and traffic operations at the US-12/3rd Street intersection. The study limits along US-12 were extended to west of 3rd Street after Stakeholder Meeting #2, as the US-12/3rd Street intersection was interlinked with the US-12/M-51 interchange. A more comprehensive comparison of safety was identified as necessary for comparing the at-grade alternatives with grade-separated alternatives, and the study team began a data-driven safety analysis of the alternatives following Stakeholder Meeting #2.

6.1.3 Stakeholder Meeting #3 – January 22, 2019

The final stakeholder meeting focused on how comments received at Public Open House #1 were incorporated into the refinement of alternatives between September 2018 and January 2019. The study team discussed why Alternative #3 (Roundabout) was eliminated from further consideration, that M-51 pavement rehabilitation was to be accelerated, and the results of the

data-driven safety analysis that was completed to better compare the safety benefits of the at-grade and grade-separated alternatives. Stakeholder Meeting #3 provided a preview of what would be presented at Public Open House #2 (see **Section 6.2.2**), including the rationale for selection of Alternative #2 (At-Grade Signal with Indirect (Michigan) Left-Turns) as the Leading Alternative.

6.2 Public Open Houses

Public open houses were held at Southwestern Michigan College to allow participants to have personal interaction with representatives from the study team. Each open house consisted of 2 presentations followed by an open Q/A session.

6.2.1 Public Open House #1 – July 18, 2018

Presentations to the public at the first open house included an overview of the PEL process, the proposed study schedule, a draft Purpose and Need statement, a discussion of the poor pavement and bridge conditions that prompted the study, an overview of existing safety and traffic operations, and a presentation of the alternatives.

The study team took the comments received at Public Open House #1 and incorporated them into the alternatives over the fall of 2018. The following considerations for the study came out of Public Open House #1:

- The M-51 pavement condition is poor. Is there any way to accelerate the pavement rehabilitation sooner than 2025?
- General consensus against any roundabout solution.
- Safety and operations at the US-12/3rd Street intersection should be incorporated into the study, given how close the US-12/3rd Street intersection is to the US-12/M-51 interchange.
- The lack of non-motorized facilities along M-51 was discussed by many.
- The public discussed the perceived large volumes of trucks along US-12, particularly tanker trucks with origins and destinations along 3rd Street south of US-12.
- Multiple people commented how eastbound-to-northbound left-turns from the US-12 ramp onto M-51 were difficult to make, so motorists bypassed the movement by taking eastbound US-12 to southbound 3rd Street to eastbound Bell Road to northbound M-51.
- Comments at the open house and written comments received by MDOT following the event primarily indicated a preference for US-12/M-51 to remain a grade-separated interchange since this was understood to be the safest solution.
- Members of the public would like more or better connections between the Indiana-Michigan River Valley Trail and M-51.

6.2.2 Public Open House #2 – February 6, 2019

Presentations to the public at the second open house included a review of the Purpose and Need statement, a discussion of the study schedule, and a discussion of the alternatives. The presentations focused on how the study team addressed the comments received at Public Open House #1:

- M-51 pavement rehabilitation was accelerated with a project in 2019 from the Indiana State Line to a point near Wal-Mart, followed by a second pavement rehabilitation project through the US-12 interchange up to M-60BR in 2023. Improved connections from the Indiana-Michigan River Valley Trail to M-51 were also included with ADA-compliant crosswalks along M-51 at Bertrand Road and Fulkerson Road.
- The roundabout alternative was eliminated.
- Safety and operations at the US-12/3rd Street were examined and incorporated into all alternatives.
- MDOT indicated that crosswalks added at Bertrand and Fulkerson as part of the accelerated 2019 work would be incorporated into the design along M-51 from Bell Road to Brandywine Creek (i.e. through the US-12 interchange area).
- The study team discussed how each alternative has sufficient capacity to serve trucks, including those with origins and destinations along 3rd Street south of US-12.
- The study team discussed how each alternative would improve the operation of eastbound-to-northbound left turns at US-12/M-51, so that motorists would not need to divert to Bell Road in the future.
- The results of a detailed predictive safety analysis were discussed, revealing Alternative #2 (At-Grade Signal with Indirect (Michigan) Left-Turns) to be the safest solution because of the elimination of numerous conflict points at US-12/M-51 and US-12/3rd Street.

Alternative #2 (At-Grade Signal With Indirect (Michigan) Left-Turns) was presented as the Leading Alternative at Public Open House #2. The open house had 51 attendees and multiple news outlets present. Most comments from attendees and written comments received by MDOT after Public Open House #2 indicated a preference that US-12/M-51 remain a grade-separated interchange. Final adjustments (discussed in **Section 9.2**) were made to the Leading Alternative to address these comments.

6.3 Other Stakeholder Outreach

6.3.1 Coordination with Municipalities

The study team met with both the City of Niles and Niles Charter Township on June 27th, 2018 to discuss the utilities in the study area. A summary of this discussion and a series of utility maps provided by the municipalities are presented in **Appendix E**.

The Berrien County Road Department was engaged regarding the US-12/M-51 PEL study and its potential outcomes. Mr. Latham and Mr. Stack indicated that they did not foresee any negative impacts on County Roads, regardless of which alternative was selected. They indicated that an upgrade at the intersection might reduce cut-through traffic on Bell Road that people often use to avoid certain turning movements at US-12. They also suggested that intersection upgrades at 3rd Street and Bertrand Road could improve functionality and safety for all users, especially pedestrians.

In addition, the Berrien County Drain Commission and its staff were contacted regarding the PEL study. Ms. Totzke and Ms. Hendrix both indicated that they did not have any significant input for such a study. They did not feel that this project would have any impacts of significance to their office or its duties. They did ask, however, to be included on invitations moving forward.

6.3.2 Niles Charter Township Hall Meetings

On June 3, 2019, Niles Charter Township hosted a meeting with MDOT to discuss the Township's concerns related to the proposed operation of the US-12/3rd Street intersection as it relates to the Leading Alternative. Niles Township officials and fuel tanker operators that use 3rd Street south of US-12 had concerns related to traffic safety and operations, fuel tanker truck operations, corridor consistency, and pedestrian safety. Based on the comments received at the meeting, the following actions were taken:

- MDOT completed additional study related to traffic operations and safety, fuel tanker operations, and pedestrian safety at the US-12/3rd Street intersection.
- AECOM collected updated tanker truck counts in June 2019 and MDOT completed additional origin-destination analysis related to trucks that would navigate the proposed directional median crossovers that would be constructed along US-12 on each side of 3rd Street with the Leading Alternative. The new counts revealed similar volumes to those provided by MDOT when the study began.
- MDOT compared the expected changes (diversions) in certain traffic patterns to verify that the Leading Alternative would not encourage the use of Bell Road by traffic using US-12 and M-51.
- MDOT further analyzed the comparison of safety for non-motorized traffic between different intersection types at US-12/3rd Street and investigated options for improving pedestrian safety.

On July 22, 2019, MDOT met with Niles Township officials and fuel tanker operators to discuss the additional analysis that was completed. Based on the results of the analysis, the following modifications to the Leading Alternative were made to address the concerns:

1. The proposed directional median crossover along US-12 east of 3rd Street would be signalized to improve fuel tanker operations. The need for signalization of the crossover west of US-12 would be monitored after construction.
2. To improve pedestrian safety at the Trail crossing of the east leg of the US-12/3rd Street intersection, MDOT recommended providing a "leading pedestrian interval" as part of the signal improvements that would be constructed. The leading pedestrian interval would allow pedestrians to begin entering the crosswalk while all vehicle streams were stopped so that the pedestrians become more conspicuous to motorists when the signal turns green.
3. MDOT agreed they would be willing to provide a pedestrian connection along the south side of US-12 between the Indiana Michigan River Valley Trail and M-51 in order to improve non-motorized connectivity to the M-51 corridor.

A summary of the June and July meetings with Niles Township are presented in **Appendix D**.

7. Alternative Development

Five alternatives were developed in addition to maintaining the existing configuration of the US-12/M-51 interchange. Each alternative can be constructed within the existing right-of-way.

7.1 Existing Configuration

The existing US-12/M-51 interchange area, including the US-12/3rd Street intersection is depicted in **Figure 11** below. The existing partial cloverleaf interchange does not meet current geometry standards. The westbound US-12 on-ramp is particularly tight with a 100-foot radius curve prior to entering US-12. The low speed imposed on motorists by this tight radius makes it difficult to merge with much faster traffic traveling on US-12. Rebuilding the interchange in its existing configuration would not be allowed using current design standards.

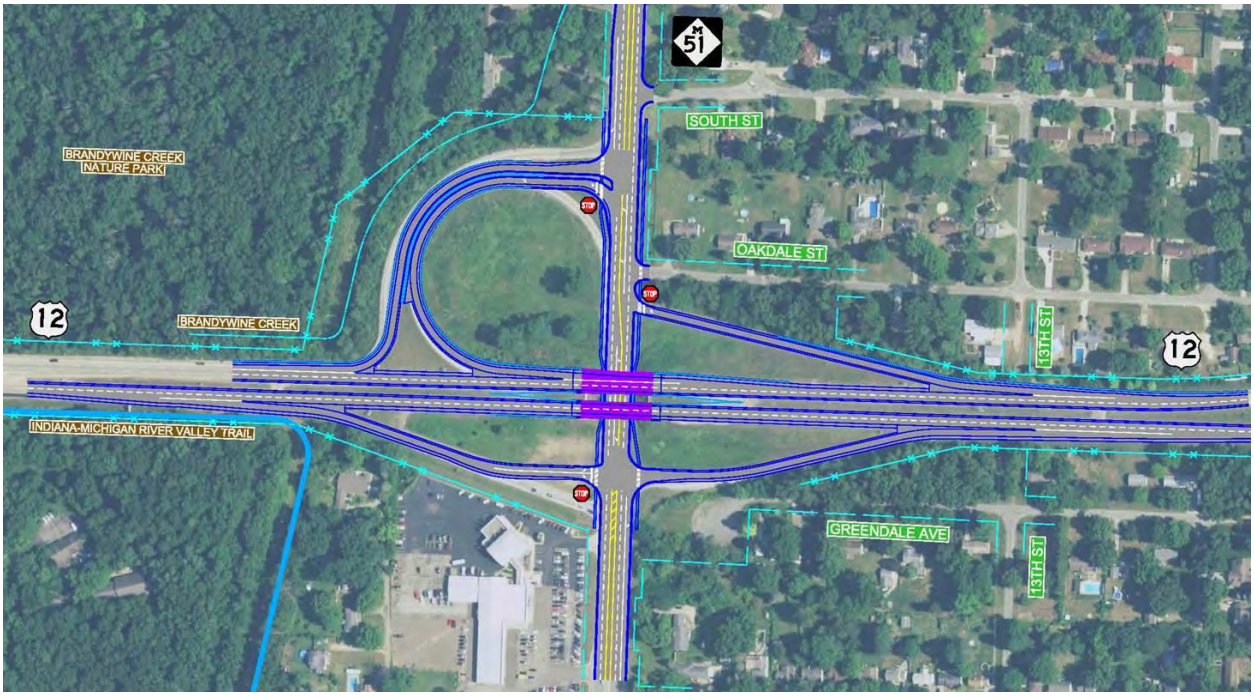
Figure 11: Existing Configuration

7.2 Alternative #0 – Rebuild Existing Interchange

The Rebuild Existing Interchange Alternative (**Figure 12**) would improve existing geometric deficiencies to the extent possible. The entrance and exit ramp tapers would be upgraded to current standards. The loop off-ramp would tee into a stop sign at M-51 to eliminate the existing sub-standard acceleration taper onto southbound M-51. The eastbound on-ramp and off-ramp would be directly opposite each other to improve ramp alignment. The sub-standard radius of the loop off-ramp and the westbound on-ramp would remain in order to stay within the right-of-way footprint. Because the geometry of these two ramps does not meet adopted standards, it would require special exception agreements. The existing bridges carrying US-12 over M-51

would be replaced. No changes to the design or operation of the US-12/3rd Street intersection would occur.

Figure 12: Existing Interchange with Geometric Improvements



Advantages of Alternative #0:

- Improves alignment of the eastbound ramps.
- Provides standard acceleration and deceleration tapers along US-12.
- Replaces bridges, allowing US-12 through traffic to free-flow over M-51.
- Eliminates sub-standard acceleration taper of loop ramp onto southbound M-51.

Disadvantages of Alternative #0:

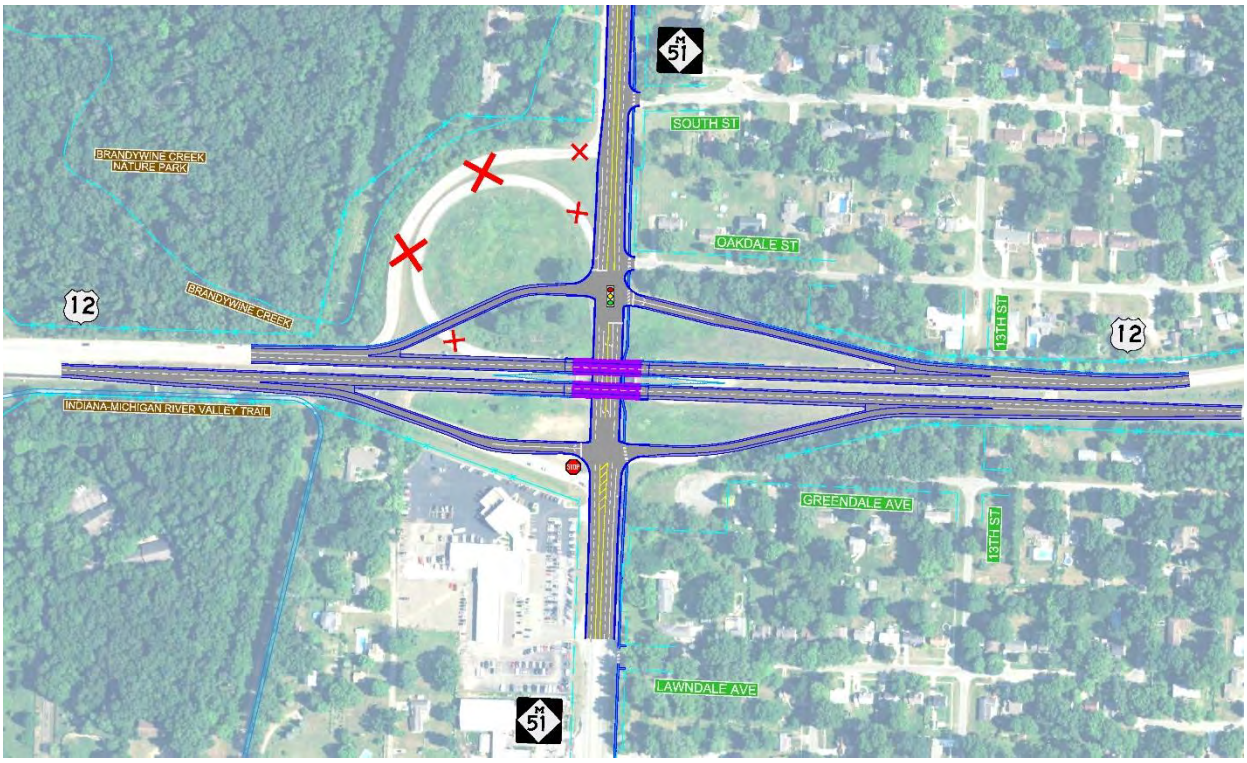
- One sub-standard horizontal curve remains for the westbound US-12 to southbound M-51 loop ramp.
- Two sub-standard horizontal curves remain for the M-51 to westbound US-12 ramp, with the second curve having a design speed of less than 25 mph merging with much higher speed traffic.
- Westbound off-ramp remains very close to Oakdale Street, making it difficult for motorists on Oakdale Street to turn onto M-51.
- Costly to rebuild and maintain bridges.

7.3 Alternative #1 – Grade-Separated Diamond Interchange

In the Grade-Separated Diamond Interchange Alternative (**Figure 13**), the loop off-ramp in the northwest quadrant would be eliminated, creating a single point of exit for westbound traffic. The remaining westbound off-ramp would remain on its current alignment, while a new westbound on-ramp would be aligned directly opposite it. The eastbound on-ramp and off-ramp would also be aligned directly opposite each other. The entrance and exit ramp tapers would be

upgraded to current standards. The existing bridges carrying US-12 over M-51 would be replaced to current standards with 16'-0" height between the M-51 pavement and the bottom of the bridge beams above. No changes to the design or operation of the US-12/3rd Street intersection would occur.

Figure 13: Grade-Separated Diamond Interchange



Advantages of Alternative #1:

- Improves alignment of the eastbound ramps.
- Improves alignment of the westbound ramps
- Eliminates the sub-standard loop ramp in the northwest quadrant.
- Eliminates sub-standard horizontal curves on the westbound on-ramp.
- Provides standard acceleration and deceleration tapers along US-12.
- Replaces bridges, allowing US-12 through traffic to free-flow over M-51.

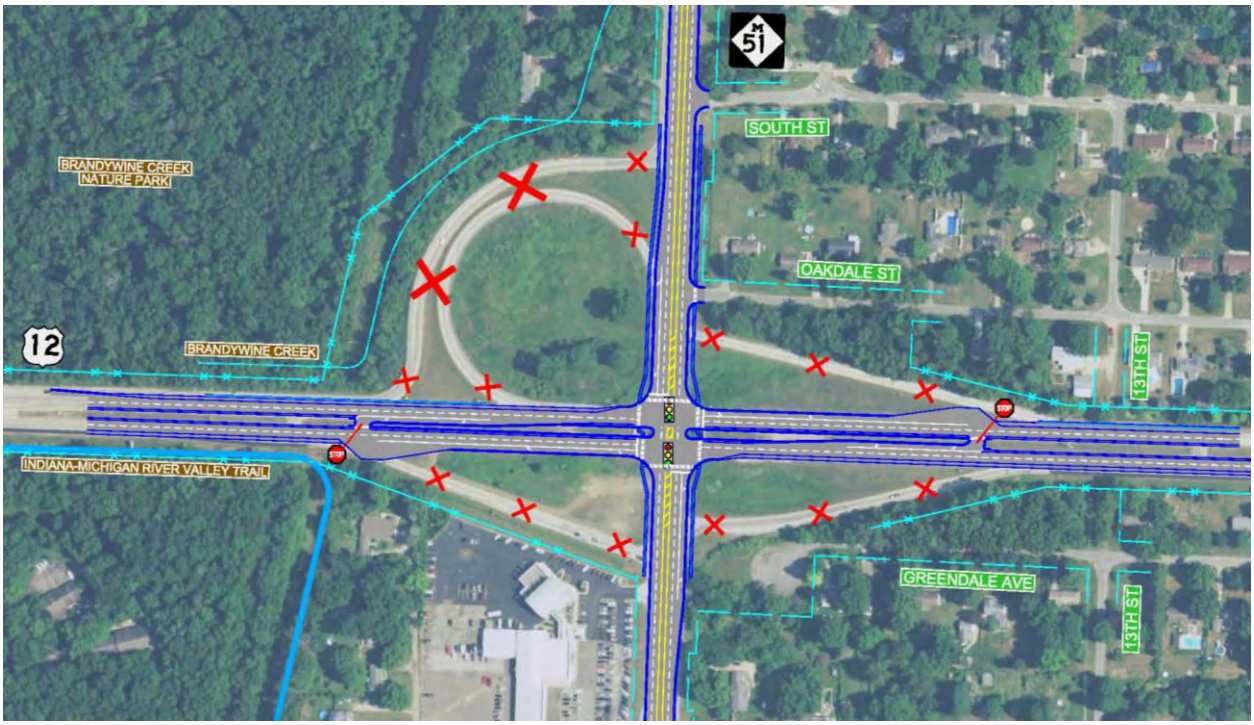
Disadvantages of Alternative #1:

- Westbound off-ramp remains very close to Oakdale Street.
- Costly to rebuild and maintain bridges.

7.4 Alternative #2 – At-Grade Signal with Indirect (Michigan) Left-Turns

Alternative #2 (**Figure 14**) brings US-12 and M-51 to grade with a two-phase traffic signal controlling the US-12 and M-51 traffic streams. Since US-12 has a median, left-turns at the new US-12/M-51 intersection would be prohibited, and directional median crossovers would be constructed along US-12 approximately 660 feet on each side of M-51. The crossovers would not be signalized.

Figure 14: At-Grade Signal with Indirect (Michigan) Left-Turns



Advantages of Alternative #2:

- Eliminates all existing sub-standard geometry.
- Reduces cost and right-sizes the infrastructure by eliminating bridges.
- Right-sizes the infrastructure by eliminating excess capacity, given the character of US-12 and the traffic volumes that use US-12.

Disadvantages of Alternative #2:

- Creates the potential for collisions of US-12 through traffic with M-51 (which formerly had been grade-separated).

7.5 Alternative #3 – At-Grade Roundabout

Alternative #3 (**Figure 15**) brings M-51 and US-12 to grade with a multilane modern roundabout. The roundabout would have a 180-foot-diameter inscribed circle and provide two circulating lanes. The roundabout would include a right-turn bypass lane for the northbound-to-eastbound right-turn movement.

Figure 15: At-Grade Roundabout

Advantages of Alternative #3:

- Eliminates all existing sub-standard geometry.
- Reduces cost and right-sizes the infrastructure by eliminating bridges.
- Right-sizes the infrastructure by eliminating excess capacity, given the character of US-12 and the traffic volumes that use US-12.

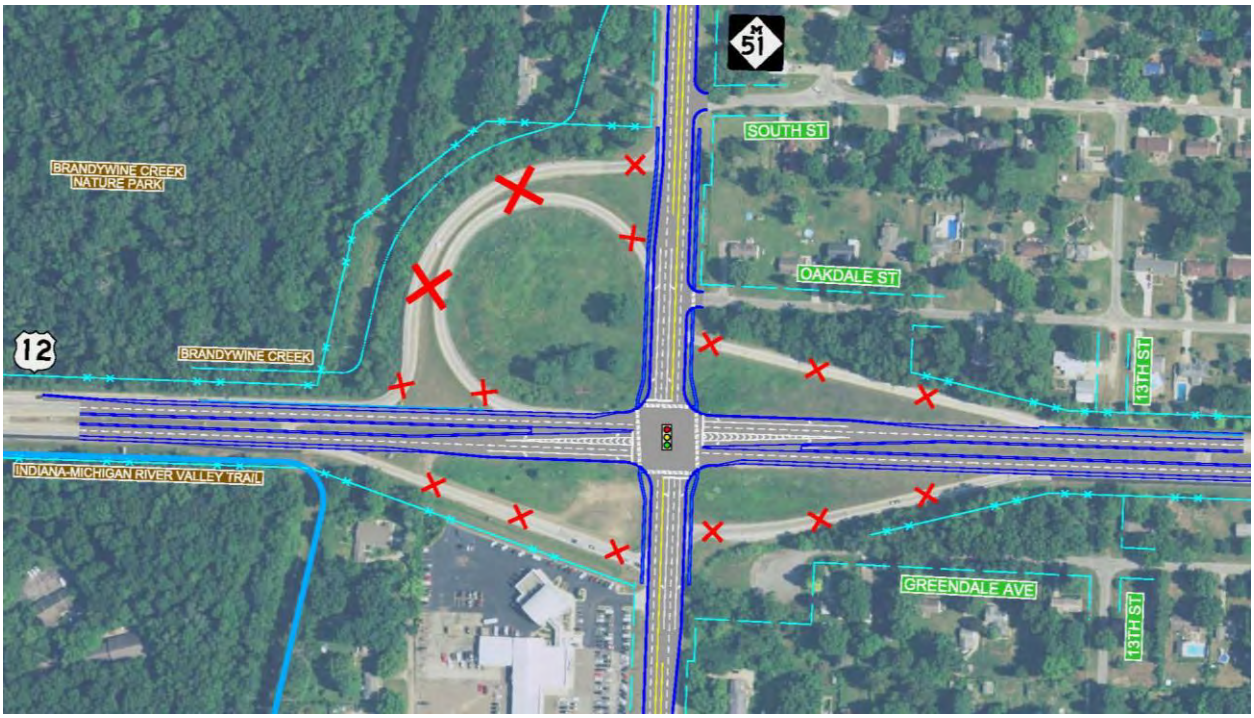
Disadvantages of Alternative #3:

- Creates the potential for collisions of US-12 through traffic with M-51 (which formerly had been grade-separated).
- Motorists in the Niles area are unfamiliar with roundabouts
- The public is concerned with the difficulty of navigating this configuration, especially for trucks, and the potential to off-track into an adjacent lane of the multilane roundabout.
- Multi-lane roundabouts are more difficult to navigate for sight-impaired pedestrians.

7.6 Alternative #4 – At-Grade Signal with Direct Left-Turns

Alternative #4 brings M-51 and US-12 to grade with a standard four-leg signalized intersection (**Figure 16**). Dedicated left-turn lanes would be provided on all four approaches. The signal would operate with 3-phase traffic signal control with a protected left-turn phase for US-12. M-51 left-turn phases could be added in the future should volumes dictate the need.

Figure 16: At-Grade Signal with Direct Left-Turns



Advantages of Alternative #4:

- Eliminates all existing sub-standard geometry.
- Reduces cost and right-sizes the infrastructure by eliminating bridges.
- Maintains design continuity with the nearby US-12/3rd Street intersection.

Disadvantages of Alternative #4:

- Creates the potential for collisions of US-12 through-traffic with M-51 (which formerly had been grade-separated).

7.7 Consideration of 3rd Street

There were multiple comments related to traffic operations and safety at the US-12/3rd Street intersection at Public Open House #1. As a result, the study limits along US-12 were extended west of 3rd Street to incorporate the US-12/3rd Street intersection into each alternative.

8. Evaluation of Alternatives

8.1 Evaluation Criteria

Evaluation criteria were developed by the study team with feedback from the stakeholder group to better compare the alternatives:

1. **Travel Delay.** Can the alternative improve existing and future traffic operations in terms of travel delay and Level-of-Service?
2. **Pedestrian Safety.** Does the alternative include infrastructure for non-motorists that is consistent with existing and future needs of the communities? Does the proposed infrastructure provide higher levels of safety than what is currently available?
3. **Motorist Safety.** Does the alternative improve existing and future conditions that contribute to higher than expected crash rates? Is the alternative easily navigable for all drivers?
4. **Geometry.** Is the proposed geometry appropriate for the intersection? Would it conform to all regulatory requirements? Can movements be made easily by all roadway users, including large trucks?
5. **Social/Environmental.** Does the alternative create any social or environmental constraints? Does it divide neighborhoods or prevent travel by means other than motor vehicle? Does the alternative generate air, noise, or environmental pollution greater than what could be achieved by choosing a different alternative?
6. **Cost and Future Maintenance.** Is the cost of the alternative in line with the assumed future traffic levels? Do other alternatives achieve levels of efficiency equal or better at a lower cost? Is the infrastructure easily maintainable and is the cost of such maintenance affordable?
7. **Constructability.** Can the alternative be constructed with reasonable efforts? Can it be constructed with minimal impacts to existing traffic? Will this alternative require any detours or reduction in travel lanes?
8. **Right-Sized.** Is this alternative consistent with the corridor? Is the intersection type one that drivers unfamiliar with the area would expect to approach on these roadways? Does the footprint of the intersection occupy more or less right-of-way than other alternatives that achieve the same level of efficiency?

8.2 Future Year (2043) Traffic Analysis

A future year (2043) capacity analysis was completed for the alternatives discussed in **Section 7**. A growth rate of 0.5% per year was utilized to grow existing traffic volumes (based on traffic counts taken in August 2017 and January 2018) to future year levels. This rate is based on past growth, regression analysis, and population projections in Berrien County. The future year capacity analysis focused on the US-12 junctions with M-51 and 3rd Street.

The future year peak-hour volumes and associated Levels of Service for each conceptual alternative are shown in **Figure 17** to **Figure 21** on the following pages. Each alternative provides acceptable peak-hour Levels of Service (LOS “D” or better) for all individual turn movements in the study area.

Figure 17: Future Year (2043) Peak-Hour Volumes and Levels of Service (Alternative #0 – Rebuild Existing Interchange)

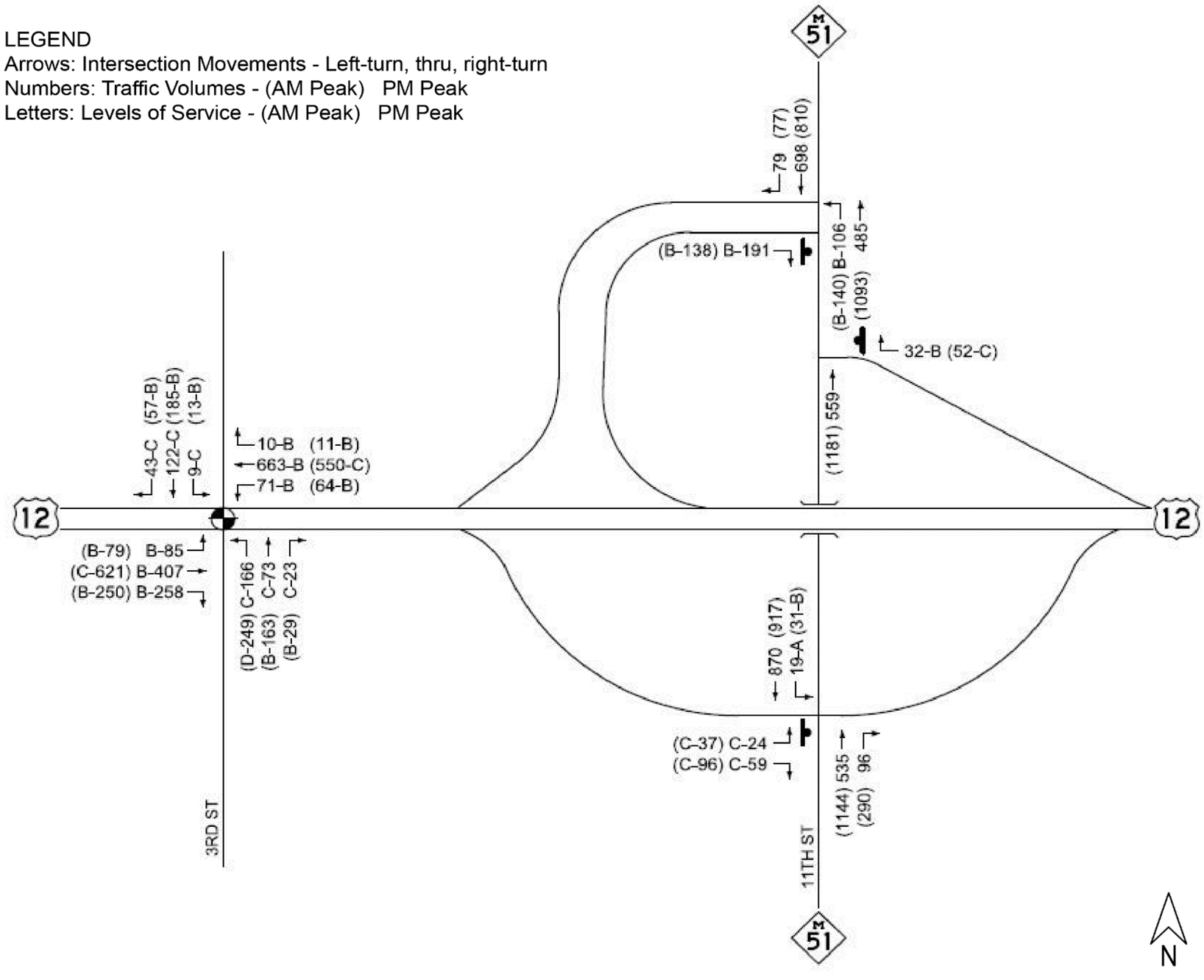


Figure 18: Future Year (2043) Peak-Hour Volumes and Levels of Service (Alternative #1 – Grade-Separate Diamond Interchange)

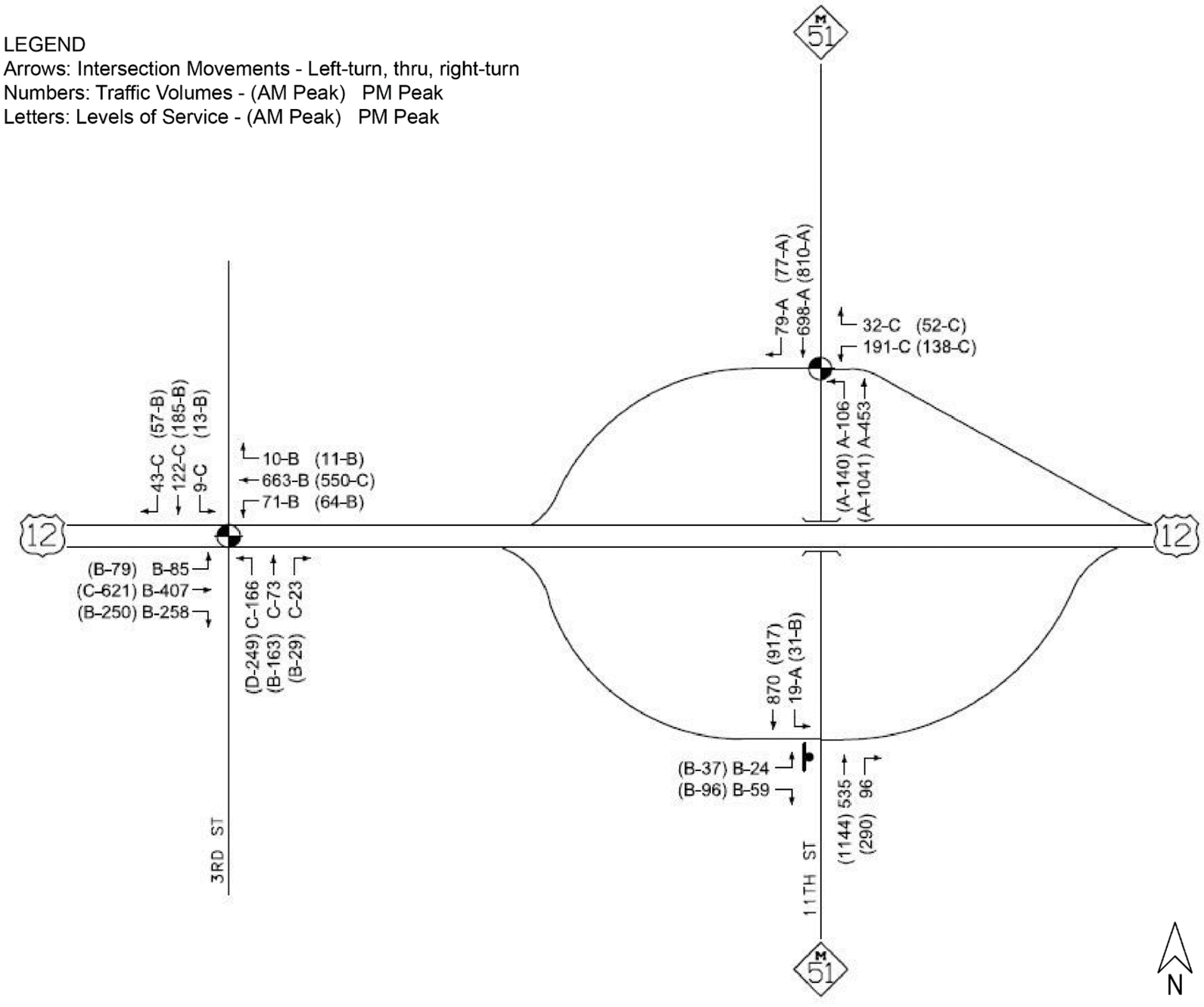
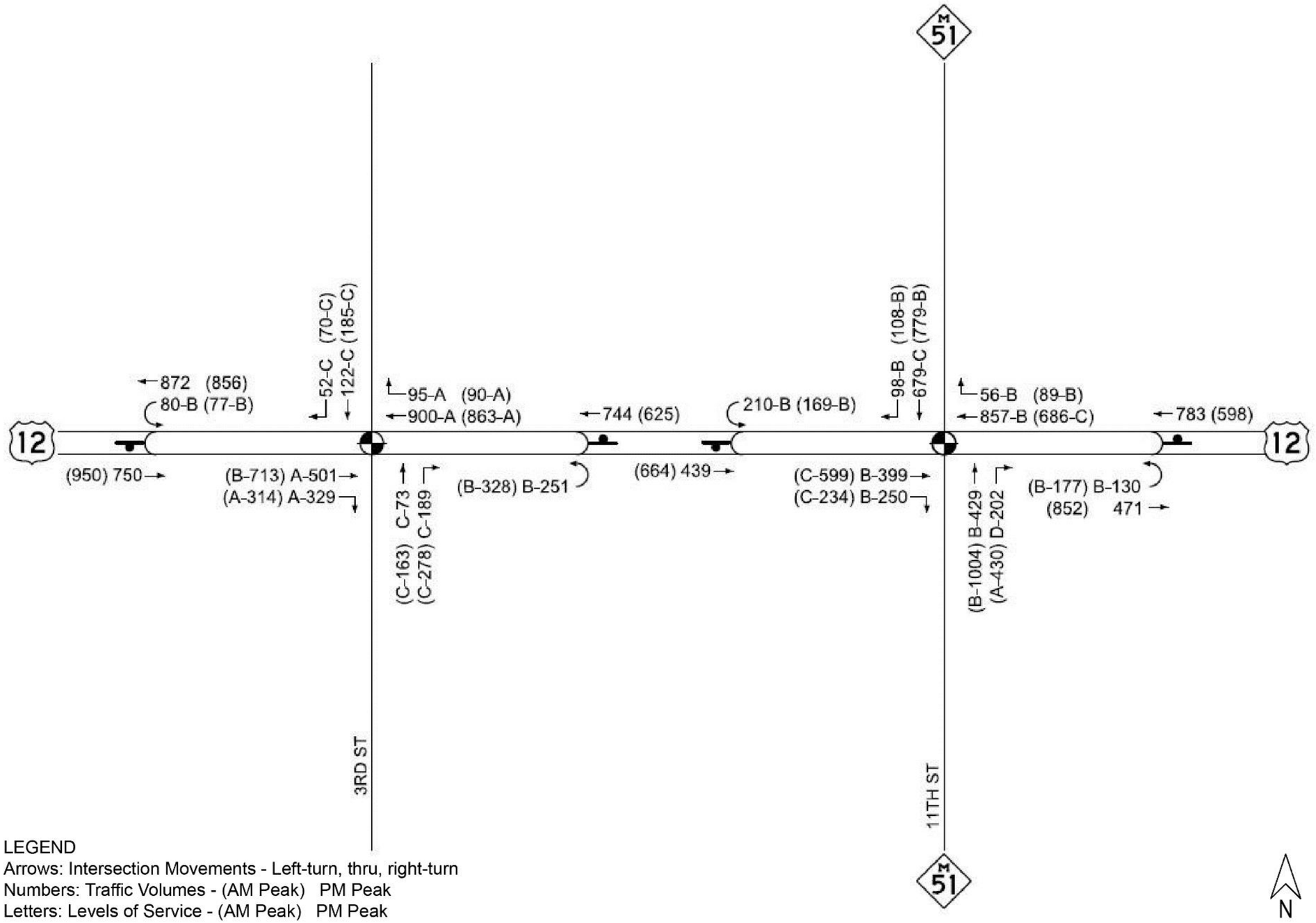


Figure 19: Future Year (2043) Peak-Hour Volumes and Levels of Service (Alternative #2 – At-Grade Signal with Indirect (Michigan) Left-Turns)



LEGEND
Arrows: Intersection Movements - Left-turn, thru, right-turn
Numbers: Traffic Volumes - (AM Peak) PM Peak
Letters: Levels of Service - (AM Peak) PM Peak

Figure 20: Future Year (2043) Peak-Hour Volumes and Levels of Service (Alternative #3 – At-Grade Roundabout)

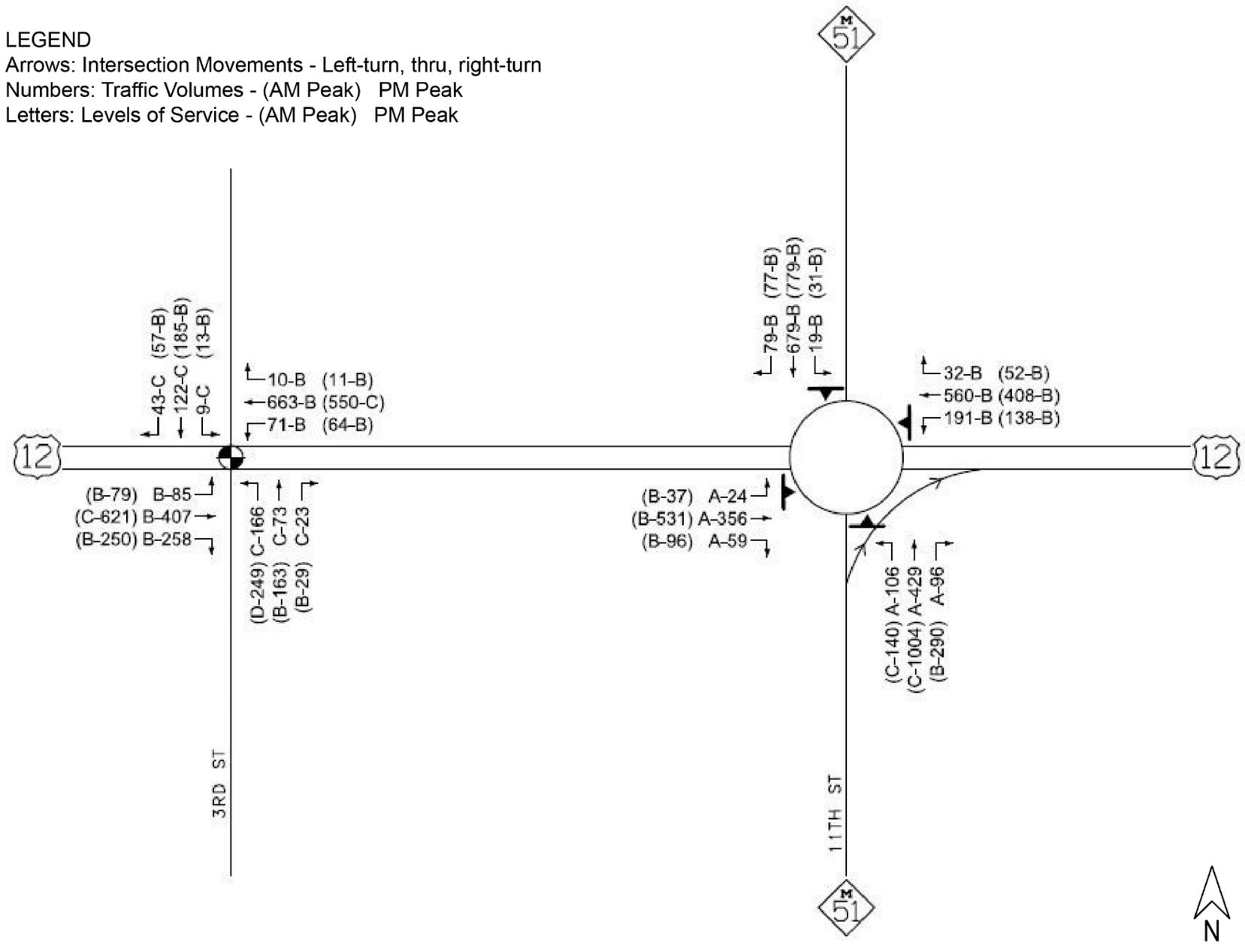
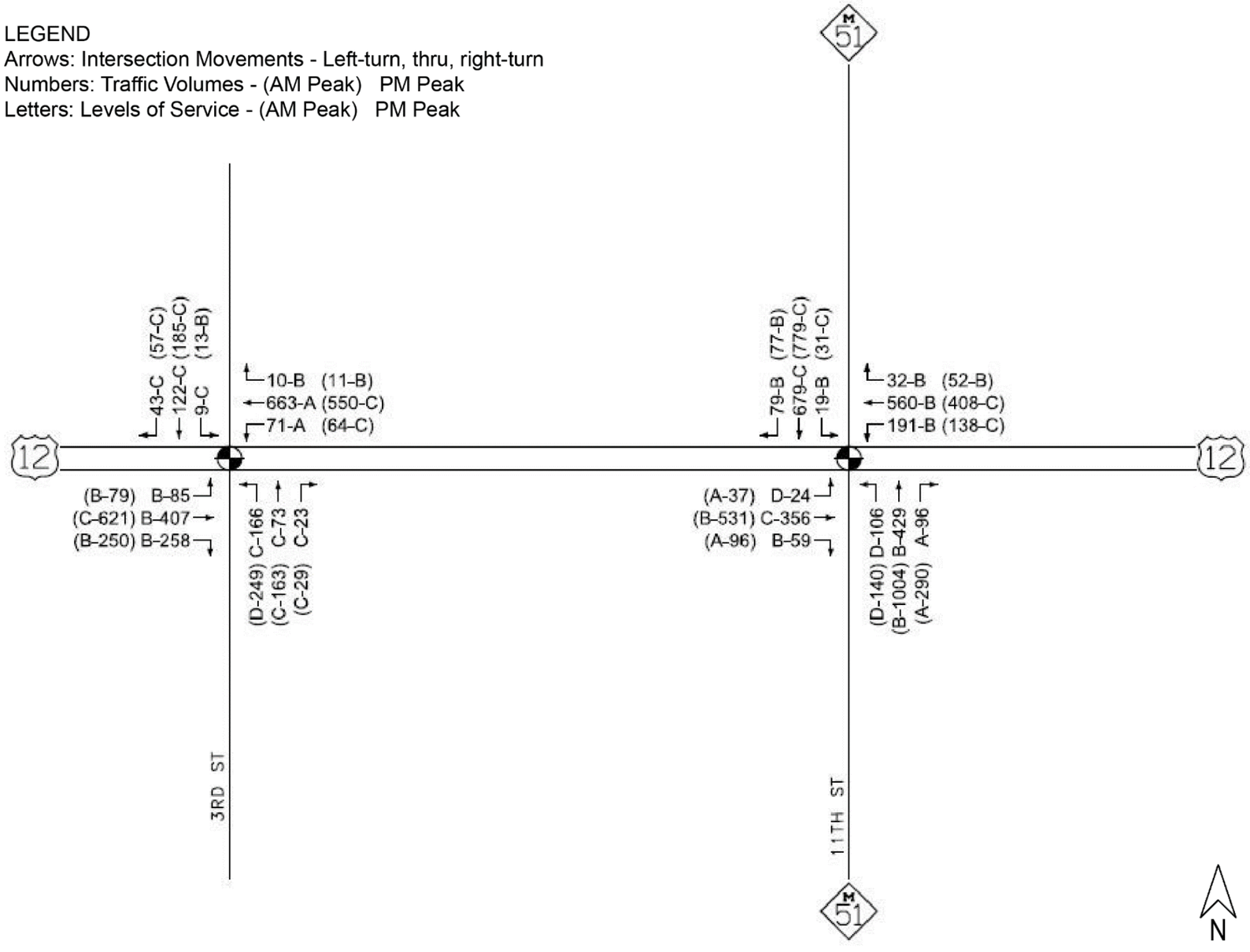


Figure 21: Future Year (2043) Peak-Hour Volumes and Levels of Service (Alternative #4 – At-Grade Signal with Direct Left-Turns)



8.3 Elimination of Roundabout

Many of the comments from open house attendees involved their dislike of Alternative #3 (At-Grade Roundabout), so it was eliminated after Public Open House #1. Opposition to the roundabout was primarily focused on the perceived difficulty to navigate that multi-lane configuration—particularly for trucks and the potential for trucks to "off-track" into an adjacent lane of the multilane roundabout. The public also considered roundabouts more difficult to navigate as a pedestrian.

In addition, MDOT traffic and safety staff had concerns about the roundabout option because of the nearby proximity to the signals at 3rd street and Bell Road. Having a signal so close would cause waves of traffic to be released into the roundabout at the same time which would significantly reduce its efficiency and also cause safety concerns.

8.4 Predictive Safety Analysis

The written comments received after Public Open House #1 by those that attended favored Alternative #1 (Diamond Interchange) due to the perceived safety benefits associated with a grade separation. A quantitative safety comparison of the various alternatives was desirable, since some alternatives provided a grade separation while others did not.

A predictive analysis of safety performance was completed to compare the alternatives using the methods of the Highway Safety Manual (HSM) and the Interactive Highway Safety Design Model (IHSDM) – see **Appendix F** for the full report.

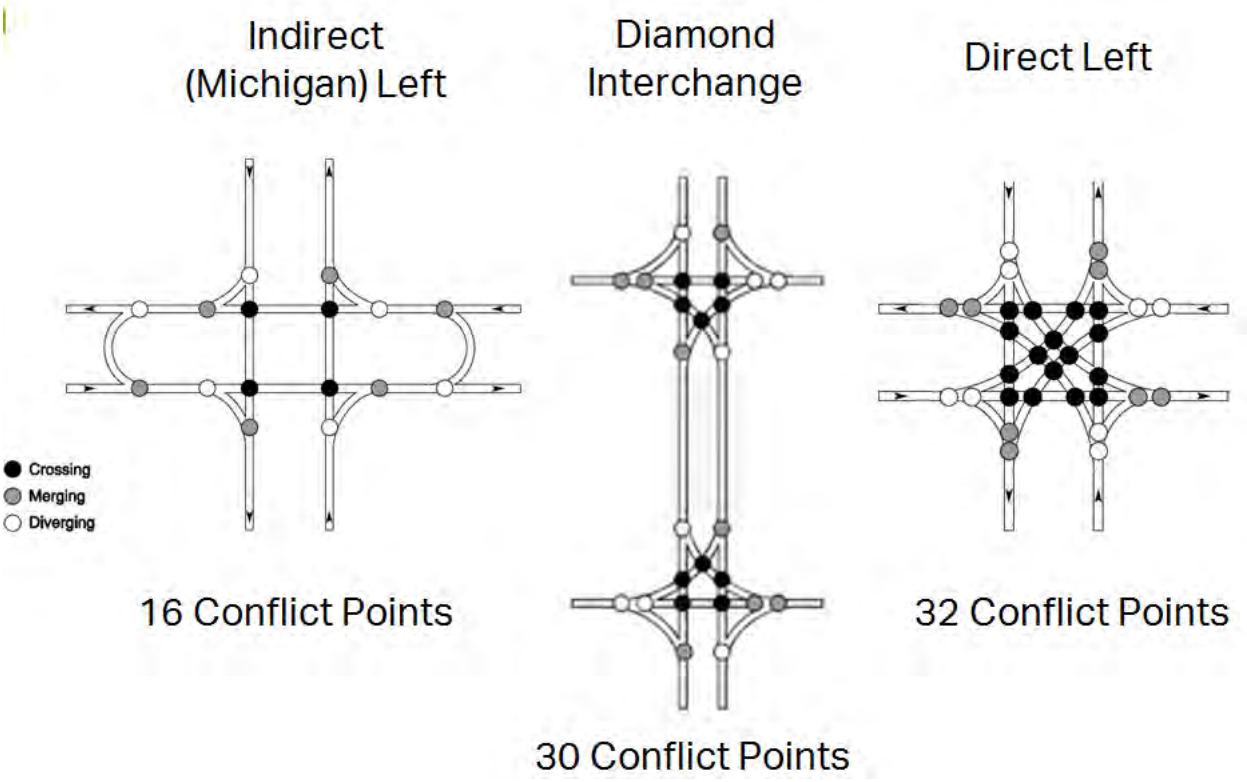
The results of the predictive analysis are depicted in **Table 5**. The predicted number of crashes over a 3-year period was lowest for Alternative #2 (At-Grade Signal with Indirect (Michigan) Left-Turns) compared to Alternative #4 (At-Grade Signal with Direct Left Turns) and Alternative #1 (Grade-Separated Diamond Interchange). Crash severity was also lowest for Alternative #2.

Table 5: Predictive Safety Analysis Results

Crash Type	Predicted Number of Crashes		
	Alternative #1: Diamond Interchange	Alternative #2: Indirect (Michigan) Left-Turns	Alternative #4: Direct Left-Turns
Total Crashes – 3 Years	49	37	43
Fatal/Injury Crashes	21 (42%)	9 (25%)	14 (31%)
Property Damage Only Crashes	28 (58%)	28 (75%)	29 (69%)

Figure 22 illustrates the number of conflict points associated with each of the three alternatives that were analyzed. The significantly fewer number of conflict points associated with Alternative #2 and the relatively small volumes of traffic along US-12 likely contributed to the results of the safety analysis.

Figure 22: Conflict Point Comparison



8.5 Environmental Screening

MDOT's Environmental Section completed an environmental scoping review analysis for the US-12/M-51 PEL study area that preliminarily assessed potential impacts to environmental resources. At this stage of project development (PEL), the intent is to identify constraints that could impact the alternative evaluation and selection process. The results of the environmental screening are summarized below and included in detail in **Appendix G**.

Environmental factors identified to have possible impacts are listed below. These items have been identified as either being in the vicinity or potentially in the vicinity of the project based on existing data.

- Agriculture, due to Farmland Development Rights Agreement (PA116) parcels
- National Pollutant Discharge Elimination System (NPDES), due to earth disturbance and stormwater runoff to streams in the study area
- Migratory bird nest removal, due to the removal of bridges

- Threatened and endangered plant and wildlife species, due to the potential species in the area
- Contaminated sites, due to the potential locations in the approximate area
- Historic properties, due to the known structures in the area
- Archaeological investigations, potentially required for any work outside the right-of-way
- Recreational resources, due to the close nature to the Michiana trail
- Tree removals, due to the many mature trees in the project area

Other factors that were analyzed but have no anticipated concerns are the Farmland Protection Policy Act (FPPA), air quality, bridge painting, noise abatement, social factors, detours during construction, and controversy.

Coastal zones and indirect/cumulative factors are also included in the analysis but have no involvement in the study area.

8.6 Evaluation Results

A comparative screening of the alternatives is depicted in **Table 6** based on the results below.

Table 6: Comparative Screening of Alternatives

Alternative	Travel Delay	Pedestrian Safety	Motorist Safety	Geometry	Social / Environmental	Cost and Future Maintenance	Construct-ability	Right Sized
Alternative #1 Grade-Separated Diamond Interchange	A	A	A	A	C	C	B	C
Alternative #2 At-Grade Signal with Indirect (Michigan) Lefts	A	B	A	A	B	A	A	A
Alternative #4 At-Grade Signal with Direct Lefts	A	B	B	B	B	A	A	A

A = Very Good B = Acceptable C = Not Preferable

1. **Travel Delay.** All alternatives are expected to operate at similarly-acceptable levels.
2. **Pedestrian Safety.** A grade separation at US-12 and M-51 will make it easier for pedestrians to cross US-12 compared to the at-grade alternatives.

3. **Motorist Safety.** Alternative #2 (At-Grade Signal with Indirect (Michigan) Left-Turns) is predicted to have the least number of crashes.
4. **Geometry.** Each alternative would be designed to the latest geometric criteria. Alternative #4 (At-Grade Signal with Direct Left-Turns) contains "buried" direct left-turns along the US-12 approaches, which is an allowable design treatment for left-turns where the roadway is median-separated, but the treatment is not preferable.
5. **Social/Environmental.** Each of the alternatives is anticipated to have similar levels of impact to the environment. Alternative #1 (Grade-Separated Diamond Interchange) received a lower score because it requires more resources to construct (i.e. steel for bridge beams) than the at-grade alternatives.
6. **Cost and Future Maintenance.** The results of the cost comparison are depicted in **Table** 7, which shows the grade-separated alternatives to be significantly costlier than the at-grade alternatives. While the cost of future maintenance is not quantified in **Table 7**, the grade-separated alternatives also received lower scores due to the need to maintain the bridge structures.
7. **Constructability.** The grade-separated alternatives require replacing the bridges carrying US-12 over M-51, while the other alternatives simply require removing them. Constructability is slightly more difficult for Alternative #1 (Grade-Separated Diamond Interchange) due to the potential need for temporary sheet piling required for the replacement of the bridges, so it received a lower score.
8. **Right-Sized.** Alternative #1 (Grade-Separated Diamond Interchange) received a lower score compared to the at-grade alternatives because Alternative #1 (Grade-Separated Diamond Interchange) requires the construction of more infrastructure than is required to serve existing and project traffic. The at-grade alternatives are projected to provide acceptable traffic operations well into the future without the costs associated with building and maintaining bridges.

Table 7: Preliminary Construction Cost Estimate

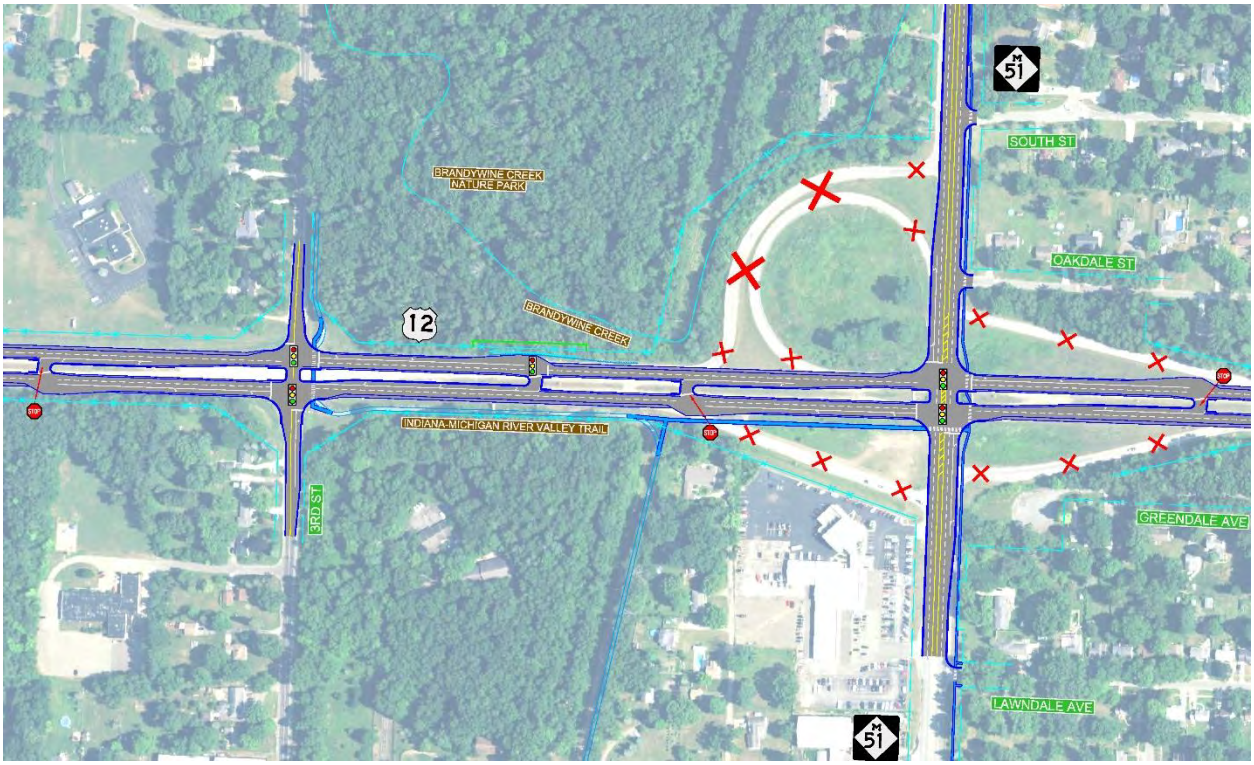
Alternative	Construction Cost Estimate
Rebuild Existing Interchange*	$17.3 million
Alternative #1 – Grade-Separated Diamond Interchange	$16.3 million
Alternative #2 – At-Grade Signal with Indirect (Michigan) Left Turns	$11.0 million at M-51 $3.8 million at 3rd St
Alternative #3 – At-Grade Roundabout	$11.5 million
Alternative #4 – At-Grade Signal with Direct Left Turns	$10.8 million

*- Rebuilding the existing interchange would include some minor geometric upgrades.

9. Leading Alternative

MDOT has selected Alternative #2 (At-Grade Signal with Indirect (Michigan) Left Turns) as the Leading Alternative. Alternative #2 was presented as the Leading Alternative at Stakeholder Meeting #3 on Tuesday, January 22, 2019 and Public Open House #2 on Wednesday, February 6, 2019.

Figure 23: Leading Alternative – At-Grade Signal with Indirect (Michigan) Left-Turns



9.1 Rationale for Selection

Alternative #2 was selected as the Leading Alternative for four primary reasons:

1. **Safety.** The predictive safety analysis discussed in **Section 8.4** reveals that Alternative #2 is anticipated to result in the fewest number of crashes. It has the fewest number of conflict points, which is a major contributor to the anticipated lower crash experience. Although Alternative #2 brings US-12 to grade with M-51, creating the potential for US-12 thru traffic to collide with M-51 thru traffic, the total number of crashes associated with Alternative #2 is still predicted to be less than all other alternatives. Additionally, the indirect left concept was incorporated at 3rd Street in this alternative which assists with traffic flow, safety, and reduced diversions. These are significant features affecting long term performance of US-12 and 3rd Street users.
2. **Acceptable Capacity.** Alternative #2, like all other alternatives, provides sufficient capacity for future-year traffic. The Leading Alternative was modified to account for the truck volumes and origin-destination patterns associated with the collection of petroleum distribution terminals on 3rd Street south of US-12 (see **Section 9.2**).

3. **Corridor Consistency.** Removal of the M-51 grade separation and construction of directional median crossovers along US-12 at 3rd Street and M-51 extends the boulevard character of the US-12 corridor from US-31 (west of the study area) through the M-51 intersection. The existing US-12/M-51 interchange is "out of place" given the traffic volumes that use it (and are projected to use it). Bringing the M-51 traffic stream to the same grade as US-12 matches how other traffic streams intersect US-12 elsewhere in the Niles area.
4. **Fiscal Responsibility.** The Leading Alternative is less expensive than the grade-separated alternatives due to the elimination of the bridges carrying US-12 over M-51. The upfront expense to construct the improvements is much lower, and long-term maintenance is simpler and less expensive.

9.2 Adjustments to the Leading Alternative

Based on comments received at Public Open House #2 and based on discussions with Niles Township and fuel tanker operators in summer 2019, minor modifications were made to the Leading Alternative. The following issues were researched and incorporated as needed into the Leading Alternative:

1. **Right-turn storage on the northbound 3rd Street approach to US-12.** MDOT contacted Marathon Petroleum to verify the number of trucks and their origins/destinations from the collection of petroleum distribution terminals on 3rd Street. The amount of right-turn storage required on the northbound 3rd Street approach was analyzed, and 200 feet of right-turn storage was determined to be the amount required.

2. **Southbound 3rd Street approach to US-12.** Based on projected volumes, a dedicated right-turn lane is not required to maintain an acceptable Level of Service for the southbound approach. The dedicated southbound right-turn lane was eliminated from the Leading Alternative after Public Open House #2.

   Niles Township also noted overhanging trees and a dip in the vertical profile along the southbound 3rd Street to approach to US-12 makes it difficult to see the traffic signals. It is recommended that overhanging tree branches be removed to improve vision, and "Signal Ahead Symbol" signs be erected on both sides of 3rd Street on the southbound approach to US-12.

3. **Eastbound-to-westbound crossover east of 3rd Street.** At Public Open House #2, there were concerns with the ability to maneuver a commercial vehicle from 3rd Street through the US-12 crossover east of 3rd Street. To address this concern, the length of the crossover east of 3rd Street was extended to the US-12/3rd St intersection. It was also agreed that the crossover east of 3rd Street be signalized based on discussions with Niles Township and fuel tanker operators.

4. **Non-Motorized Improvements at US-12/3rd Street.** Based on comments from Niles Township regarding non-motorized safety at the Indiana-Michigan River Valley Trail crossing at 3rd Street, MDOT will modify the signal timing of the US-12/3rd Street

intersection to incorporate a leading pedestrian interval as part of the Leading Alternative. The leading pedestrian interval will allow pedestrians to get the "walk" signal at 3rd Street to cross US-12 before the green signal is given for 3rd Street traffic. The interval will allow pedestrians to occupy the crosswalk before vehicles move, improving pedestrian safety. Existing ground-mounted signing on the northbound 3rd Street approach will also be up-sized, and "NO TURN ON RED" blank-out signs for northbound 3rd Street and westbound US-12 will be erected as part of the leading pedestrian interval installation.

In addition, a non-motorized connection will be constructed along the south side of US-12 between the Indiana-Michigan River Valley Trail and M-51 in order to improve connectivity between the Trail and M-51.

5. **Median width of US-12.** The median on US-12 is widened to 44 feet from west of 3rd Street to east of M-51 in order to provide better turning radii for the indirect (Michigan) left turns.

All these additions to Alternative #2 are included in **Figure 23** above, and the revised cost estimate is provided below in **Table 8**. **Appendix H** contains a more detailed geometric layout of the Leading Alternative.

Table 8: Leading Alternative Preliminary Construction Cost Estimate

Leading Alternative Alternative - At-Grade Signal with Indirect (Michigan) Left Turns	Construction Cost Estimate
US-12 at 3rd Street - At-Grade Signal with Indirect (Michigan) Left Turns	$3.94 million
US-12 at M-51 - At-Grade Signal with Indirect (Michigan) Left Turns	$10.98 million
Total:	**$14.92 million**

10. Conclusion & Next Steps

Based on the results of the alternatives development and evaluation process, MDOT has selected Alternative #2 (At-Grade Signal with Indirect (Michigan) Left Turns) as the Leading Alternative. It will be carried forward into future National Environmental Policy Act (NEPA) evaluation and further project development. Alternative #2 was found to meet the Purpose and Need to the highest degree while minimizing environmental and community impacts. It is expected that the project will be considered a Categorical Exclusion (CE) once in the NEPA process.

The PEL process is intended to provide the framework for the long-term implementation of the Leading Alternative transportation system improvements as funding is available and to be used as a resource for future NEPA documentation. Once funding is secured, the environmental

planning process can be initiated. The environmental process will build on the environmental work, public outreach, and agency outreach conducted by this PEL Study.

The FHWA has developed a standard questionnaire to summarize the planning process and ease the transition from planning to a NEPA analysis. That questionnaire, included in **Appendix C**, summarizes the information that has been analyzed and identifies the issues that a future project team should be aware of to efficiently move forward in future NEPA processes.

The next steps in the project development process include:

- Ensure Programmed project is approved in the Niles Area Transportation Study's 2020-2023 transportation improvement program.
- Begin Design
- Complete NEPA analyses of Leading Alternative or separate project phases
- Complete design
- Obtain right-of-way (if required)
- Complete Intergovernmental Agreement with local agencies regarding maintenance
- Complete construction

These steps will be coordinated with FHWA to ensure consistency with the NEPA process.