PROPEL US 30

Smarter Transportation.
Stronger Communities.

US 30 West

LEVEL 2 SCREENING REPORT

DRAFT

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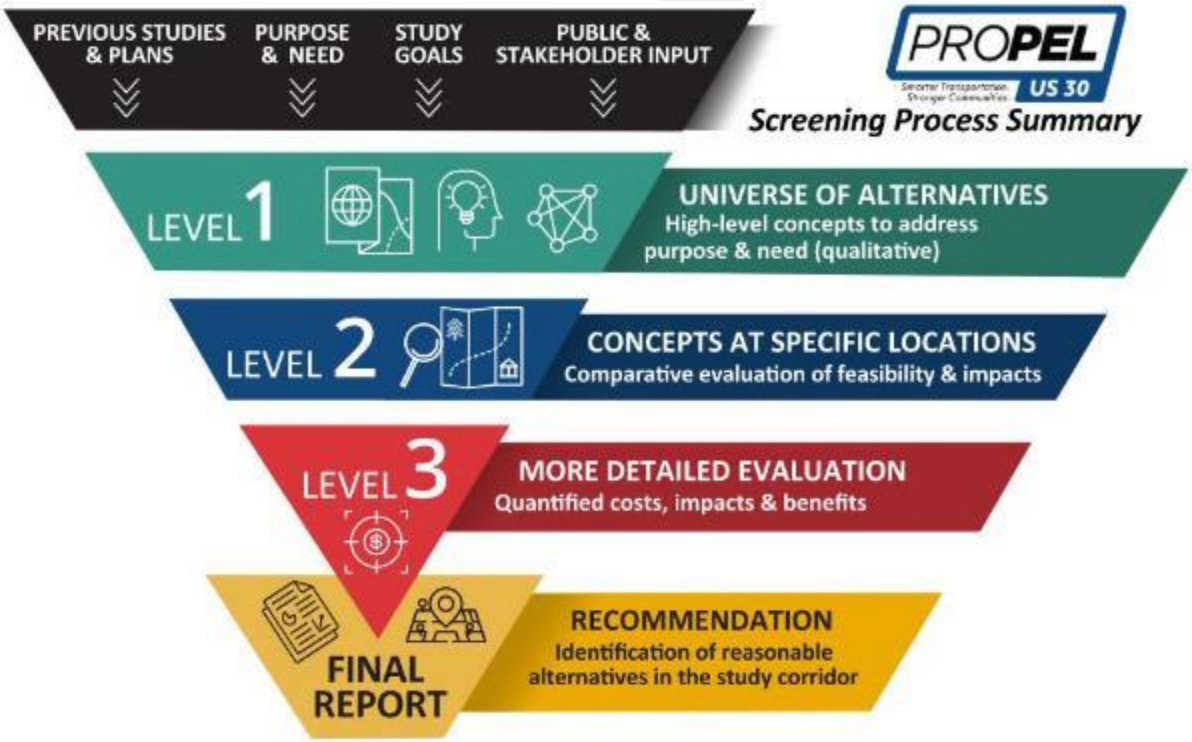
EXECUTIVE SUMMARY

ProPEL is an Indiana Department of Transportation (INDOT) initiative for transportation planning that uses collaborative planning and environment linkages (PEL) studies to consider environmental, community, and economic goals. The ProPEL US 30/31 studies are utilizing a three-level screening process, depicted in **Figure ES-1**, to identify reasonable alternatives that address the identified transportation needs and goals of the study area. The Level 2 screening evaluates concepts advancing from the Level 1 screening at the primary intersections within the study area.

Figure ES-1: ProPEL US 30 West Alternatives Development and Screening Process



This *ProPEL US 30 West Level 2 Screening Report*, which details the Level 2 screening methodology and results, has been prepared for the ProPEL US 30 West study and is based on existing conditions, current plans and past studies, public comments, stakeholder input as well as social, economic, and environmental constraints. The ProPEL US 30 West study area includes US 30 from SR 49 in Valparaiso to South Beech Road in Marshall County (approximately 53.2 miles). The US 30 West study area also includes US 31 from the US 30 interchange in Marshall County south to west CR 700 North in Fulton County (approximately 13.9 miles).

This Level 2 screening report provides a comparative evaluation of the feasibility and impacts of transportation improvement concepts and identifies alternatives to further evaluate in Level 3.

LEVEL 2 SCREENING METHODOLOGY

OVERVIEW

A three-step evaluation process was applied to each of the 29 primary intersections within the ProPEL US 30 West study area. This process is summarized as follows:

STEP 1 – DECISION TREE

A decision tree was developed to identify potential primary concepts for each primary intersection based on safety and operational data, as well as input from both the public and stakeholders. More information is provided in **Section 3.1.1.**

STEP 2 – OPERATIONAL ANALYSIS

Various concepts or intersection types were evaluated at each primary intersection. Concepts that are expected to produce poor operating conditions were eliminated from further consideration. More information is provided in **Section 3.1.2.**

STEP 3 – CONCEPTUAL DESIGN AND EVALUATION MATRIX

Concepts advancing from Step 2 were developed into intersection alternatives by preparing conceptual designs to establish a high-level estimation of the improvement limits (i.e., a footprint). These footprints were then used to assess impacts and screen out alternatives with high impacts. Avoidance and minimization of adverse impacts to the human and natural environment were incorporated to the extent feasible in a planning study.

A matrix was prepared for each primary intersection to assess the following attributes for all intersection alternatives advancing from Step 2:

- Ability to meet purpose and need.
- Social, economic, and environmental impacts.
- Relative cost.

Some concepts were eliminated in this step due to high impacts and/or low benefits. Further details on this process are provided in **Section 3.1.3.**

LEVEL 2 SCREENING RESULTS

The Level 2 screening has identified a wide range of alternatives to improve operations and safety at the 29 primary intersections. The alternatives passing the Level 2 screening are listed in **Table ES-1**.

Table ES-1: List of Alternatives Passing Level 2 Screening

Location	Advanced to Level 3 Screening
US 30 and SR 49	• Add/Extend Acceleration/Deceleration Lanes
US 30 and Industrial Drive	• Median Safety Improvements • Add or Lengthen Turn Lanes • Signalized Intersection Improvements • Unsignalized Intersection Improvements
US 30 and Porter CR 325 E	• Median Safety Improvements • Add or Lengthen Turn Lanes • Cross Road Overpass/Underpass • Signalized Intersection Improvements • Unsignalized Intersection Improvements
US 30 and Porter CR 400 E	• Median Safety Improvements • Add or Lengthen Turn Lanes • Cross Road Overpass/Underpass • Convert to Interchange • Unsignalized Intersection Improvements
US 30 and County Line Road	• Median Safety Improvements • Add or Lengthen Turn Lanes • Cross Road Overpass/Underpass • Unsignalized Intersection Improvements
US 30 and Main Street	• Access Management • Add or Lengthen Turn Lanes
US 30 and US 421	• Access Management • Add or Lengthen Turn Lanes • Add/Extend Acceleration/Deceleration Lanes • Convert to Interchange • Signalized Intersection Improvements • Unsignalized Intersection Improvements
US 30 and LaPorte CR 600 W	• Add or Lengthen Turn Lanes • Cross Road Overpass/Underpass
US 30 and Thompson Street	• Add or Lengthen Turn Lanes • Unsignalized Intersection Improvements
Us 30 and Old US 30 West	• Add or Lengthen Turn Lanes • Convert to Interchange • Limit Access
US 30 and Laporte CR 300 W	• Add or Lengthen Turn Lanes • Cross Road Overpass/Underpass

Location	Advanced to Level 3 Screening
US 30 and SR 39	• Add or Lengthen Turn Lanes • Add/Extend Acceleration/Deceleration Lanes • Convert to Interchange • Signalized Intersection Improvements • Unsignalized Intersection Improvements
US 30 and US 35	• Add/Extend Acceleration/Deceleration Lanes
US 30 and Starke CR 750 E	• Add or Lengthen Turn Lanes • Cross Road Overpass/Underpass
US 30 and SR 23	• Add or Lengthen Turn Lanes • Add/Extend Acceleration/Deceleration Lanes • Convert to Interchange • Signalized Intersection Improvements • Unsignalized Intersection Improvements
US 30 and Queen Road	• Add or Lengthen Turn Lanes • Add/Extend Acceleration/Deceleration Lanes • Cross Road Overpass/Underpass • Convert to Interchange • Signalized Intersection Improvements • Unsignalized Intersection Improvements
US 30 and Pioneer Drive	• Add/Extend Acceleration/Deceleration Lanes • Cross Road Overpass/Underpass • Convert to Interchange • Signalized Intersection Improvements • Unsignalized Intersection Improvements
US 30 and Oak Drive	• Add or Lengthen Turn Lanes • Add/Extend Acceleration/Deceleration Lanes • Cross Road Overpass/Underpass • Signalized Intersection Improvements
US 30 and Michigan Street	• Add/Extend Acceleration/Deceleration Lanes
US 30 and Plymouth Goshen Trail	• Add or Lengthen Turn Lanes • Add/Extend Acceleration/Deceleration Lanes • Cross Road Overpass/Underpass • Unsignalized Intersection Improvements
US 30 and US 31	• Add/Extend Acceleration/Deceleration Lanes

Location	Advanced to Level 3 Screening
US 30 and King Road	• Add or Lengthen Turn Lanes • Add/Extend Acceleration/Deceleration Lanes • Cross Road Overpass/Underpass • Signalized Intersection Improvements • Unsignalized Intersection Improvements
US 30 and Fir Road	• Add or Lengthen Turn Lanes • Cross Road Overpass/Underpass
US 30 and SR 331	• No Intersection Alternatives
US 31 and 9A Road	• Cross Road Overpass/Underpass
US 31 and Michigan Road	• Add or Lengthen Turn Lanes • Convert to Interchange
US 31 and 13th Road	• Add or Lengthen Turn Lanes • Add/Extend Acceleration/Deceleration Lanes • Cross Road Overpass/Underpass • Convert to Interchange • Unsignalized Intersection Improvements
US 31 and SR 10	• Interchange Project Already Planned
US 31 and SR 110	• Interchange Project Already Planned

1. INTRODUCTION

1.1. PURPOSE OF THIS REPORT

This report documents the Level 2 screening of concepts that advanced from the Level 1 screening process. These concepts address the transportation needs identified in the *ProPEL US 30 West Purpose and Need Report* (https://propelus30.com/30doclibrary/) and are practical.

The Level 2 screening represents the second step in a three level alternatives development and screening process, as depicted in **Figure 1-1**. Concepts advanced from the Level 1 screening process were evaluated at specific locations in the Level 2 screening process to assess reasonability and potential impacts as intersection alternatives. Public and stakeholder input received to date was considered as part of Level 2 screening. The ability of each concept to meet the study purpose and needs is also analyzed in the Level 2 screening.

As part of the Level 2 screening process, location-specific intersection alternatives will be identified and evaluated qualitatively based on study needs, costs, and social, economic, and environmental impacts. The results of this process will be made available for public comment and any feedback received will be considered before advancing to the Level 3 screening process.

Figure 1-1: ProPEL US 30 West Alternatives Development and Screening Process

A stated goal of this PEL study is to identify the reasonable range of alternatives for the study area. Given the needs identified within the study area, a reasonable alternative could consist of improvements at a single intersection; it could also consist of improvements at multiple intersections and/or the roadway sections in between them. Depending on multiple factors, including statewide priorities and funding availability, improvements considered as part of this PEL study could be combined in different ways to address the identified transportation needs and support the goals of the study area.

The Level 2 screening process focuses on the primary intersections within the study area and identifies the location-specific alternatives that are reasonable at each of these intersections. Primary intersections are those locations where US 30 or US 31 intersects with a roadway with classification of *Major Collector* or higher.

The Level 2 screening for the ProPEL US 30 West study was developed utilizing information from the following reports which are available at the project website (https://propelus30.com/30doclibrary/):

- ProPEL US 30 West Existing Transportation Conditions Report (May 05, 2023)
- ProPEL US 30 West Final Environmental Constraints Report (September 07, 2023)
- ProPEL US 30 West Final Purpose and Need Report (December 07, 2023)
- ProPEL US 30 West Resource Agency, Stakeholder & Public Involvement (RASPI) Summary Reports
    - *RASPI #1* (May 12, 2023)
    - *RASPI #2* (August 15, 2023)
- ProPEL US 30 West Universe of Alternatives (Level 1) Screening Technical Memorandum (November 13, 2023)

Additional inputs to this screening process include previous studies, current plans, and input received from both the public and study stakeholders.

The following information is provided in this report:

- A summary of the study area's purpose and needs and goals.
- A summary of the Level 1 Screening and the concepts advanced.
- The methodology applied in the Level 2 screening process.
- Details of how alternatives were identified, developed, and evaluated at each primary intersection during the Level 2 screening.
- An overview of the next steps in this PEL study.

1.2. STUDY INTERSECTIONS

The study area contains 86 intersections with crossroads. These intersections were designated as "primary" or "secondary" intersections, based on the functional classification of the crossroad[1]. Below is further description of these designations:

- **Primary Intersections** – Intersections where the crossroad has a classification of *Principal Arterial*, *Minor Arterial*, or *Major Collector*, which are the highest non-interstate classifications of roadways[2]. US 30 and US 31 within the study area are classified as Principal Arterials (Other). These intersections

[1] Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide.
[2] https://www.fhwa.dot.gov/planning/processes/statewide/related/hwy-functional-classification-2023.pdf

may be stop controlled, signalized, or have existing interchanges. The crossroads of these intersections collectively carry the majority of the north-south traffic flow through the study area across US 30 or east-west across US 31. Therefore, they largely control the operations of the corridor. Intersections within the US 30 West study area are listed in **Table 1-1**.

- **Secondary Intersections** – Intersections where the crossroad has a classification of *Minor* Collector or *Local Road,* which are the lowest classifications of roadways[3]. These intersections are typically two-way stop controlled and have crossroads that carry low traffic volumes. These intersections have minor influence on the operations of US 30 and US 31 within the study area.

Secondary intersections were considered in the Level 2 screening process only when directly impacted by alternatives at adjacent primary intersections. All secondary intersections will be addressed in the Level 3 screening.

Table 1-1: List of Primary Intersections

County	Main Road	Cross Road	Cross Road Functional Classification
Porter	US 30	SR 49	Principal Arterial
		Industrial Drive	Major Collector
		CR 325 E	Major Collector
		CR 400 E	Major Collector
		County Line Road	Major Collector
LaPorte		Main Street	Major Collector
		US 421	Principal Arterial
		CR 600 W	Major Collector
		Thompson Road	Major Collector / Minor Collector
		US 30 Alt Rte	Major Collector
		CR 300 W	Major Collector
		SR 39	Minor Arterial
Starke		US 35	Principal Arterial
		CR 750 E	Major Collector
		SR 23	Major Collector
Marshall		Queen Road	Major Collector
		Pioneer Drive	Major Collector
		Oak Road	Minor Arterial
		Michigan Street	Minor Arterial
		Plymouth Goshen Trail	Major Collector
		US 31	Principal Arterial
		9A Road	Major Collector
		Fir Road	Major Collector
		SR 331	Minor Arterial
	US 31	9A Road	Minor Arterial

[3] https://www.fhwa.dot.gov/planning/processes/statewide/related/hwy-functional-classification-2023.pdf

		Michigan Road	Major Arterial
		13th Road	Major Collector
		SR 10	Major Collector
		SR 110	Major Collector

There are currently four (4) individually programmed INDOT projects that are located along US 31 within the US 30 West PEL study area and that are advancing through project development independent of the PEL study. The projects include:

- US 31 at SR 10 – New Interchange (Des. No. 1802052)
- US 31 from SR 110 to SR 10 – Access Control (Des. No. 2200482)
- US 31 at SR 110 – New Interchange (Des. No. 2200483)
- US 31 at CR 700 N – New Bridge (Overpass) (Des. No. 2200484)

Each of the projects are included in the INDOT 2022-2026 State Transportation Improvement Program (STIP) and are programmed for construction in 2027. Some other programmed projects located within the US 30 West PEL study area were postponed pending the conclusion of the PEL study, however, due to safety concerns at these locations, these projects were determined to be individually important enough to continue design and development independent of the PEL study. Projects that perform maintenance and preservation of existing assets were not postponed. Because projects are already programmed at these SR 10, SR 110, and CR 700, the PEL study will not analyze the US 31 intersections with SR10, SR110, or CR700 or evaluate the access between these intersections. However, the US30 West PEL study will consider the improvements planned at these locations and overall corridor recommendations resulting from the PEL study will factor in these future projects.

1.3. PURPOSE AND NEED

The needs, goals, and purpose identified in the *ProPEL US 30 West Purpose and Need Report* are summarized below.

1.3.1. TRANSPORTATION NEEDS

The following transportation needs have been identified for the ProPEL US 30 West study area:

- Safe, high-quality mobility for long-distance passenger and freight trips through the study corridor
- Safety concerns due to high crash frequencies and/or high crash severities within the study area
- Lack of consistency with INDOT's Access Management Guidelines
- Roadway deficiencies such as median widths and acceleration/deceleration lanes

1.3.2. PURPOSE

As defined by, and to address the needs identified above, the purpose of the ProPEL US 30 West study is to improve regional mobility and safety along US 30 and US 31 and preserve both as vital statewide transportation corridors for moving people and goods.

- Enhance the efficiency and reliability of US 30 and US 31 as regional and statewide corridors.
- Improve safety by reducing the frequency and severity of crashes within the study area.
- Improve access control through implementation of INDOT's Access Management Guidelines.
- Improve existing roadway deficiencies.

1.3.3. GOALS

The following goals have been identified for the ProPEL US 30 West study area:

- **Economic Development** – Provide transportation infrastructure to support local economies and economic development goals.
- **Equity In Transportation** – Provide equitable access and mobility for underserved communities.
- **Multimodal Access & Connections** – Accommodate non-motorized, transit, and active modes of travel in and across the study corridor.
- **Emerging Technologies** – Support emerging technologies and related infrastructure, including alternative fuel, and autonomous or connected vehicles.
- **Fiscal & Environmental Practicality** – Identify fiscally responsible improvements and avoid/minimize impacts to the human and natural environment.
- **Corridor Character –** Maintain character of local communities within the corridor.
- **Local Access –** Balance transportation improvements with maintaining and improving local access.

2. CONCEPTS EVALUATED

2.1. SUMMARY OF LEVEL 1 SCREENING

The Level 1 screening process considered 55 transportation improvement concepts, including the No-Build concept, for the ProPEL US 30 West study area. These concepts were qualitatively evaluated against the study area purpose and need and evaluated for practicality. The purpose and need statement for the ProPEL US 30 West study applies to both US 30 and US 31 within the study area; however, for the purposes of alternatives screening, these two roadways were evaluated separately since the routes are unique and have different existing infrastructure and conditions.

The US 30 screening process identified 27 concepts which were found to meet one or more of the study area's needs and are considered practical. Nine of these concepts met a majority of the transportation needs. These concepts were designated as Primary Concepts and were evaluated as stand-alone alternatives in the Level 2 screening process. Seventeen of these concepts addressed some of the transportation needs. These concepts were designated as Complementary Concepts. Complementary Concepts were evaluated in the Level 2 screening process as location-specific application(s) as part of a Primary Concept. The US 30 screening process also identified nine Design Elements that did not meet any of the study area needs but were considered practical as they provided some benefit to the study area. These concepts were incorporated, where applicable, into concepts developed in the Level 2 and will be incorporated in the future Level 3 screening processes.

The US 31 screening process identified 20 concepts which were found to meet one or more of the study area's needs and are considered practical. Seven of these concepts met majority of the transportation needs and were designated as Primary Concepts. Twelve of these concepts addressed some of the transportation needs. and were designated as Complementary Concepts. The US 31 screening process also identified nine Design Elements and were incorporated, where applicable, into concepts developed in the Level 2 and will be incorporated in the future Level 3 screening processes.

The No-Build alternative meets two transportation needs of the study area and will be advanced throughout the PEL study and throughout any ensuing NEPA analyses to serve as a baseline for comparison to build alternatives.

Table 2-1 and **Table 2-2** lists the practical concepts advanced from the Level 1 screening process.

Table 2-1: Level 1 Screening: Practical Concepts (US 30)

Primary Concepts (9)	Complementary Concepts (17)	Design Elements (9)
• Access Management • Freeway (Free Flow Facility with Full Control of Access) • Median Safety Improvements • Add or Lengthen Turn Lanes • Add or Extend Acceleration/Deceleration Lanes • Cross Road Overpass/ Underpasses • Convert to Interchange • Signalized Intersection Improvements • Unsignalized Intersection Improvements	• Realign Skewed Intersections • Intersection Sight Distance Improvements • Auxiliary Lanes • Bypass • Signal Timing Updates/Coordination • Add Capacity to Movements • Ramp Terminal Intersection Improvements • Wildlife Crossings • Railroad Crossing Improvement • Spot Roadway Lighting • Warning Systems • Roadside Assistance • Incident Management • Freight Priority System • Traveler Information Systems • Bike/Pedestrian Facilities • Non-Motorized User Accommodations	• Collector-Distributor System • Adjacent Intersection Improvements • Traffic control Visibility Upgrades • Pavement Marking Improvements • Roadway Signage Improvements • Roadway Drainage Improvements • Gateway/Corridor Treatments • Speed Management • Alternative Fuel/Electric Vehicle Considerations

Table 2-2: Level 1 Screening: Practical Concepts (US 31)

Primary Concepts (7)	Complementary Concepts (12)	Design Elements (9)
• Access Management • Freeway (Free Flow Facility with Full Control of Access) • Add or Lengthen Turn Lanes • Add or Extend Acceleration/Deceleration Lanes • Cross Road Overpass/ Underpasses • Convert to Interchange • Unsignalized Intersection Improvements	• Realign Skewed Intersections • Intersection sight distance Improvements • Auxiliary Lanes • Median Safety Improvements • Wildlife Crossings • Spot Roadway Lighting • Warning Systems • Roadside Assistance • Incident Management • Traveler Information Systems • Bike/Pedestrian Facilities • Non-Motorized User Accommodations	• Collector-Distributor System • Adjacent Intersection Improvements • Traffic Control Visibility Upgrades • Pavement Marking Improvements • Roadway Signage Improvements • Roadway Drainage Improvement • Gateway/Corridor Treatments • Speed Management • Alternative Fuel/Vehicle Considerations

2.2. PRIMARY CONCEPTS

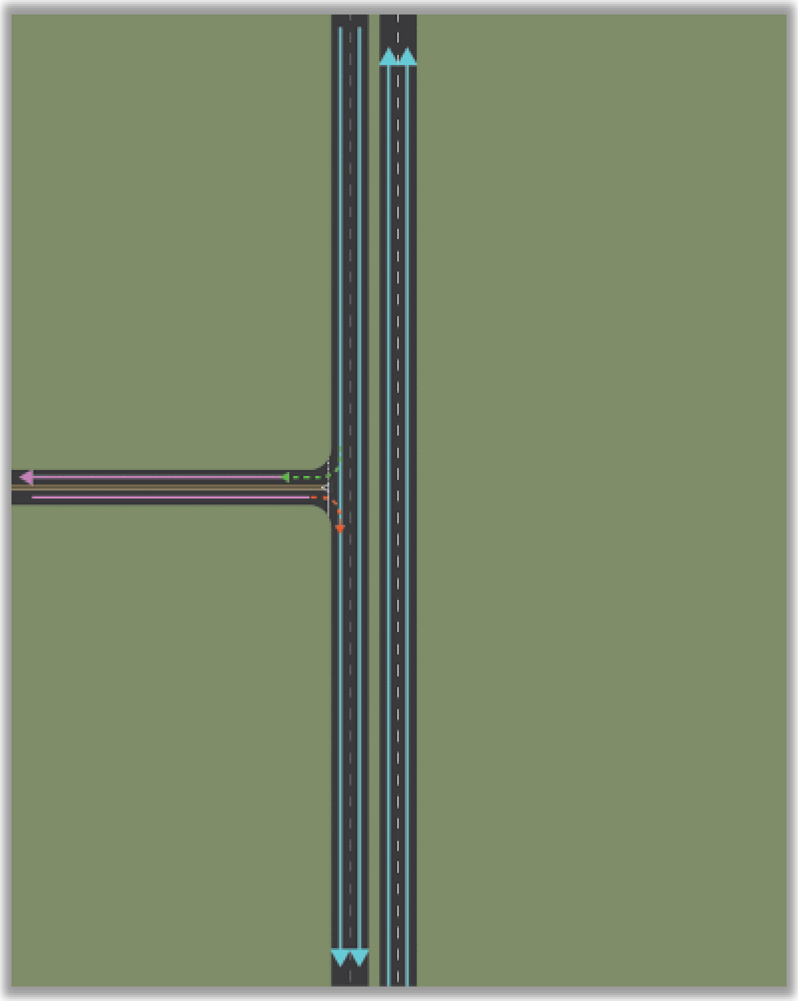
For US 30, nine primary concepts were carried forward from the Level 1 screening for further evaluation in the Level 2 screening. For US 31, seven primary concepts were carried forward from the Level 1 screening for further evaluation in the Level 2 screening. These concepts will define how the study corridor operates, such as whether it provides for free flow along the US 30/31 corridors (US 31 is already free flow) or requires intermittent stops.

2.2.1. ACCESS MANAGEMENT

Access management includes various modifications that could be implemented at primary and secondary intersections as well as on the segments between intersections, to improve safety and operations by eliminating conflict points. Access management improvements considered in the Level 2 screening include the following:

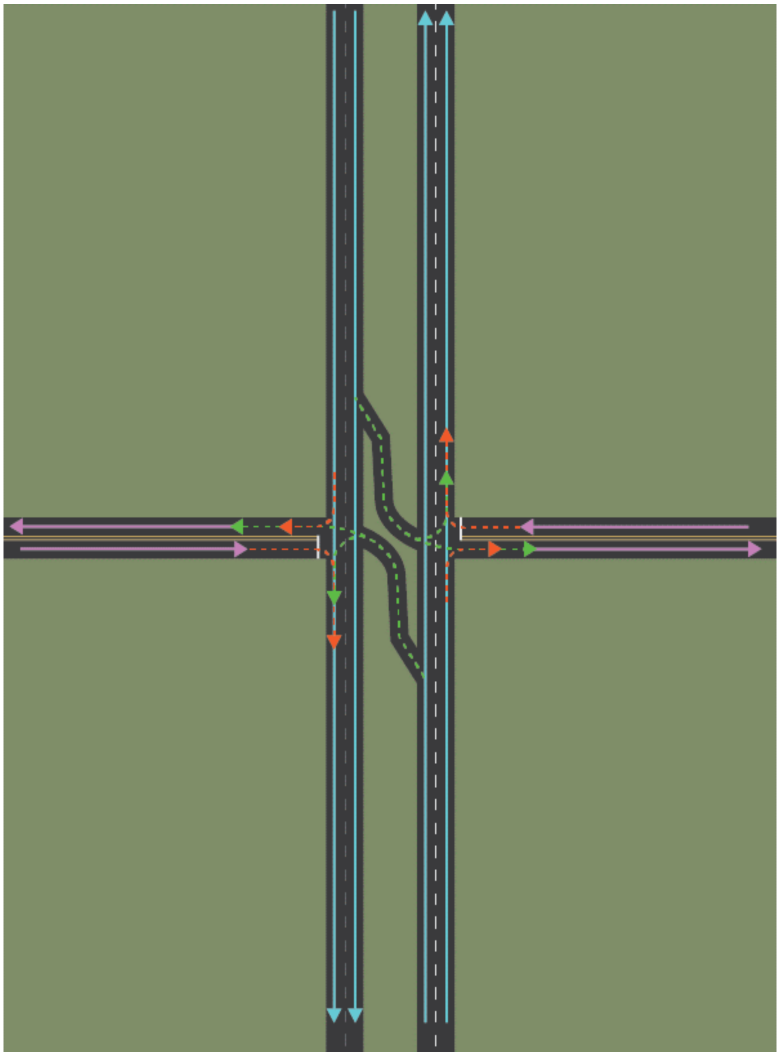
- A **right-in / right-out (RIRO)** intersection configuration, shown in **Figure 2-1**, can be applied to a crossroad or a driveway. This configuration allows only right turns to/from the minor road (green and red arrows) or driveway. The major roadway (blue arrows) is not required to stop at this intersection type. This solution is also considered an unsignalized intersection improvement in this study.
- Closure and/or consolidation of driveways within the intersection footprint.
- **Closure of an intersection** occurs when all connections between US 30 or US 31 and a crossroad are severed. Closures typically include construction of cul-de-sacs on the crossroad.

Figure 2-1: Right-In Right-Out Schematic Diagram



- **Directional median openings** as shown in **Figure 2-2**, where through movements on the cross road (purple arrows) and left turn movements from the crossroad are prohibited. The major roadway (blue arrows) is not required to stop at this intersection type. This solution is also considered an unsignalized intersection improvement in this study.

Figure 2-2: Directional Median Schematic Diagram



2.2.2. FREE FLOW FACILITIES (FULL AND PARTIAL CONTROL OF ACCESS)

A free-flow facility is road that has no traffic signals, stop signs, or yield signs on the mainline. There are varying types of free-flow facilities, ranging from freeways—which have full control of access—to free-flow facilities that have no or partial control of access.

1.1.1a Freeway (Free-Flow Facility with Full Access Control)

A freeway is one example of a free-flow facility. A freeway concept was advanced from the Universe of Alternatives (Level 1) screening for further study. A freeway also includes full control of access, which means that access to/from the facility is restricted to select crossroads at interchanges. The US 31 bypass around Kokomo is a freeway with full control of access.

1.1.1b Free-Flow Facility with Partial Control of Access (Expressway and/or Unsignalized Arterial)

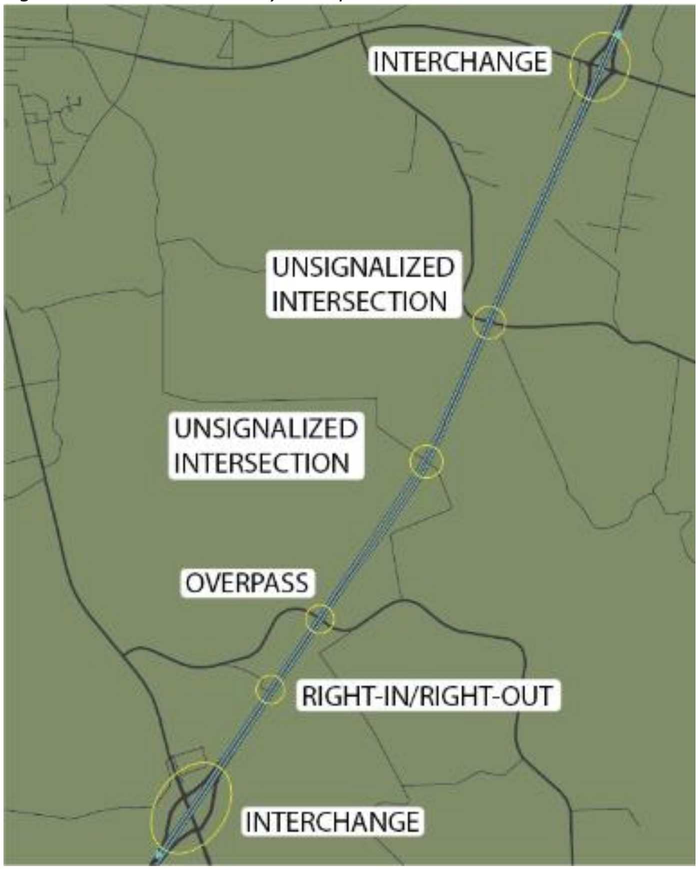
A free-flow facility can also have partial access control, which means that access to/from the facility may be provided via at-grade intersections, interchanges, and/or major commercial driveways. The number of driveway connections (residential and commercial) may be reduced in number and/or limited to right-in/right-out movements. The number of median openings may also be reduced. An example of a free flow facility with partial control of access is depicted in **Figure 2-3**. US 31 within the ProPEL US 30 West study area is a free-flow facility with partial control of access; however, several areas do not meet INDOT's access management guidelines.

Note: A common theme of the public comments received to date is that facility types beyond a freeway (i.e., those that provide more access to/from US 30 or US 31) should be considered as part of the PEL study. As a result, the Level 2 alternatives screening will focus on Primary Intersection improvements. The options for potential facility types in the US 30 West study area will be evaluated in the Level 3 alternatives screening.

Because it is possible to have varying facility types within the study area, the ProPEL US 30 West study area may be divided into smaller pieces or focus areas as part of the Level 3 screening. This approach will enable maximum flexibility to combine improvements in different ways to address the identified transportation needs, support study area goals, as well as to reflect community-specific context regarding fit and function.

Alternatives passing the Level 2 screening will be combined in different ways during the Level 3 screening to create different types of non-free-flow and free-flow facilities for evaluation. The specific characteristics (e.g., the level of access control) may vary in different sections or focus areas of the US 30 West study area.

Figure 2-3: Free Flow Facility Example with Partial Access Control



2.2.3. MEDIAN SAFETY IMPROVEMENTS

This concept identifies one or more areas in the study corridor where medians would be added, widened, removed, or otherwise improved (e.g., adding barriers where justified). Medians were evaluated at each primary intersection as part of this Level 2 report. Medians in the remainder of the study corridor will be evaluated in the Level 3 screening. Closure of median openings are covered under Access Management. Median improvements are only a consideration on US 30 since the medians on US 31 already meet nominal design criteria width requirements.

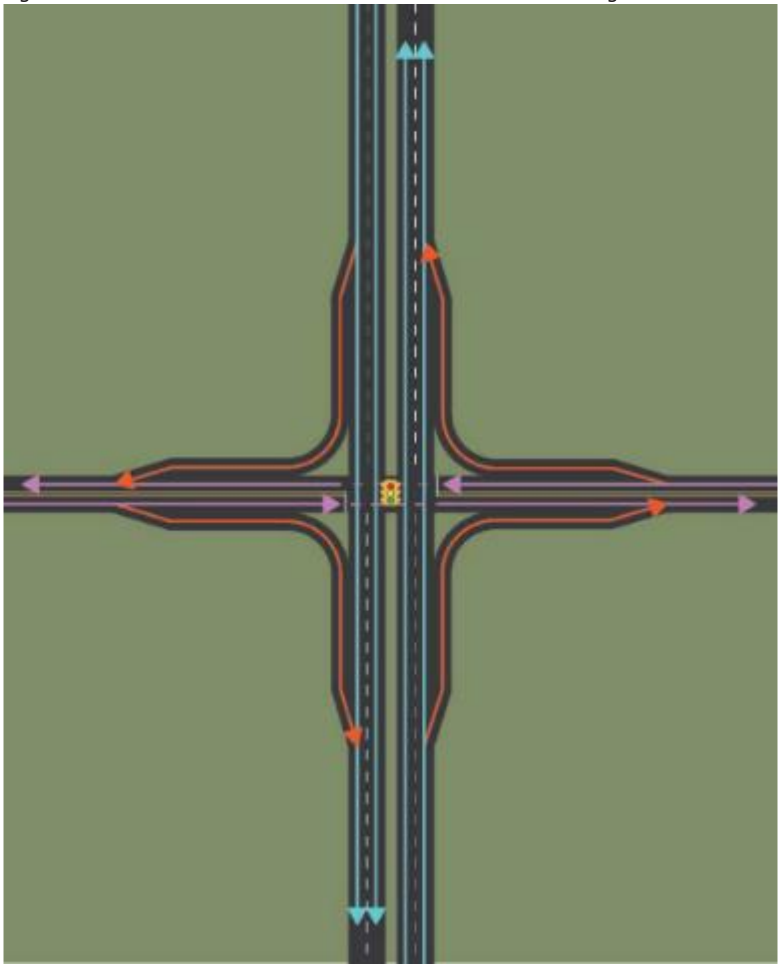
2.2.4. ADD OR LENGTHEN TURN LANES

Add or Lengthen Turn Lanes involves adding left and/or right turn lanes to existing intersections in the study corridor, as needed, to separate turning vehicles from through traffic. In locations where they currently exist, turn lanes would be evaluated to determine if adequate deceleration and storage lengths are provided. Depending on the volume of traffic served, dual turn lanes may be appropriate for some intersections.

2.2.5. ADD/EXTEND ACCELERATION/DECELERATION LANES

Acceleration and deceleration lanes are components of highways and roads that allow motorists to enter and exit mainline travel lanes at or near the same speed of through traffic. An acceleration lane is an additional lane on a roadway (red arrows), often found at on-ramps or entrances to highways or freeways. Its purpose is to allow vehicles entering the main road to accelerate and match the speed of the traffic already on the road before merging. An acceleration lane can also be applied at an at-grade intersection. By having this separate lane, drivers can safely and smoothly merge into the flow of traffic minimizing disruptions or hazards to other vehicles. A deceleration lane is a designated lane that allows vehicles to pull out of the mainline lanes before slowing to exit the facility. This alternative would add or extend acceleration or deceleration lanes for vehicles entering or exiting US 30/US 31. Depending on the site specifics, this alternative may require acquisition of additional ROW.

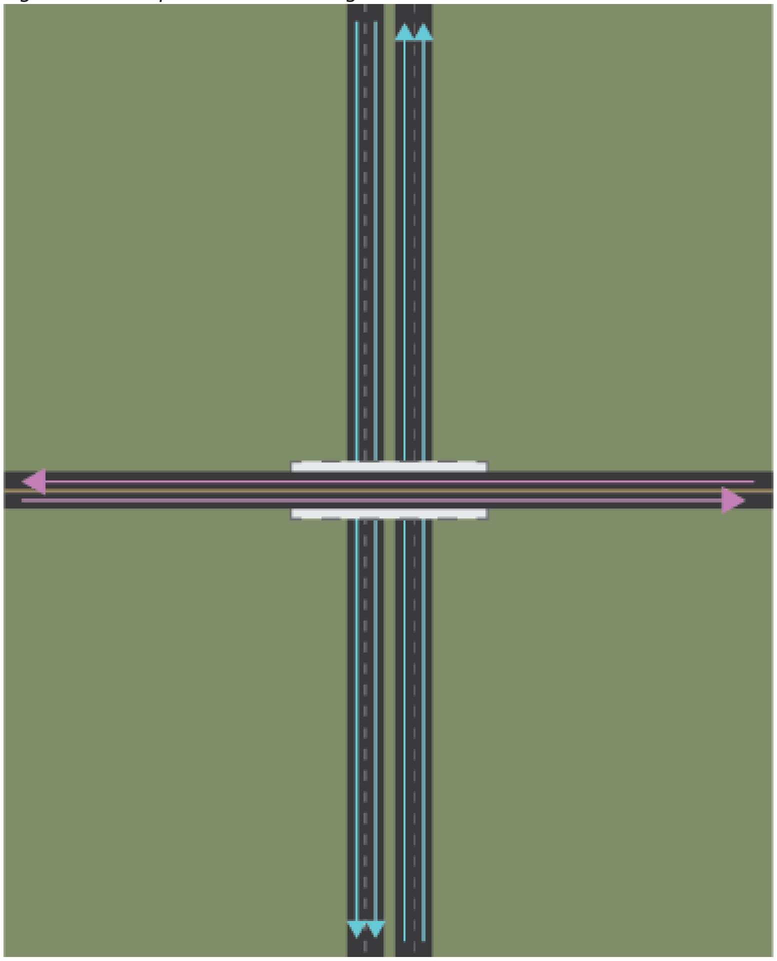
Figure 2 4: Acceleration and Deceleration Lanes Schematic Diagram



2.2.6. CROSS ROAD OVERPASS/UNDERPASS

Overpasses and underpasses allow for free flow conditions by grade separating the major roadway (blue arrows) from the crossroad (purple arrows), which allows both roadways to be free flowing. The decision whether the major roadway or the crossroad should be carried over the other is made by examining impacts of each option. Both options sever all connections between the major roadway and the crossroad. A schematic of a crossroad overpass is provided in **Figure 2-5**.

Figure 2-5: Overpass Schematic Diagram



2.2.7. INTERCHANGES

An **interchange** is a junction where the major roadway and the crossroad are grade separated to provide free flow conditions on the major roadway. Access to/from the major roadway is provided via a series of entrance and exit ramps. All interchanges fall into one of two categories:

System interchanges provide connections between multiple controlled access highways and provide for free-flowing movements between roadways. The US 30 & US 31 interchange is an example of a system interchange.

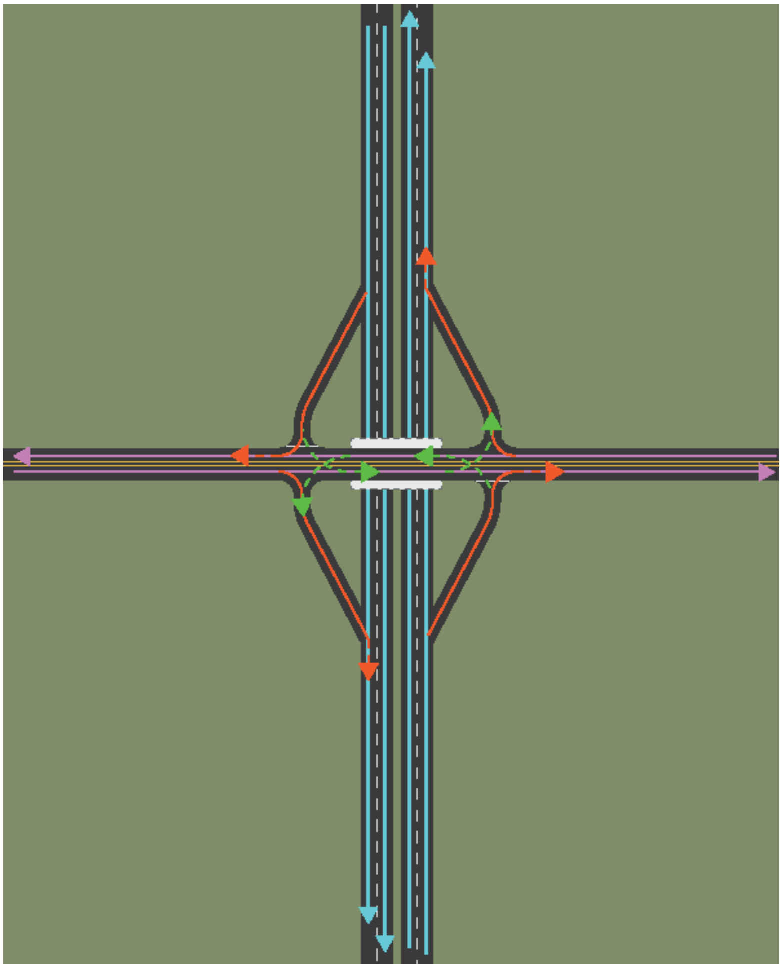
Service interchanges connect access-controlled highways to roadways of a lower classification and commonly do not provide for free-flowing movements between roadways. The US 30 & SR 17/Michigan St. interchange is an example of a service interchange.

Interchanges typically require substantial amounts of right-of-way and have higher construction costs than at-grade intersection improvements. Location specific solutions may be developed that achieve the safety, operational, and mobility benefits comparable to the benefits of an interchange at reduced costs and/or fewer impacts.

Should interchanges be identified as potential solutions, they will be service interchanges as none of the crossroads without existing interchanges in the study area are controlled access facilities While multiple concepts exist for service interchanges, one concept had to be chosen to provide a high-level estimation of the improvement limits (i.e., a footprint). A diamond interchange was selected as the starting point as it is the simplest interchange type, and it is expected to accommodate the 2045 traffic forecasts for the study area., Using the diamond interchange as a starting point for interchanges in this PEL study does not preclude other interchange alternatives from consideration during subsequent studies or project development. In some cases, alternative/innovative interchange configurations will be considered to provide equivalent access, mobility, and safety benefits while minimizing costs and adverse impacts.

Diamond interchanges, as depicted in **Figure 2-6**, are typically the starting point in an interchange selection process. Diamond interchanges provide for free-flowing traffic on the mainline (blue arrows). Traffic moves to/from the mainline through a series of ramps (red and green arrows). Traffic on the crossroad (purple arrows) may be free-flowing or signal controlled, depending on traffic volumes on the ramps.

Figure 2-6: Diamond Interchange Schematic Diagram



Folded Diamond Interchanges, depicted in **Figure 2-7**, are applicable when a barrier, such as a railroad, river, or other constraint prevents implementation of a diamond interchange without excessive costs to avoid the barrier. Like diamond interchanges, folded diamond interchanges provide for free-flowing traffic on the mainline (blue arrows). Ramps are provided on only one side of the crossroad (purple arrows) to avoid the constraint or barrier. Ramps (red and green arrows) are provided to connect the mainline to the crossroad. Ramp terminal intersections of this interchange type are typically roundabouts, which discourage wrong-way driving.

Figure 2-7: Folded Diamond Interchange Schematic Diagram

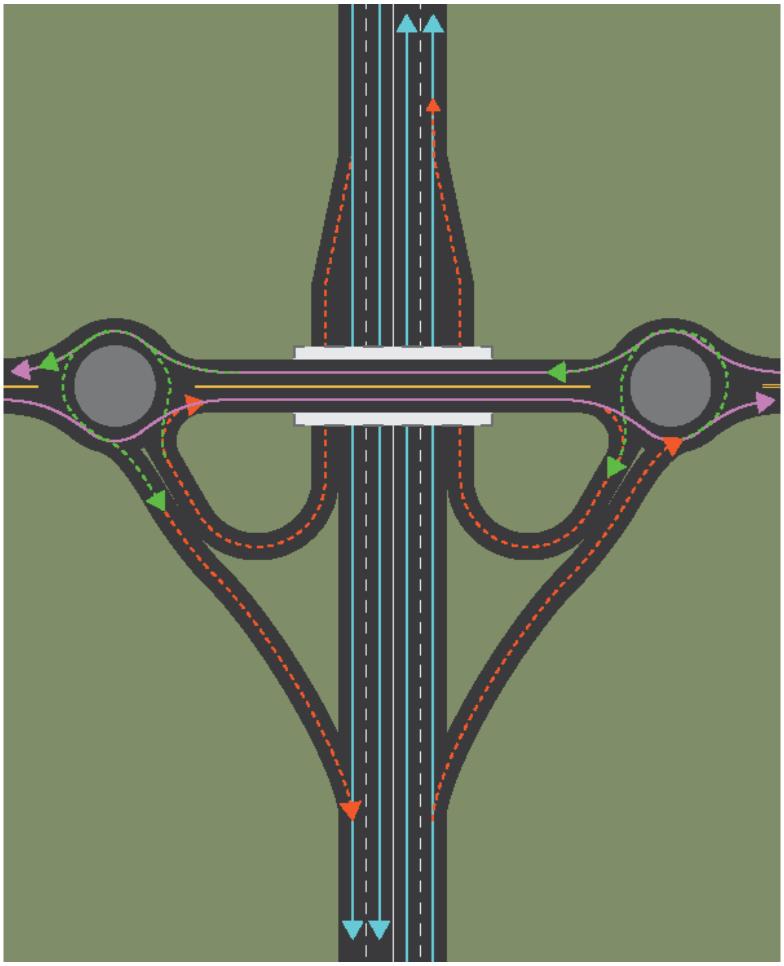
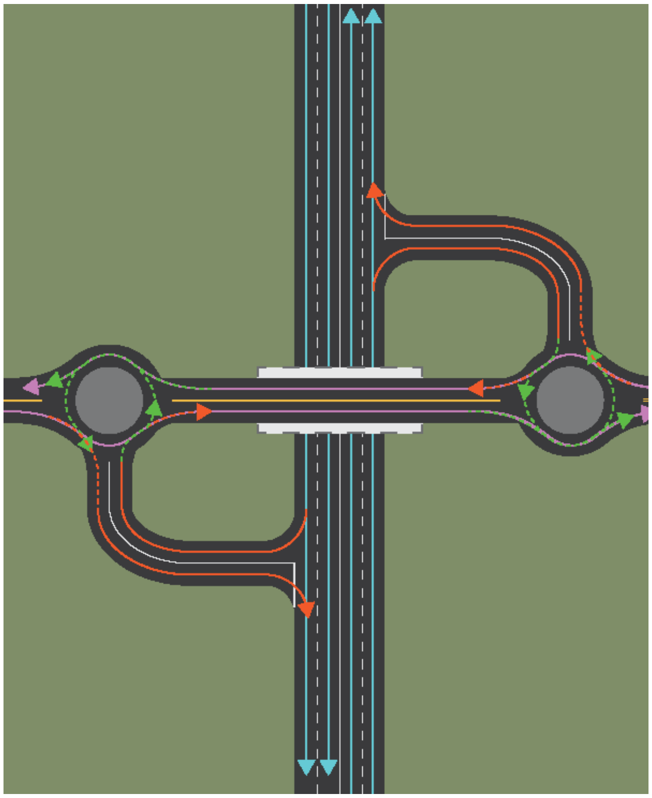


Figure 2-8: Quadrant Interchange Schematic Diagram



Site specific factors may require alternative/innovative interchange or grade separated intersection configurations to address the need for access, to preserve mobility on US 30 or US 31, while working within identified engineering, environmental, and cost constraints.

A variation of the folded diamond interchange, depicted in **Figure 2-8**, and known as a quadrant interchange, replaces the merge conditions at the ends of the ramps with right-in/right out configurations. This often results in a lower cost and lower impact solution than a traditional interchange and can provide operational and safety conditions similar to those of a folded diamond interchange.

2.2.8. SIGNALIZED AND UNSIGNALIZED IMPROVEMENTS

The *INDOT Intersection Decision Guide*[4] identifies multiple at-grade intersection types that may improve operations, safety, and/or mobility at primary intersections. These include the following:

A **roundabout** is a circular intersection or junction in which road traffic flows almost continuously in one direction around a central island, as illustrated in **Figure 2-9**. Roundabouts are commonly used to improve safety and operations. While roundabouts can be designed for high-speed roadways, roundabouts are not being considered for US 31 in the ProPEL US 30 West study area as introducing a roundabout in this corridor

[4] https://www.in.gov/indot/files/ROP_IntersectionDecisionGuide.pdf

and the associated potential for a stop situation along US 31 where none currently exist, would likely violate driver expectations, and may result in safety concerns. However, it may be considered along US 30 where stop conditions do currently exist.

A **signalized intersection** is an intersection where a traffic signal assigns the right-of-way to all movements, which can improve the efficiency and safety of the intersection. The decision to signalize an intersection is based on the outcome of a needs study which determines if a traffic signal is expected to improve conditions. These needs studies are conducted based on national guidelines[5] established by the Federal Highway Administration (FHWA). No figure is provided for this intersection concept.

A **Reduced Conflict Intersection (RCI),** as shown in **Figure 2-10**, is an intersection type where left turn and through movements from the crossroad are facilitated by turning right (red arrows) onto the major road (blue arrows), making a U-turn movement (green arrows) provided along the major roadway and proceeding past or turning right onto the minor road. Left turn movements from the major roadway (green arrows) are typically permitted at the crossroad (green dashed arrows).

This intersection type is commonly used to improve safety on the major roadway by rerouting left turn and through movements from the crossroad as crashes associated with these movements are typically severe. Additionally, this intersection type provides or maintains free flow conditions on the major roadway.

Figure 2-9: Roundabout Schematic Diagram

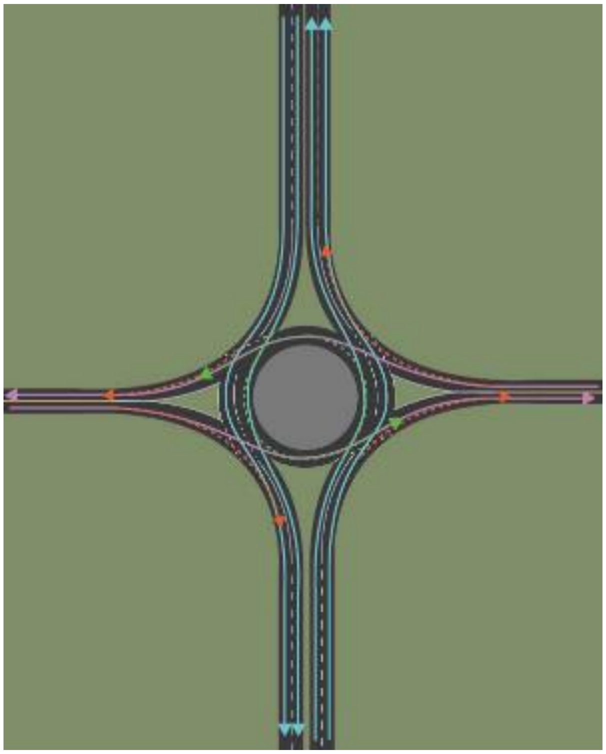
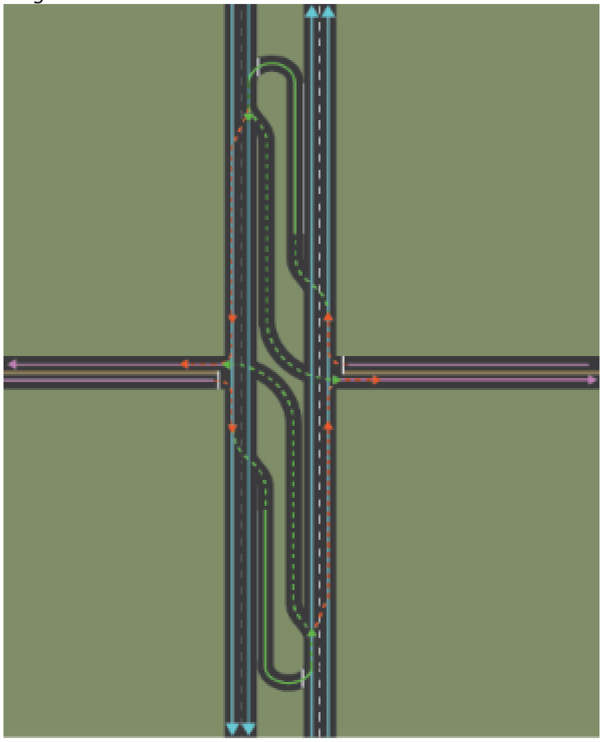


Figure 2-10: Reduced Conflict Intersection Schematic Diagram

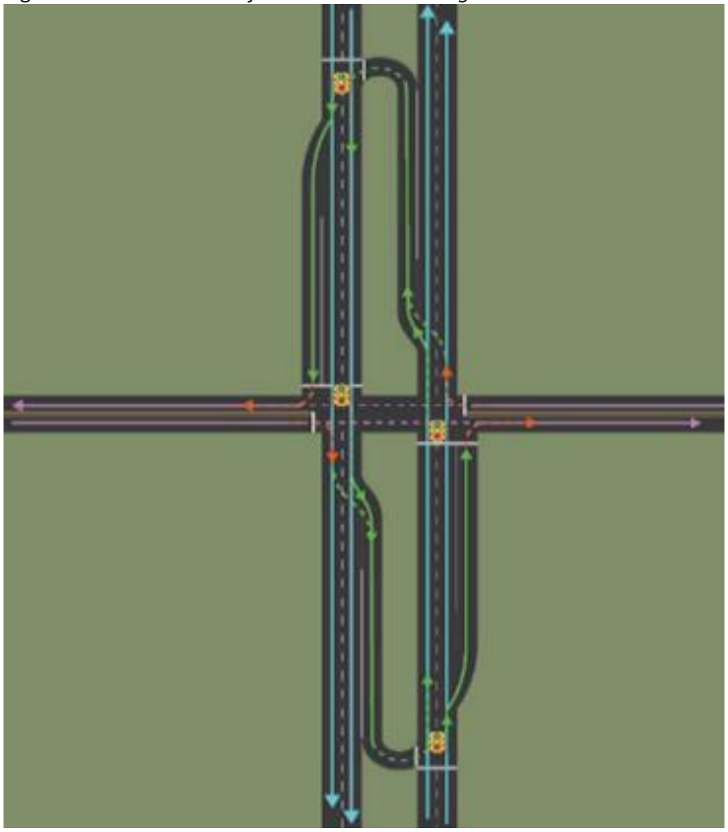


[5] https://mutcd.fhwa.dot.gov/htm/2009r1r2r3/part4/part4c.htm

A **Restricted Crossing U-Turn** (RCUT) functions very similarly to a Reduced Conflict Intersection (RCI). The key difference is in traffic control. While an RCI is typically stop- or yield-controlled, an RCUT utilizes traffic signals at the main intersection and U-turn locations to provide gaps in mainline traffic for side street and u-turning traffic to complete movements through the intersection. RCUTS are typically installed at locations where traffic volumes warrant the need for traffic signals. This intersection type is commonly used to improve operations by eliminating signal phases and improve safety by reducing conflict points.

A **Boulevard Left Turn Intersection** is an intersection type in which all left turns occur via U-turn movements (green arrows) provided on either side of the intersection. Through (purple and blue arrows) and right turn movements are allowed at the intersection, as illustrated in **Figure 2-11**. This intersection type is commonly used to improve operations by eliminating signal phases and improve safety by reducing conflict points. Boulevard left turn intersections are best suited for high volume intersections were left turn phases cause poor signal operations.

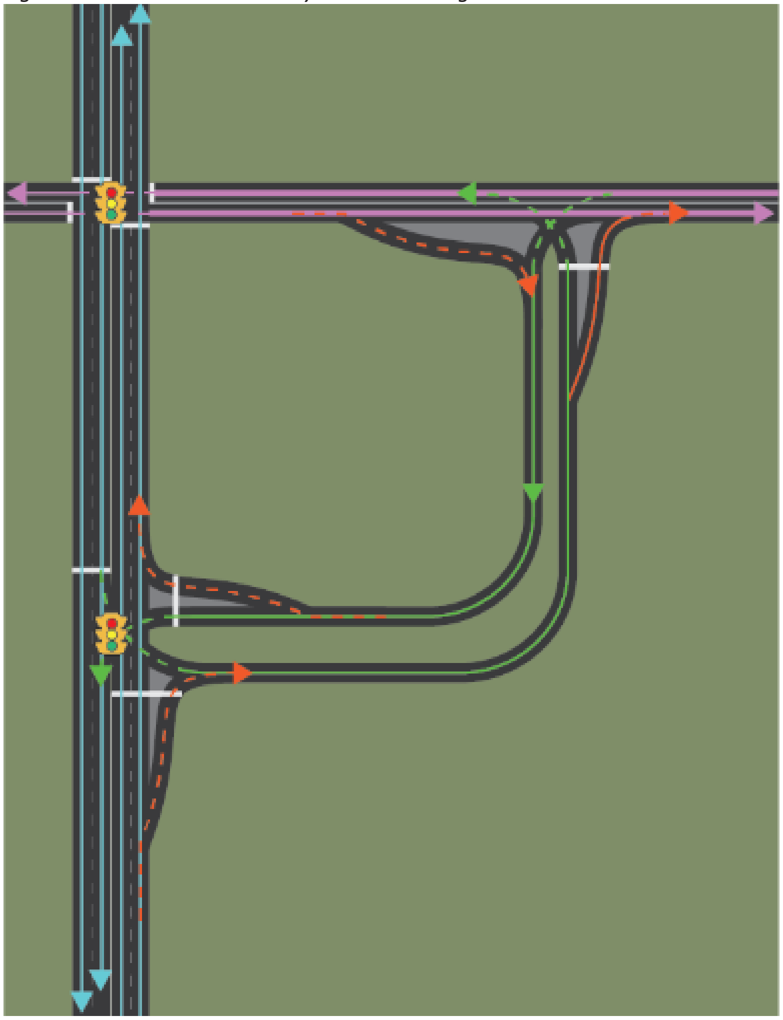
Figur*e 2-11: Boulevard Left Turn Schematic Diagram*



A Quadrant Roadway Intersection is an intersection in which a new roadway (green arrows) is constructed in one quadrant and all turn movements (dashed red and green arrows) are displaced to this new roadway. The main or original intersection then serves only through movements for both the major roadway (blue arrows) and crossroad (purple arrows), as illustrated in **Figure 2-12**. The intersections at the ends of the quadrant roadway may be signalized or unsignalized, depending on traffic volumes.

Quadrant roadways improve operations by eliminating signal phases and improve safety by reducing conflict points on the major roadway.

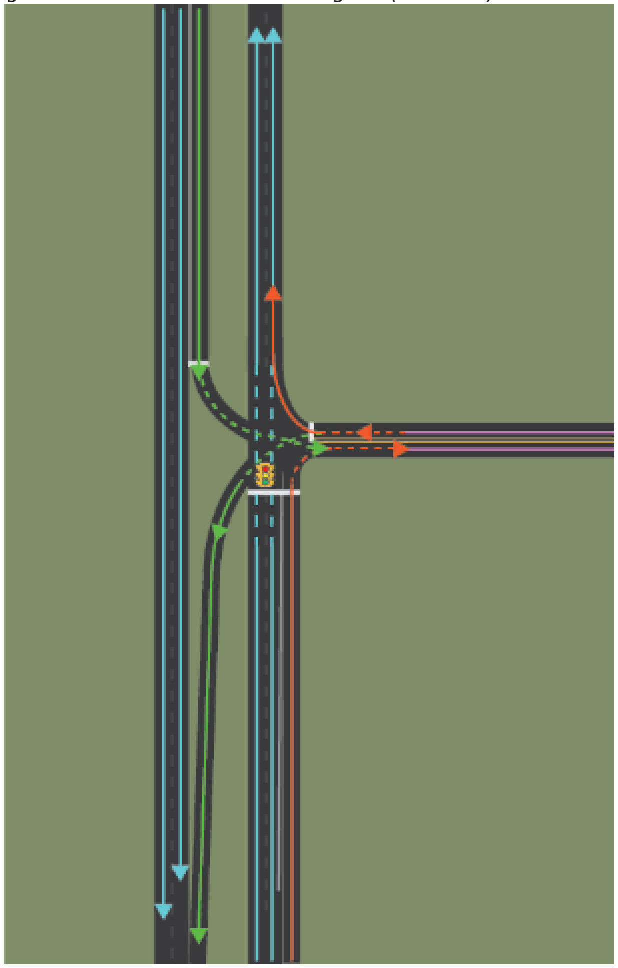
Figure 2-12: Quadrant Roadway Schematic Diagram



A **Green-T Intersection** is an at-grade three-legged intersection where the left turns (green arrows) to/ from the crossroad (purple arrows) are barrier separated from the major roadway (blue arrows) with acceleration and deceleration lanes provided for these movements. This concept provides for free flow movements on one or both directions of the major roadway and improves safety by reducing conflict points. Depending on traffic volumes, the left turn movements may require signalization, as shown in **Figure 2-13**, or grade separation.

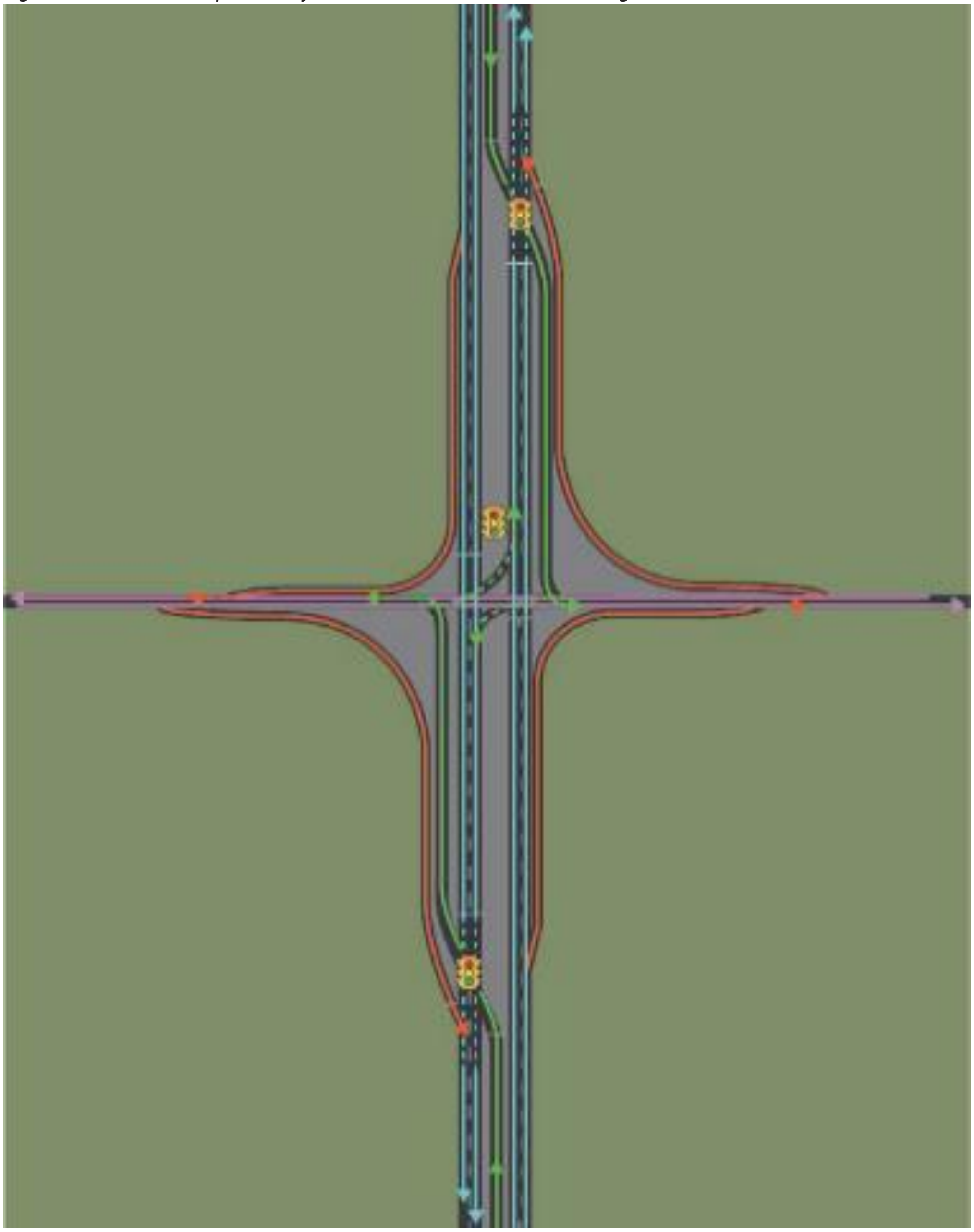
No locations to implement this concept were identified in the Level 2 screening, however it was considered in Step 2.

Figure 2-13: Green-T Schematic Diagram (At-Grade)



A **Displaced Left Turn Intersection** is an intersection in which left turn movements are displaced or offset to allow the left turn movements and the opposing through movements to operate in unison. This can be implemented on all approaches (a full displaced left turn intersection) or on select approaches (a partial displaced left turn intersection). The movements of a partial displaced left turn intersection are depicted in **Figure 2-14** This type of intersection is commonly used when left turn and through movement volumes are high.

Figure 2-14: Partial Displaced Left Turn Intersection Schematic Diagram



Other intersection types not considered for the US 30 West study area include offset-T intersections and jughandle intersections. More information on these intersection types can be found in the *INDOT Intersection Decision Guide*, which is available at https://www.in.gov/indot/files/ROP_IntersectionDecisionGuide.pdf.

2.3. COMPLEMENTARY CONCEPTS

The complementary concepts described below were considered in the development of Level 2 alternatives.

- Complementary concepts for both US 30 and US 31
    - Realign Skewed Intersections – Considered at locations where realignment of a crossroad skew could benefit the intersection.
    - Intersection Sight Distance Improvements – Considered at locations where improvement of sight distance could benefit the intersection.
    - Auxiliary Lanes – Considered between adjacent intersections or interchanges where added capacity is needed.
    - Accommodate Wildlife Crossing – Considered where bridges or culverts may allow for extra space for wildlife to cross the roadway without interfering with vehicular traffic. None of the primary intersections reviewed in Level 2 utilize this complementary concept as there were no bridges or culverts near the intersections. Further analysis will take place in Level 3.
    - Spot Roadway Lighting – Considered at all interchanges and intersections per INDOT lighting guidelines.
    - Warning Systems – Considered at all signalized intersection and all two-way stop-controlled intersections where left turns and through movements are allowed from the crossroad. Warning systems are expected to reduce the likelihood of right angle and left turning crash types, which often result in severe injuries.
    - Roadside Assistance – Considered systemwide.
    - Incident Management – Considered systemwide.
    - Traveler Information Systems – Considered systemwide.
    - Bike/Pedestrian Facilities – Considered where bicycle or pedestrian users are present or would benefit from the infrastructure being present, such as in towns and cities.
    - Non-Motorized User Accommodations – Considered where non-motorized users are present, such as Amish buggies. None of the primary intersections reviewed in Level 2 utilize this complementary concept at this stage. Secondary intersections are anticipated to be a relevant location of this concept to be reviewed in Level 3.
- Complementary Concepts for US 30
    - Bypass – Considered where impacts of bypass may be better than impacts of improvement in existing small town.
    - Signal Timing Updates/Coordination – Considered at all signalized intersections.
    - Add Capacity to Movements – Considered where additional capacity could benefit the movement and a need is known.
    - Ramp Terminal Intersection Improvements – Considered at all ramp terminals, which are the intersections where interchange ramps intersect the crossroad.
    - Railroad Crossing Improvements – Considered where at-grade railroad crossings exist on the corridor.
    - Freight Priority System – Considered at all signalized intersections as a means to reduce stops for freight traveling the US 30 corridor.
- Complementary Concepts for US 31

- Median Safety Improvements – Considered when improvements to the median could benefit the intersection.

Roadside Assistance, Incident Management, and Traveler information Systems are to be considered as systemwide complementary concepts. Therefore, they are not individually screened as part of the Level 2 screening process.

2.4. DESIGN ELEMENTS

Design elements are defined as concepts that did not meet any of the study area needs but are considered practical and provide some benefit to the study area. Each of the design elements is listed in **Table 2-3**, along with an explanation of if and how a design element can be evaluated in this PEL study. Although they may not be able to be evaluated as part of this study, they will be carried forward as potential improvements as part of any projects that result from the study.

Table 2-3: Design Elements Evaluation Process

Design Element	Evaluate Further in this PEL Study	Explanation
Collector-Distributor System	Yes	Collector-distributor system will be considered at Level 3 for interchanges or intersections close enough to one another to benefit from a collector-distributor roadway.
Adjacent Intersection Improvements	Yes	Adjacent intersection improvements of roadways will be considered at all study intersections where the improvement stretches into the adjacent intersection. This consideration will occur during the Level 2 and Level 3 screenings.
Traffic Control Visibility Upgrades	Yes	Improvements to the visibility of traffic control devices will be considered in all alternatives where visibility concerns are identified. This consideration will occur during the Level 2 and Level 3 screenings.
Pavement Marking Improvements	No	Pavement markings are subject to change based on the final alternatives selected. Improvements will be addressed in the preliminary design phase of any project that follows this PEL study.
Roadway Signage Improvements	No	Roadway signage is subject to change based on the final alternatives selected. Improvements will be addressed in the preliminary design phase of any project that follows this PEL study.
Roadway Drainage Improvements	No	Roadway drainage is subject to change based on the final alternatives selected. The locations for improvements may be identified at a high level in this PEL study; however, details of the improvement should be addressed in the preliminary design phase of any project that follows this PEL study.
Gateway & Aesthetic Treatment	No	Gateway and corridor treatments are aesthetic improvements that would not address the study area purpose and need; however, they are considered in direct response to public input. Possible locations for such improvements will be identified in the Level 3 screening process; however, details of the treatment would be addressed in the preliminary design phase of any future projects in the study corridor.
Speed Management	Yes	Techniques to manage speed that require changes to geometry or intersection types will be considered in the development concepts in the Level 2 and 3 screenings. Other speed management techniques are assumed to require policy changes and cannot be evaluated in this PEL study.

Design Element	Evaluate Further in this PEL Study	Explanation
Alternative Fuel/Electric Vehicle Considerations	Yes	Provisions to support alternative fuel/electric vehicles are being implemented by INDOT through specific programs. The INDOT National Electric Vehicle Infrastructure (NEVI) Plan includes the US 30 corridor across Northern Indiana as an alternative fuel corridor. Further and more detailed consideration will occur in Level 3.

3. LEVEL 2 SCREENING PROCESS

Each of the primary and complementary concepts described in **Section 2** have been evaluated in the Level 2 screening process to identify alternatives for each primary intersection. The Level 2 screening process is described in detail in the following sub-sections.

3.1. STEP 1 – DECISION TREE

The first step in the decision-making process was to answer a series of questions that were intended to identify the potential primary concepts that were applicable at each study intersection. To standardize the process and document answers, the questions were arranged in the form of a decision tree. A different tree format was used for US 30 and US 31 since different questions are required due to the differences between the primary concepts carried forward from Level 1 for US 30 and US 31. However, the questions were the same for each concept used by both corridors. These questions, listed below, were oriented around the ideas as follows and led to the consideration of a particular primary concept as an intersection alternative:

- Questions regarding current design standards and guidance
    - At existing interchanges, are there substandard acceleration/deceleration lanes?
        - If yes, adding or extending acceleration/deceleration lanes was considered.
    - Is the intersection functional area inconsistent with INDOT Access Management Guidelines?
        - If yes, there other intersections or drives near to the primary intersection that do not meet the INDOT Access Management Guidelines, then access management was considered.
    - Does the median violate the Indiana Design Manual (IDM) requirements?
        - If yes, median safety improvements were considered.
    - Are turn lanes missing or do not include deceleration distance?
        - If yes, adding or lengthening turn lanes was considered.
- Questions regarding intersection context
    - Are there crash patterns potentially due to not having acceleration lanes?
        - If yes, adding or extending acceleration lanes was considered.
    - Are there any other locations within around two miles with equal or better access?
        - If yes, cross road overpass or underpass was considered.
- Questions regarding intersection performance and operation
    - Is this intersection vital for access to/from US 30 or US 31?
        - If no, due to lack of usage or redundancy, limiting or removing access was considered.
        - If yes:
            - Do volumes or other factors support an interchange?
                - If yes, convert to interchange was considered.
            - Are there safety or operational concerns?
                - If yes, signalized and/or unsignalized intersection improvements were considered.

Data contained in the *ProPEL US 30 West Existing Conditions Report* was used to determine answers to the decision tree for each primary intersection and to identify primary and complementary concepts that should be further evaluated. Answers to these questions led to the identification of concepts that should be further evaluated at each primary intersection.

The complementary concepts that applied were listed next to the decision tree while the complementary concepts that do not apply were grayed out. The base decision trees used are provided in **Figure 3-1** and **Figure 3-2** while the completed decision trees are provided in **Appendix A**.

A key element of the decision tree is that all questions are answered for each primary intersection. This results in multiple concepts being identified as possible solutions at each intersection – even those where no transportation needs were identified. This is necessary to support the Level 3 screening, where the primary intersection improvements passing the Level 2 screening will be combined with secondary intersection improvements and access management improvements into improvement packages. When this bundling occurs, some primary intersections with no identified transportation needs may require modification or improvement to work within that overall context. Therefore, the Level 2 analysis was used to identify the reasonable range of potential improvements for all primary intersections – even those where no transportation needs were identified. This is to ensure the compatibility of alternatives along the corridor during the Level 3 screening.

The evaluation of the concepts in the decision tree was conducted with the assumptions as follows:

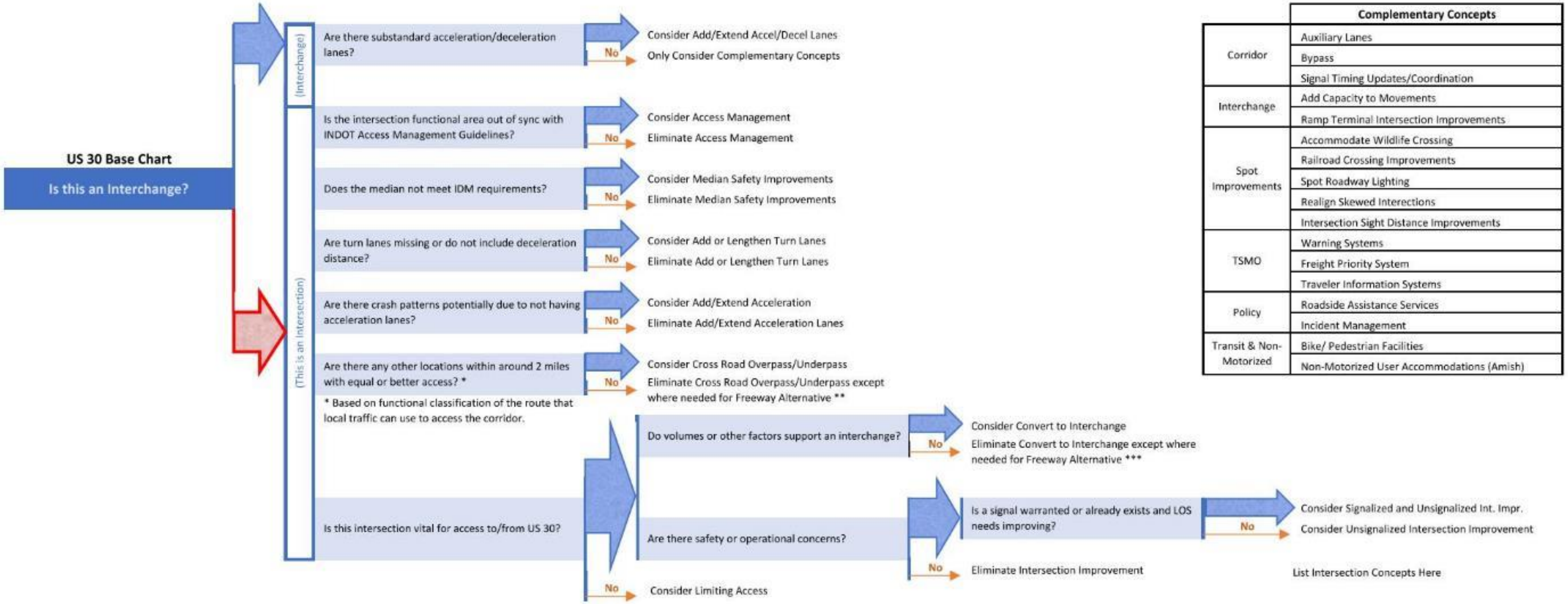
- If no improvements were necessary per the decision tree results, complementary concepts were still considered as a means of improving safety or operations and providing consistency and compatibility at different locations within the corridor for use during Level 3 screening.
- Similarly, even if no major safety or operational concerns exist, retaining the existing intersection configuration is considered, along with the results of the decision tree in order to carry forward alternatives for use during Level 3 screening and as a product of public or stakeholder input. Some alternatives may serve to further improve a safety or operational item that has not become a measurable concern at this time but would be to the benefit of the corridor, to be determined in Level 3, which may have safety concerns when reviewed in areas of improvements. Safety concerns are determined from recent year crash data while operational concerns are determined from design year (2045) traffic data.
- Access management outside of the primary intersection areas will be revisited when developing improvement packages in Level 3.
- Median improvements do not apply to US 31 since the median width meets the standard width throughout the study corridor.
- An overpass or underpass, known as grade separation, was evaluated as a potential solution based on whether a route of equal or better access based on functional classification would be available within 2 miles of the location being evaluated. This is a qualitative assessment of whether another nearby access point could potentially serve as the access point if the primary intersection being analyzed was converted to a grade separation. Overpass or underpass may also be considered in Level 3 as part of an improvement package that requires changes to access.
- Converting to an interchange was considered for intersections based on traffic operations and safety. Interchange placement and spacing was also considered holistically as part of a free flow facility type to be analyzed in the Level 3 screening. The effort in Level 3 may change the locations where interchange treatments are selected.
    - An interchange was considered to be a potential solution when traffic operational analysis projects unacceptable future delay or failing level of service (LOS) of the

intersection, as documented in the *ProPEL US 30 West Existing Conditions Report* and if no at-grade intersection concepts would address existing safety needs or concerns. There were no intersections that met this criterion in the study area.

- The Level 3 screening will be used to determine improvement packages.
- that will be made up of a few consecutive intersections and their alternatives as determined in Level 2. Therefore, analysis of interchanges was included in Level 2 screening with the following guides in mind.
    - The proximity of development to any given intersection was a factor in identification of an interchange as a potential solution. Intersections where development is in proximity and/or have higher roadway functional classifications or jurisdictions (i.e., state route or U.S. route) are more justifiable locations for interchanges than intersections with no surrounding development. On the contrary, more developed areas may require more impacts than desirable to place an interchange.
    - Public and/or stakeholder input has suggested the need for an interchange at various locations. Additionally, each county's comprehensive plan lists locations where interchanges are desired. This input was used to identify locations where interchanges could be a potential solution.

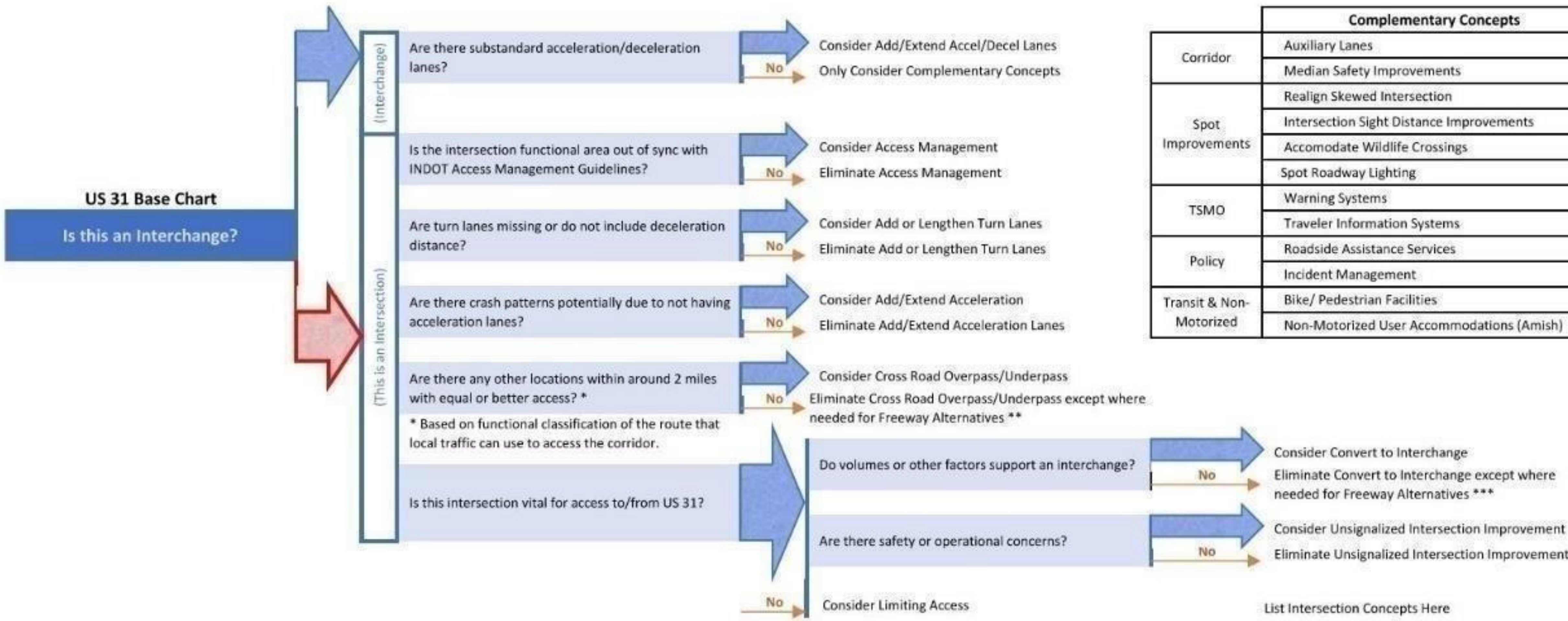
When at-grade intersections were identified as a potential solution, multiple intersection types were evaluated using the Federal Highway Administration (FHWA) Cap-X tool as described in Step 2.

Figure 3-1: US 30 Base Decision Tree



	Complementary Concepts
Corridor	Auxiliary Lanes
	Bypass
	Signal Timing Updates/Coordination
Interchange	Add Capacity to Movements
	Ramp Terminal Intersection Improvements
Spot Improvements	Accommodate Wildlife Crossing
	Railroad Crossing Improvements
	Spot Roadway Lighting
	Realign Skewed Interections
	Intersection Sight Distance Improvements
TSMO	Warning Systems
	Freight Priority System
	Traveler Information Systems
Policy	Roadside Assistance Services
	Incident Management
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)

Figure 3-2: US 31 Base Decision Tree



	Complementary Concepts
Corridor	Auxiliary Lanes
	Median Safety Improvements
Spot Improvements	Realign Skewed Intersection
	Intersection Sight Distance Improvements
	Accomodate Wildlife Crossings
	Spot Roadway Lighting
TSMO	Warning Systems
	Traveler Information Systems
Policy	Roadside Assistance Services
	Incident Management
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)

3.2. STEP 2 – OPERATIONAL ANALYSIS

The decision tree of Step 1 identifies when at-grade intersection improvements should be evaluated as potential solutions. Each of these at-grade intersection types are described in **Section 2.2**.

Preliminary capacity analysis of these intersection types was conducted using the Federal Highway Administration (FHWA) Cap-X tool, which provides the ability to evaluate the operations of multiple intersection types and compare based on volume to capacity ratios. Design year no-build traffic volumes and lane configurations for each intersection were input into the analysis tool, which then provides ranking of intersection types based on volume to capacity (v/c) ratios. The design year no-build traffic volumes were obtained from the *ProPEL US 30 West Existing Transportation Conditions Report*.

The following intersection types were not considered for evaluation in the preliminary capacity analysis:

- **Offset T Intersections** are not being considered for primary intersections evaluated in the Level 2 screening as no locations to implement this concept were identified. This concept may be applied to various secondary intersections in the Level 3 screening.
- **Jughandle intersections** are not being considered as left turning volumes in the study area can be accommodated by either conventional intersection type, Displaced Left Turn intersection, or a Quadrant Roadway intersection type.

A total of seven signalized intersection configurations were evaluated in Cap-X which included:

- Traditional traffic signal
- Partial and full versions of Displaced Left Turns (DLT)
- Partial and full Boulevard Left Turns
- Quadrant Roadway
- Restricted Crossing U-Turn (RCUT)

Similarly, two unsignalized intersection configurations were evaluated which include:

- Two Way Stop Control
- Reduced Conflict Intersection

As is documented in the *ProPEL US 30 West Purpose and Need Report*, there is a need to improve regional and statewide mobility in the study area and adding signalized intersection improvements would introduce delay, negatively impacting mobility. In addition, the Purpose and Need report identifies a safety need on both highways and introducing signals where none currently exist would create new conflict points and violate driver expectation, potentially contributing to a negative safety impact. Signalized intersection improvements are being considered on US 30 but not on US 31 since US 31 currently meets free-flow conditions within the study area. On US 30, signalized intersection improvements are considered in Level 2. Further analysis on the impacts on safety and mobility will be reviewed in Level 3.

Cap-X presents v/c results for all the possible intersection configuration types at each location. For signalized intersections, up to three out of the seven possible intersection types that had the most optimal v/c results compared to existing traffic control were considered in the evaluation matrix as described in Step 3. It should be noted that Cap-X results are a high-level metric, and v/c results for multiple intersection types at the same location could be similar. In such situations, engineering judgement was applied to select the appropriate intersection type (e.g., Partial Displaced Left Turn vs. Full Displaced Left Turn) for consideration in the evaluation matrix. Since Cap-X provides the ranking for innovative intersection configurations based on v/c ratios (a lower v/c ratio is better), the impact of the new intersection design right-of-way requirements and cost are often overlooked in its ranked results. This results in intersection configurations such as displaced left turn (DLT) having better v/c ratios than RCUT for locations with very low left turn volumes. DLT is an innovative configuration which is a high-impact, high-cost solution for intersections with high turn volumes. In such instances, only the innovative intersection types corelating with the turn volumes were selected as improvements. An example of such an instance was at Queen Rd where there are low left turn volumes, but the Cap-X results showed a DLT intersection having the best v/c results. RCUT and Boulevard Left Turn intersections were considered instead of DLT for comparison in the evaluation matrix because they are more suitable to the intersection context.

The results of the preliminary capacity analyses, provided in **Appendix B**, were used to evaluate all concepts quantitatively based on their ability to yield acceptable operating conditions The intersection types selected to move to Step 3 for each primary intersection are listed on the decision trees in **Appendix A**.

3.3. STEP 3 – CONCEPTUAL DESIGN AND EVALUATION MATRIX

Concepts advancing to Step 3 of the evaluation process were evaluated qualitatively based on: Ability to meet purpose and need; Social, economic, and environmental impacts; and Relative cost.

This assessment is documented in an evaluation matrix prepared for each primary intersection. The goal of Step 3 is to identify those alternatives that have high impacts and few benefits that should be discarded before reaching the Level 3 screening for the ProPEL US 30 West Study.

The qualitative analysis was based on footprints created by preparing conceptual designs based on current design standards and assumptions that were coordinated with INDOT, which are provided in **Appendix C**. Figures of alternatives provided in this document show only the approximate footprint of each alternative and do not provide design detail. No design detail is provided as the safety and operational analysis of the Level 3 screening is expected to result in refinement of these conceptual designs.

During the conceptual design process, the environmental constraints present at each location were analyzed as part of the development of intersection alternatives with a particular focus on avoidance and minimization of adverse impacts to human and natural environment, when feasible. When avoidance was infeasible, minimization measures (e.g., retaining walls) were incorporated where possible to avoid impacts to environmentally sensitive areas (e.g., historic properties, churches, cemeteries, wetland and water resources). The results of this analysis are shown in the screening tables at each location.

Conceptual designs were developed by using existing aerial photography and LiDAR data provided by the State of Indiana and/or available in *OpenRoads ConceptStation*. This information was used in the *OpenRoads ConceptStation* software to produce conceptual designs for each of the primary intersections. The *OpenRoads ConceptStation* platform was selected for use as it provided an efficient means to visualize intersection alternatives and associated impacts at a planning level, and because it provides the ability to interface with Geographic Information Systems (GIS), which improves both the quality of data utilized in the conceptual design and the ability to produce graphics.

After development of conceptual designs and footprints, all alternatives for a given intersection were compared in the evaluation matrix and only those with reasonable impacts were selected for advancement to the Level 3 screening process. The methodology used in the evaluation matrix is explained below.

3.3.1. ABILITY TO MEET PURPOSE & NEED

The intersection alternatives advancing from Step 3 must satisfy at least a portion of the purpose and need for the study. The ability of each alternative to address purpose and need at each primary intersection was determined by answering the questions listed in **Table 3-2.**

Table 3-1: Needs Assessment

Needs	Performance Measure
Regional and Statewide Mobility	Improve operations on US 30 or US 31 and not introduce delay.
Safety Along US 30 and US 31	Reduce conflict points or apply crash reduction measures to improve safety.
Corridor Access	Maintain or improve local access or meet INDOT Access Management guidelines or reduce non-compliant access points.
Roadway Deficiencies	Improve substandard elements of the corridor.

Table 3-2: Evaluation Criteria (Purpose and Need)

	Criteria	Performance Measure	Ratings and Definitions
Purpose and Need	Safety	Applies safety countermeasures to reduce crash rates and/or severity?	Yes = The concept applies safety countermeasures to address identified concerns.
			No = The concept does not apply safety countermeasures that address identified concerns, or no safety concerns have been identified.
			N/A = Not applicable.
	Traffic operations	Reduces delay or improves intersection operations?	Yes = The concept reduces delay or improves operations.
			No = The concept does not reduce delay or improve operations.
			N/A = Not applicable.
	Access Management	Maintains or improve local access?	Yes = The concept maintains or improves local access on US 30 or US 31.
			No = The concept does not maintain or improve local access on US 30 or US 31.
			N/A = Not applicable.
		Meets access management guidelines?	Yes = The concept meets access management guidelines.
			No = The concept does not meet access management guidelines.
			N/A = Not applicable.
	Deficiencies	Improves substandard elements in the corridor?	Yes = The concept improves substandard elements in the corridor.
			No = The concept does not improve substandard elements in the corridor.
			N/A = Not applicable.

3.3.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL IMPACTS

The intersection alternatives developed for the US 30 West study area have a wide range of impacts on various social, economic, and environmental factors, which are listed in **Table 3-3**. These impacts were assessed qualitatively for each alternative to determine the relative impacts and better inform the decision-making process. The assessment of impacts was based on imagery analysis, Google maps (http://maps.google.com), and desktop GIS analysis.

Table 3-3: Social, Economic, and Environmental Factors

Natural Resources	Cultural Resources	Community Impacts	ROW/ Displacements	Railroad
• Wetlands • Streams • Floodplains • Lakes • Forests • Protected Species Habitat • INDOT Mitigation Sites	• Above-Ground Resources • Archaeological Resources • Potential Section 4(f) Resources	• Access to/from US 30 and US 31 corridors • Communities with Environmental Justice Concerns • Underserved Communities • Businesses • Farmland	• Right-of-way/ Relocations • Businesses • Farmland	• Railroad Crossings and/or Adjacent Tracks

3.3.3. RELATIVE COST

Approximate costs for all intersection alternatives evaluated in the Level 2 screening process were estimated from historical cost information or from high-level construction cost estimates when no historical cost information was available. These costs per location, provided in **Table 3-4**, were used to determine the relative cost of these alternatives.

Relative costs were estimated on a low/medium/high basis as follows:

- Low Cost: <$5M
- Medium Cost: $5M to $15M
- High Cost: >$15M

Table 3-4: Estimated Cost of Concepts

Improvement	Relative Cost
Do Nothing	Low
Access Modifications	Low
Unsignalized Intersection Improvements	
Reduced Conflict Intersection	Low
Roundabout	Medium
Signalized Intersection (New)	Low
Grade Separation	Medium
Convert to Interchange	High
Auxiliary Lane (1/2-mile length)	Low
Signal Timing Updates	Low
Add/Lengthen Turn Lanes (Per Lane)	Low
Add/Extend Acceleration/Deceleration Lanes (Per Lane)	Low
Signalized Intersection Improvements	
Quadrant Roadway	Medium
RCUT	Low
Boulevard Left	Low
Full/Partial Displaced Left Turn	High/Medium
Green-T Intersection	Low
Green-T Intersection with Overpass	High
Signal Timing Updates	Low
Add/Lengthen Turn Lanes (Per Lane)	Low
Add/Extend Acceleration/Deceleration Lanes (Per Lane)	Low
Median Safety Improvements	Low/High*
Ramp Terminal Intersection Improvements	Medium
Spot Roadway Lighting	Low
Warning Systems	Low
Bike/Pedestrian Facilities	Low
Add Capacity to Movement	Medium
Railroad Crossing Improvements	Medium
Intersection Sight Distance Improvements	Low
Freight Priority System	Low

*Low – For median cable barrier, High – For median widening

3.3.4. RATING AND COMPARISON OF INTERSECTION ALTERNATIVES

The assessments of each intersection alternative's safety and operational benefits, social, economic, and environmental impacts, and relative cost were assigned ratings as provided in **Table 3-5**, **Table 3-6**, and **Table 3-7**. The ability to meet safety, operations, access, and deficiency needs was rated on a Yes/No scale. The magnitude of environmental and right-of-way impacts was generally assessed on a low/medium/high scale, with impacts being assessed based on environmental constraints and the potential footprints of each intersection alternative as described in **Section 4**. The impacts to railroads were also assessed on a low/medium/high scale. The relative cost of each intersection alternative was also assessed on a low/medium/high scale, with ratings assigned based on historical costs.

Table 3-5: Evaluation Criteria (Environmental Impacts)

	Criteria	Performance Measure	Ratings and Definitions
Environmental Impacts	Natural Resources	Potential for adverse impacts to natural resources?	Low = The concept has the potential to result in no or relatively minor adverse impacts to documented natural resources, including wetlands, streams, floodplains, lakes, forests, protected species and mitigation sites.
			Medium = The concept has the potential to result in relatively minor adverse impacts to documented natural resources, including wetlands, streams, floodplains, lakes, protected species and mitigation sites.
			High = The concept has the potential to result in relatively high adverse impacts to documented natural resources, including wetlands, streams, floodplains, lakes, protected species and mitigation sites.
	Cultural Resources	Potential for adverse impacts to cultural resources?	Low = The concept has the potential to result in no or relatively minor adverse impacts to documented above-ground and/or archaeological resources and/or cemeteries.
			Medium = The concept has the potential to result in relatively minor adverse impacts to documented above-ground and/or archaeological resources and/or cemeteries.
			High = The concept has the potential to result in relatively high adverse impacts to documented above-ground and/or archaeological resources and/or cemeteries.
	Community Impacts	Potential for adverse impacts to underserved communities with environmental justice (EJ) concerns and/or Disadvantaged Communities (DACs)?	No = The concept does not have the potential to result in adverse impacts to underserved communities with EJ concerns and/or DACs.
			Yes = The concept has the potential to result in adverse impacts to underserved communities with EJ concerns and/or DACs.
	Right-of-Way	Potential for right-of-way impacts?	Low = The concept has the potential for no or relatively minor right-of-way (ROW) acquisition acreage.
			Medium = The concept has the potential for relatively moderate right-of-way (ROW) acquisition acreage.
			High = The concept has potential for relatively substantive right-of-way (ROW) acquisition acreage.
		Potential for displacement impacts?	Low = The concept has the potential for no or minor right-of-way (ROW) displacements.
			Medium = The concept has the potential for relatively moderate right-of-way (ROW) acquisition displacements.
			High = The concept has potential for right-of-way (ROW) acquisition displacements.
	Railroad	Potential for railroad impacts?	Low = The concept has the potential for no or relatively minor railroad impacts.
			Medium = The concept has the potential for relatively moderate railroad impacts.
			High = The concept has potential for relatively substantive railroad impacts.

Table 3-6: Evaluation Criteria (Cost)

	Criteria	Performance Measure	Ratings and Definitions
Cost	Cost	Relative costs	Low = The concept would include relatively minor costs to implement.
			Medium = The concept would include relatively moderate costs to implement.
			High = The concept would include relatively high costs to implement.

The ratings were compiled into an evaluation matrix, as depicted in **Figure 3-3**, where a decision on whether to carry the intersection alternative forward could be made based on the ratings.

3.3.5. ADVANCEMENT TO LEVEL 3

The decision to advance an intersection alternative for further consideration in the Level 3 screening was based on the outcome of the needs, environmental impacts, and relative cost evaluation. Alternatives that did not significantly address needs, with high costs and high impacts were discarded. Alternatives that satisfied needs at a high level with reasonable impacts and costs were selected for advancement unless extenuating factors indicated the alternative should be discarded. These factors are listed in the evaluation matrix for documentation purposes.

Figure 3-3: Evaluation Matrix

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
Intersection	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build														
Primary Concepts														
Access Management														
Median Safety Improvements														
Add or Lengthen Turn Lanes														
Add/Extend Acceleration/ Decel Lanes														
Cross Road Overpass/ Underpass														
Convert to Interchange														
Signalized Intersection Improvements														
Unsignalized Intersection Improvements														
Complementary Concepts														
Realign Skewed Intersections														
Intersection Sight Distance Improvements														
Auxiliary Lanes														
Bypass														
Signal Timing Updates/ Coordination														
Add Capacity to Movements														
Ramp Terminal Intersection Improvements														
Wildlife Crossings														
Railroad Crossing Improvement														
Spot Roadway Lighting														
Warning Systems														
Freight Priority System														
Roadside Assistance														

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
Intersection	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
Incident Management														
Traveler Information Systems														
Bike/Pedestrian Facilities														
Non-Motorized User Accommodations														

3.3.6. STUDY AREA GOALS

Study area goals were developed for the ProPEL US 30 West study in conjunction with the INDOT project management team, resource agencies, and input from stakeholders and the public. The goals reflect both the local and regional planning documents and are aligned with the adjacent ProPEL US 30 East and ProPEL US 31 studies as applicable. Study area goals are useful as a guide to the development and review of potential concepts, but they do not take the place of the purpose and need statement. Goals will not be the sole basis for eliminating or carrying forward a solution or alternative; they will be considered alongside other factors such as transportation performance, benefits, impacts, and costs.

As part of the Level 2 screening, the study area goals were considered; however, the relative ability of each specific intersection alternative to address broader study area goals was difficult to assess given these improvements are at isolated locations. A more robust assessment of study area goals will occur once the improvement packages are developed and analyzed as part of the Level 3 screening. In the interim, the relative ability to support each of the seven stated goals was considered as part of the Level 2 screening criteria, as shown in **Table 3-8**.

Table 3-7: Study Area Goals

Study Area Goal	How Measured?	Where Considered in Level 2 Screening Criteria?		
		Relative Ability to Meet Purpose and Need	Relative Environmental Impacts	Relative Cost
Economic Development	Support the existing economy and/or planned economic development through improved safety, mobility and/or access.	X		
Equity in Transportation	Improve safety, mobility, or access for underserved communities.	X	X	
Multi-Modal Access and Connections	Include sidewalk, trails or other non-motorized methods of travel, and transit.	Level 3 will include additional alternative development, including identification of where bicycle/pedestrian infrastructure may be included. None of the Level 2 intersection alternatives preclude the incorporation of bicycle/pedestrian infrastructure.		
Emerging Technologies	Has the potential to interact with connected vehicles and/or support alternative fuel initiatives.	The INDOT National Electric Vehicle Infrastructure (NEVI) Plan includes the US 30 corridor across Northern Indiana as an alternative fuel corridor. Further and more detailed consideration will occur in Level 3.		
Fiscal & Environmental Practicality	Expected to have minimal negative environmental impacts (positive impacts in some cases) and are expected to have good returns on the investments.	X	X	X
Corridor Character	Preserve rural character and support agricultural activities.	X	X	
Local Access	Maintain local access for residents and businesses	X		X

4. INTERSECTION ALTERNATIVES

4.1. US 30 AND SR 49 IN PORTER COUNTY

4.1.1. OVERVIEW OF LOCATION

This partial cloverleaf (PARCLO) interchange is expected to operate acceptably through the design year of this study for all ramp and mainline movements. The crash cost index for all ramps and mainline are slightly elevated, indicating an opportunity for safety improvements at the interchange.

This interchange is located at the eastern limits of the city of Valparaiso. Valparaiso University is located just west of the interchange, the Porter County Municipal Regional Airport is in the northeast corner of the interchange, and an industrial park is located in the southeast corner of the interchange. There have been no specific public comments to date regarding concerns at this interchange.

The area surrounding the Porter County Regional Airport is located within the Porter County Airport Economic Development Zone. Future development and expansion of the industrial parks is expected as noted in the "Envision 2030 Valparaiso Comprehensive Plan". The Envision 2030 Valparaiso Comprehensive Plan indicates that a gateway into Valparaiso is desired at US 30 and SR 49.

4.1.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the US 30 and SR 49 interchange poses numerous constraints that were considered in the development of alternatives. The constraints are summarized as follows:

- A residential area is located just south of eastbound US 30 on-ramp.
- A railroad running east and west located south of US 30.
- Porter County Regional Airport is located directly east of the interchange.
- Several businesses are in a commercial area adjacent to northbound SR 49 on-ramp.
- Underserved populations are located near the interchange.
    - Family Income Below Poverty Level
    - Non-English Speaking Population
    - Minority Population
- A stream runs along the south side of eastbound US 30.

4.1.3. SCREENING OF ALTERNATIVES

The decision tree indicates that improvements to the existing interchange would be applicable, while new grade-separated and at-grade alternatives would be unnecessary. Alternatives were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-1**.

The primary alternatives that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Extend Acceleration/Deceleration Lanes – The existing US 30 eastbound acceleration lane is substandard and should be lengthened.

Complementary Concepts to be considered at this interchange are as follows:

- Add Capacity to Movements – Potential to improve mobility at the interchange.

The interchange alternatives advancing to the conceptual footprint comparison conceptual design stage are described below. The Complementary Concepts have been incorporated into these intersection interchange alternatives where applicable.

4.1.3.1. Extend Acceleration Lanes Alternative

At this interchange, the only substandard deceleration or acceleration lane identified was the SR 49 northbound to US 30 eastbound acceleration lane. This alternative would improve the safety at the interchange of US 30 and SR 49 by providing a longer dedicated lane for vehicles entering US 30 eastbound from SR 49 northbound to reach the design speed before merging with through traffic on US 30. This would decrease the risk of rear-end crashes. This alternative would also improve operations by reducing the differential speed between mainline and entering ramp traffic. The improvement limits for this alternative are shown in **Figure 4-1**.

The complementary concept, Add Capacity to Movements, could have impacts on the surrounding natural resources without adding much benefit as additional capacity for this facility is not needed. For this reason, this complementary concept will not be advanced for further evaluation in the Level 3 screening process.

This alternative would require minimal additional right-of-way and all property access would be maintained. This alternative could have impacts on the surrounding natural resources such as the stream running along the south side of eastbound US 30. This is considered a low-cost option due to the low potential for right-of-way acquisition impacts. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.1.4. INTERCHANGE ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

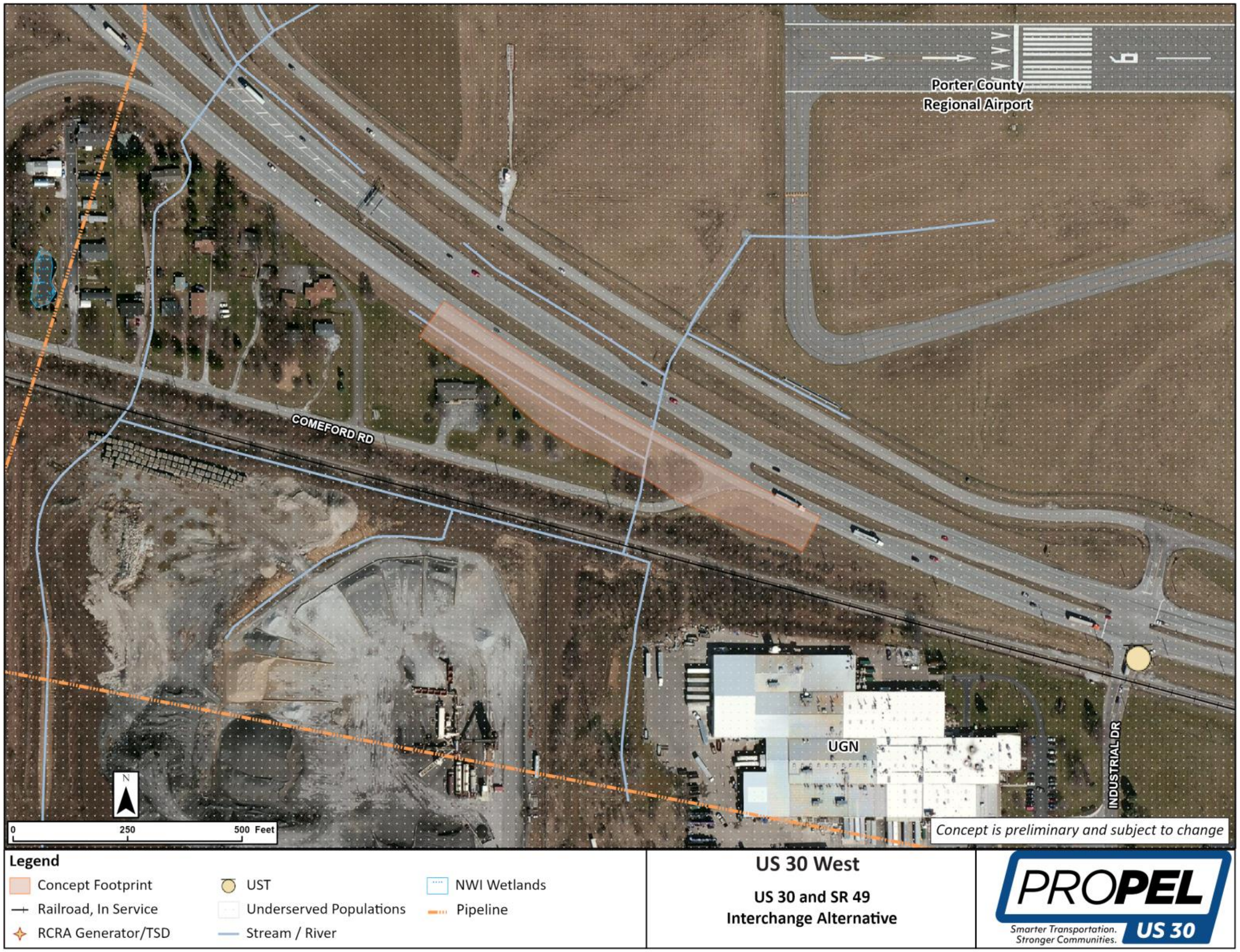
The following interchange alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives
- Extend Acceleration Lanes

Table 4-1: US 30 and SR 49 Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x SR 49	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential For Adverse Impacts to Natural Resources?	Potential For Adverse Impacts to Cultural Resources?	Potential For Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	Yes	Yes	No	N/A	N/A	No	N/A	N/A	N/A	N/A	**Yes**	
Primary Concepts														
Add/Extend Acceleration/Deceleration Lanes	Yes	Yes	Yes	Yes	Yes	Medium	Low	No	Low	Low	N/A	Low	Yes	Add acceleration lanes to east half of interchange.
Complementary Concepts														
Add Capacity to Movements	No	Yes	Yes	Yes	No	Medium	Low	No	Low	Low	N/A	Medium	No	Additional capacity for this facility is not needed. This concept will not be advanced for further evaluation.

Figure 4-1: US 30 and SR 49 – Interchange Improvement Alternative



4.2. US 30 AND INDUSTRIAL DRIVE IN PORTER COUNTY

4.2.1. OVERVIEW OF LOCATION

This signalized intersection is expected to operate acceptably through the design year of this study. The crash cost index is slightly elevated, indicating there are opportunities to improve safety.

This intersection is an entrance to the Porter County Regional Airport on the north side of the roadway and an industrial park south of the intersection. The Porter County Regional Airport recommended improving the quality of US 30 (i.e., condition of facilities) and including new airport signage as part of area improvements. No other public comments have been received to date regarding concerns at this intersection.

The area surrounding the Porter County Regional Airport is located within the Porter County Airport Economic Development Zone. Future development and expansion of the industrial parks is expected as noted in the "Envision 2030 Valparaiso Comprehensive Plan". The Envision 2030 Valparaiso Comprehensive Plan indicates that a gateway into Valparaiso is desired at US 30 and SR 49. A 2013 joint study conducted by the City of Valparaiso, the Porter County Regional Airport, and Porter County titled "In Plane View: A Clear Vision of the Future" notes a goal of reducing the number of curb cuts along US 30 as well as general recommendations of farmland preservation, sustainable development, and buffers and setbacks. "In Plane View: A Clear Vision of the Future" also recommends creating a new airport entrance at Industrial Drive and adding a traffic signal at the intersection. This plan also recommends a small gateway feature and planting treatment be constructed at this intersection.

4.2.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the US 30 and Industrial Drive intersection poses numerous constraints that were considered in the development of alternatives. The constraints are summarized as follows:

- Several businesses are located adjacent to the intersection, including UGN, Task Force Tips, and Top Fuel CrossFit.
- Pilot Travel Center is located 0.3 miles east of the intersection.
- The interchange of US 30 and SR 49 is located 0.5 miles west of the intersection.
- An at-grade railroad crossing is located on the south leg of the intersection, crossing Industrial Drive.
- 2 National Wetlands Inventory (NWI) wetlands are in the vicinity of the intersection.
- Hazardous material concerns are near the intersection, including 1 Underground Storage Tank (UST) and 3 Leaking Underground Storage Tank (LUST) sites located in the northeast quadrant of the intersection.
- Underserved populations are located near the intersection.
    - Non-English Speaking Population

4.2.3. SCREENING OF ALTERNATIVES

The decision tree indicates that at-grade alternatives would be applicable, while grade-separated alternatives would be unnecessary. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative cost, with the results of this screening provided in **Table 4-2**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Median Safety Improvements – The existing median does not meet Indiana Design Manual requirements and should be widened. This alternative would maintain local access.
- Add or Lengthen Turn Lanes – Existing turn lanes do not provide sufficient deceleration length and should be lengthened. This alternative would maintain local access.
- Signalized and Unsignalized Intersection Improvements – This intersection is important for access to and from US 30 due to a regional airport to the north, industrial area to the south, and the interchange of US 30 and SR 49 to the east. This intersection is already signalized. The Cap-X analysis indicated that the following at-grade intersection types could produce acceptable operating conditions in the design year.
    - Partial Displaced Left Turn – This alternative would reduce delay and improve intersection operations along US 30.
    - Restricted Crossing U-Turn Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. It would also create free flow along Us 30 and meet access management guidelines.
    - Reduced Conflict Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. A Reduced Conflict Intersection would meet access management guidelines as well as create free-flow operations on US 30.

Primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.
- Add/Extend Acceleration Lanes – Crash patterns do not indicate a concern with missing acceleration lanes.
- Cross Road Overpass/Underpass – There are no other locations within approximately 2 miles with equal or better access than Industrial Drive, based on the functional classification of the route that local traffic can use to access the corridor.
- Convert to Interchange – There are no traffic volumes or other factors that support an interchange at this location as a standalone alternative. The proximity to the SR 49 interchange also precludes an interchange due to spacing constraints.
- Other signalized intersection types were eliminated through Cap-X tool analysis because their potential benefits were not substantial enough when compared to the existing conditions. Therefore, they were not further analyzed as part of this process. These intersection types included:
    - Green-T Intersection – This alternative is not applicable to a four-legged intersection.
    - Boulevard Left Turn Intersection – The Cap-X results indicate that this alternative cannot accommodate the high volume of eastbound left turning traffic projected at this intersection.

Complementary Concepts to be considered as part of intersection alternatives are as follows:

- Signal Timing Updates / Coordination – Signal timing updates and coordination have the potential to improve safety and relieve congestion, when applied to alternatives that retain a signal at this intersection and nearby signalized intersections.
- Spot Roadway Lighting – Provide lighting for all alternatives.
- Warning Systems – Potential to raise awareness for approaching traffic.

- Freight Priority System – Potential to reduce delay for trucks.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.2.3.1. Median Safety Improvement Alternative

Widening the existing median from 26 feet improves safety at the intersection of US 30 and Industrial Drive by reducing the likelihood of head-on crashes. This alternative would widen the median of US 30 while maintaining the existing left and right turn lanes. The improvement limits for this alternative are shown in **Figure 4-2**.

The widened median alternative includes right-of-way impacts to all quadrants due to grading, but there are no changes to property access. This alternative also includes widening of the existing railroad crossing located on the south leg of the intersection. This is considered a medium-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.2.3.2. Lengthen Turn Lanes Alternative

Lengthened turn lanes would improve safety at the intersection by providing sufficient deceleration length and increased storage space, thereby reducing the chances of rear-end crashes. The lengthened turn lanes would meet Indiana Design Manual (IDM) standards. The improvement limits for this alternative are shown in **Figure 4-2**.

The lengthened turn lanes alternative's impacts would be limited to within the existing right-of-way with no impact to the existing at-grade railroad crossing at the south leg of the intersection. There are no changes to property access. This is a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.2.3.3. Partial Displaced Left Turn Alternative

The Partial Displaced Left Turn (DLT) alternative would reroute left turns from US 30 upstream of the main intersection, thereby eliminating the left turn signal phase for the mainline approach at the main intersection. This would improve operations and reduce delay at the intersection of US 30 and Industrial Drive. The improvement limits for this alternative are shown in **Figure 4-3**.

The Partial DLT alternative would include right-of-way impacts in all quadrants of the intersection and widening of the existing at-grade railroad crossing at the south leg of the intersection, as well as the potential relocation of one or more properties and impacts to underserved populations. This is a medium-cost option. This intersection alternative will not be advanced for further consideration in Level 3.

4.2.3.4. Restricted Crossing U-Turn Intersection Alternative

The RCUT alternative would reroute left turns from Industrial Drive to US 30. A truck loon has been included in the design of this alternative to assist with the completion of U-Turns. The improvement limits for this alternative are shown in **Figure 4-4**.

Impacts are expected in all quadrants of the intersection and widening of the existing at-grade railroad crossing at the south leg of the intersections. Additionally, the alternative requires realignment of the existing intersection of Murvihill Road and Industrial Drive to the north and potential relocation of one or more properties. This is a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.2.3.5. Reduced Conflict Intersection Alternative

The Reduced Conflict Intersection alternative would allow the free-flow of through traffic along US 30 while rerouting left turns from Industrial Drive to US 30 and minor road through movements. This would improve safety by reducing the risk of right-angle crashes and reduce delay at the intersection. The addition of truck loons was included in the conceptual alternative. The improvement limits for this alternative are identical to that of what is shown in **Figure 4-4.**

Impacts are expected in all quadrants of the intersection and widening of the existing at-grade railroad crossing at the south leg of the intersections. Additionally, the alternative requires realignment of the existing intersection of Murvihill Road and Industrial Drive to the north and the potential relocation of one or more properties. This is a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.2.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Median Safety Improvements (Median Widening).
- Add or Lengthen Turn Lanes.
- Restricted Crossing U-Turn.
- Reduced Conflict Intersection.
- Signal Timing Updates/Coordination – May be incorporated into all alternatives.
- Spot Roadway Lighting – May be incorporated into all alternatives.
- Warning Systems – May be incorporated into all alternatives.
- Freight Priority System – May be incorporated into all alternatives.

Table 4-2: US 30 and Industrial Drive – Qualitative Comparison of Alternatives

	Safety	**Traffic**	**Access**		**Deficiencies**	**Environmental Impacts**			**ROW**		**Railroads**	**Cost**	**Advance**	
US30 x Industrial Drive	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	Yes	Yes	No	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Median Safety Improvements	Yes	Yes	Yes	Yes	Yes	Low	Low	No	Low	Low	Medium	Medium	Yes	Widened Median would provide improved safety at the intersection by increasing separation between opposing travel lanes.
Add or Lengthen Turn Lanes	Yes	No	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Lengthened EB and WB right and left turn lanes would improve intersection safety by providing sufficient deceleration length to meet IDM Standards and reduce the risk of rear-end crashes.
Signalized Intersection Improvements														
Partial DLT E-W	Yes	Yes	Yes	Yes	No	Low	Low	Yes	Medium	Medium	Medium	Medium	No	Alternative eliminated because of the cost and right-of-way impacts.
Restricted Crossing U-Turn Intersection	Yes	Yes	Yes	Yes	No	Low	Low	No	Low	Low	Medium	Low	Yes	Improves safety by reducing conflicting movements and reduces delay by reducing the number of required signal phases.
Unsignalized Intersection Improvements														
Reduced Conflict Intersection	Yes	Yes	Yes	Yes	No	Low	Low	No	Low	Low	Medium	Low	Yes	Improves safety by reducing conflicting movements
Complementary Concepts														
Signal Timing Updates/Coordination	Yes	Yes	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Potential to improve safety and relieve congestion. Signal timings can be updated to be more efficient but there are currently no other signals close enough for coordination.
Spot Roadway Lighting	Yes	No	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Provide lighting for alternatives per INDOT guidelines
Warning Systems	Yes	No	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Raises awareness of approaching traffic to improve safety
Freight Priority System	No	Yes	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Can reduce delays for trucks by extending green time. Can be applied alongside signalized concepts.

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Figure 4-2: US 30 and Industrial Drive – Lengthened Turn Lanes and Median Safety Improvements Alternatives

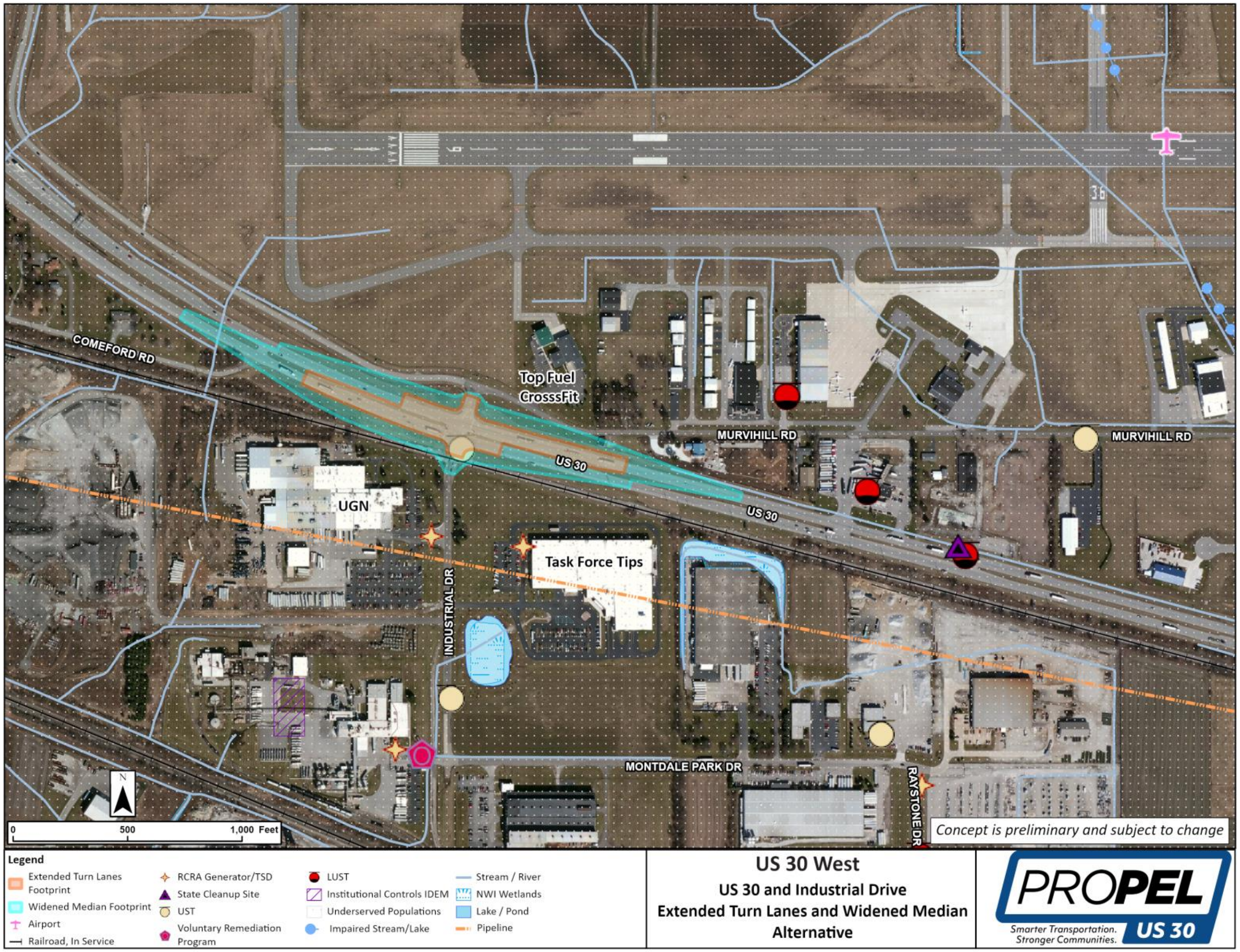


Figure 4-3: US 30 and Industrial Drive – Partial Displaced Left Turn Alternative

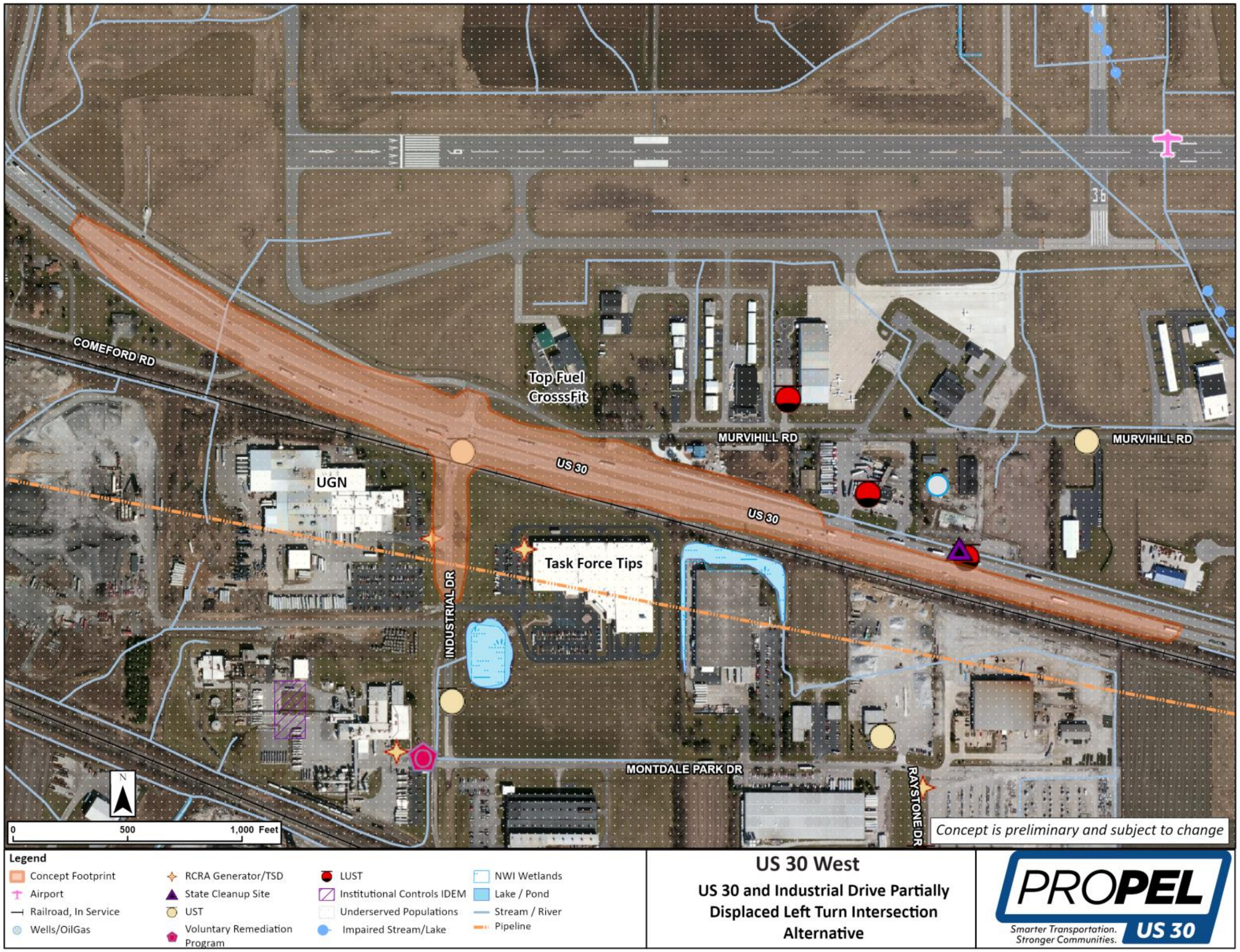
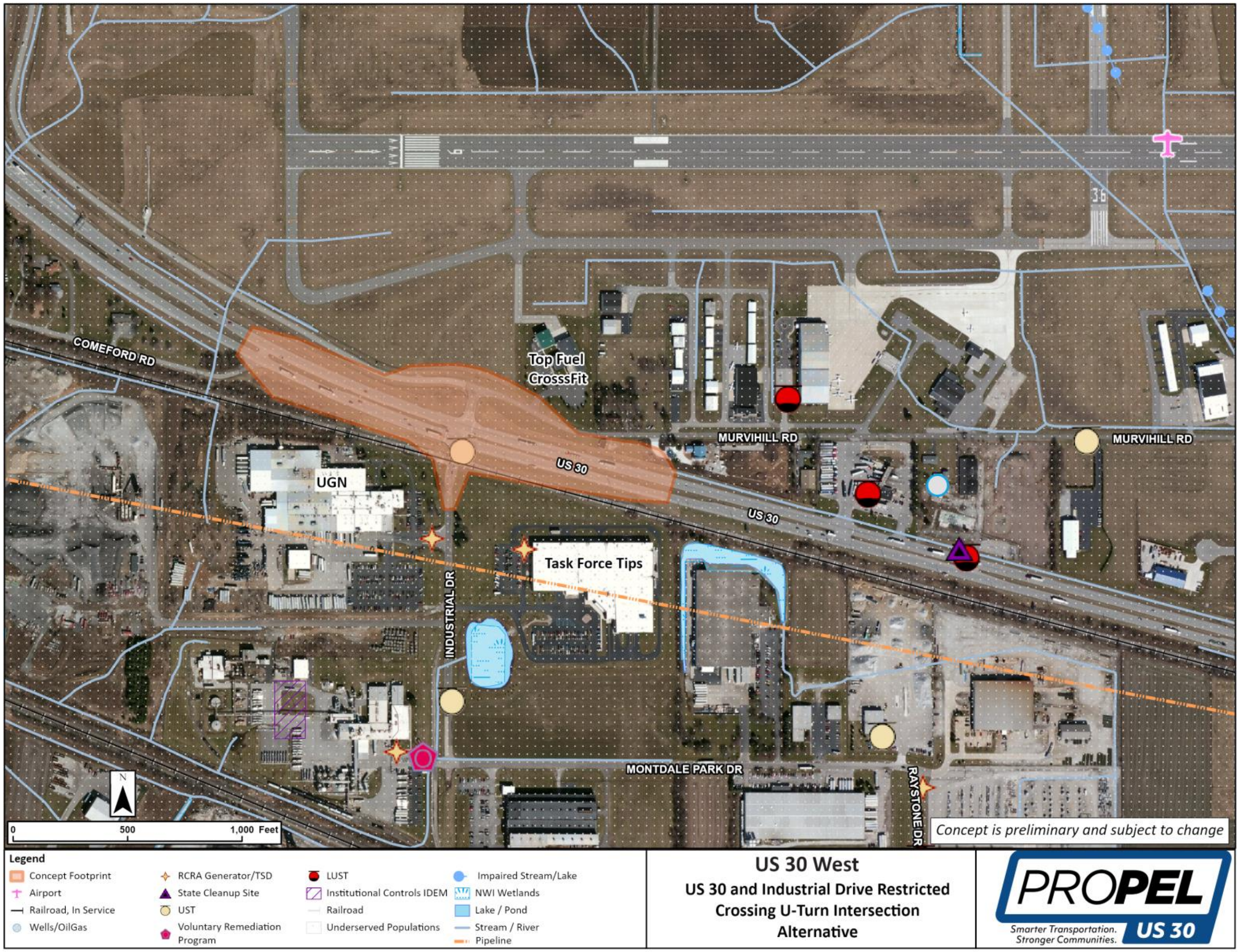


Figure 4-4: US 30 and Industrial Drive – Restricted Crossing U-Turn Intersection Alternative



4.3. US 30 AND CR 325 E IN PORTER COUNTY

4.3.1. OVERVIEW OF LOCATION

This intersection is expected to operate acceptably through the design year of this study. The crash frequency and crash cost indices for the intersection are both slightly elevated, indicating there are opportunities for safety improvements at the intersection.

The Porter County Airport recommended grade separation at this intersection.

4.3.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the US 30 and Porter CR 325 E intersection poses numerous constraints that were considered in the development of alternatives. These constraints are summarized as follows:

- Several businesses are located adjacent to the intersection, including Two Men and A Truck, H&T Electrical Services, Weed Man, White Cap, Culligan Water of Valparaiso, and Fastenal Fulfillment Center
- Pilot Travel Center is located 0.4 miles west of the intersection.
- The interchange of US 30 and SR 49 is located 1.4 miles west of the intersection.
- An at-grade railroad crossing is on the south leg of the intersection, crossing Porter CR 325 E.
- 1 NWI wetland is in the vicinity of the intersection.
- Hazardous material concerns are near the intersection, including 1 UST and 3 LUST sites located west of the intersection.
- A mobile home park is in the northeast quadrant of the intersection.
- Underserved populations are located near the intersection.
    - Non-English Speaking Population
- US 30 crosses an impaired stream just east of the intersection

4.3.3. SCREENING OF ALTERNATIVES

This intersection is important for access to and from US 30 due to an industrial area to the south and several businesses and a mobile home park to the north. The decision tree indicates that both at-grade and grade-separated alternatives would be applicable, while an interchange would be unnecessary. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-3**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Median Safety Improvements – The existing median does not meet IDM requirements and should be widened. This alternative would maintain local access.
- Add or Lengthen Turn Lanes – The existing left turn lanes do not provide sufficient deceleration lengths and right turn lanes are missing. The left turn lanes should be lengthened and right turn lanes should be added. This alternative would maintain local access.
- Cross Road Overpass/Underpass – There are other locations with approximately 2 miles of the intersection that provide equal or better access based on the functional classification of the route

that local traffic can use to access the corridor. Therefore, a cross road overpass or underpass should be considered, especially in Level 3 as part of a limited access section.

- Signalized and Unsignalized Intersection Improvements – This intersection is important for access to and from US 30 due to the industrial area to the south and mobile home park in the northeast corner. The crash cost and crash frequency indices indicate there is opportunity for safety improvements. This intersection is currently two-way stop controlled and forecasted traffic volumes meet a signal warrant. The Cap-X analysis indicated that the following intersection types could produce acceptable operating conditions in the design year:

    - Restricted Crossing U-Turn Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. It would also meet access management guidelines and maintain local access.
    - Signalized Intersection – This alternative would improve safety, for some types of crashes (right-angle), but may introduce other types (rear-ends) as well. It would improve intersection operations. This alternative would maintain local access.
    - Roundabout– This alternative would reduce delay and improve intersection operations along US 30 while maintaining all local access. This alternative also improves safety at the intersection by reducing speeds and lowering the risk of right-angle crashes.
    - Reduced Conflict Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. A Reduced Conflict Intersection would meet access management guidelines and maintains local access as well as preserve free-flow operations on US 30.

Primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.
- Add/Extend Acceleration Lanes – Crash patterns do not indicate a concern with missing acceleration lanes.
- Convert to Interchange – There are no factors that support an interchange. The proximity to the SR 49 interchange also precludes an interchange due to spacing constraints.
- Other signalized intersection types were eliminated through Cap-X tool analysis because their potential benefits were not substantial enough when compared to the existing conditions. Therefore, they were not further analyzed as part of this process. These intersection types included:

    - Green-T Intersection – This alternative is not applicable to a four-legged intersection.
    - Displaced Left Turn Intersection – Based on low left turning volumes and the requirement of additional right-of-way for left turn crossovers, this alternative would become prohibitively expensive compared to other feasible intersection types such as an RCI.
    - Boulevard Left Turn Intersection – The Cap-X results indicate that this alternative would add additional delay to the mainline left turning traffic.

Complementary Concepts to be considered as part of Intersection Alternatives are as follows:

- Signal Timing Updates / Coordination – Signal timing updates and coordination have the potential to improve safety and relieve congestion.
- Intersection Sight Distance Improvements – Potential to improve safety.
- Spot Roadway Lighting – Provide lighting for intersection alternatives.
- Warning Systems – Potential to raise awareness for approaching traffic.
- Freight Priority System – Potential to reduce delay for trucks.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.3.3.1. Median Safety Improvements Alternative

Widening the median from the existing 26-foot median increases safety at US 30 and Porter CR 325 E by reducing the likelihood of head on crashes. This alternative maintains the existing eastbound and westbound left turns while widening the median of US 30. The improvement limits of this alternative can be seen in **Figure 4-5**.

The widened median only has right-of-way impacts to the south of US 30 just before the railroad crossing and maintains all property access. It is considered a medium-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.3.3.2. Add and Lengthen Turn Lanes Alternative

Adding eastbound and westbound right turn lanes improves the operations of the intersection. Both adding and lengthening turn lanes improves the safety of the intersection by providing adequate deceleration lengths and increasing storage space, reducing the likelihood of rear end collisions and meeting IDM standards. The improvement limits of this alternative can be seen in **Figure 4-5**.

With the addition of eastbound and westbound right turn lanes there are potential right-of-way impacts in both the northeast and southwest quadrants of the intersection with improvements not impacting the existing railroad crossing. No changes to property access are expected. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.3.3.3. Crossroad Overpass / Underpass Alternative – Porter CR 325 E over US 30

Reconfiguring this intersection so that Porter CR 325 E goes over US 30 increases safety by eliminating access from Porter CR 325 E to US 30 and vice versa. In this alternative traffic would be routed over top of US 30 by use of a bridge. The improvement limits of this alternative can be seen in **Figure 4-6**.

By constructing an overpass to reach the allowed clearance over the railroad and US 30 the NWI-line wetland associated with the constructed ditch in the southeast quadrant would be impacted by grading. The potential right-of-way impacts of a minor road overpass at this intersection are along the east and west sides of Porter CR 325 E with the largest impacts coming closer to US 30. This is where the potential roadway is the highest before the bridge. Right-of-way impacts then taper back into the existing limits as the potential road profile ties back into the existing profile. With this alternative there are potential relocations in the northeast, northwest, and southwest quadrants. Included in the impacts to right-of-way would be impacts to the mobile home park to the north of US 30, this has the potential to be an environmental justice concern. It is considered a medium-cost option.

This alternative is mainly applicable to the improvement packages associated with the limited access section, to be analyzed in Level 3. This grade-separated configuration was preliminarily selected as opposed to elevating US 30 over Porter CR 325 E due to the assumed lower impacts given the rural environment. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.3.3.4. Restricted Crossing U-turn Intersection Alternative

The RCUT alternative keeps all existing movements for US 30 while rerouting left turns and through movements from Porter CR 325 E to US 30. A truck loon was included in the conceptual design. The improvement limits for this alternative are shown in **Figure 4-7**.

Potential right-of-way impacts are expected in all quadrants of the intersection. Widening of the existing at-grade railroad crossing at the south leg of the intersection is also expected. Additionally, the potential design impacts the existing wetland in the southeast quadrant of the intersection. This alternative has the potential for adverse impacts to underserved populations. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.3.3.5. Signalized Intersection Alternative

Porter CR 325 E is an unsignalized intersection that meets the warrants of a signal. A signal can improve safety for some types of crashes (e.g. Right-angle) but may introduce other types (rear-ends) as well. The improvement limits would be limited to the existing footprint of the intersection and have not been drawn.

Converting to a signalized intersection requires no potential right-of-way impacts and does not encroach on the existing railroad crossing to the south, assuming turn lanes would not be added or lengthened, and the substandard median is not improved. This alternative is considered a low-cost. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.3.3.6. Roundabout Alternative

Reconfiguring the US 30 and Porter CR 325 E intersection into a roundabout alternative would require the center of the roundabout to be northeast of the current intersection so railroad impacts can be limited. The roundabout alternative would increase safety by reducing travel speed and the chance for more severe right angle, left turn, and head on collisions, although additional rear-end crashes may occur. Speed management strategies would have to be paired with the roundabout alternative to mitigate the risk of rear-end crashes. The improvement limits of this alternative can be seen in **Figure 4-8**.

The potential right-of-way impacts for this alternative affects all quadrants of the intersection. Along with right-of-way impacts, this alternative would require the railroad crossing to shift to the east, because of this shift, the wetland in the southeast quadrant would be affected as well. Potential relocations of underserved populations exist in the northeast quadrant. It is considered a medium-cost option. Due to the high impacts, this alternative will not be advanced for further consideration in the Level 3 screening process.

4.3.3.7. Reduced Conflict Intersection Alternative

The RCI alternative would allow the free-flow of through traffic along US 30 while rerouting left turns and minor road through movements from Porter CR 325 E to US 30.. This would improve safety by reducing the risk of right-angle crashes and reduce delay at the intersection. The addition of truck loons was included in the conceptual alternative. The improvement limits for this alternative are identical to that of what is shown in **Figure 4-7**.

Potential right-of-way impacts are expected in all quadrants of the intersection. Widening of the existing at-grade railroad crossing at the south leg of the intersection is also expected. This alternative has the potential for adverse impacts to underserved populations. Additionally, the potential alternative impacts the existing wetland in the southeast quadrant of the intersection. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.3.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Median Safety Improvements (Median Widening).
- Add or Lengthen Turn Lanes.
- Crossroad Overpass/Underpass.
- Restricted Crossing U-Turn Intersection.
- Signalized Intersection.
- Reduced Conflict Intersection.
- Signal Timing Updates/Coordination – May be incorporated into all alternatives involving signalization.
- Intersection Sight Distance Improvements – May be incorporated into all alternatives.
- Spot Roadway Lighting – May be incorporated into all alternatives.
- Warning Systems – May be incorporated into all alternatives.
- Freight Priority Systems – May be incorporated into all alternatives involving signalization.

Table 4-3: US 30 and Porter CR 325 E – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x Porter CR 325 E	**Applies Safety Counter-Measures**	**Reduces Delay or Improves Intersection Operations**	**Maintain or Improve Local Access**	**Meet Access Management Guidelines**	**Improves Substandard Elements**	**Potential for Adverse Impacts to Natural Resources?**	**Potential for Adverse Impacts to Cultural Resources?**	**Potential for Adverse Impacts to Underserved Populations?**	**Potential ROW Impacts**	**Potential Relocations**	**Impacts to Railroad**	**Relative Cost**	**Carry Forward?**	**Notes/ Comments**
No build	N/A	N/A	Yes	Yes	No	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Median Safety Improvements	Yes	Yes	Yes	Yes	Yes	Low	Low	No	Medium	Low	Medium	Medium	Yes	Widened Median. Alternative carried forward due to improvements to intersection safety associated with more separation between opposing travel lanes.
Add or Lengthen Turn Lanes	Yes	Yes	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Lengthen WB EB Left Turn Lanes and Added WB EB Right Turn Lanes. Alternative carried forward due to improvements to safety and intersection operations associated with sufficient deceleration length, reducing the risk of rear-end crashes. The new turn lane lengths would meet IDM standards.
Cross Road Overpass / Underpass	Yes	Yes	No	Yes	No	Medium	Low	Yes	High	High	Medium	Medium	Yes	Grading encroaches on mobile home park. Alternative carried forward due to its necessity for other alternatives being considered in Level 3.
Signalized Intersection Improvements														
Restricted Crossing U-Turn Intersection	Yes	Yes	Yes	Yes	No	Low	Low	Yes	Medium	Low	Medium	Low	Yes	Alternative carried forward due to positive impacts on intersection safety by reducing the number of conflicting movements
Signalized Intersection	No	Yes	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Alternatives carried forward because it would improve intersection operations.
Unsignalized Intersection Improvements														
Roundabout	Yes	Yes	Yes	Yes	No	Medium	Low	Yes	High	Medium	Medium	Medium	No	Alternative eliminated due to high impacts on nearby mobile home park and impacts to railroad.
Reduced Conflict Intersection	Yes	Yes	Yes	Yes	No	Low	Low	Yes	Medium	Low	Medium	Low	Yes	Carried forward because alternative would improve safety by reducing conflicting movements and improve operations by reducing delay associated with left turns onto US 30.
Complementary Concepts														
Signal Timing Updates/Coordination	Yes	Yes	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Potential to improve safety and relieve congestion for Signalized Intersection alternatives. Currently, not other signals are close enough for coordination, but timings can be updated to improve operations.
Intersection Sight Distance Improvements	Yes	No	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Intersection is on a skew. Improvements to sight distance would increase safety.
Spot Roadway Lighting	Yes	No	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Provide lighting for Intersection Alternatives
Warning Systems	Yes	No	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Raises awareness of approaching traffic for intersection alternatives
Freight Priority System	No	Yes	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Can reduce delays for trucks for Signalized Intersection Improvements

Figure 4-5: US 30 and Porter CR 325 E – Add and Lengthen Turn Lanes and Median Safety Improvements Alternatives

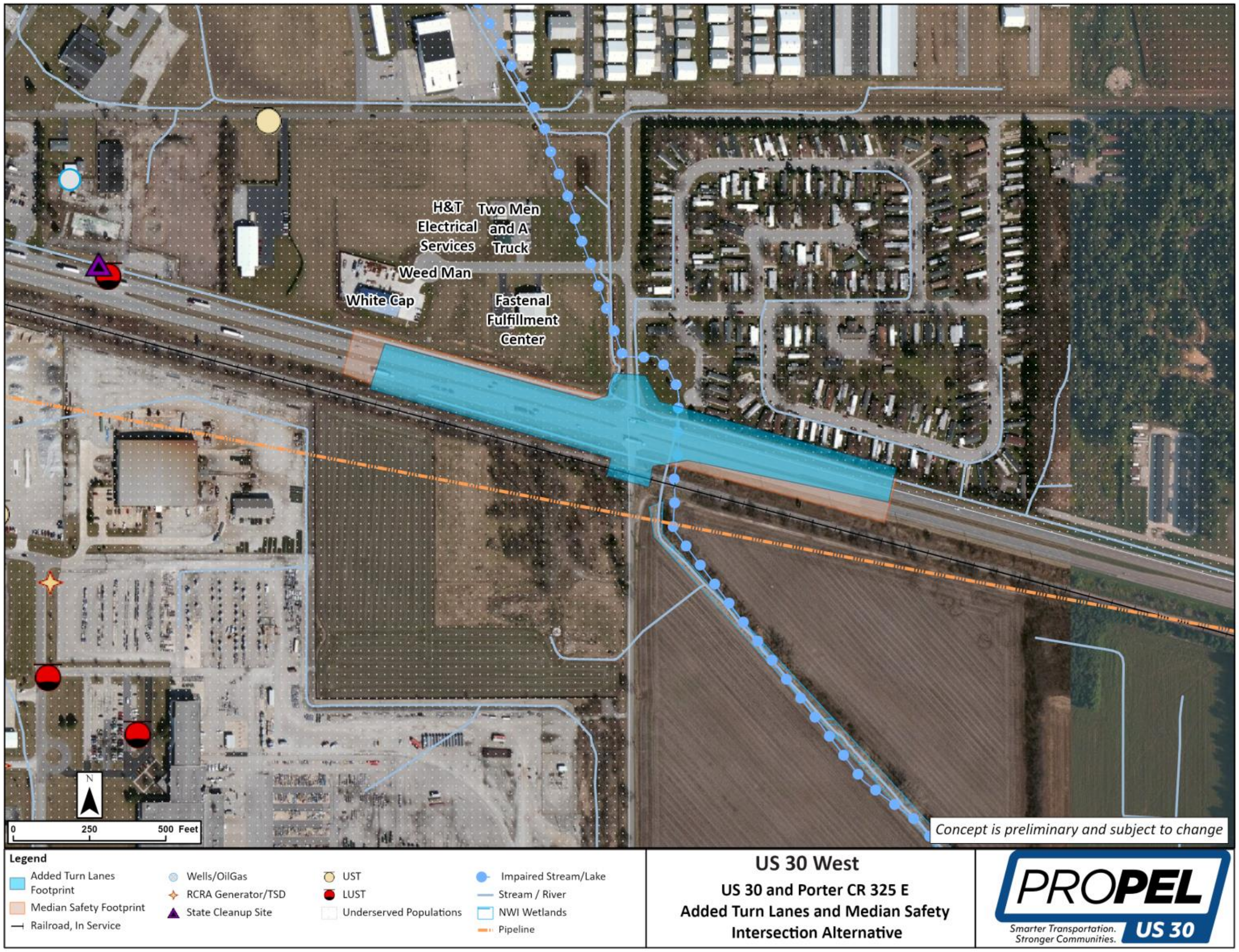


Figure 4-6: US 30 and Porter CR 325 E – Cross Road Overpass/Underpass Alternative – Porter CR 325 E Over US 30

Figure 4-7: US 30 and Porter CR 325 E – Restricted Crossing U-Turn Intersection Alternative

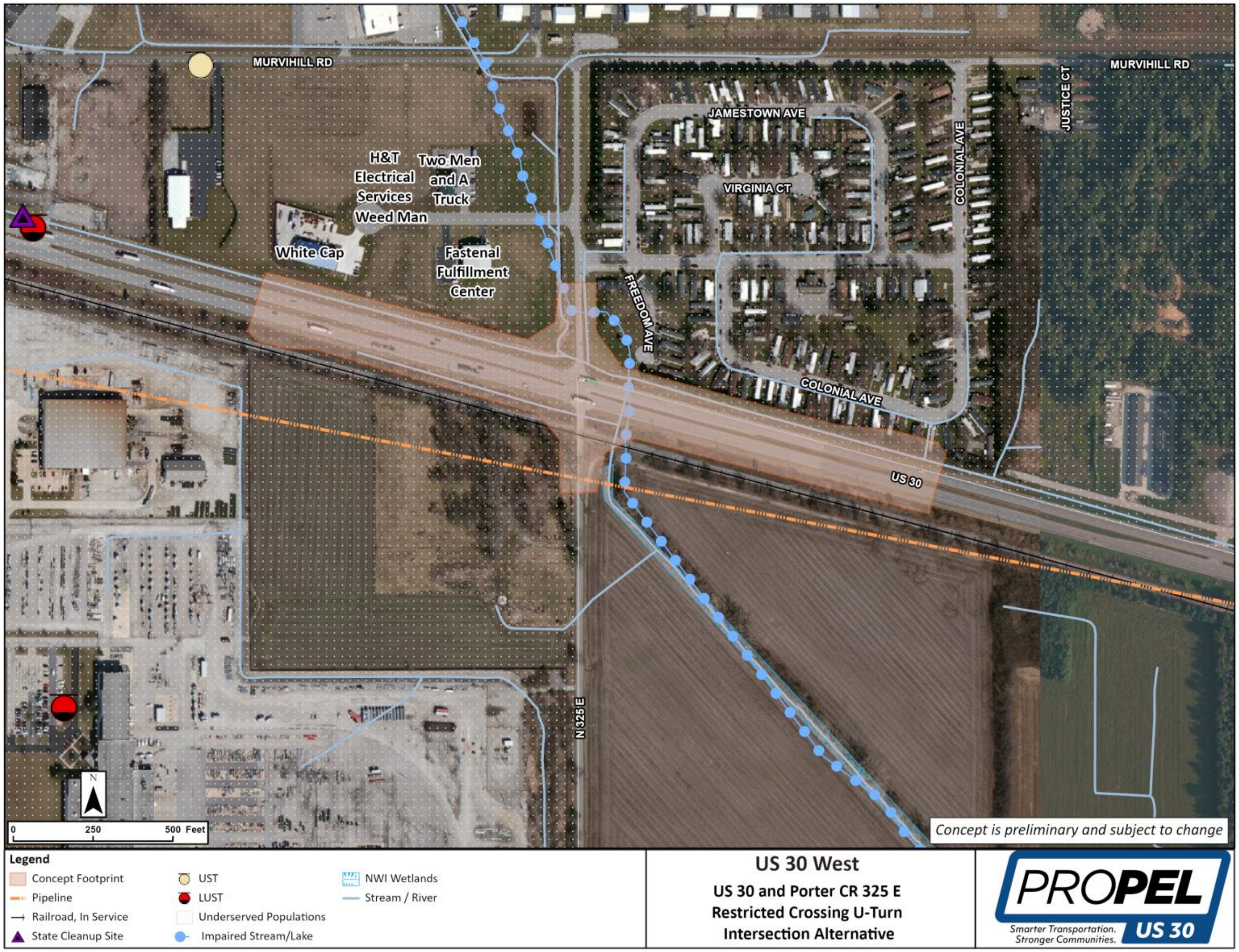
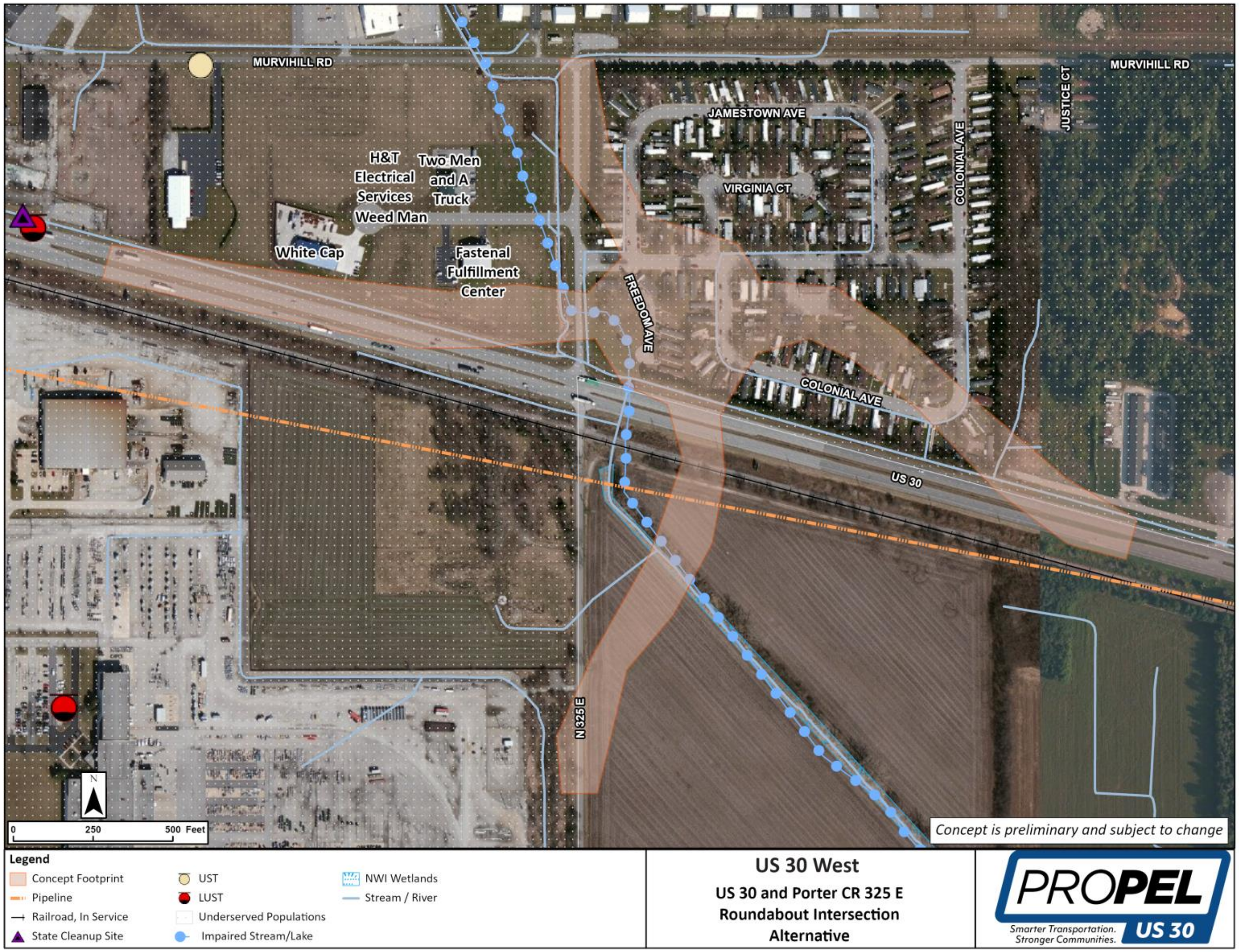


Figure 4-8: US 30 and Porter CR 325 E – Roundabout Alternative



4.4. US 30 AND CR 400 E IN PORTER COUNTY

4.4.1. OVERVIEW OF LOCATION

This intersection is expected to operate acceptably through the design year of this study. The crash frequency and crash cost indices indicate that there are no major safety concerns at the intersection. Improvements were still considered at this intersection as a part of safety or operational improvements along this segment of US 30, to be further considered in the Level 3 screening.

There is existing commercial development surrounding the intersection with a residential development on the north side of the roadway. The Porter County Airport recommended grade separation at this intersection.

4.4.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding US 30 and Porter CR 400 E poses numerous constraints that were considered in development of the alternatives. These constraints are summarized as follows:

- There are several businesses adjacent to the intersection, including: Illiana Industrial Electric Motor Service, Awards America, Tudor Floors & More Carpet One, Co Alliance, and Morgan Distributing, INC – Valparaiso
- Cain Ditch runs alongside US 30 along the east leg of the intersection.
- There is a pond and 2 NWI wetlands near the intersection.
- Multiple hazardous material concerns are located near the intersection, including 2 LUSTs; 1 located at the north leg of the intersection and 1 at the property of Co Alliance in the northeast quadrant; an Indiana Department of Environmental Management (IDEM) institutional control site is located in the southeast quadrant of the intersection.
- Underserved populations are located near the intersection.
    - Non-English Speaking Population
- There is a railroad parallel to US 30 on the south side, crossing Porter CR 400 E.

4.4.3. SCREENING OF ALTERNATIVES

The decision tree indicates that at-grade, grade-separated, and interchange alternatives are applicable. Complementary and at-grade intersection improvements can improve safety at this intersection. Grade separated alternatives were also considered due to the broader context of the area. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-4**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Median Safety Improvements – The existing median does not meet IDM requirements and should be widened.
- Add or Lengthen Turn Lanes – The existing left turn lanes do not provide sufficient deceleration length and right turn lanes are missing. The left turn lanes should be lengthened, and right turn lanes should be added. This alternative would maintain local access.

- Cross Road Overpass/Underpass– There are other locations within approximately 2 miles with equal or better access based on the functional classification of the route that local traffic would use to access the corridor. Therefore, a cross road overpass or underpass should be considered.
- Convert to Interchange – There are no factors that support an interchange at this location as a standalone alternative. However, given further bundled improvements anticipated to be analyzed in Level 3, this location was identified as a potential interchange due to the proximity of development and the city of Valparaiso and spacing from the SR 49 interchange. This alternative would maintain local access.
- Unsignalized Intersection Improvements – This intersection is important for access to/from US 30 due to the businesses in the surrounding area and overall usage of this intersection. While there are no major safety or operational concerns at this intersection, the following improvements were still considered as part of segment safety and operational improvements, to be further considered in Level 3. This intersection is two-way stop controlled and forecasted traffic volumes at this intersection do not warrant a signal. CAP-X analysis indicated that the following intersection types would operate acceptably in the design year.
    - Reduced Conflict Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. A Reduced Conflict Intersection would meet access management guidelines as well as preserve free-flow operations on US 30 and maintain local access.

Primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.
- Add/Extend Acceleration Lanes – Crash patterns do not indicate a concern with acceleration distances.
- Signalized Intersection Improvements – This intersection is currently two-way stop controlled and traffic volumes do not warrant a signal.

Complementary concepts to be considered as part of Intersection Alternatives include:

- Intersection Sight Distance Improvements – Potential to improve safety.
- Spot Roadway Lighting – Provide lighting for Intersection Alternatives.
- Warning Systems – Potential to raise awareness of approaching traffic.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.4.3.1. Median Safety Improvements Alternative

Widening the median from the existing 26-foot median increases safety at the intersection of US 30 and Porter CR 400 E by reducing the likelihood of head on crashes. This alternative maintains the existing eastbound and westbound left turn lanes while widening the median of US 30. The improvement limits of this alternative can be seen in **Figure 4-9**.

The widened median has right-of-way impacts in all quadrants of the intersection due to grading but maintains all access to surrounding properties. This alternative also includes widening of the existing at-grade railroad crossing on the south leg of Porter CR 400 E. It is considered a medium-cost option due to the minimal potential right-of-way impacts. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.4.3.2. *Add or Lengthen Turn Lanes Alternative*

This alternative would include the lengthening of existing eastbound and westbound left turn lanes and the addition of eastbound and westbound right turn lanes. Both adding and lengthening turn lanes improves safety at the intersection by providing sufficient deceleration lengths and increasing storage space which would reduce the likelihood of rear-end crashes. The proposed turn lanes would meet IDM standards. The addition of right turn lanes would improve the operations of the intersection. The improvement limits of this alternative can be seen in **Figure 4-9**.

The add or lengthen turn lanes alternative has right-of-way impacts in the northeast and southwest quadrants of the intersection, but property access is not affected. The improvement would not impact the railroad located south of the intersection. It is considered a low-cost option . This alternative will be advanced for further evaluation in the Level 3 screening process.

4.4.3.3. *Crossroad Overpass / Underpass Alternative – Porter CR 400 E over US 30*

This alternative would make use of a bridge to elevate Porter CR 400 E over US 30 and the railroad. This alternative would eliminate the existing at-grade railroad crossing and remove all access to US 30 from Porter CR 400 E and vice versa. This alternative would improve safety by removing all conflict points of the existing intersection and improves operations by eliminating any delay caused by the existing two-way stop control at the intersection. The improvement limits can be seen in **Figure 4-10**.

Extensive right-of-way is required for this alternative with several potential relocations of adjacent properties required to accommodate the grading of the overpass. This alternative has the potential for adverse impacts to underserved populations. It is considered a medium-cost option.

This alternative is mainly applicable to the improvement packages associated with a limited access section, to be analyzed in Level 3. This grade-separated configuration was preliminarily selected as opposed to elevating US 30 over Porter CR 400 E due to the assumed lower impacts given the rural environment. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.4.3.4. *Convert to Interchange Alternative*

This alternative for the free-flow alternatives allows for US 30 traffic to move without interruption. US 30 would utilize two bridges over Porter CR 400 E and on and off ramps to allow access to and from US 30. The improvement limits for this alternative can be seen in **Figure 4-11**.

Extensive right-of-way is required for this alternative with several potential relocations of adjacent properties. Substantial impacts to the existing railroad along the southside of US 30 would occur. The interchange would impact natural resources east of the intersection. This alternative has the potential for adverse impacts to underserved populations. This is a high-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process for potential use with bundled improvements.

4.4.3.5. *Reduced Conflict Intersection Alternative*

This alternative allows for free-flow conditions along US 30 while rerouting left turns from Porter CR 400 E to US 30 and minor road through movements. This would improve safety by reducing the risk of right-angle crashes and reduce delay at the intersection. The addition of truck loons was included in the conceptual design. The improvement limits for this alternative can be seen in **Figure 4-12**.

Additional right-of-way is required for this alternative with potential relocations due to changes in the intersection geometry. Larger turning radii impact the frontage road in the northwest quadrant of the intersection requiring the frontage road to be realigned. This alternative would also include the widening of the existing at-grade rail crossing at the south end of the intersection. This alternative has the potential for adverse impacts to underserved populations. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.4.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Median Safety Improvements (Median Widening).
- Add or Lengthen Turn Lanes.
- Cross Road Overpass/Underpass.
- Convert to Interchange.
- Reduced Conflict Intersection.
- Intersection Sight Distance Improvements – May be incorporated into all alternatives.
- Spot Roadway Lighting – May be incorporated into all alternatives.
- Warning Systems – May be incorporated into all alternatives.

Table 4-4: US 30 and Porter CR 400 E – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x Porter CR 400E	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	N/A	Yes	No	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Median Safety Improvements	Yes	Yes	Yes	Yes	Yes	Low	Low	Yes	Medium	Medium	Medium	Medium	Yes	Widened median. Carried forward due to improved safety associated with increasing separation between opposing travel lanes.
Add or Lengthen Turn Lanes	Yes	Yes	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Added EB and WB right turn lanes, extended EB and WB left turn lanes to meet IDM standards. Carried forward due to safety improvements associated with appropriate deceleration lengths, reducing the risk of rear-end crashes.
Cross Road Overpass / Underpass	Yes	Yes	No	Yes	No	Low	Low	Yes	High	High	High	Medium	Yes	Carried forward due to the safety and operation improvements associated with grade-separation.
Convert to Interchange	Yes	Yes	Yes	Yes	No	Medium	Low	Yes	High	High	High	High	Yes	Carried forward due to necessity for the limited access alternative. Not considered for other bundled improvements.
Unsignalized Intersection Improvements														
Reduced Conflict Intersection	Yes	Yes	Yes	Yes	No	Low	Low	Yes	Medium	Medium	Medium	Low	Yes	Carried forward due to improvements to intersection safety and operations associated with reducing conflicting movements.
Complementary Concepts														
Intersection Sight Distance Improvements	Yes	No	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Existing intersection is skewed. Improvements to sight distance will improve safety
Spot Roadway Lighting	Yes	No	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Provide lighting for intersection alternatives per INDOT guidelines
Warning Systems	Yes	No	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Raises awareness of approaching traffic to upcoming hazards, improving safety.

Figure 4-9: US 30 and Porter CR 400 E – Add or Lengthen Turn Lanes and Median Safety Improvements Alternatives

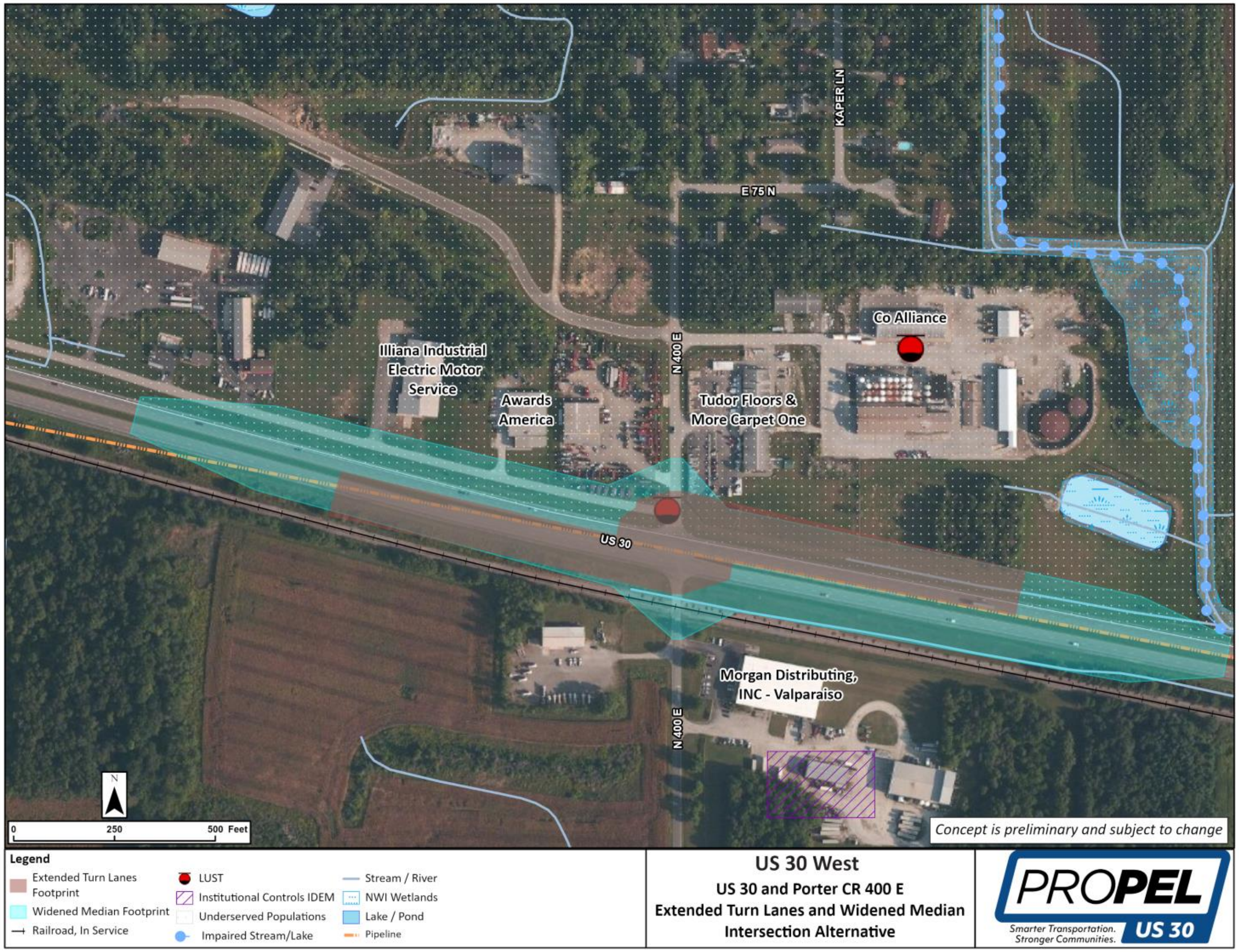


Figure 4-10: US 30 and Porter CR 400 E – Cross Road Overpass/Underpass Alternative – Porter CR 400 E Over US 30

Figure 4-11: US 30 and Porter CR 400 E – Interchange Alternative

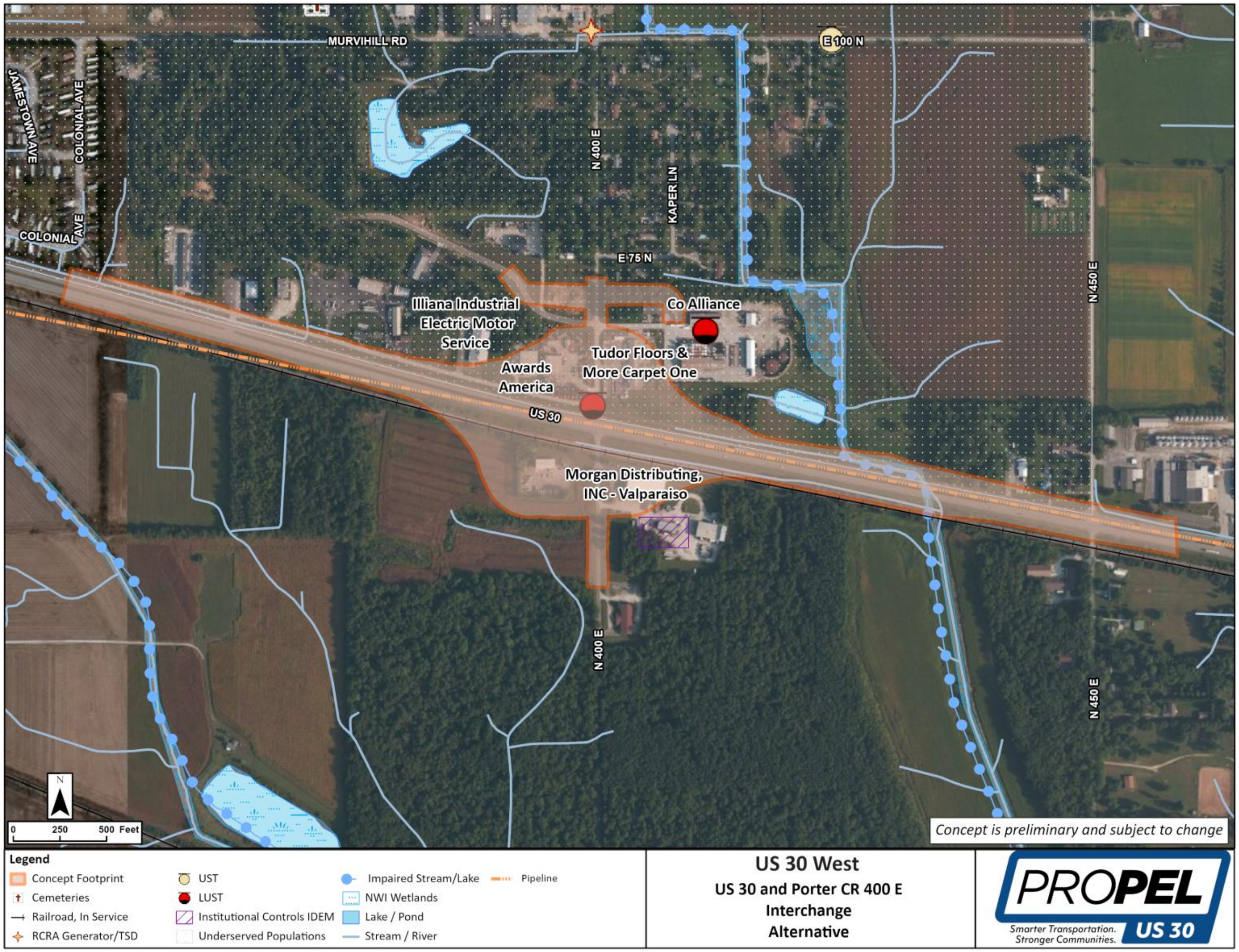
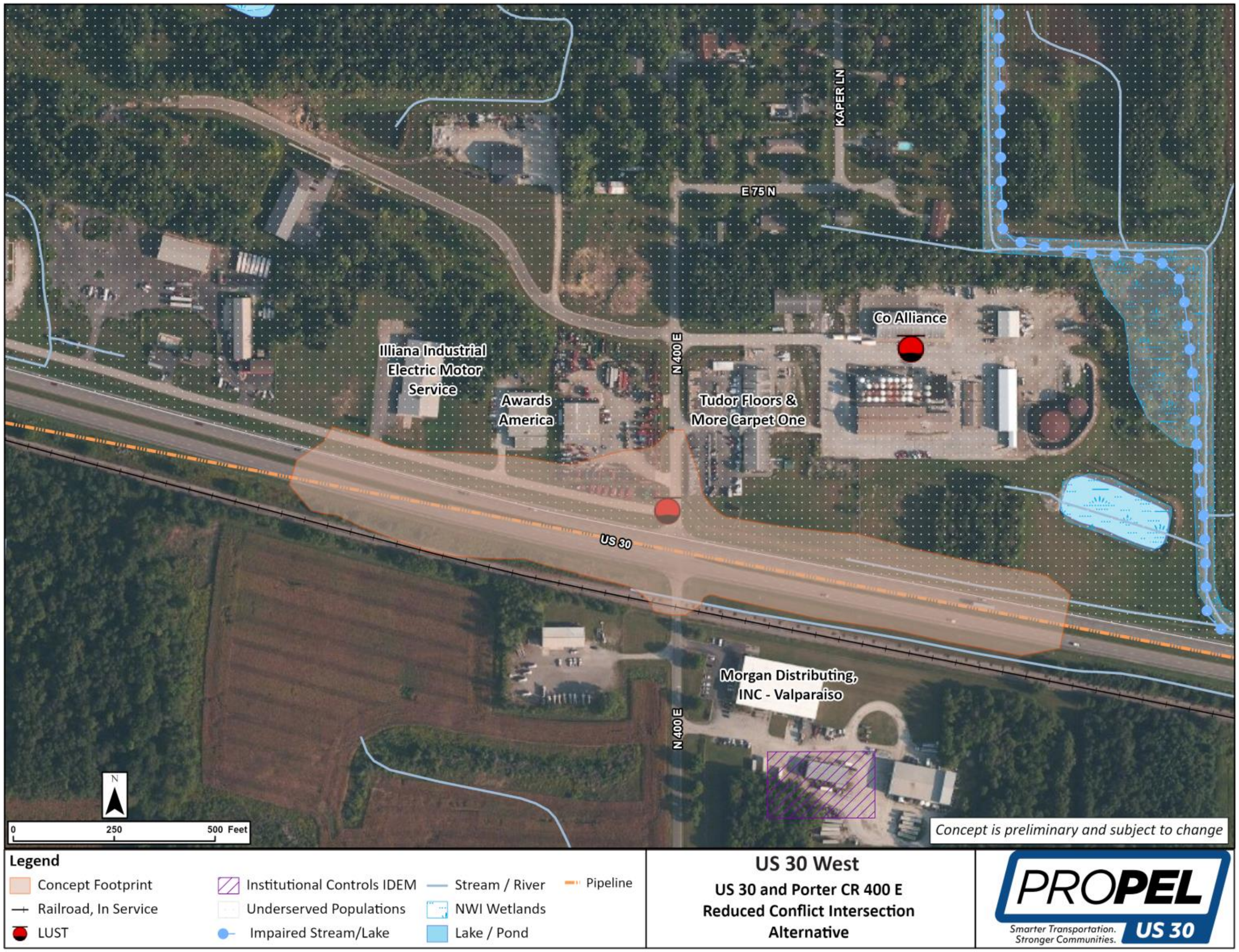


Figure 4-12: US 30 and Porter CR 400 E – Reduced Conflict Intersection Alternative



4.5. US 30 AND COUNTY LINE ROAD IN PORTER COUNTY

4.5.1. OVERVIEW OF LOCATION

This intersection is expected to operate acceptably through the design year of this study. The crash frequency and crash cost indices indicate that there are no major safety concerns at the intersection. Improvements were still considered at this intersection as a part of safety or operational improvements along this segment of US 30, to be further considered in level 3.

There have been no specific public comments to date regarding concerns at this intersection.

4.5.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

This intersection is in a rural area at the edge of Porter and LaPorte counties. The land surrounding the US 30 and County Line Road intersection poses numerous constraints that were considered in the development of these alternatives. These constraints are summarized as follows:

- There are two UNTs running parallel to US 30 along the north side.
- There is a NWI wetland located southeast of the intersection.
- Sacred Heart Cemetery is located in the southwest quadrant of the intersection.
- There is an at-grade railroad crossing on County Line Road located approximately 0.12 miles south of the US 30 County Line Road intersection.
- Underserved populations are located near the intersection.
    - Non-English Speaking Population
    - Minority Populations

4.5.3. SCREENING OF ALTERNATIVES

The decision tree indicates that both at-grade and grade-separated alternatives would be applicable, while an interchange would be unnecessary. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-5**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Median Safety Improvements – The existing median does not meet IDM requirements and should be widened. This alternative would maintain local access.
- Add or Lengthen Turn Lanes – The existing left turn lanes do not provide sufficient deceleration length and right turn lanes are missing. The left turn lanes should be lengthened, and right turn lanes should be added. This alternative would maintain local access.
- Crossroad Overpass/Underpass – There are other locations within approximately 2 miles with equal or better access based on the functional classification of the route that local traffic would use to access the corridor. Therefore, a crossroad overpass or underpass should be considered.
- Unsignalized Intersection Improvements – The intersection is important for access to and from US 30 due to high usage of this intersection. While there are no major safety or operational concerns, the following improvements were still considered as a part of segment safety and operational improvements, to be further considered in level 3. This intersection is currently two-way stop

controlled and forecasted traffic volumes do not warrant signalization. The Cap-X analysis indicated that the following at-grade intersection types could produce acceptable operating conditions in the design year.

- Reduced Conflict Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. A Reduced Conflict Intersection would meet access management guidelines as well as preserve free-flow operations on US 30 and maintain local access.

Primary Concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.
- Add/Extend Acceleration Lanes – The crash patterns do not indicate concerns with acceleration distances.
- Convert to Interchange – While this intersection is important for access to and from US 30, there are no factors that support an interchange at this location.
- Signalized Intersection Improvements – This intersection is currently two-way stop controlled and traffic volumes do not warrant a signal.

Complementary concepts to be considered as part of intersection alternatives include:

- Intersection Sight Distance Improvements – Potential to improve safety.
- Spot Roadway Lighting – Provide lighting for intersection alternatives.
- Warning Systems – Potential to raise awareness for approaching traffic to hazards.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.5.3.1. Median Safety Improvements Alternative

Widening of the existing median from 26 feet would improve safety at the intersection by reducing the risk of head-on crashes. This alternative maintains the existing eastbound and westbound left turn lanes. The improvement limits for this alternative can be seen in **Figure 4-13**.

This alternative would require additional right-of-way from all quadrants of the intersection due to grading, but property access would not be impacted. It is assumed a retaining wall would be used as needed along the southwest quadrant to avoid impacts to Sacred Heart Cemetery. It is considered a medium-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.5.3.2. Add or Lengthen Turn Lanes Alternative

This alternative would extend the existing eastbound and westbound left turn lanes and adding eastbound and westbound right turn lanes. Adding right turn lanes would improve intersection operations. Both adding and lengthening turn lanes would improve safety by providing sufficient deceleration length and increasing storage space which would reduce the likelihood of rear-end crashes. The proposed turn lanes would meet IDM standards. The improvement limits for this alternative can be seen in **Figure 4-13**.

This alternative would require additional right-of-way from the northeast and southwest quadrants to accommodate the additional roadway width and grading due to the new right turn lanes. It is assumed a retaining wall would be used as needed in the southwest quadrant to avoid impacts to the Sacred Heart Cemetery. No property access would be impacted. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.5.3.3. Cross Road Overpass / Underpass Alternative – County Line Road over US 30

This alternative would make use of a bridge to elevate County Line Road over US 30. This would improve safety and reduce delay by removing all movements between US 30 and County Line Road and vice versa. This alternative calls for County line road to be elevated starting at approximately 0.05 miles south of the intersection to maintain access to Sacred Heart Cemetery. To achieve the necessary clearance over US 30, the mainline would be lowered. The elevation change would be graded in all quadrants except the southwest quadrant where a retaining wall would be used to avoid impacts to Sacred heart Cemetery. The improvement limits for this alternative can be seen in **Figure 4-14**.

Substantial additional right-of-way would be required in this alternative from all quadrants except the southwest quadrant. It is considered a medium-cost option.

This alternative is mainly applicable to the improvement packages associated with a limited access section, to be analyzed in Level 3. This grade-separated configuration was preliminarily selected as opposed to elevating US 30 over County Line Road due to the assumed lower impacts given the rural environment. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.5.3.4. Reduced Conflict Intersection Alternative

This alternative would retain free-flow conditions along US 30 while rerouting left turn movements from County Line Road to US 30 and minor road through movements. This would improve safety by reducing the risk of right-angle crashes and reduce delay at the intersection. Loons would be provided approximately 800 feet east and west of the intersection to assist large vehicles in the completion of the U-Turn movement. In this alternative, to avoid impacts to Sacred Heart Cemetery, the intersection would be shifted to the east and access would be provided from LaPorte CR 1200 S to US 30. At the north side of the intersection, access would be provided to County Line Road from US 30. The improvement limits for this alternative can be seen in **Figure 4-15**.

This alternative requires additional right-of-way from the northeast and southeast quadrants of the existing intersection. All property access would be maintained. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.5.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Median Safety Improvements (Median Widening).
- Add or Lengthen Turn Lanes.
- Cross Road Overpass/Underpass.
- Reduced Conflict Intersection.
- Intersection Sight Distance Improvements – May be incorporated into all alternatives.
- Spot Roadway Lighting – May be incorporated into all alternatives.
- Warning Systems – May be incorporated into all alternatives.

Table 4-5: US 30 and County Line Road – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x County Line Road	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	N/A	Yes	No	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Median Safety Improvements	Yes	Yes	Yes	Yes	Yes	Low	Medium	No	Medium	Low	Low	Medium	Yes	Retaining Wall used in SW Corner to avoid impact to cemetery. Carried forward due to safety improvements associated with increased separation between opposing travel lanes.
Add or Lengthen Turn Lanes	Yes	Yes	Yes	Yes	No	Low	Medium	No	Low	Low	Low	Low	Yes	Added WB & EB Right Turn Lanes and Extended EB & WB Left Turn lanes to meet IDM requirements. Retaining wall used in SW Corner to avoid impact to cemetery. Carried forward due to improvements to safety due to sufficient deceleration distances, reducing the risk of rear-end crashes. The proposed turn lanes will meet IDM standards.
Cross Road Overpass / Underpass	Yes	Yes	No	Yes	No	Low	Medium	No	Medium	Low	Low	Medium	Yes	Lower mainline to meet clearance and avoid impacts to railroad. Retaining wall used on SW side avoid grading impacts. Carried forward due to necessity for other alternatives being considered in level 3 and ease of construction when compared to the underpass alternative.
Unsignalized Intersection Improvements														
Reduced Conflict Intersection	Yes	Yes	Yes	Yes	No	Medium	Medium	No	Medium	Low	Low	Low	Yes	Carried forward due to potential improvements to safety and operations due to reduced conflicting movements.
Complementary Concepts														
Intersection Sight Distance Improvements	Yes	No	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Existing intersection is skewed. Sight distance improvements would increase safety.
Spot Roadway Lighting	Yes	No	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Provide lighting for intersection alternatives. Per INDOT guidelines
Warning Systems	Yes	No	Yes	Yes	No	Low	Low	No	Low	Low	Low	Low	Yes	Raises awareness of approaching traffic for intersection alternatives

Figure 4-13: US 30 and County Line Road – Add or Lengthen Turn Lanes and Median Safety Improvements Alternatives

Figure 4-14: *US 30 and County Line Road – Cross Road Overpass/Underpass Alternative – County Line Road Over US 30*

Figure 4-15: US 30 and County Line Road – Reduced Conflict Intersection Alternative

4.6. US 30 AND MAIN STREET IN LAPORTE COUNTY

4.6.1. OVERVIEW OF LOCATION

This intersection is expected to operate acceptably through the design year of this study. The crash frequency and crash cost indices indicate that there are no major safety concerns at the intersection. Improvements were still considered at this intersection as a part of safety or operational improvements along this segment of US 30, to be further considered in level 3.

This intersection is in the Town of Wanatah. There have been no specific public comments to date regarding concerns at this intersection.

4.6.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONCERNS

The land surrounding the US 30 and Main Street intersection poses numerous constraints considered in the development of alternatives. These constraints are summarized as follows:

- There are several businesses located near the intersection with several access points in the area, including: United Steelworkers, BP, Dewey's Auto Supply, and W Kendall & Sons.
- There is a bridge located approximately 0.17 miles west of the intersection which allows US 30 to cross over Slocum Ditch.
- The intersection of US 30 and US 421, another intersection being studied, is located 0.3 miles east of the intersection of US 30 and Main Street.
- There are residential neighborhoods located directly north and south of the intersection.
- There are 3 NWI wetlands located in the vicinity of the intersection, as well as several streams and a lake.
- There are several hazardous material concerns near the intersection. Including UST's and LUSTs located:
    - UST 0.02 miles west of the intersection
    - LUST 0.07 miles east of the intersection
    - LUST 0.17 miles west of the intersection
    - LUST 0.25 miles northwest of the intersection

4.6.3. SCREENING OF ALTERNATIVES

The decision tree indicates that at-grade alternatives would be applicable, while grade-separated alternatives would be unnecessary. The alternatives identified in the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-6**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Access Management – The intersection functional area is inconsistent with INDOT access management guidelines. Access points around the intersection should be closed.
- Median Safety Improvements – The existing median does not meet IDM requirements and should be widened . This alternative would maintain local access.

- Add or lengthen Turn Lanes – The existing turn lanes do not provide sufficient deceleration length. The turn lanes should be lengthened. This alternative would maintain local access.

Primary concepts eliminated from further consideration are as follows:

- Add/Extend Acceleration Lanes – Crash patterns do not indicate a concern with acceleration distance.
- Cross Road Overpass/Underpass – While there are other locations within approximately 2 miles with equal or better access based on functional classification of the route that local traffic can use to access the corridor, this is a 3-leg intersection, making an overpass unfeasible.
- Convert to Interchange – There are no factors supporting an interchange at this location.
- Signalized Intersection Improvements – This intersection is currently one-way stop controlled and traffic volumes do not warrant a signal.
- Unsignalized Intersection Improvements – There are no apparent safety or operational concerns at this intersection requiring improvements at this time. If conditions change in the future and there are safety or operational concerns, solutions such as a reduced conflict intersection should be considered at this location as it is known to reduce severe crashes at intersections with similar physical characteristics.

Complementary concepts to be considered as a part of intersection alternatives include:

- Spot Roadway Lighting – Provide lighting for intersection alternatives.
- Warning Systems – Potential to raise awareness for approaching traffic.
- Bike/Pedestrian Facilities – Urban environment indicates potential desire for bike and pedestrian facilities.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.6.3.1. Access Management Alternative

This alternative would involve closing the median access at the intersection of US 30 and the other adjacent intersections. This alternative would require no additional right-of-way and would maintain property access from US 30. This alternative would reduce local access while meeting access management guidelines. No conceptual footprint was developed for this alternative as it would fit within the existing roadway. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.6.3.2. Median Safety Improvements Alternative

This alternative would involve widening the median from the existing 26-foot width. This would involve maintaining the existing eastbound and westbound turn lanes and median openings. This alternative would improve safety by reducing the risk of head-on crashes. The improvement limits for this alternative can be seen in **Figure 4-16**.

This alternative would require additional right-of-way from all quadrants of the intersection as well as the potential relocation of several properties. This alternative would also impact the bridge on US 30, west of the intersection which crosses over Slocum Ditch. It is considered a medium-cost option due to the potentially substantial relocations associated with widening the median. Due to the high impacts on nearby properties and nearby natural resources, this alternative will not advance to Level 3 screening.

4.6.3.3. Add or Lengthen Turn Lanes Alternative

This alternative would close median access at the adjacent intersections of US 30 with N. Ohio Street and N. Illinois Street. The WB left turn lane would be removed west of Main Street. This would make the existing westbound left turn lane, which currently acts as a turn lane for the three intersections, to only serve left turns from US 30 to Main Street. This would improve safety for vehicles turning left from US 30 to Main Street by providing sufficient deceleration length and increasing storage space, reducing the likelihood of rear-end crashes. The proposed turn lane would meet IDM standards. The existing eastbound right turn lane would remain unaltered. Improvement limits for this alternative have not been drawn.

This alternative would require no additional right-of-way. There would be no potential relocations or wetland impacts. It is considered a low-cost option.. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.6.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Access Management.
- Add or Lengthen Turn Lanes.
- Spot Roadway Lighting – May be incorporated into all alternatives.
- Warning Systems – May be incorporated into all alternatives.
- Bike/Pedestrian Facilities – May be incorporated into all alternatives.

Table 4-6: US 30 and Main Street - Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x Main St	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	N/A	Yes	No	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Access Management	Yes	Yes	No	Yes	No	Low	Low	No	Low	Low	N/A	Low	Yes	Closed off median access at adjacent intersections. Carried forward due to potential improvements to safety and operations associated with meeting INDOT Access Management Guidelines.
Median Safety Improvements	Yes	Yes	Yes	Yes	Yes	Medium	Low	No	Low	High	N/A	Medium	No	Widened median. Not carried forward due to high potential relocations
Add or Lengthen Turn Lanes	Yes	No	Yes	Yes	No	Low	Low	No	Low	Low	N/A	Low	Yes	This alternative involves closing access to nearby side streets from the turn lane. Carried forward due to potential to improve intersection safety for a relatively low cost. The proposed turn lane would meet IDM standards.
Complementary Concepts														
Spot Roadway Lighting	Yes	No	Yes	Yes	No	Low	Low	No	Low	Low	N/A	Low	Yes	Provide lighting for intersection alternatives, per INDOT guidelines
Warning Systems	Yes	No	Yes	Yes	No	Low	Low	No	Low	Low	N/A	Low	Yes	Raises awareness of approaching traffic of upcoming hazards.
Bike/Pedestrian Facilities	Yes	Yes	Yes	Yes	No	Low	Low	No	Low	Low	N/A	Low	Yes	Potential to improve safety for bike users and pedestrians

Figure 4-16: US 30 and Main Street – Median Safety Improvements Alternative

4.7. US 30 AND US 421 IN LAPORTE COUNTY

4.7.1. OVERVIEW OF LOCATION

This signalized intersection experiences the most delay out of all of the intersections in the corridor but is expected to operate acceptably in the design year of the study. The crash cost index is slightly elevated, indicating an opportunity for safety improvements at the intersection. Of the intersection crashes occurring, the predominant crash type was rear-end crashes. These crashes may be related to vehicles pulling out in front of on-coming traffic or high-speed vehicle traffic not expecting to stop for the signal.

This intersection is located on the eastern boundary of the Town of Wanatah.

Public comments received specific to this location include the following:

- Concerns regarding noise pollution, drivers failing to follow traffic laws, improper signing resulting in increased traffic through the adjacent neighborhood, a lack of bike and pedestrian facilities, and safety concerns along US 30 West involving drivers ignoring speed reduction postings.

4.7.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the US 30 and US 421 intersection is urban and poses numerous constraints that were considered in the development of the alternatives. These constraints are summarized as follows:

- Multiple businesses are in the area of the intersection, including Dairy Queen, Burger King, Speedway and Casey's.
- There is a residential neighborhood in the northwest quadrant and homes located in the northeast quadrant.
- There are 5 NWI wetlands in the vicinity of the intersection. Also, numerous UNTs and ponds.
- There is a bridge located approximately 0.38 miles south of the intersection, along US 421, which overpasses a rail line.
- There are 3 outstanding Indiana Historic Sites and Structures Inventory (IHSSI) notable sites located approximately 0.47 miles southwest of the intersection.
- Several hazardous material concerns are located near the intersection, including 2 UST sites one northwest of the intersection and the other located west of the intersection; 2 LUST sites one located west of the intersection and one east of the intersection. An IDEM institutional control site is also located in the northeast quadrant.
- Wanatah Public School is located 0.6 miles south of the intersection.

4.7.3. SCREENING OF ALTERNATIVES

The decision tree indicates that both at-grade and grade-separated alternatives, including an interchange, as part of a free-flow bundle only, would be applicable. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-7**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Access Management – The intersection functional area is inconsistent with INDOT access management guidelines. Access points around the intersection should be closed.
- Add or Lengthen Turn Lanes – The existing turn lanes do not provide sufficient deceleration length. The turn lanes should be lengthened. This alternative would maintain local access.
- Add/Extend Acceleration Lanes – Crash patterns at the intersection are potentially due to not having acceleration lanes. Acceleration lanes should be added for vehicles turning onto US 30. This alternative would maintain local access.
- Convert to Interchange – There are no traffic volumes or other factors that support an interchange at this location as a standalone alternative. However, given further bundled improvements anticipated to be analyzed in Level 3, this location was identified as a potential interchange, based on the proximity to the town of Wanatah and the US highway status of US 421. Therefore, this alternative will be advanced for further evaluation in the Level 3 screening process for potential use with bundled improvements only, including a free-flow alternatives. This alternative would maintain local access.
- Signalized and Unsignalized Intersection Improvements – This intersection is important for access to and from US 30 due to the location in the town of Wanatah, as well as businesses located around the intersection. The crash cost index indicates the potential for safety improvements. This intersection is already signalized, and the signal is warranted. The CAP-X analysis indicated that the following at-grade intersection types could produce acceptable operating conditions in the design year.
    - Partial Displaced Left Turn – This alternative would improve safety at the intersection while also improving operations and maintaining local access.
    - Quadrant Roadway, Southwest – This alternative would improve safety at the intersection while also improving operations and maintaining local access.
    - Quadrant Roadway, Southeast – This alternative would improve safety at the intersection while also improving operations and maintaining local access.
    - Roundabout – This alternative would reduce delay and improve intersection operations along US 30 while maintaining all local access. This alternative also improves safety at the intersection by reducing speeds and lowering the risk of right-angle crashes.

Primary concepts eliminated from further consideration are as follows:

- Median Safety Improvements – The median at this intersection meets the Indiana Design Manual requirements.
- Cross Road Overpass / Underpass – There are no locations with approximately 2 miles with equal or better access based on the functional classification of the route that local traffic can use to access the corridor.
- Other signalized intersection types were eliminated through Cap-X tool analysis because their potential benefits were not substantial enough when compared to the existing conditions. Therefore, they were not further analyzed as part of this process. These intersection types included:
    - Green-T Intersection – This alternative is not applicable to a four-legged intersection.
    - Restricted Crossing U-Turn Intersection – The CAP-X results indicate that this alternative cannot accommodate the high volume of minor street through and left turning traffic projected at this intersection.

- Boulevard Left Turn Intersection – The CAP-X results indicate that this alternative cannot accommodate the high volume of major street left turning traffic as well as minor street through and left turning traffic projected at this intersection.

Complementary Concepts to be considered as part of intersection alternatives include:

- Signal Timing Updates / Coordination – Potential to improve safety and relieve congestion.
- Spot Roadway Lighting – Provide lighting for intersection alternatives.
- Warning Systems – Potential to raise awareness of approaching traffic.
- Freight Priority Systems – Potential to reduce delays for trucks.
- Bike/Pedestrian Facilities – Urban environment indicates potential desire for bike and pedestrian facilities.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.7.3.1. Access Management Alternative

This alternative would involve closing the median access at the intersection of US 30 and N. Illinois Street, N. Main Street, N. Ohio Street, and Condon Street as well as median access directly adjacent to the east and west of the intersection. This alternative would require no additional right-of-way and would maintain property access from US 30. No conceptual footprint was developed for this alternative as it is believed the alternative would fit within the existing roadway. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.7.3.2. Add or Lengthen Turn Lanes Alternative

This alternative would involve lengthening the existing eastbound and westbound left and right turn lanes. Lengthening the existing turn lanes would improve safety by providing sufficient deceleration length and increasing storage space, thereby reducing the likelihood of rear-end crashes. The proposed turn lanes would meet IDM standards. The improvement limits for this alternative are shown in **Figure 4-17**.

This alternative would have no additional right-of-way impacts and would have minimal impacts on the natural resources in the area. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.7.3.3. Add/Extend Acceleration Lanes Alternative

This alternative would improve the safety at the intersection of US 30 and US 421 by providing a dedicated lane for vehicles turning from US 421 onto US 30 to reach the design speed before merging with through traffic on US 30. This would decrease the risk of rear-end crashes. This alternative would also improve intersection operations by reducing the differential speed between mainline traffic and traffic entering the mainline from the minor road. The improvement limits for this alternative are shown in **Figure 4-17**.

This alternative would require minimal additional right-of-way and all property access would be maintained. This alternative would also have minimal impacts on the surrounding natural resources. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.7.3.4. Convert to Interchange Alternative

This alternative for the free-flow concepts allows for US 30 traffic to move without interruption. US 30 would utilize two bridges over US 421 and on and off ramps, folded into the east side of US 421 to avoid further right-of-way impacts, to allow access to and from US 30. The improvement limits for this alternative can be seen in **Figure 4-18**.

Extensive right-of-way is required for this alternative with several potential relocations of adjacent properties. The most substantial portion of work would be in the northeast, southwest, and southeast quadrants to avoid impacts to the residential area to the northwest. It is considered a high-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process for potential use with bundled improvements.

4.7.3.5. Partial Displaced Left Turn Alternative

The Partial Displaced Left Turn alternative would relocate left turns from US 30 upstream of the main intersection, thereby eliminating the left turn signal phase for approaches at the main intersection. This would improve intersection safety. The improvement limits for this alternative are shown in **Figure 4-19**.

The DLT alternative would require substantial additional right-of-way. There would also be substantial impacts to nearby natural resources. This alternative would also result in several potential relocations. It is considered a medium-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.7.3.6. Quadrant Roadway Southwest Alternative

This alternative would improve intersection safety by splitting the movements at the main intersection into three separate signalized intersections. In this alternative, a connector road would be added in the southwest quadrant connecting US 30 with US 421; a signalized intersection would be placed at each intersection. Existing aerial imagery has not been updated to show the Casey's located in the southeast quadrant. The improvement limits for this alternative are shown in **Figure 4-20**.

This alternative would have substantial additional right-of-way impacts to the surrounding area including several potential relocations due to improvements at the main intersection included in this alternative, such as increases to the turning radii and additional lanes. There is also potential impact to the natural resources in the vicinity of the intersection. It is considered a medium-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.7.3.7. Quadrant Roadway Southeast Alternative

This alternative would improve intersection safety by splitting the movements at the main intersection into three separate signalized intersections. In this alternative, a connector road would be added in the southeast quadrant connecting US 30 with US 421; a signalized intersection would be placed at each intersection.. The improvement limits for this alternative are shown in **Figure 4-21**.

This alternative would have substantial additional right-of-way impacts to the surrounding area including a few potential relocations, as well as impact the natural resources in the vicinity of the intersection. It is considered a medium-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.7.3.8. Roundabout Alternative

Reconfiguring the US 30 and US 421 intersection into a roundabout alternative would require the center of the roundabout to be approximately 50 feet southwest of the current intersection so impacts to the Casey's at the southeast corner can be limited. The roundabout alternative would increase safety by reducing travel speed and the chance for more severe right angle, left turn, and head on collisions, although additional rear-end crashes may occur. The improvement limits for this alternative are shown in **Figure 4-22**.

The potential right-of-way impacts for this alternative impacts all quadrants of the intersection; however, all property access is maintained. It is considered a medium-cost option. Speed management strategies would have to be paired with the roundabout alternative to mitigate the risk of rear-end crashes. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.7.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Access Management.
- Add or Lengthen Turn Lanes.
- Add/Extend Acceleration Lanes.
- Convert to Interchange.
- Full Displaced Left Turn.
- Quadrant Roadway S-W.
- Quadrant Roadway S-E.
- Roundabout.
- Signal Timing Updates/Coordination – May be incorporated into all alternatives involving signalization.
- Spot Roadway Lighting – May be incorporated into all alternatives.
- Warning Systems – May be incorporated into all alternatives.
- Freight Priority System – May be incorporated into all alternatives involving signalization.
- Bike/Pedestrian Facilities – May be incorporated into all alternatives.

Table 4-7: US 30 and US 421 – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x US 421	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	N/A	Yes	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Access Management	Yes	Yes	No	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Carried forward due to safety and operation improvements associated with meeting access management guidelines.
Add or Lengthen Turn Lanes	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Lengthen Existing Left and Right Turn Lanes EB and WB. Carried forward due to safety improvements associated with sufficient deceleration distances. The proposed turn lanes would meet IDM standards.
Add/Extend Acceleration/Deceleration Lanes	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Add Acceleration lanes for right turns onto US 30. Carried forward due to safety improvements to observed issue with crash patterns at the intersection.
Convert to Interchange	Yes	Yes	Yes	Yes	N/A	High	Low	No	High	High	N/A	High	Yes	Carried forward due to necessity for limited access alternative, but not considered for other bundled improvements.
Signalized Intersection Improvements														
Full Displaced Left Turn	Yes	Yes	Yes	Yes	N/A	High	Low	No	High	High	N/A	Medium	Yes	Carried forward due to improvements to intersection safety and operations associated with reduced signal phases.
Quadrant Roadway S-W	Yes	Yes	Yes	Yes	N/A	Medium	Low	No	High	High	N/A	Medium	Yes	Carried forward due to improvements to intersection safety and operations associated with reducing traffic around the main intersection.
Quadrant Roadway S-E	Yes	Yes	Yes	Yes	N/A	Medium	Low	No	High	High	N/A	Medium	Yes	Carried forward due to improvements to intersection safety and operations associated with reducing traffic around the main intersection.
Unsignalized Intersection Improvements														
Roundabout	Yes	Yes	Yes	Yes	N/A	Medium	Low	No	High	Low	N/A	Medium	Yes	Carried forward due to safety improvements associated with reduced speed around the intersection and operational improvements by eliminating signal delay.
Complementary Concepts														
Signal Timing Updates/Coordination	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Potential to improve safety. No other existing signals close enough for coordination, but timings updates can be made to improve efficiency. Coordination can be included in the signalized intersection alternatives because each alternative involves multiple new signals.
Spot Roadway Lighting	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Provide lighting for intersection alternatives per INDOT guidelines

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x US 421	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Raises awareness of approaching traffic to upcoming hazards
Freight Priority System	No	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Can reduce delays for trucks at intersection alternatives involving signalization by extending green time
Bike/Pedestrian Facilities	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Potential to improve safety for bike users and pedestrians.

Figure 4-17: US 30 and US 421 – Add or Lengthen Turn Lanes and Add/Extend Acceleration Lanes Alternatives

Figure 4-18: US 30 and US 421 – Interchange Alternative

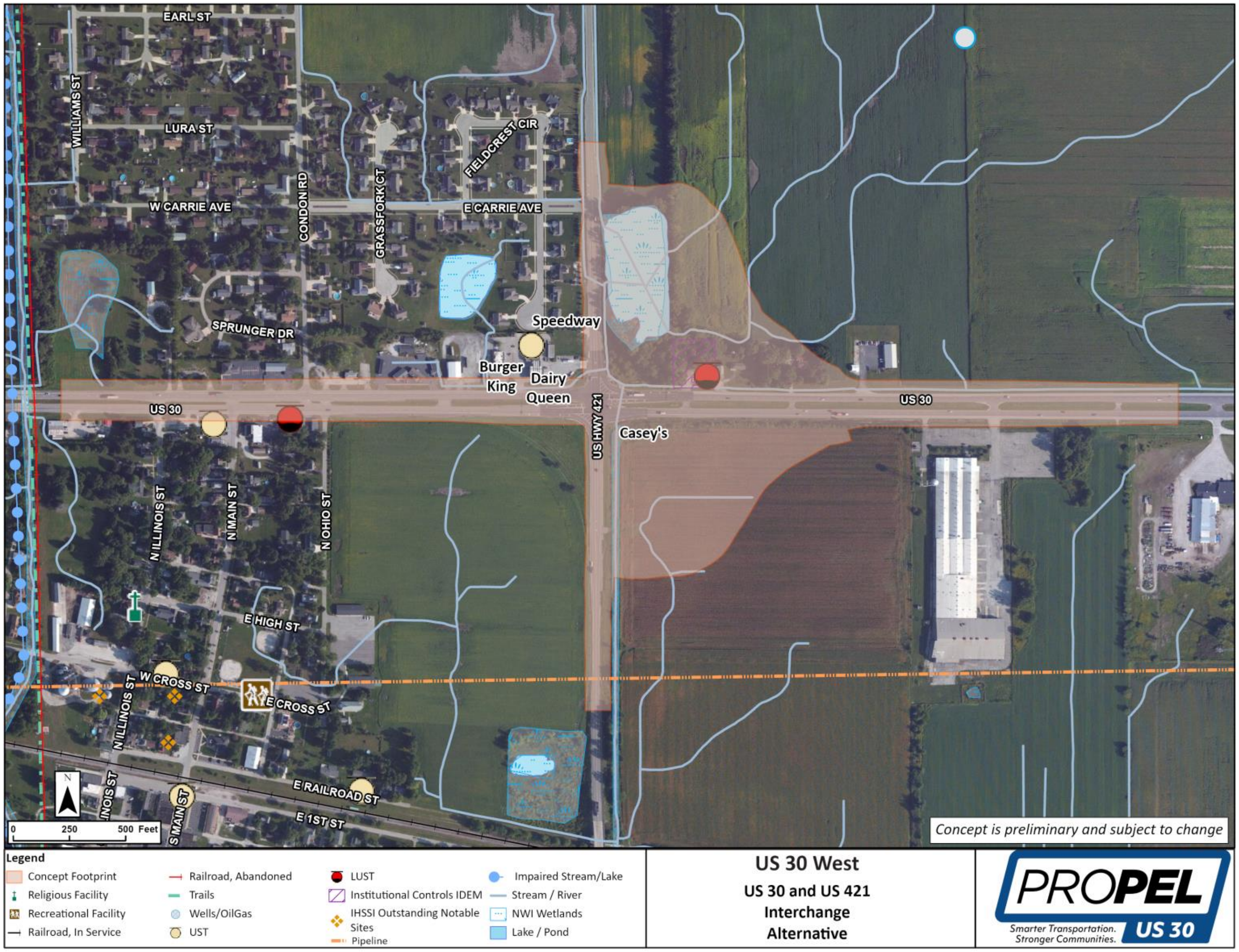


Figure 4-19: US 30 and US 421 – Partial Displaced Left Turn Alternative

Figure 4-20: US 30 and US 421 – Quadrant Roadway Southwest Alternative

Figure 4-21: US 30 and US 421 – Quadrant Roadway Southeast Alternative

Figure 4-22: US 30 and US 421 – Roundabout Alternative

4.8. US 30 AND CR 600 W IN LAPORTE COUNTY

4.8.1. OVERVIEW OF LOCATION

This intersection is expected to operate acceptably through the design year of this study. The crash frequency and crash cost indices indicate that there are no major safety concerns at the intersection. Improvements were still considered at this intersection as a part of safety or operational improvements along this segment of US 30, to be further considered in the Level 3 screening.

Public comments received specific to this location include:

- This intersection is a school crossing and a secondary entrance to the town of Hanna. Improved access to and from US 30 is desired. Improved access to the area around this intersection is desired.
- Concerns regarding potential relocations involved with intersection improvements at this intersection.
- Desire for turning lanes along CR 600 W for improved safety at the school campus located nearby.
- Maintain access for truck/trailer traffic along CR 600 E to maintain business operations.

4.8.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the US 30 and Laporte CR 600 intersection poses numerous constraints that were considered in the development of alternative s. The constraints are summarized as follows:

- Plaza 30 Truck Stop is located 0.4 miles west of the intersection.
- Laporte CR 1200 S is located 300 feet north of the intersection.
- 2 NWI wetlands are in the vicinity of the intersection.
- Richman Ditch crosses underneath US 30 at the intersection.
- South Central Community Schools is located 2 miles north of the intersection.
- Underserved populations are located near the intersection.
    - Non-English Speaking Population
    - Family Income Below Poverty Level

4.8.3. SCREENING OF ALTERNATIVES

The decision tree indicates that both at-grade and grade-separated alternatives would be applicable, while an interchange would be unnecessary. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-8**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Add or Lengthen Turn Lanes – The existing left turn lanes do not provide sufficient deceleration length and right turn lanes are missing. The left turn lanes should be lengthened and right turn lanes should be added. This alternative would maintain local access.
- Cross Road Overpass/Underpass – There are other locations within approximately 2 miles with equal or better access based on the functional classification of the route that local traffic would use to

access the corridor. Therefore, a crossroad overpass or underpass should be considered, especially when applied alongside a limited access section.

Primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.
- Median Safety Improvements – The median meets IDM requirements.
- Add/Extend Acceleration Lanes – The crash patterns do not indicate a concern with missing acceleration lanes.
- Convert to Interchange – There are no traffic volumes or other factors that support an interchange at this location as a standalone alternative.
- Signalized Intersection Improvements – There are no apparent safety or operation issues at this intersection requiring improvements at this time.
- Unsignalized Intersection Improvements – There are no apparent safety or operation issues at this intersection requiring improvements at this time.
- If conditions change in the future and there are safety or operational concerns, solutions such as a reduced conflict intersection should be considered at this location as it is known to reduce severe crashes at intersections with similar physical characteristics.

Complementary Concepts to be considered as part of intersection alternatives are as follows:

- Intersection Sight Distance Improvements – Potential to improve safety.
- Spot Roadway Lighting – Provide lighting for intersection alternatives.
- Warning Systems – Potential to raise awareness for approaching traffic.
- Bike / Pedestrian Facilities – Nearby school indicates potential need for bike and pedestrian facilities.
- Freight Priority System – Potential to reduce delay for trucks.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.8.3.1. Add and Lengthen Turn Lanes Alternative

This alternative involves lengthening the existing eastbound left and westbound right turn lanes and adding eastbound right and westbound left turn lanes. Adding turn lanes improves intersection operationsBoth lengthening existing and adding turn lanes improves intersection safety by providing sufficient deceleration length and increasing storage space, reducing the likelihood of rear-end crashes. The proposed turn lanes will meet IDM standards. The improvement limits of this alternative can be seen in **Figure 4-23**.

With the addition of the eastbound right turn lane and the lengthening of the westbound right turn lane there are potential right-of-way impacts in all quadrants of the intersection. No changes to property access are expected. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.8.3.2. Cross Road Overpass / Underpass Alternative – LaPorte CR 600 W over US 30

Reconfiguring this intersection so that Laporte CR 600 W goes over US 30 increases safety by eliminating access from Laporte CR 600 W to US 30 and vice versa. In this alternative, CR 600 W would be routed over top of US 30 by use of a bridge. The improvement limits of this alternative can be seen in **Figure 4-24**.

By constructing an overpass to reach the allowed clearance over US 30 the wetland and streams in the northwest, southwest, and southeast quadrants would be impacted by grading. The potential right-of-way impacts of an overpass configured this way at this intersection are along the east and west sides of Laporte CR

600 W with the largest impacts coming closer to US 30 which would introduce impacts to underserved populations. This is where the potential roadway is the highest before the bridge. Right-of-way Impacts then taper back into the existing limits on the south side as the potential road profile ties back into the existing profile. On the north side Laporte CR 1200 S is realigned to the north so that it maintains access to Laporte CR 600 W. With this alternative there are no potential relocations. It is considered a medium-cost option.

This alternative is mainly applicable to the improvement packages associated with a limited access, to be analyzed in Level 3. This grade-separated configuration was preliminarily selected as opposed to elevating US 30 over LaPorte CR 600 W due to the assumed lower impacts given the rural environment. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.8.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Add or Lengthen Turn Lanes.
- Cross Road Overpass/Underpass.
- Intersection Sight Distance Improvements – May be incorporated into all alternatives.
- Spot Roadway Lighting – May be incorporated into all alternatives.
- Warning Systems – May be incorporated into all alternatives.

Table 4-8: US 30 and Laporte CR 600 W – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x LaPorte CR 600 W	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	N/A	Yes	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add or Lengthen Turn Lanes	Yes	Yes	Yes	Yes	N/A	Medium	Low	No	Medium	Low	N/A	Low	Yes	Added WB Left and Right Turn lanes and Added EB Right Turn Lane. Carried forward due to safety improvements associated with sufficient deceleration length which reduces the chance of rear-end crashes. The proposed turn lanes will meet IDM standards.
Cross Road Overpass / Underpass	Yes	Yes	No	Yes	N/A	High	Low	Yes	High	Low	N/A	Medium	Yes	Elevation change graded down to existing. Carried forward dure to improvements to safety and operations associated with grade separation.
Complementary Concepts														
Intersection Sight Distance Improvements	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Existing intersection is skewed. Improving sight distances would improve safety.
Spot Roadway Lighting	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Provide lighting for Intersection Improvements per INDOT guidelines
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Raises awareness of approaching traffic to upcoming hazards
Freight Priority System	No	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Potential to reduce delay for trucks by extending green time. Applicable to intersection alternatives involving signalization.

Figure 4-23: US 30 and LaPorte CR 600 W – Add and Lengthen Turn Lanes Alternative

Figure 4-24: US 30 and LaPorte CR 600 W – Cross Road Overpass/Underpass Alternative – LaPorte CR 600 W Over US 30

4.9. US 30 AND THOMPSON STREET IN LAPORTE COUNTY

4.9.1. OVERVIEW OF LOCATION

This intersection is expected to operate acceptably through the design year of this study. The crash frequency and crash cost indices indicate that there are no major safety concerns at the intersection. Improvements were still considered at this intersection as a part of safety or operational improvements along this segment of US 30, to be further considered in level 3.

The intersection is located approximately 195 feet east of the at-grade Chesapeake & Indiana Railroad crossing on the north side of Hanna.

Public comments received to date about this intersection are summarized as follows.

- Safety concern due to missing turn lanes
- Bike and pedestrian safety concerns when crossing US 30.
- Noise Pollution
- Emergency Vehicle and Farm Equipment access
- Safety concerns with existing at-grade rail crossing

4.9.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the US 30 and Thompson Street intersection poses numerous constraints that were considered in development of alternatives. These constraints are summarized as follows:

- The LaPorte County Highway Department is in the southeast quadrant of the intersection.
- There are several residential properties in the southwest quadrant of the intersection.
- There is an at-grade railroad crossing US 30, located approximately 200 feet west of the intersection.
- There is a bridge located approximately 0.4 miles east of the intersection, elevating US 30 over Sheldon Arm Ditch.
- Underserved populations are located near the intersection.
    - Family Income Below Poverty Level
- There is an Indiana Historic Building, Bridge and Cemetery (IHBBC) cemetery located 0.3 miles southwest of the intersection.
- There is an unnamed stream/ditch running parallel to US 30 along the southside.
- Hazardous material concerns are near the intersection, including 1 UST site located southeast of the intersection.
- Hanna Park, a recreational facility, is located approximately 0.13 mile southeast of the intersection.
- Thompson Street is one of two access points to the town of Hanna from US 30.
- Last Resort Campground is located 0.5 miles west of the intersection.

4.9.3. SCREENING OF ALTERNATIVES

The decision tree indicates that at-grade alternatives would be applicable, while grade-separated alternatives would be unnecessary. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided is summarized in **Table 4-9**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Add or Lengthen Turn Lanes – The existing eastbound right and westbound left turn lanes do not provide sufficient deceleration length and eastbound left and westbound right turn lanes are missing. The existing turn lanes should be lengthened and eastbound left and westbound right turn lanes should be added. This alternative would maintain local access.
- Unsignalized Intersection Improvements – This intersection is important for access to and from US 30. While there are no major safety or operational concerns, the following improvements were still considered as a part of segment safety and operational improvements, to be further considered in level 3. This intersection is two-way stop controlled and forecasted traffic volumes do not warrant a signal. The CAP-X analysis indicated that the following at-grade intersection types could produce acceptable operating conditions in the design year.
    - Reduced Conflict Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. A Reduced Conflict Intersection would meet access management guidelines as well as preserve free-flow operations on US 30 and maintain local access.

Primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.
- Median Safety Improvements – The existing median meets IDM requirements.
- Add/Extend Acceleration Lanes – Crash patterns do not indicate a concern with acceleration distances.
- Cross Road Overpass / Underpass – There are no other locations within approximately 2 miles which provide equal or better access based on the functional classification of the route that local traffic can use to access the corridor.
- Convert to Interchange – There are no traffic volumes or other factors that support an interchange at this location as a standalone alternative.
- Signalized Intersection Improvements – This intersection is currently two-way stop controlled and traffic volumes do not warrant a signalized intersection.

Complementary concepts to be considered as part of Intersection Alternatives include:

- Railroad Crossing Improvements – Provide deceleration and acceleration lanes for vehicles stopping at railroad crossings, such as busses and hazardous cargo carriers. The Railroad Crossing Improvement concept is included in the footprints for the following alternatives:
    - Add or Lengthen Turn Lanes Alternative
    - Reduced Conflict Intersection Alternative
- Intersection Sight Distance Improvement – Potential to improve safety.
- Spot Roadway Lighting – Provide lighting for intersection alternatives.
- Warning Systems – Potential to raise awareness of approaching traffic.
- Bike/Pedestrian facility – Urban environment indicates potential desire for bike and pedestrian facilities, as well as recreational facilities nearby.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.9.3.1. Add or Lengthen Turn Lanes Alternative

This alternative involves lengthening the existing eastbound right and westbound left turn lanes and adding eastbound left and westbound right turn lanes. Adding turn lanes improves intersection operations. Both adding and lengthening existing turn lanes improves safety by providing sufficient deceleration length and increasing storage space, reducing the likelihood of rear-end crashes. The proposed turn lanes will meet IDM standards. The improvement limits of this alternative can be seen in **Figure 4-25**.

With the addition and lengthening of turn lanes, there are potential right-of-way impacts in all quadrants of the intersection including potential relocations. No changes to property access are expected. The at-grade railroad crossing at the west leg of the intersection would be widened to accommodate the changes to the turn lanes and the application of the railroad crossing improvement complementary concept. This alternative has the potential for adverse impacts to underserved populations. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.9.3.2. Reduced Conflict Intersection

The RCI alternative would allow the free-flow of through traffic along US 30 while rerouting left turns from Thompson Street to US 30 and minor road through movements. This would improve safety by reducing the risk of right-angle crashes and reduce delay at the intersection. The addition of truck loons was included in the conceptual design. The improvement limits for this alternative can be seen in **Figure 4-26**.

This alternative would require additional right-of-way and would have impacts to natural resources. This alternative also has the potential for adverse impacts to underserved populations and potential relocations. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.9.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Add or Lengthen Turn Lanes.
- Reduced Conflict Intersection.
- Intersection Sight Distance Improvements – May be incorporated into all alternatives.
- Railroad Crossing Improvement – May be incorporated into all alternatives.
- Spot Roadway Lighting – May be incorporated into all alternatives.
- Warning Systems – May be incorporated into all alternatives.
- Bike/Pedestrian Facilities – May be incorporated into all alternatives.

Table 4-9: US 30 and Thompson Street – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x Thompson St	**Applies Safety Counter-Measures**	**Reduces Delay or Improves Intersection Operations**	**Maintain or Improve Local Access**	**Meet Access Management Guidelines**	**Improves Substandard Elements**	**Potential for Adverse Impacts to Natural Resources?**	**Potential for Adverse Impacts to Cultural Resources?**	**Potential for Adverse Impacts to Underserved Populations?**	**Potential ROW Impacts**	**Potential Relocations**	**Impacts to Railroad**	**Relative Cost**	**Carry Forward?**	**Notes/ Comments**
No build	N/A	N/A	N/A	Yes	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add or Lengthen Turn Lanes	Yes	Yes	Yes	Yes	N/A	Low	Low	Yes	Medium	Medium	High	Low	Yes	Lengthened EB Right and WB Left Turn Lanes, Added EB Left and WB Right Turn Lanes. Railroad Crossing Improvements included. Carried forward due to improvements to safety associated with sufficient deceleration distances which reduce the likelihood of rear-end crashes. The proposed turn lanes will meet IDM standards.
Unsignalized Intersection Improvements														
Reduced Conflict Intersection	Yes	Yes	Yes	Yes	N/A	Medium	Low	Yes	Medium	Medium	High	Low	Yes	Railroad crossing improvements included in conceptual design. Carried forward due to improvements to safety and operations associated with reducing conflicting movements.
Complementary Concepts														
Intersection Sight Distance Improvements	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Existing intersection is skewed. Improvements to sight distances would improve safety.
Railroad Crossing Improvement	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	High	Medium	Yes	Decel accel lanes for vehicles stopping. Increases footprint of all alternatives when applied.
Spot Roadway Lighting	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Provide lighting for Intersection Alternatives per INDOT guidelines
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Raises awareness of approaching traffic to upcoming hazards. Would improve safety
Bike/Pedestrian Facilities	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Potential to improve safety for cyclists and pedestrians

Figure 4-25: US 30 and Thompson Street – Add or Lengthen Turn Lanes Alternative

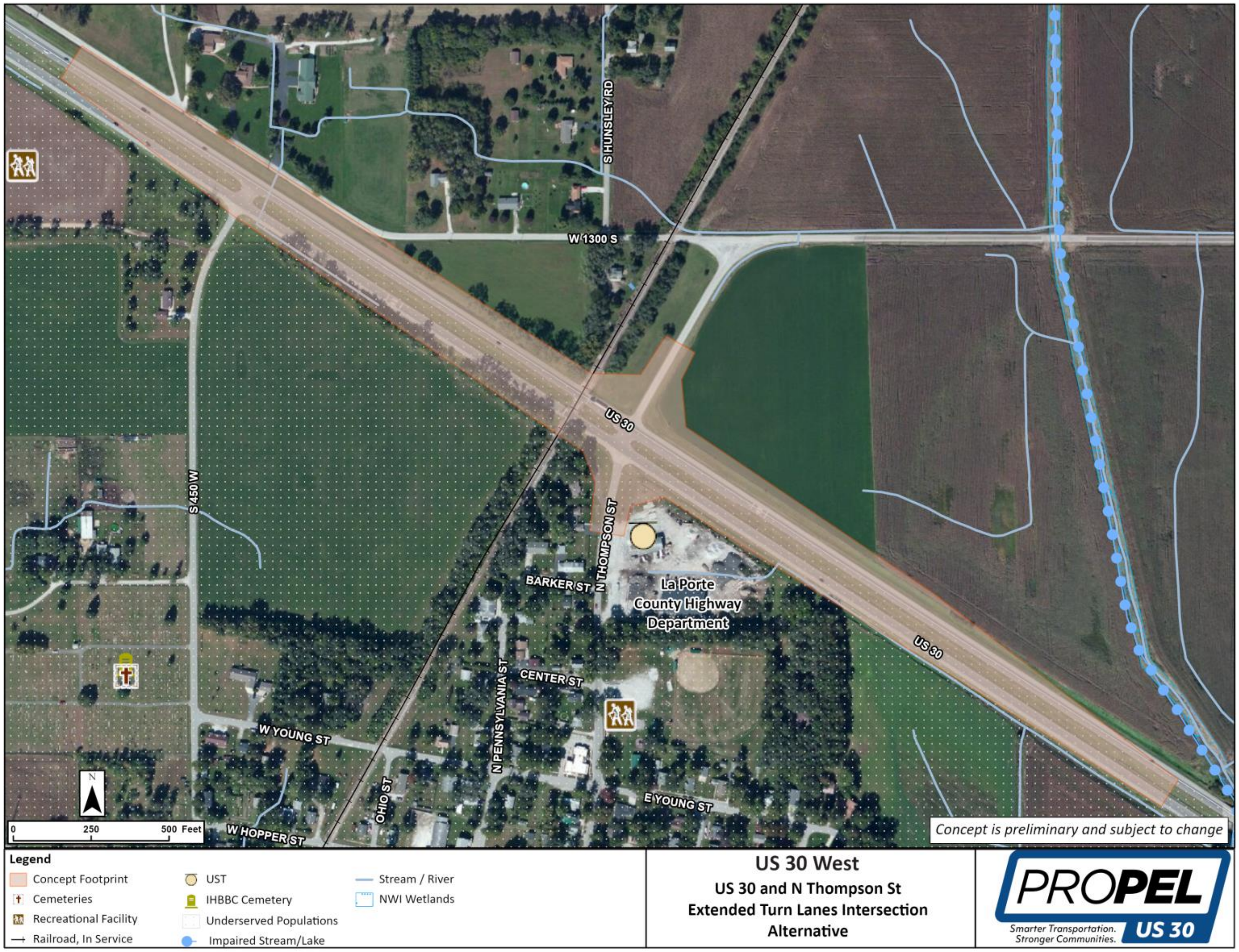
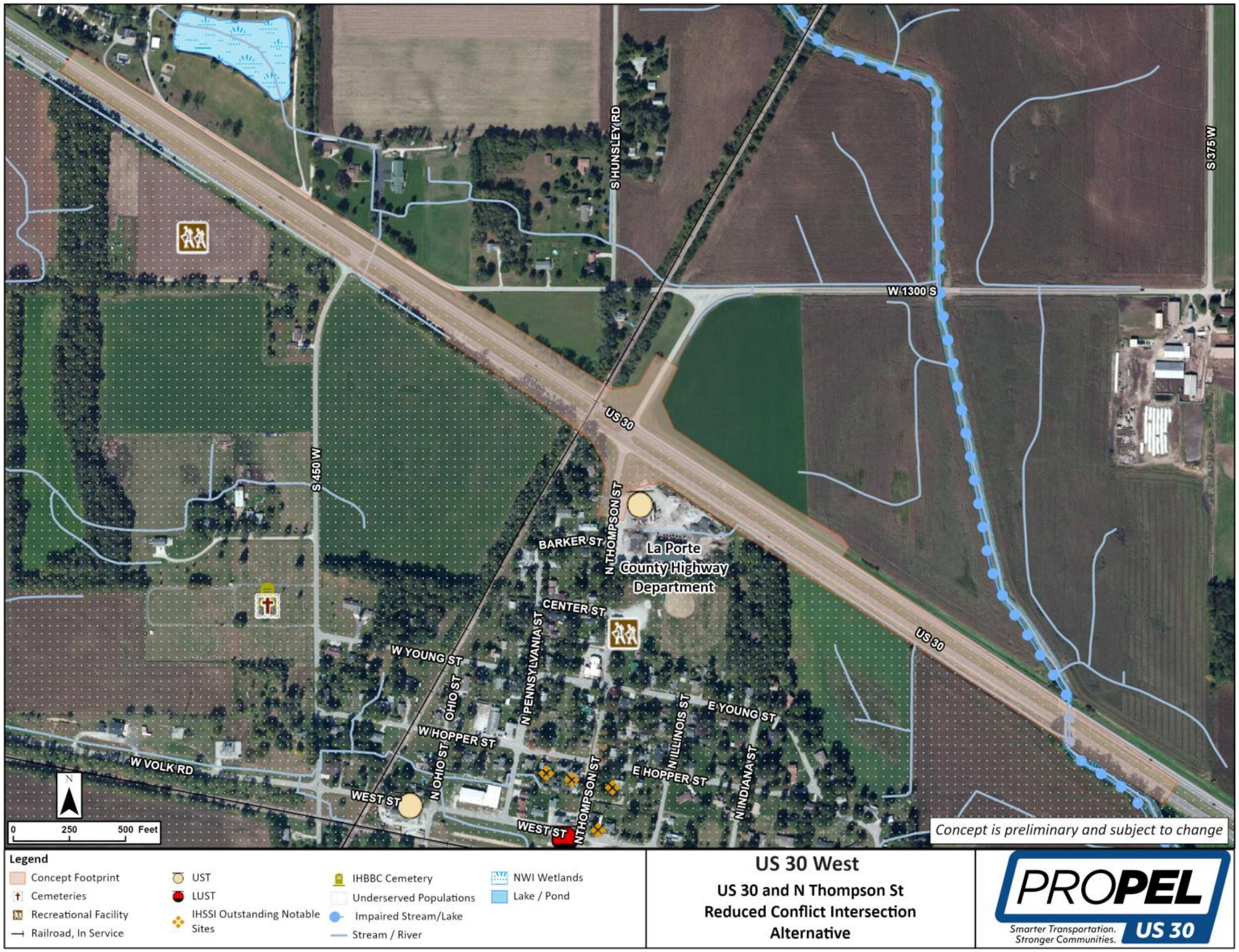


Figure 4-26: US 30 and Thompson Street – Reduced Conflict Intersection Alternative



4.10. US 30 AND OLD US 30 WEST IN LAPORTE COUNTY

4.10.1. OVERVIEW OF LOCATION

This three-legged intersection is expected to operate acceptably through the design year of this study. The crash frequency and cost indices indicate that there are no major safety concerns at the intersection. Improvements were still considered at this intersection as a part of safety or operational improvements along this segment of US 30, to be further considered in level 3.

There have been no specific public comments to date regarding concerns at this intersection.

4.10.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the intersection of US 30 and Old US 30 West poses numerous constraints that were considered in the development of alternatives. These constraints are summarized as follows:

- There is a box culvert located 0.1 miles west of the intersection that allows Rice Ditch to pass under US 30.
- Underserved populations are located near the intersection, including:
    - Family Income Below Poverty Level
- A railroad runs along the south side of US 30 at this intersection.
- The area immediately surrounding Rice Ditch, located 0.1 miles west of the intersection, is a NWI Wetland.
- There are hazardous material concerns as a LUST site is located 0.1 miles northwest of the intersection.
- The town of Hanna is located 0.8 miles west of the intersection.
- Old US 30 West is one of two access points to the town of Hanna from US 30.

4.10.3. SCREENING OF ALTERNATIVES

The decision tree at this intersection indicates that a few at-grade alternatives are applicable, while grade-separated alternatives are unnecessary. This intersection is not important for access to or from US 30, due to low usage and redundancy with both Thompson Street and County Road 1350 S both located within approximately 0.9 miles and providing access to US 30. As such, extensive intersection improvements were not considered. The evaluation of this intersection can be summarized in **Table 4-10**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Add or Lengthen Turn Lanes – There are no existing turn lanes. Turn lanes should be added. This alternative would maintain local access.
- Limit Access – This intersection is not important for access to or from US 30 due to low usage and redundancy with both Thompson Street and County Road 1350 S located within approximately 0.9 miles and providing access to US 30.
- Convert to Interchange – There are no factors that indicate an interchange is needed at this location as a standalone alternative. However, given further bundled improvements anticipated to be analyzed in Level 3, this location was identified as a potential interchange due to proximity to Hanna and instead of at Thompson Street due to right-of-way and railroad constraints at the Thompson

Street intersection. This alternative would maintain local access. Further analysis on the configuration of this alternative, such as using CR 1350, will be conducted in level 3.

The primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.
- Median Safety Improvements – The existing median is consistent with IDM requirements.
- Add/Extend Acceleration Lanes – The crash patterns do not indicate a concern with acceleration distances.
- Cross Road Overpass/Underpass – While there are other locations within approximately 2 miles with equal or better access based on the functional classification of the route that local traffic can use to access the corridor, this is a three-legged intersection with a cross road extending only one way from US 30 and is unsuitable for a crossroad overpass/underpass.
- Signalized Intersection Improvements – This intersection is one way stop controlled and traffic volumes do not warrant signalization. Unsignalized Intersection Improvements – This intersection is not important for access to or from US 30 and does not have any existing safety or operational concerns.
    - If conditions change in the future and there are safety or operational concerns at this intersection, solutions such as a reduced conflict intersection should be considered as it is known to reduce severe crashes at intersections with similar physical characteristics.

The complementary concepts to be considered as part of the intersection alternatives include:

- Spot Roadway Lighting – Provide lighting for intersection alternatives.
- Warning Systems – Potential to raise awareness for approaching traffic.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.10.3.1. Add or Lengthen Turn Lanes Alternative

Adding eastbound and westbound left and right turn lanes to the intersection of US 30 and Old US 30 West improves the operations of the intersection. Adding turn lanes also improves the safety of the intersection by providing adequate deceleration lengths, reducing the likelihood of rear end collisions. The proposed turn lanes will meet IDM standards. The improvement limits of this alternative can be seen in **Figure 4-27**.

With the addition and lengthening of turn lanes, there are potential right-of-way impacts in the southwest and southeast quadrants of the intersection. No changes to property access are expected. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.10.3.2. Limiting Access Alternative

Limiting access to and from US 30 West would improve safety at this location along US 30 because there would be no interaction between US 30 and US 30 West, eliminating all conflict points. This is a low-cost option. This alternative is not expected to require any additional right-of-way and no improvement limits have been drawn.

4.10.3.3. Convert to Interchange Alternative

This alternative for the free-flow concepts allows for US 30 to move without interruption. Old US 30 would utilize a bridge over US 30 and connect with Laporte CR 1350 S road north of the existing intersection. On and off ramps would allow access to and from US 30. The improvement limits for this alternative can be seen in **Figure 4-28**.

Extensive right-of-way is required for this alternative with several potential relocations of adjacent properties which would impact underserved populations. The most substantial portion of the work would be to the north and south of US 30 with new access being provided to nearby residential properties. It is considered a high-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process for potential use with bundled improvements.

4.10.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

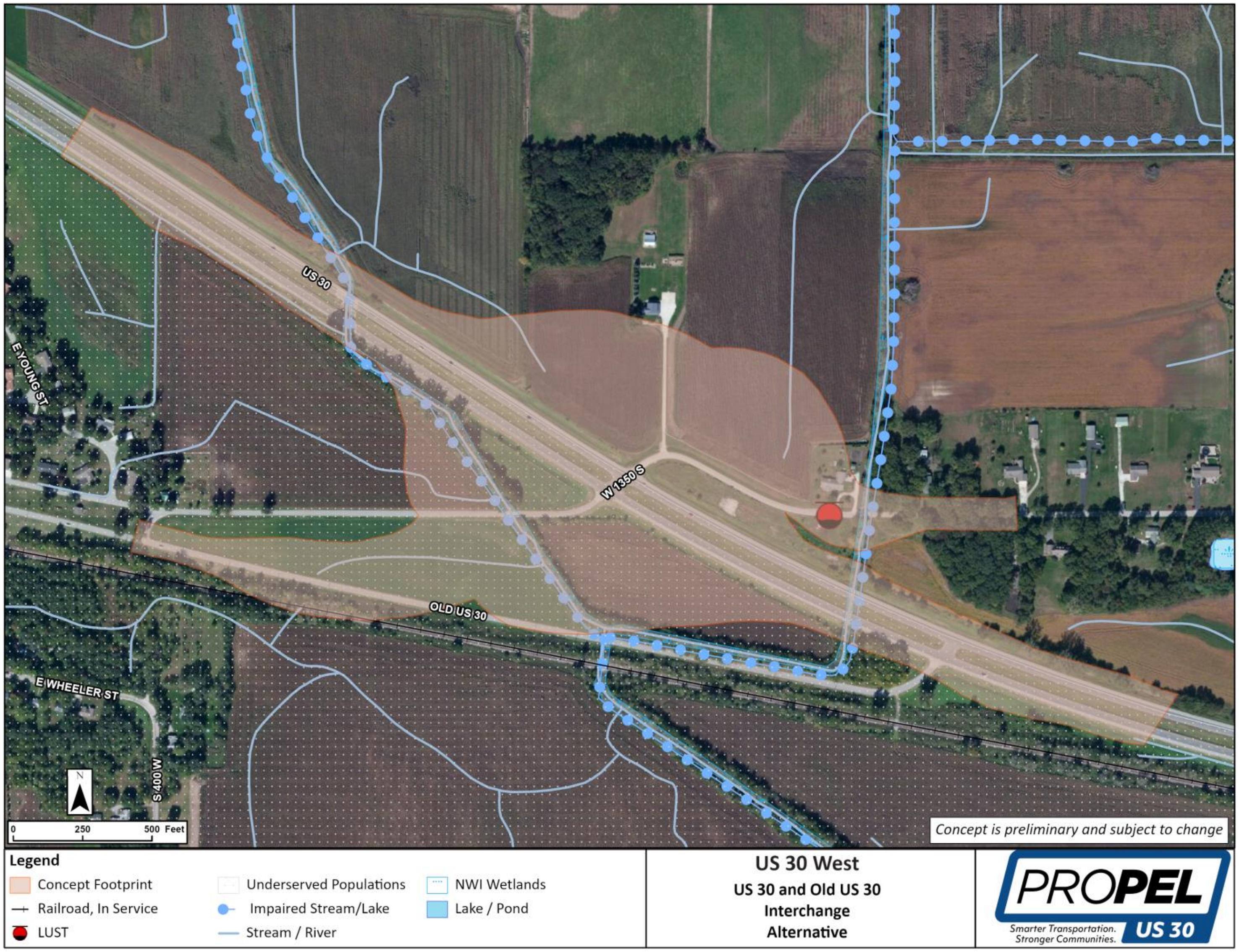
- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Add or Lengthen Turn Lanes.
- Convert to Interchange.
- Limit Access.
- Spot Roadway Lighting – May be incorporated into all alternatives.
- Warning Systems – May be incorporated into all alternatives.

Table 4-10: US 30 and Old US 30 West – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x Old US 30 West	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	N/A	Yes	Yes	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add or Lengthen Turn Lanes	Yes	Yes	Yes	Yes	N/A	Medium	Low	No	Low	Low	Low	Low	Yes	Added EB Right turn lane and WB left turn lane. Carried forward due to improvements to safety associated with dedicated deceleration lanes. The proposed turn lanes will meet IDM standards.
Convert to Interchange	Yes	Yes	Yes	Yes	Yes	High	Low	Yes	High	Medium	Low	High	Yes	Carried forward due necessity with a limited access alternative considered in Level 3. Not considered for other bundled improvements.
Unsignalized Intersection Improvements														
Limit Access	Yes	No	No	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Carried forward because this intersection was identified as not important for access to the corridor. Eliminating this access point to US 30 would provide potential safety improvements by reducing conflict points.
Complementary Concepts														
Spot Roadway Lighting	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Provide lighting for intersection alternatives per INDOT guidelines
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Raises awareness of approaching traffic to upcoming hazards

Figure 4-27: US 30 and Old US 30 West – Add or Lengthen Turn Lanes Alternative

Figure 4-28: US 30 and Old US 30 West – Interchange Alternative



4.11. US 30 AND CR 300 W / LONG LANE IN LAPORTE COUNTY

4.11.1. OVERVIEW OF LOCATION

This intersection is expected to operate acceptably through the design year of this study. The crash frequency and crash cost indices indicate that there are no major safety concerns at the intersection. Alternatives were still considered at this intersection as a part of safety or operational improvements along this segment of US 30, to be further considered in level 3.

The Norfolk-Southern Railroad runs parallel to US 30 approximately 100' south of the intersection. Review of the LaPorte County Countywide Land Development Plan (2008) did not indicate any preferences with regard to transportation infrastructure improvements along US 30. There have been no specific public comments to date regarding concerns at this intersection.

4.11.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the US 30 and Laporte CR 300 W (Long Lane) intersection poses numerous constraints that were considered in the development of Intersection Alternatives. The constraints are summarized as follows:

- Farmland surrounds this intersection with the closest residential parcel located 0.2 miles north of the intersection.
- Powerhouse Travel Plaza is located 1.2 miles east of the intersection.
- The intersection of US 30 and SR 39 is located 1.0 miles east of the intersection.
- The intersection of US 30 and Old US 30 West is located 0.5 miles west of the intersection.
- An at-grade railroad crossing is on the south leg of the intersection, crossing LaPorte CR 300 W.
- 5 NWI wetlands are in the vicinity of the intersection, including an impaired stream south of the railroad.
- There are no hazardous material concerns near the intersection.
- Underserved populations are located near the intersection.
    - Family Income Below Poverty Level
- A floodplain is located approximately 0.11 miles northeast of the intersection.

4.11.3. SCREENING OF ALTERNATIVES

The decision tree indicates that both at-grade and grade-separated alternatives would be applicable, while an interchange would be unnecessary. These alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-11**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Add or Lengthen Turn Lanes – There are no turn lanes at the intersection. Turn lanes should be added. This alternative would maintain local access.
- Cross Road Overpass/Underpass – There are other locations within approximately 2 miles of the intersection with equal or better access based on the functional classification of the route that local traffic would use to access the corridor. Therefore, a crossroad overpass or underpass should be considered, especially in Level 3 as part of a limited access section .

Primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.
- Median Safety Improvements – The median meets IDM requirements
- Add/Extend Acceleration Lanes – The crash patterns do not indicate a concern with missing acceleration lanes.
- Convert to Interchange – There are no traffic volumes or other factors that support an interchange at this location as a standalone alternative.
- Signalized Intersection Improvements – This intersection is currently two-way stop controlled and traffic volumes do not warrant a signalized intersection.
- Unsignalized Intersection Improvements – While this intersection is important for access to and from US 30, there are no safety or operational concerns here that support improvements.
    - If conditions change in the future and there are safety or operational issues, solutions such as a reduced conflict intersection should be considered as it is known to reduce severe crashes at intersection with similar physical characteristics.

Complementary Concepts to be considered as part of intersection alternatives are as follows:

- Intersection Sight Distance Improvements – Potential to improve safety.
- Spot Roadway Lighting – Provide lighting for intersection alternatives.
- Warning Systems – Potential to raise awareness for approaching traffic.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.11.3.1. Add and Lengthen Turn Lanes Alternative

This alternative involves adding eastbound and westbound right and left turn lanes at US 30 and Laporte CR 300 W (Long Lane) . Adding turn lanes improves the operations of the intersection. Adding turn lanes also improves the safety of the intersection by providing adequate deceleration lengths in a dedicated lane, reducing the likelihood of rear end collisions. The proposed turn lanes will meet IDM standards. The improvement limits of this alternative can be seen in **Figure 4-29**.

With the addition of eastbound and westbound right and left turn lanes there are potential right-of-way impacts in all quadrants of the intersection with improvements widening the existing railroad crossing. No changes to property access are expected. This alternative would involve widening the existing at-grade rail crossing on the south leg of the intersection. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.11.3.2. Cross Road Overpass / Underpass Alternative – Laporte CR 300 W (Long Lane) over US 30

Reconfiguring this intersection so that Laporte CR 300 W (Long Lane) goes over US 30 increases safety by eliminating access from Laporte CR 300 W (Long Lane) to US 30 and vice versa. In this alternative traffic would be routed over top of US 30 by use of a bridge. The improvement limits of this alternative can be seen in **Figure 4-30**.

By constructing an overpass to reach the allowed clearance over the railroad and US 30, the wetland in the northwest quadrant would be impacted by grading. The potential right-of-way impacts of a minor road overpass at this intersection are along the east and west sides of Laporte CR 300 W (Long Lane) with the largest impacts coming closer to US 30. This is where the potential roadway is the highest before the bridge. Right-of-way Impacts then taper back into the existing limits as the potential road profile ties back into the existing profile. Right-of-way changes would potentially impact underserved populations. It is considered a medium-cost option.

This alternative is mainly applicable to the improvement packages associated with a limited access section, to be analyzed in Level 3. This grade-separated configuration was preliminarily selected as opposed to elevating US 30 over LaPorte CR 300 W due to the assumed lower impacts given the rural environment. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.11.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Add or Lengthen Turn Lanes.
- Cross Road Overpass/Underpass.
- Intersection Sight Distance Improvements – May be incorporated into all alternatives.
- Spot Roadway Lighting – May be incorporated into all alternatives.
- Warning Systems – May be incorporated into all alternatives.

Table 4-11: US 30 and Laporte CR 300 W Long Lane – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x Laporte CR 300W Long Lane	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	N/A	Yes	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add or Lengthen Turn Lanes	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Medium	Low	Medium	Low	Yes	Added EB and WB left and right turn lanes. Carried forward due to safety improvements associated with sufficient deceleration lengths and dedicated turn lanes within a small footprint. The proposed turn lanes will reduce the likelihood of rear-end crashes and meet IDM standards.
Cross Road Overpass / Underpass	Yes	Yes	No	Yes	N/A	Low	Low	Yes	High	Low	High	Medium	Yes	Carried forward due to safety and operational improvements associated with grade separation.
Complementary Concepts														
Intersection Sight Distance Improvements	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Existing intersection is skewed. Improvements to sight distances would improve safety
Spot Roadway Lighting	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Provide lighting for intersection alternatives per INDOT guidelines
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Raises awareness of approaching traffic to upcoming hazards.

Figure 4-29: US 30 and LaPorte CR 300 W Long Lane – Add and Lengthen Turn Lanes Alternative

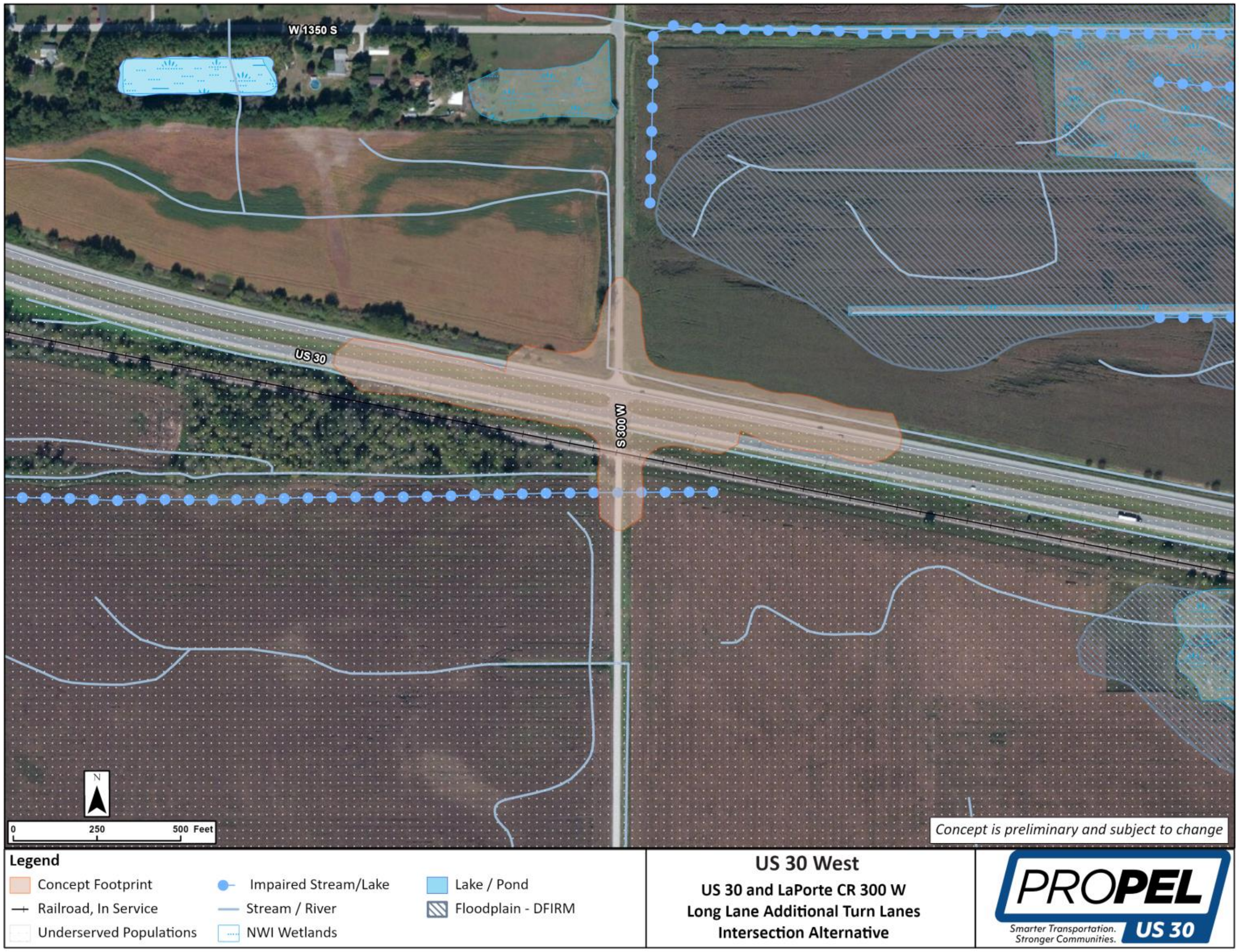
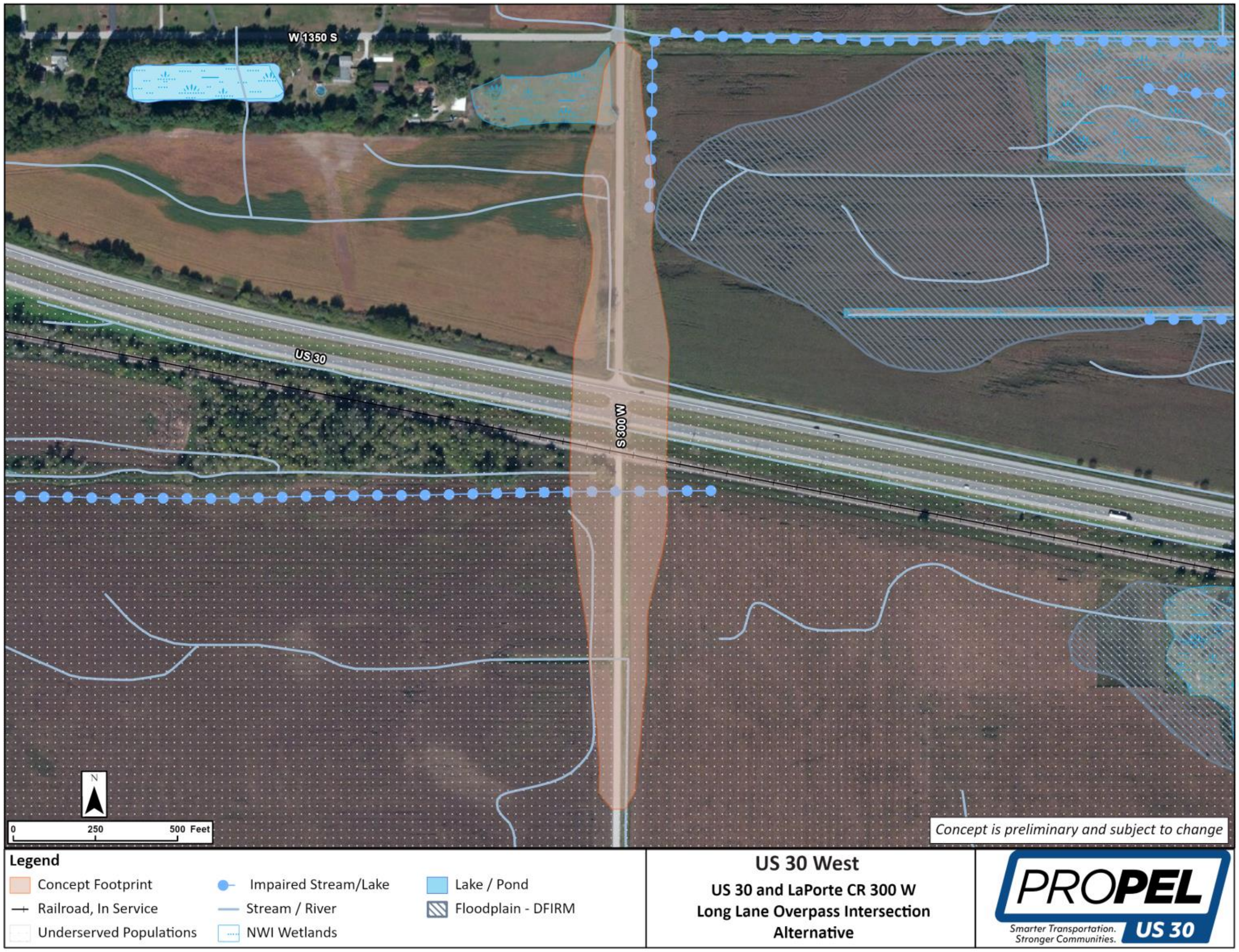


Figure 4-30: US 30 and LaPorte CR 300 W Long Lane – Cross Road Overpass/Underpass Alternative – LaPorte CR 300 W Over US 30



4.12. US 30 AND SR 39 IN LAPORTE COUNTY

4.12.1. OVERVIEW OF LOCATION

This signalized intersection is expected to operate acceptably through the design year of this study. The crash frequency index is slightly elevated, indicating an opportunity for safety improvements at the intersection. Of the intersection crashes occurring, the predominant crash type was rear-end crashes. These crashes may be related this signalized intersection being a surprise after a long run of unsignalized intersections.

There have been no specific public comments to date regarding concerns at this intersection.

The FY2022-2026 INDOT State Transportation Improvement Program (STIP) includes an intersection improvement project (Des. No. 1801871) to convert this location to a reduced conflict intersection. The project was suspended pending the completion of the ProPEL US 30 West study and recommendations.

4.12.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the intersection of US 30 and SR 39 poses numerous constraints that were considered in the development of intersection alternatives. These constraints are summarized as follows:

- There is a truck stop, Powerhouse Travel Plaza, located in the northeast quadrant of the intersection.
- There are several residential properties located in the southwest quadrant of the intersection.
- There are hazardous material concerns with a LUST located 0.2 miles east of the intersection.
- There are numerous UNTs and unnamed ditches in the immediate vicinity of the intersection.
- There are 16 NWI wetlands located in the area surrounding the intersection.
- Multiple floodplains surround the intersection.
- There are 4 lakes/ponds near the intersection.
- There is an at-grade railroad crossing at the south leg of the intersection running parallel to US 30, crossing SR 39.
- Underserved populations are located near the intersection.
    - Family Income Below Poverty Level

4.12.3. SCREENING OF ALTERNATIVES

The decision tree indicates that both at-grade and interchange alternatives would be applicable, while other grade-separated alternatives would be unnecessary. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-12**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Add or Lengthen Turn Lanes – The existing left and right turn lanes do not provide sufficient deceleration length. Turn lanes should be lengthened. This alternative would maintain local access.
- Add/Extend Acceleration Lanes – Crash patterns are potentially due to not having acceleration lanes. Acceleration lanes should be added. This alternative would maintain local access.
- Convert to Interchange – There are no factors that support an interchange being needed at this location as a standalone alternative. However, given further bundled improvements anticipated to be

analyzed in Level 3, this location was identified as a potential interchange due to the relatively high traffic volume observed here and State Route status of the roadway. This alternative would maintain local access.

- Signalized and Unsignalized Intersection Improvements – This intersection is important for access to and from US 30 due to heavy usage, and the crash frequency index indicates an opportunity for safety improvements. This intersection is already signalized. The CAP-X analysis indicated that the following at-grade intersection types could produce acceptable operating conditions in the design year.
    - Partial Displaced Left Turn – This alternative would improve safety at the intersection while also improving operations and maintaining local access.
    - Restricted Crossing U-Turn Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. This alternative would retain the existing signal, but with fewer phases. A Restricted Crossing U-Turn Intersection would meet access management guidelines and maintain local access.
    - Reduced Conflict Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. A Reduced Conflict Intersection would meet access management guidelines as well as create free-flow operations on US 30 and maintain local access.

The primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.
- Median Safety Improvements – The existing median meets IDM requirements.
- Cross Road Overpass / Underpass – There are no other locations within approximately 2 miles with equal or better access based on the functional classification of the route that local traffic can use to access the corridor.
- Other signalized intersection types were eliminated through Cap-X tool analysis because their potential benefits were not substantial enough when compared to the existing conditions. Therefore, they were not further analyzed as part of this process. These intersection types included:
    - Green-T Intersection – This alternative is not applicable to a four-legged intersection.
    - Quadrant Roadway – The CAP-X results indicated a high volume to capacity ratio implying poor operational performance of the intersection.
    - Boulevard Left Turn – The CAP-X results indicated a high volume to capacity ratio implying poor operational performance of the intersection.

The complementary concepts to be considered as part of the intersection alternatives include:

- Intersection Sight Distance Improvements – Potential to improve safety.
- Spot Roadway Lighting – Provide lighting for intersection alternatives.
- Warning Systems – Potential to raise awareness of approaching traffic.
- Freight Priority System – Potential to reduce delay for trucks.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.12.3.1. *Add or Lengthen Turn Lanes Alternative*

Lengthening the existing eastbound and westbound left and right turn lanes would improve intersection safety by providing sufficient deceleration lengths which would reduce the risk of rear-end crashes. The proposed turn lanes would meet IDM standards. The improvement limits for this alternative can be seen in **Figure 4-31**.

This alternative is expected to require minimal additional right-of-way from the southwest and northeast quadrants. All property access would be maintained. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.12.3.2. *Add/Extend Acceleration Lanes Alternative*

Added acceleration lanes would improve intersection safety by providing dedicated lanes for vehicles turning onto US 30 from SR 39 to achieve sufficient speed before entering the travel lanes. This alternative would also improve intersection operations by reducing the differential speed between mainline traffic and traffic entering the mainline from the minor road. The improvement limits for this alternative can be seen in **Figure 4-31**.

This alternative is expected to require minimal additional right-of-way from the northeast and southwest quadrants. All property access would be maintained. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.12.3.3. *Convert to Interchange Alternative*

This intersection alternative for the free-flow concepts allows for US 30 traffic to move without interruption. SR 39 would utilize a bridge over US 30 and on and off ramps to allow access to and from US 30. The improvement limits for this alternative can be seen in **Figure 4-32**.

Extensive right-of-way is required for this alternative with several potential relocations of adjacent properties. The most substantial portion of work would be in the northeast and northwest with new access being provided to nearby residential properties in the southwest and southeast quadrants. This alternative would maintain local access while meeting access management guidelines. The Interchange alternative has the potential for adverse impacts to underserved populations. It is considered a high-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process for potential use with bundled improvements.

4.12.3.4. *Partial Displaced Left Turn Alternative*

The Partial Displaced Left Turn would reroute the left turns originating on US 30 upstream of the main intersection. This would improve intersection operations by reducing the number of signal phases at the main intersection and allowing signal timing coordination between the signal controls at the left turns and at the main intersection. The improvement limits for this alternative can be seen in **Figure 4-33**.

This alternative is expected to require substantial additional right-of-way from all quadrants of the intersection to account for the additional displaced left turn and backside right turn travel lanes along US 30 and the widening of the existing intersection radii. This alternative would also have impacts to nearby streams and wetlands. All property access would be maintained while introducing potential adverse impacts to underserved populations. It is considered a medium-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.12.3.5. *Restricted Crossing U-Turn Intersection Alternative*

The RCUT alternative would reroute left turns from SR 39 to US 30 and minor road through movements. This would improve safety by reducing the risk of right-angle crashes and reduce delay at the intersection. The improvement limits for this alternative are the same as those shown in **Figure 4-35**.

This alternative would require minimal additional right-of-way and would have impacts to the natural resources surrounding the intersection. This alternative has no potential relocations and no potential for adverse impacts to underserved populations. The RCUT is a low-cost option. The RCUT alternative will be carried forward to the Level 3 screening process due to the potential for safety improvements.

4.12.3.6. Reduced Conflict Intersection Alternative

The RCI alternative would allow the free-flow of through traffic along US 30 while rerouting left turns from Porter SR 39 to US 30 and minor road through movements. This would improve safety by reducing the risk of right-angle crashes and reduce delay at the intersection. . The improvement limits for this alternative can be seen in **Figure 4-35**.

This alternative would require minimal additional right-of-way and would have impacts to the natural resources surrounding the intersection. This alternative has no potential relocations and no potential for adverse impacts to underserved populations. The RCI is a low-cost option. The RCI alternative will be carried forward to the Level 3 screening process due to the potential for safety improvements.

4.12.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Add or Lengthen Turn Lanes.
- Add/Extend Acceleration Lanes.
- Convert to Interchange.
- Partial Displaced Left Turn.
- Reduced Conflict Intersection.
- Restricted Crossing U-Turn Intersection
- Intersection Sight Distance Improvements – May be incorporated into all alternatives.
- Spot Roadway Lighting – May be incorporated into all alternatives.
- Warning Systems – May be incorporated into all alternatives.
- Freight Priority System – May be incorporated into all alternatives which involve signalization.

Table 4-12: US 30 and SR 39 – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US 30 x SR 39	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	N/A	Yes	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add or Lengthen Turn Lanes	Yes	No	Yes	Yes	N/A	Medium	Low	No	Low	Low	Medium	Low	Yes	Extend existing turn lanes, providing sufficient deceleration lengths. Carried forward due to the potential safety improvements associated with sufficient deceleration lengths which reduce the likelihood of rear-end crashes. The proposed turn lanes will meet IDM standards.
Add/Extend Acceleration/Deceleration Lanes	Yes	Yes	Yes	Yes	N/A	Medium	Low	No	Low	Low	Medium	Low	Yes	Carried forward due to potential safety improvements and improvements to observed crash patterns at the intersection.
Convert to Interchange	Yes	Yes	Yes	Yes	N/A	High	Low	Yes	High	High	High	High	Yes	Carried forward as a necessity for a limited access alternative. Not considered for other bundled improvements.
Signalized Intersection Improvements														
Partial DLT E-W	Yes	Yes	Yes	Yes	N/A	High	Low	Yes	High	Low	Medium	Medium	Yes	Carried forward due to the potential to improve intersection safety and operations as a result of reducing the number of conflict points and signal phases at the main intersection.
Restricted Crossing U-Turn Intersection E-W	Yes	Yes	Yes	Yes	N/A	Medium	Low	No	Low	Low	Medium	Low	Yes	Carried forward due to the potential safety improvements by reducing conflicting movements.
Unsignalized Intersection Improvements														
Reduced Conflict Intersection E-W	Yes	Yes	Yes	Yes	N/A	Medium	Low	No	Low	Low	Medium	Low	Yes	Carried forward due to the potential safety improvements by reducing conflicting movements and operational improvements by eliminating delay associated with the existing signal.
Complementary Concepts														
Intersection Sight Distance Improvements	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Existing intersection is skewed. Sight distance improvements would increase safety.
Spot Roadway Lighting	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Provide lighting for intersection alternatives
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Raises awareness of approaching traffic to upcoming hazards
Freight Priority System	No	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Can reduce delays for trucks by extending green time. Applicable to alternatives involving signalization.

Figure 4-31: US 30 and SR 39 – Add or Lengthen Turn Lanes and Add/Extend Acceleration Lanes Alternative

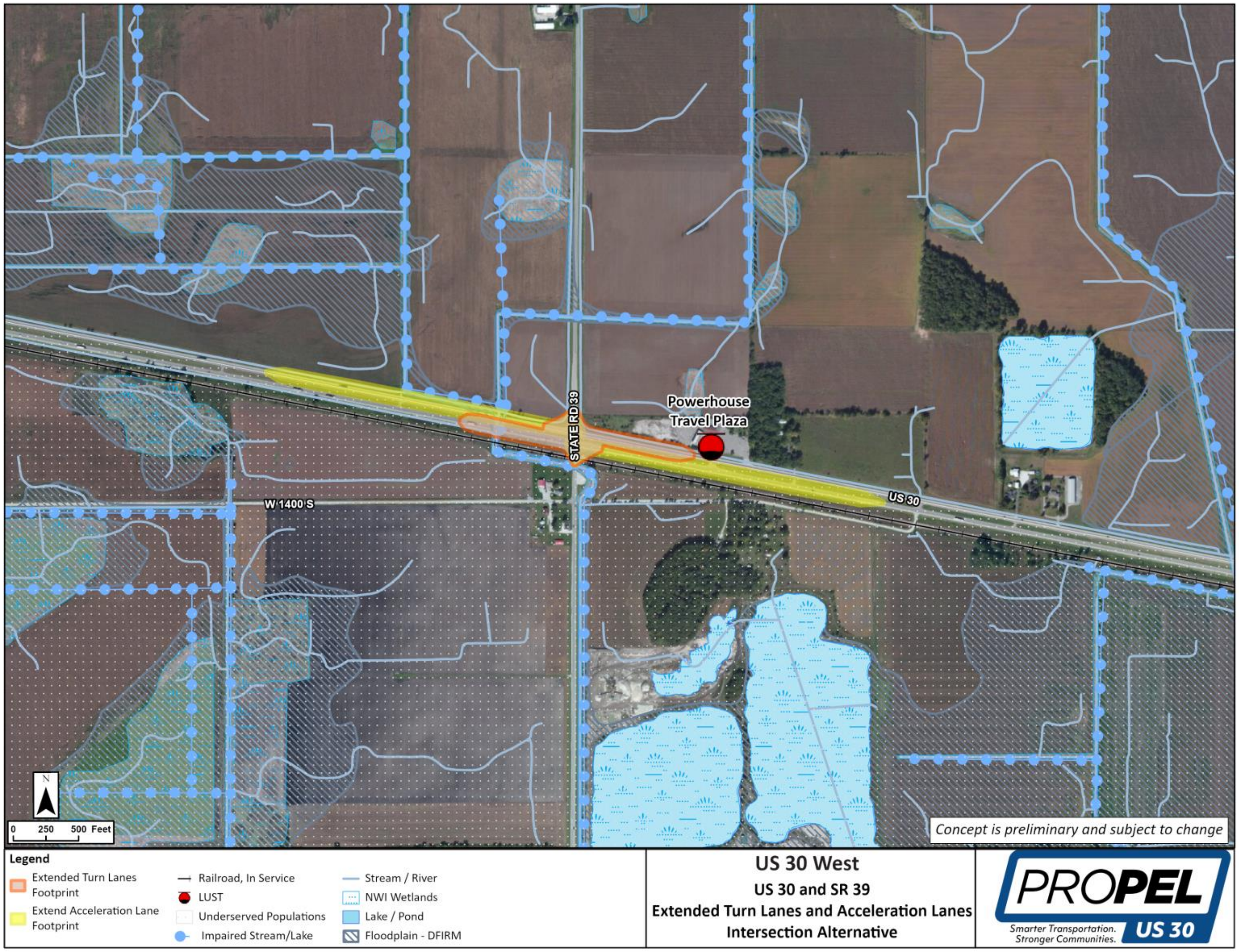


Figure 4-32: US 30 and SR 39 – Convert to Interchange Alternative

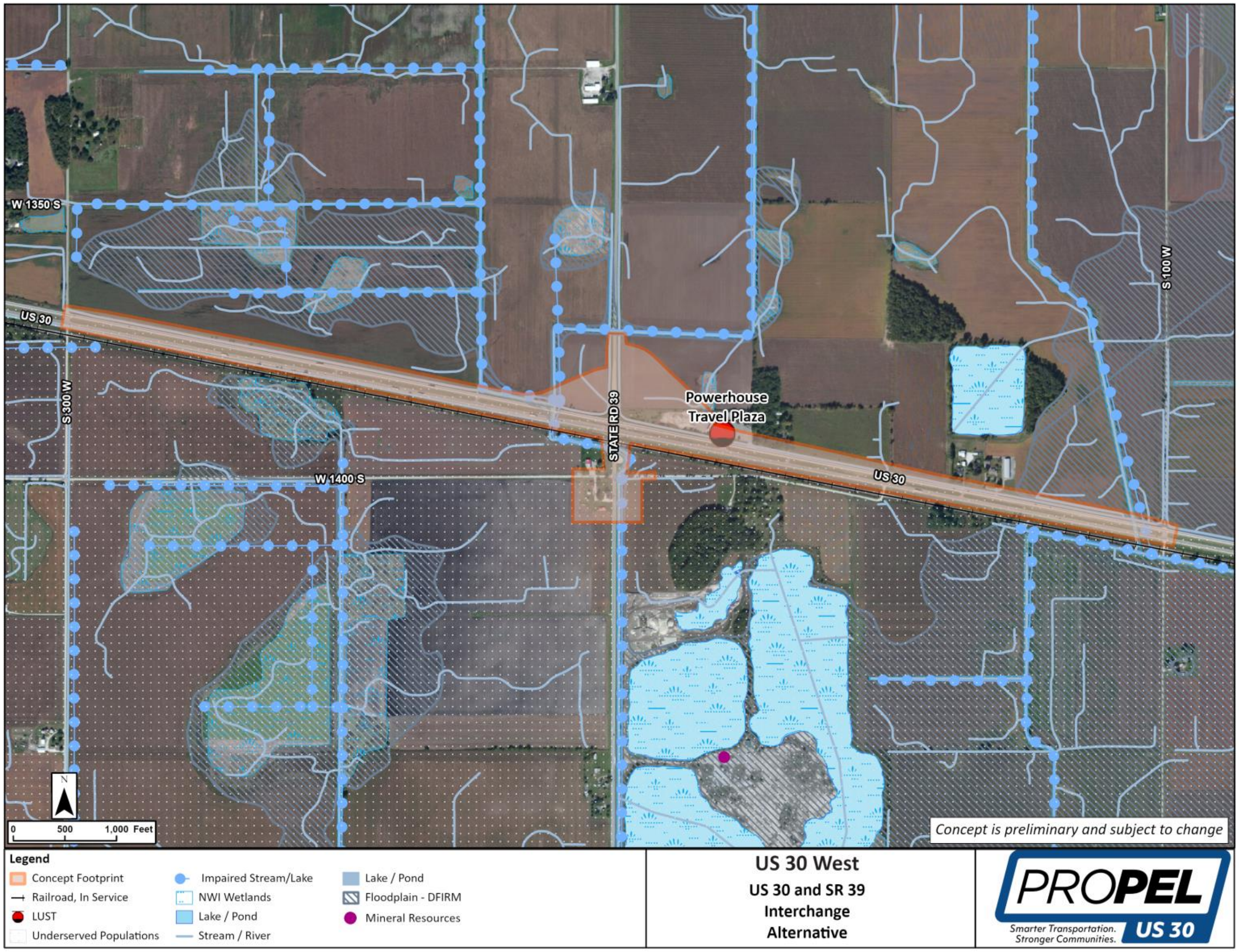


Figure 4-33: US 30 and SR 39 – Partial Displaced Left Turn Intersection Alternative

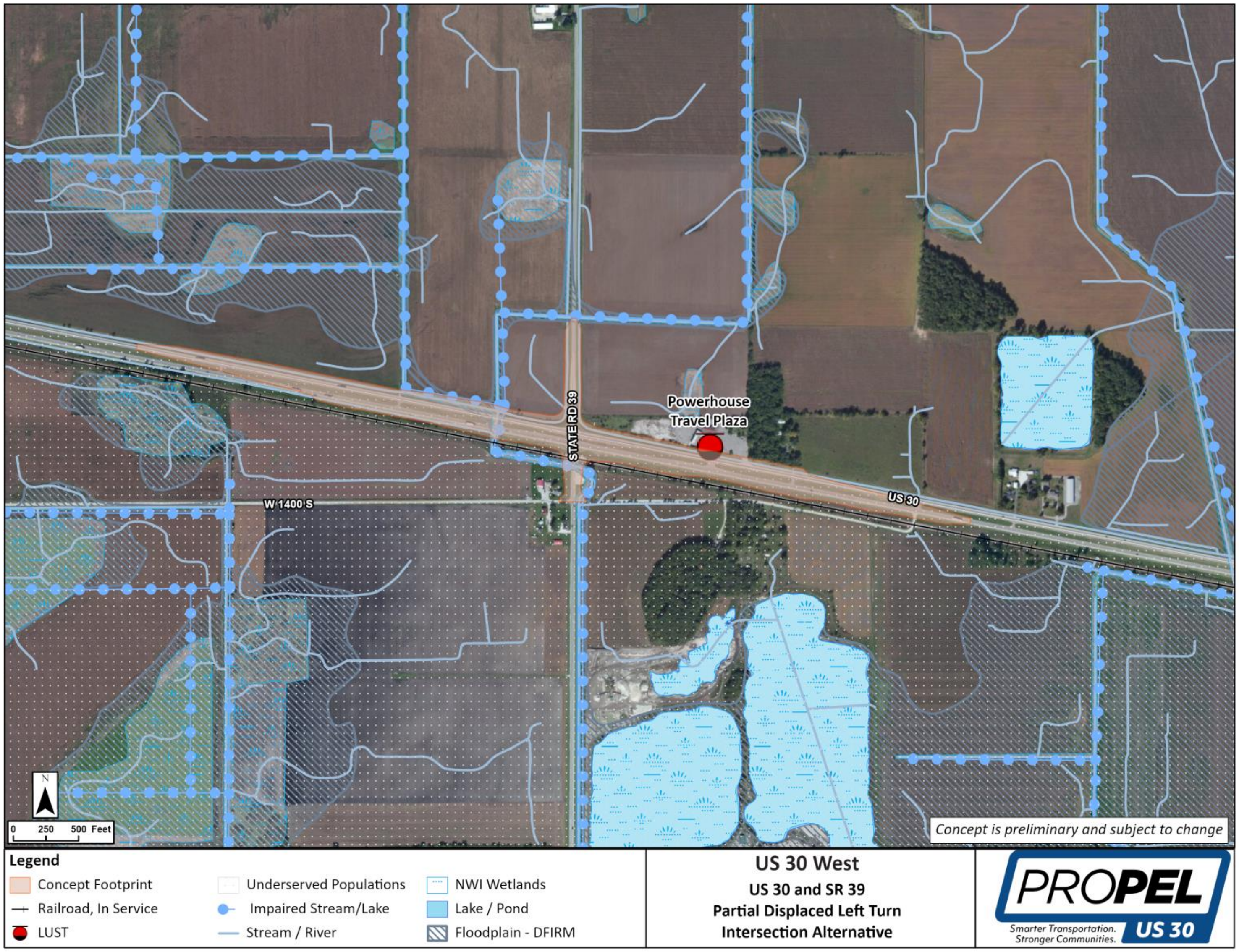
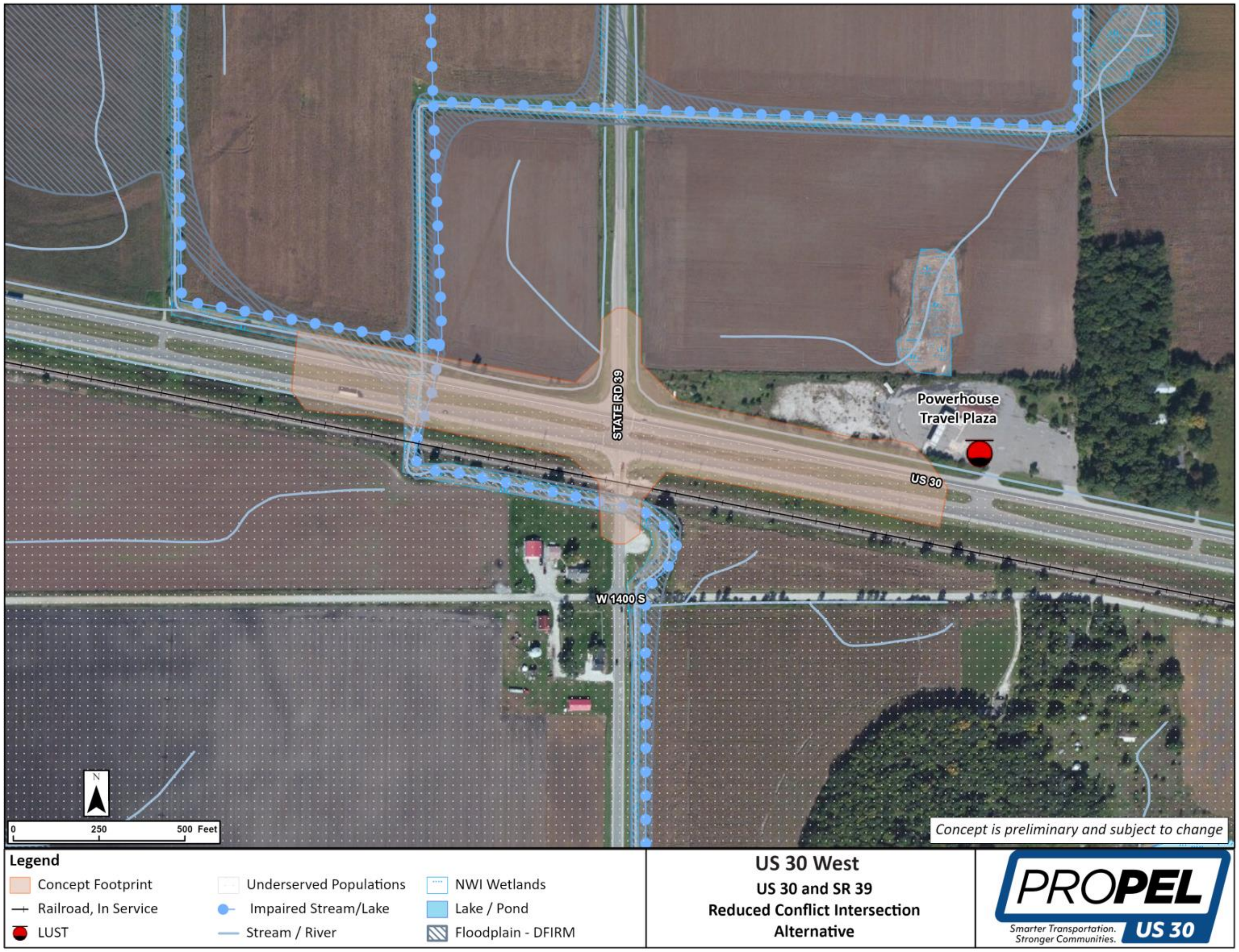


Figure 4-34: US 30 and SR 39 Reduced Conflict Intersection Alternative



4.13. US 30 AND US 35 IN STARKE COUNTY

4.13.1. OVERVIEW OF LOCATION

This diamond interchange is expected to operate acceptably through the design year of this study for all ramp and mainline movements. The crash frequency and crash cost indices for all ramps and mainline indicate that there are no major safety concerns at the interchange. Improvements were still considered at this interchange as a part of safety or operational improvements along this segment of US 30, to be further considered in level 3.

This interchange is located approximately 2.0 miles west of the Town of Hamlet.

Public comments received to date about this intersection are summarized as follows:

- The existing facilities at the interchange of US 30 and US 35 should be maintained.

4.13.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the interchange of US 30 and US 35 poses numerous constraints that were considered in the development of alternatives. These constraints are summarized as follows:

- Benninghoff Ditch is located in the northeast and northwest quadrants of the interchange and crosses US 30 just west of the interchange.
- US 35 overpasses a railroad approximately 0.40 miles south of the interchange.
- There are several wetlands, ponds, and streams located in the vicinity of the interchange.
- This interchange is located in a floodplain.
- Underserved populations are located near the intersection.
    - Family Income Below Poverty Level

4.13.3. SCREENING OF ALTERNATIVES

The decision tree indicates that improvements to the existing interchange would be applicable, while new grade-separated and at-grade alternatives would be unnecessary. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-13**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Extend Acceleration/Deceleration Lanes – The existing US 30 westbound acceleration lane does not meet IDM design standards and should be extended. This alternative would maintain local access.

Complementary Concepts to be considered at this interchange are as follows:

- Ramp Terminal Intersection Improvements – Potential to improve traffic operations and safety at the interchange.

The interchange alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these interchange alternatives where applicable.

4.13.3.1. Extend Acceleration Lanes Alternative

At this interchange, the only substandard deceleration or acceleration lane identified was the US 35 southbound to US 30 westbound. This alternative would improve the safety at the interchange of US 30 and US 35 by providing a longer dedicated lane for vehicles entering US 30 westbound from US 35 southbound to reach the design speed before merging with through traffic on US 30. This would decrease the risk of rear-end and side-swipe crashes. This alternative would also improve operations by reducing the differential speed between mainline traffic and traffic entering the mainline from the minor road. The improvement limits for this alternative are shown in **Figure 4-36**.

This alternative would require minimal additional right-of-way and all property access would be maintained. This alternative would also have minimal impacts on the surrounding natural resources. This is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.13.4. INTERCHANGE ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

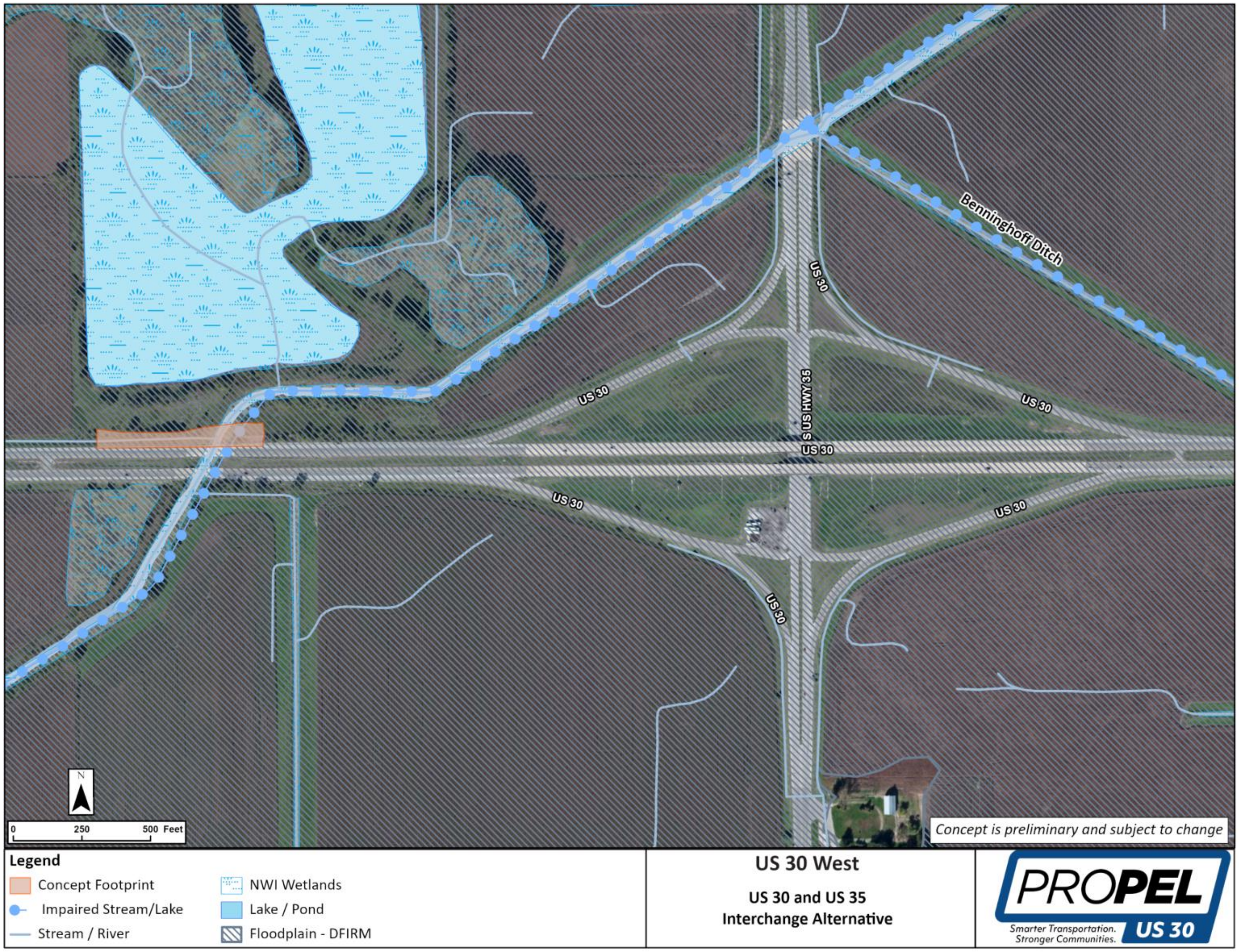
The following interchange alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Extend Acceleration Lanes.
- Ramp Terminal Intersection Improvements – May be incorporated into all alternatives.

Table 4-13: US 30 and US 35 – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x US 35	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	Yes	Yes	No	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add/Extend Acceleration/Deceleration Lanes	Yes	Yes	Yes	Yes	Yes	Medium	Low	No	Low	Low	N/A	Low	Yes	Would have to widen bridge to extend WB acceleration lane. Carried forward due to the potential for improvements to safety and operations.
Complementary Concepts														
Ramp Terminal Intersection Improvements	Yes	Yes	Yes	Yes	Yes	Low	Low	No	Low	Low	N/A	Medium	Yes	To be determined at Level 3

Figure 4-35: US 30 and US 35 – Extend Acceleration Lanes Alternative



4.14. US 30 AND CR 750 E IN STARKE COUNTY

4.14.1. OVERVIEW OF LOCATION

This intersection is expected to operate acceptably through the design year of this study. The crash frequency and crash cost indices indicate that there are no major safety concerns at the intersection. Alternatives were still considered at this intersection as a part of safety or operational improvements along this segment of US 30, to be further considered in level 3.

The Norfolk-Southern Railroad runs parallel to US 30 approximately 100' south of the intersection.

Public comments received to date about this intersection are summarized as follows:

- All local access at this intersection should be maintained.

4.14.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the US 30 and Starke CR 750 E intersection poses numerous constraints that were considered in the development of alternatives. The constraints are summarized as follows:

- Several businesses are located adjacent to the intersection, including Howard & Sons Towing & Salvage, Norton Packaging INC, Hensler Nursery, and D & M Exotic Pets
- The town of Hamlet is located 1.6 miles west of the intersection.
- Oregon Davis Elementary and High School are located 0.5 miles north of the intersection.
- An at-grade railroad crossing is on the south leg of the intersection, crossing Starke CR 750 E.
- An electric substation is located 300 feet north of the intersection.
- 4 NWI wetlands are in the vicinity of the intersection.
- There is a ditch that crosses US 30 approximately 0.2 mile west of the intersection. The ditch is listed as an impaired stream.
- Underserved populations are located near the intersection.
    - Family Income Below Poverty Level
    - Non-English Speaking Population

4.14.3. SCREENING OF ALTERNATIVES

The decision tree indicates that both at-grade and grade-separated alternatives would be applicable, while an interchange would be unnecessary. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-14**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Add or Lengthen Turn Lanes – The existing turn lanes do not provide sufficient deceleration length. The turn lanes should be lengthened. This alternative would maintain local access.
- Cross Road Overpass/Underpass – There are other locations within approximately two miles of the intersection that provide equal or better access based on the functional classification of the route that local traffic would use to access the corridor. Therefore, a crossroad overpass or underpass should be considered.

Primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.
- Median Safety Improvements – The median meets IDM requirements
- Add/Extend Acceleration Lanes – The crash patterns do not indicate a concern with missing acceleration lanes.
- Convert to Interchange – Volumes or other factors do not support an interchange.
- Signalized Intersection Improvements – Traffic volumes at this intersection do not warrant a signalized intersection.
- Unsignalized Intersection Improvements – While this intersection is important for access to and from US 30, there are no safety or operational concerns that indicate a need for intersection improvements.
    - If conditions change in the future and there are safety or operational concerns, solutions such as a reduced conflict intersection should be considered at this location as it is known to reduce severe crashes at intersections with similar physical characteristics.

Complementary Concepts to be considered as part of primary concepts are as follows:

- Intersection Sight Distance Improvements – Potential to improve safety.
- Spot Roadway Lighting – Provide lighting for intersection alternatives.
- Warning Systems – Potential to raise awareness for approaching traffic.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.14.3.1. Add and Lengthen Turn Lanes Alternative

This alternative involves lengthening the existing left and right turn lanes along US 30. Lengthening turn lanes improves the safety of the intersection by providing adequate deceleration lengths and increasing storage space, reducing the likelihood of rear end collisions. The proposed turn lanes would meet IDM standards. The improvement limits of this alternative can be seen in **Figure 4-37**.

With the eastbound and westbound turn lanes lengthened there are potential right-of-way impacts in all quadrants of the intersection with improvements widening the existing railroad crossing. No changes to property access are expected. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.14.3.2. Cross Road Overpass / Underpass Alternative – US 30 over Starke CR 750 E

Reconfiguring this intersection so that US 30 goes over Starke CR 750 E increases safety by eliminating access from Starke CR 750 E to US 30 and vice versa. In this alternative, traffic would be routed over top of Starke CR 750 E by use of two bridges. The improvement limits of this alternative can be seen in **Figure 4-38**.

The potential right-of-way impacts of an underpass configured this way at this intersection are along the north and south sides of US 30. With this alternative there are no potential relocations but there are potential adverse impacts to underserved populations. It is considered a medium-cost option.

This alternative is mainly applicable to the improvement packages associated with a limited access section, to be analyzed in Level 3. This grade-separated configuration was preliminarily selected as opposed to elevating

Starke CR 750 E over US 30 due to the assumed lower impacts to the surrounding area. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.14.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Add or Lengthen Turn Lanes.
- Cross Road Overpass/Underpass.
- Intersection Sight Distance Improvements – May be incorporated into all alternatives.
- Spot Roadway Lighting – May be incorporated into all alternatives.
- Warning Systems – May be incorporated into all alternatives.

Table 4-14: US 30 and Starke CR 750 E – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x Starke CR 750 E	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	N/A	Yes	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add or Lengthen Turn Lanes	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Medium	Low	Yes	Lengthen EB & WB Left and Right Turn Lanes. Carried forward due to the potential safety improvements associated with sufficient deceleration lengths which reduces the likelihood of rear-end crashes. The proposed turn lanes would meet IDM requirements.
Cross Road Overpass / Underpass	Yes	Yes	No	Yes	N/A	Low	Low	Yes	Medium	Low	High	Medium	Yes	EB Bridge shifted north to lessen impacts to railroad. Carried forward due to the safety and operational improvements associated with grade separation.
Complementary Concepts														
Intersection Sight Distance Improvements	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Intersection is on a skew. Improvements to sight distance would increase safety.
Spot Roadway Lighting	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Provide lighting for intersection alternatives
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Raises awareness of approaching traffic

Figure 4-36: US 30 and Starke CR 750 E – Add and Lengthen Turn Lanes Alternative

Figure 4-37: US 30 and Starke CR 750 E – Cross Road Overpass/Underpass Alternative – US 30 Over Starke CR 750 E

4.15. US 30 AND SR 23 IN STARKE COUNTY

4.15.1. OVERVIEW OF LOCATION

This unsignalized intersection (flashing signal) is expected to operate acceptably through the design year of this study. The crash cost index is slightly elevated, indicating there are opportunities for safety improvements at the intersection. Of the intersection crashes occurring, the predominant crash types were right-angle and left-turn crashes. These crashes may be related to vehicles pulling out in front of on-coming traffic.

The Norfolk Southern Railroad runs parallel to US 30 approximately 185’ south of the intersection.

The FY2022-2026 INDOT State Transportation Improvement Program (STIP) includes an intersection improvement project (Des. No. 1801870) to convert this location to a reduced conflict intersection. The project was suspended pending the completion of the ProPEL US 30 West study and recommendations.

Public comments received to date about this intersection are summarized as follows.

- Desire for this intersection to be converted to an interchange.
- Intersection improvements that would improve mobility of semi-trucks and trailers.
- Property owner concerns regarding impacts involved with intersection improvements.
- Safety concerns with the Grovertown Truck Stop.
- Emergency Response Services located near the intersection.

4.15.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the US 30 and SR 23 intersection poses numerous constraints that were considered in the development of alternatives. The constraints are summarized as follows:

- Several businesses are located adjacent to the intersection, including Indiana Hope Center and Niteline Auto Service.
- Grovertown United Methodist Church is located 600 feet north of the intersection.
- United States Postal Service is located 400 feet north of the intersection.
- Starke County EMS Grovertown Base is located just 100 feet north of the intersection.
- An at-grade railroad crossing is on the south leg of the intersection, crossing SR 23.
- 10 NWI wetlands are in the vicinity of the intersection.
- One Indiana Historic Sites and Structures Inventory (IHSSI) Notable site located 900 feet north of the intersection.
- Underserved populations are located near the intersection.
    - Family Income Below Poverty Level
    - Non-English Speaking Population
- Tall Oaks RV Campground is located approximately 0.4 miles northwest of the intersection. This location is listed as a Recreational Facility.
- A natural gas pipeline passes through the intersection.
- Hazardous material concerns are near the intersection, including 1 LUST site east of the intersection.

4.15.3. SCREENING OF ALTERNATIVES

The decision tree indicates that both at-grade and interchange alternatives would be applicable, while other grade-separated alternatives would be unnecessary. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-15**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Add or Lengthen Turn Lanes – Existing turn lanes do not provide sufficient deceleration length. Turn lanes should be lengthened. This alternative would maintain local access.
- Add/Extend Acceleration Lanes – Crash patterns indicate a concern potentially due to not having acceleration lanes. Acceleration lanes should be added. This alternative would maintain local access.
- Convert to Interchange – There are no factors that support an interchange at this location as a standalone alternative. However, given further bundled improvements anticipated to be analyzed in Level 3, this location was identified as a potential interchange due to the relatively high traffic volume observed here and State Route status of the roadway, as well as the proximity to the community of Grovertown. This alternative would maintain local access.
- Signalized and Unsignalized Intersection Improvements – This intersection is important for access to and from US 30 due to the community of Grovertown located north of the intersection. The crash cost index indicates there are safety concerns. This intersection is currently two-way stop controlled with a beacon. Forecasted traffic volumes at this intersection warrant a signal. The CAP-X analysis indicated that the following at-grade intersection types could produce acceptable operating conditions in the design year.
    - Boulevard Left Turn Intersection East-West – This alternative would improve safety at the intersection while improving intersection operations and maintaining local access.
    - Restricted Crossing U-Turn Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. It would also meet access management guidelines and maintain local access.
    - Reduced Conflict Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. A Reduced Conflict Intersection would meet access management guidelines as well as preserve free-flow operations on US 30 and maintain local access.
    - Roundabout – This alternative would reduce delay and improve intersection operations along US 30 while maintaining all local access. This alternative also improves safety at the intersection by reducing speeds and lowering the risk of right-angle crashes.

Primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.
- Median Safety Improvements – The median meets IDM requirements
- Cross Road Overpass/Underpass – There are no other locations within approximately 2 miles with equal or better access than SR 23, based on the functional classification of the route that local traffic can use to access the corridor.

- Other signalized intersection types were eliminated through Cap-X tool analysis because their potential benefits were not substantial enough when compared to the existing conditions. Therefore, they were not further analyzed as part of this process. These intersection types included:
    - Green-T Intersection – This alternative is not applicable to a four-legged intersection.
    - Displaced Left Turn Intersection – Based on low left turning volumes and the requirement of additional right-of-way for left turn crossovers, this alternative would become prohibitively expensive compared to other feasible intersection types.
    - Quadrant Roadway – The CAP-X results indicated a high volume to capacity ratio implying poor operational performance of the intersection.

Complementary Concepts to be considered as part of intersection alternatives are as follows:

- Spot Roadway Lighting – Provide lighting for intersection alternatives.
- Warning Systems – Potential to raise awareness for approaching traffic.
- Freight Priority System – Potential to reduce delay for trucks.
- Bike / Pedestrian Facilities – Nearby recreational facilities indicate a potential desire for bike and pedestrian facilities.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.15.3.1. Add and Lengthen Turn Lanes Alternative

This alternative involves lengthening the existing left and right turn lanes along US 30. Lengthening the existing turn lanes would improve safety by providing sufficient deceleration length, which reduces the likelihood of rear-end crashes, and increasing storage space. The proposed turn lanes would meet IDM requirements. The improvement limits of this alternative can be seen in **Figure 4-39**.

With the eastbound and westbound turn lanes lengthened there are potential right-of-way impacts in the northeast and southwest quadrants of the intersection with improvements widening the existing railroad crossing. Potential relocations may be required in the northeast and southwest quadrants. This alternative has the potential for adverse impacts to underserved populations. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.15.3.2. Add/Extend Acceleration Lanes Alternative

Added acceleration lanes would improve intersection safety by providing dedicated lanes for vehicles turning onto US 30 from SR 23 to achieve sufficient speed before entering the travel lanes. This alternative would also improve intersection operations by reducing the differential speed between mainline traffic and traffic entering the mainline from the minor road. The improvement limits for this alternative can be seen in **Figure 4-39**.

This alternative is expected to require additional right-of-way from the northeast, northwest, and southwest quadrants. All property access would be maintained. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.15.3.3. Convert to Interchange Alternative

This intersection alternative allows for US 30 traffic to move without interruption. US 30 would utilize two bridges over SR 23 and on and off ramps to allow access to and from US 30. This is a folded diamond interchange. The improvement limits for this alternative can be seen in **Figure 4-40**.

Extensive right-of-way is required for this alternative with several potential relocations of adjacent properties, including potential impacts to underserved populations. The most substantial portion of work would be in the northwest and southeast quadrants to avoid impacts to the residential area to the northeast and businesses in the southwest. The interchange alternative would have major impacts to natural resources in the northwest quadrant of the intersection. In addition, there would be some impacts to the IHSSI notable property in the northwest quadrant. It is considered a high-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process for potential use with bundled improvements.

4.15.3.4. Boulevard Left Turn Intersection East-West Alternative

This alternative would reroute left turns from US 30 to SR 23 which would improve intersection safety by reducing conflict points, thereby reducing the risk of right-angle crashes. This alternative would also improve intersection operations improving the capacity ratio from the existing two way stop control condition. This alternative requires the turning radii to be enlarged to accommodate truck turning movements. The improvement limits for this alternative can be seen in **Figure 4-41**.

This alternative is expected to require additional right-of-way from all four quadrants. Potential relocations may be required in the northeast and southwest quadrants which have the potential to adversely impact underserved populations. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.15.3.5. Restricted Crossing U-turn Intersection Alternative

The RCUT alternative keeps all existing movements for US 30 while rerouting left turns and through movements from SR 23 to US 30, which improves safety by eliminating conflict points. The improvement limits for this alternative are shown in **Figure 4-42**.

Potential right-of-way impacts are expected in all quadrants of the intersection including potential adverse impacts to underserved populations. Widening of the existing at-grade railroad crossing at the south leg of the intersection is also expected. Additionally, potential relocations in the northeast and southwest quadrants may be required. This alternative requires railroad impacts. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.15.3.6. Reduced Conflict Intersection Alternative

The RCI alternative would retain free-flow through traffic along US 30 while rerouting left turns from SR 23 to US 30 and minor road through movements. This would improve safety by reducing the risk of right-angle crashes and reduce delay at the intersection. The addition of truck loons was included in the conceptual design. The improvement limits for this alternative are identical to that of what is shown in **Figure 4-42**.

Potential right-of-way impacts are expected in all quadrants of the intersection, including potential adverse impacts to underserved populations. Widening of the existing at-grade railroad crossing at the south leg of the intersection is also expected. Additionally, the potential alternative may require relocations in the northeast and southwest quadrants. The RCI at this location has previously been designed by INDOT and construction was scheduled to begin in 2022. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.15.3.7. Roundabout Alternative

Reconfiguring the US 30 and SR 23 intersection into a roundabout alternative would require the center of the roundabout to be at the center of the current intersection so that impacts can be limited. The roundabout alternative would increase safety by reducing travel speed and the chance for more severe right angle, left turn, and head on collisions, although additional rear-end crashes may occur. The improvement limits of this alternative can be seen in **Figure 4-43**.

The potential right-of-way impacts for this alternative affects all four quadrants of the intersection. Additionally, the potential alternative may require relocations in the southwest quadrant. It is considered a medium-cost option. Speed management strategies would have to be paired with the roundabout alternative to mitigate the risk of rear-end crashes. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.15.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Add or Lengthen Turn Lanes.
- Add/Extend Acceleration Lanes.
- Convert to Interchange.
- Boulevard Left Turn E-W.
- Restricted Crossing U-Turn.
- Reduced Conflict Intersection.
- Roundabout.
- Spot Roadway Lighting – May be incorporated into all alternatives involving signalization.
- Warning Systems – May be incorporated into all alternatives.
- Freight Priority System – May be incorporated into all alternatives.
- Bike/Pedestrian Facilities – May be incorporated into all alternatives.

Table 4-15: US 30 and SR 23 – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x SR 23 / CR 1000 E	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward ?	Notes/ Comments
No build	N/A	N/A	N/A	Yes	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add or Lengthen Turn Lanes	Yes	No	Yes	Yes	N/A	Low	Low	Yes	Low	Medium	Medium	Low	Yes	Extend EB and WB turn lanes. Carried forward due to the potential safety improvements associated with providing sufficient deceleration lengths which reduce the likelihood of rear-end crashes. The proposed turn lanes would meet IDM requirements.
Add/Extend Acceleration/Deceleration Lanes	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	Medium	Low	Yes	Extend EB and WB acceleration lanes. Carried forward due to the potential to improve safety by reducing the rear-end crash risk which was observed as a concerns this intersection.
Convert to Interchange	Yes	Yes	Yes	Yes	Yes	High	Medium	Yes	High	High	High	High	Yes	Carried forward as a necessity for a limited access alternative. Not considered for other bundled improvements.
Signalized Intersection Improvements														
Boulevard Left Turn E-W	Yes	Yes	Yes	Yes	N/A	Low	Low	Yes	Low	Medium	Medium	Low	Yes	Carried forward due to the potential improvements to safety and intersection operations.
Restricted Crossing U-Turn Intersection E-W	Yes	Yes	Yes	Yes	N/A	Low	Low	Yes	Low	High	Medium	Low	Yes	Carried forward due to the potential for improvements to safety and intersection operations.
Unsignalized Intersection Improvements														
Reduced Conflict Intersection E-W	Yes	Yes	Yes	Yes	N/A	Low	Low	Yes	Low	High	Medium	Low	Yes	Caried forward due to the potential for improvements to safety and intersection operations.
Roundabout	Yes	Yes	Yes	Yes	N/A	Low	Low	No	High	Medium	Medium	Medium	Yes	Carried forward due to the potential for improvements to safety and intersection operations.
Complementary Concepts														
Spot Roadway Lighting	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Provide lighting for intersection alternatives per INDOT guidelines
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Raises awareness of approaching traffic to upcoming hazards.
Freight Priority System	No	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Can reduce delays for trucks by extending green time
Bike/Pedestrian Facilities	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Potential to improve safety at the intersection or bike riders and pedestrians

Figure 4-38: US 30 and SR 23 – Add and Lengthen Turn Lanes and Add/Extend Acceleration Lanes Alternative

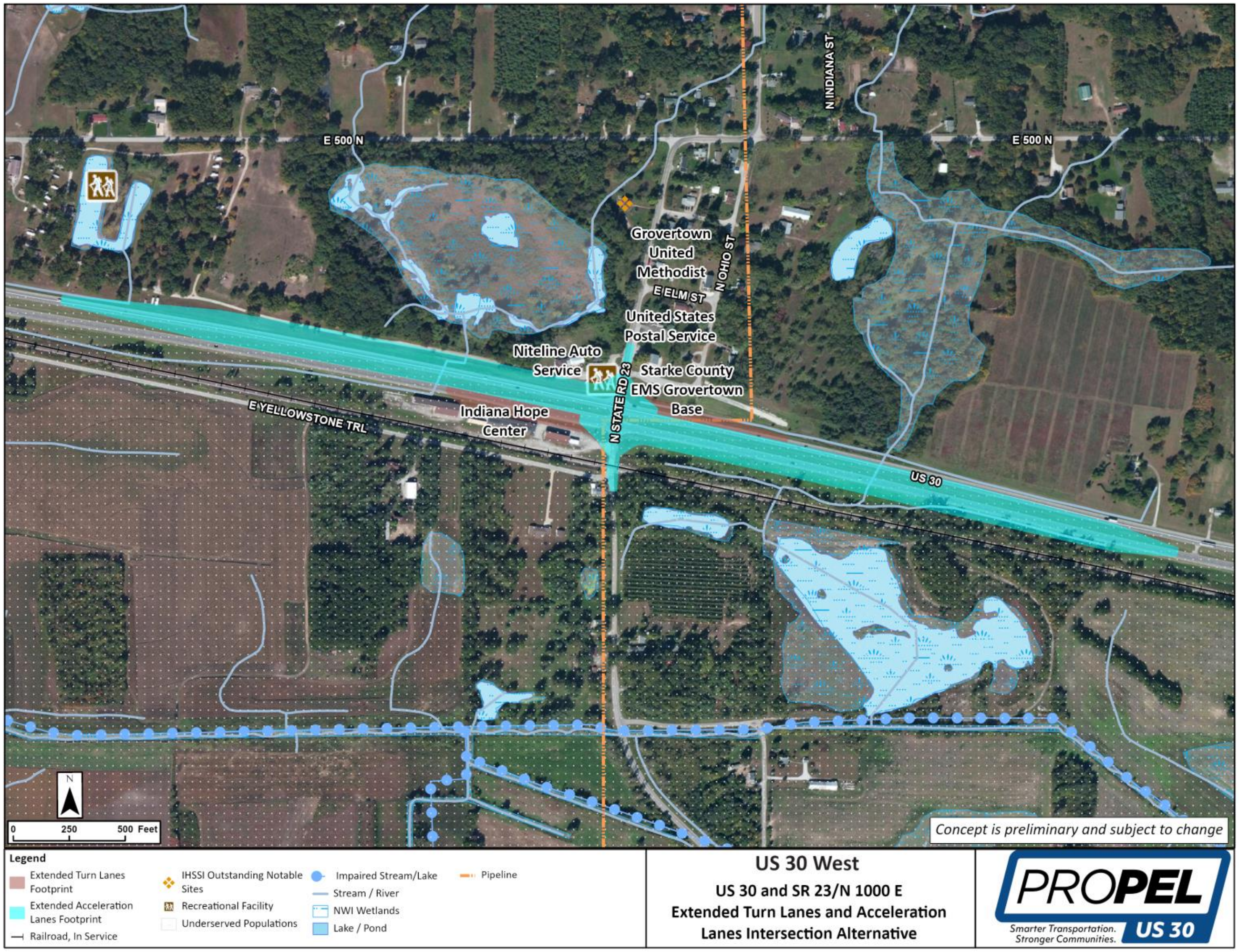


Figure 4-39: US 30 and SR 23 – Interchange Alternative

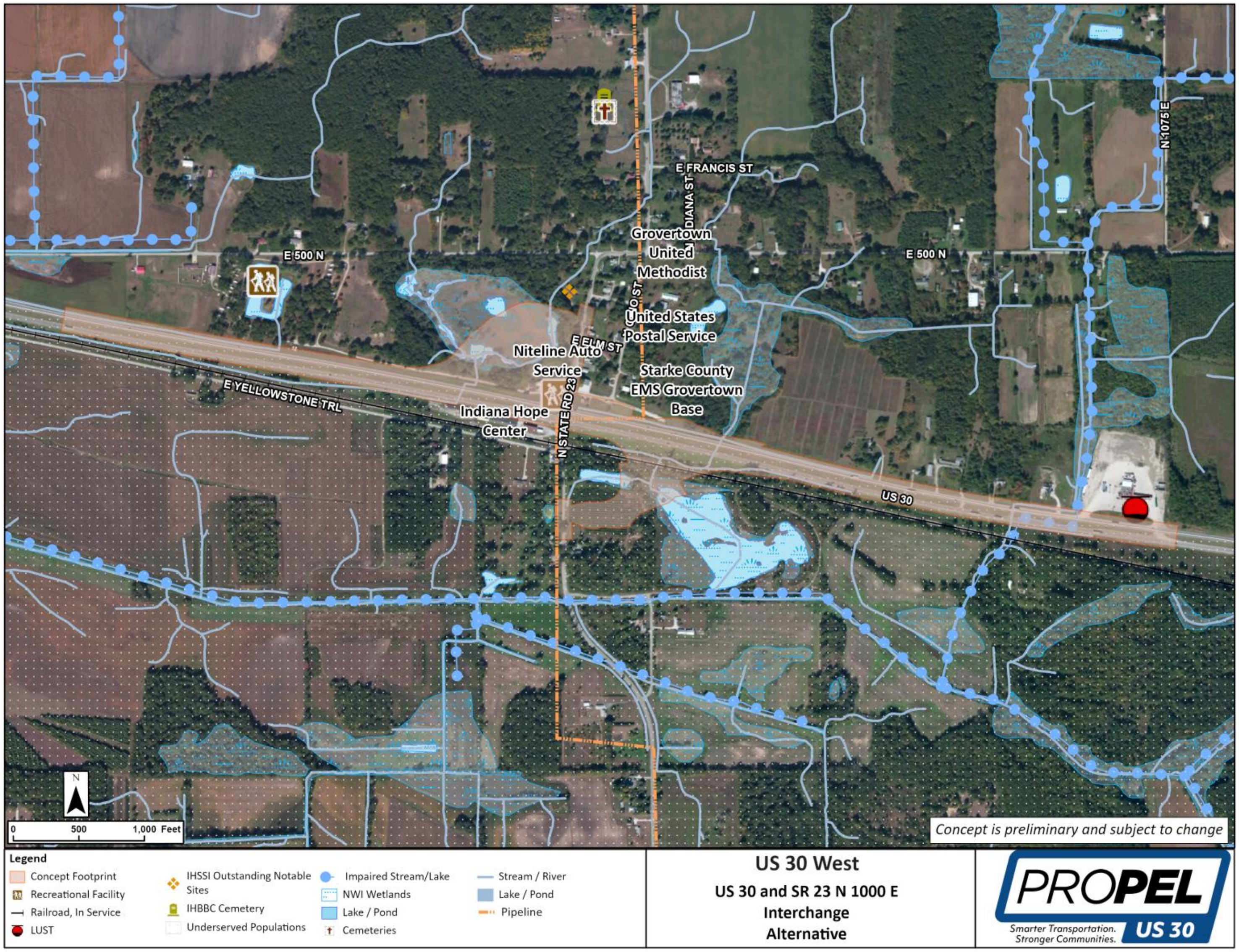


Figure 4-40: US 30 and SR 23 – Boulevard Left Turn Intersection East-West Alternative

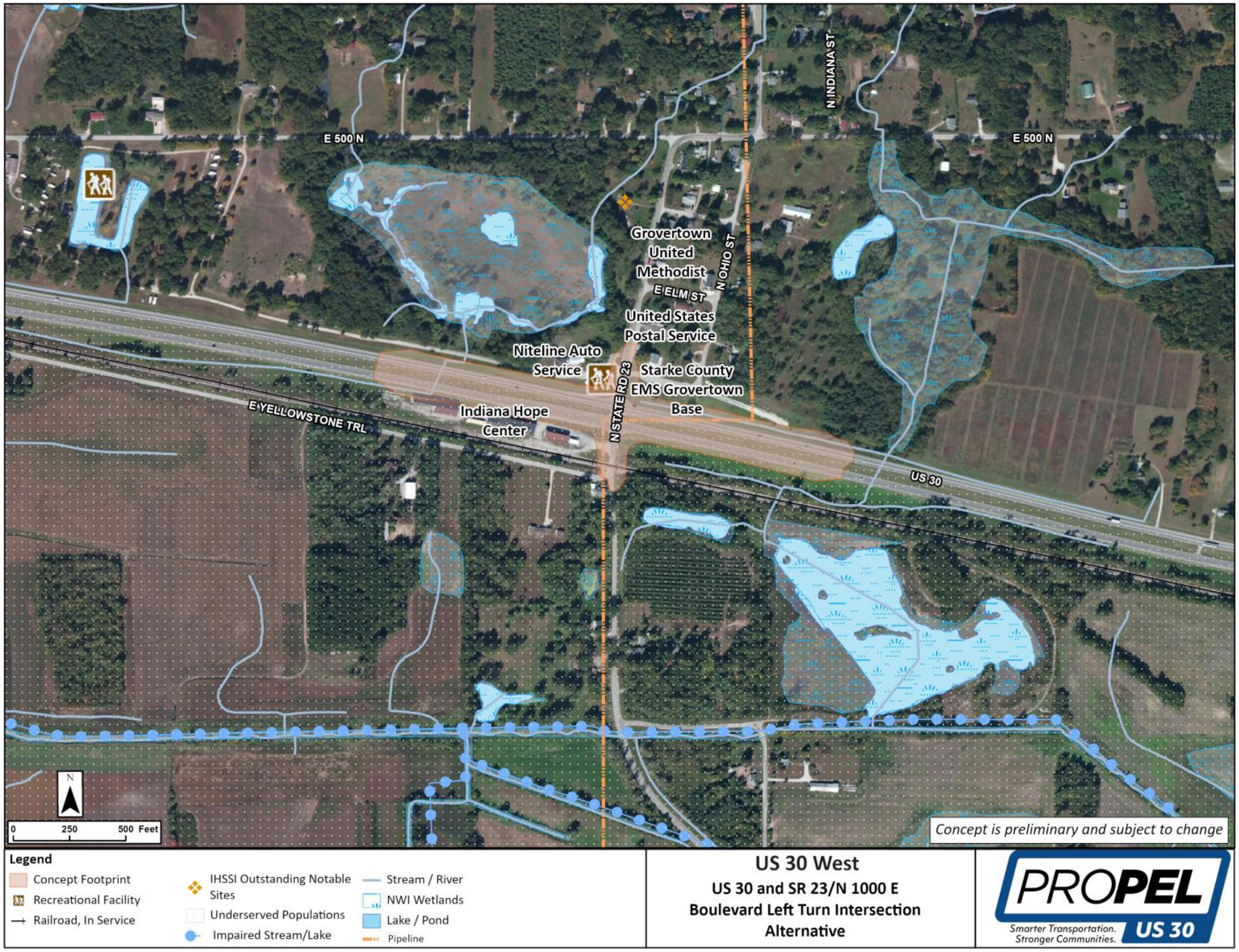


Figure 4-41: US 30 and SR 23 – Restricted Crossing U-Turn Intersection Alternative

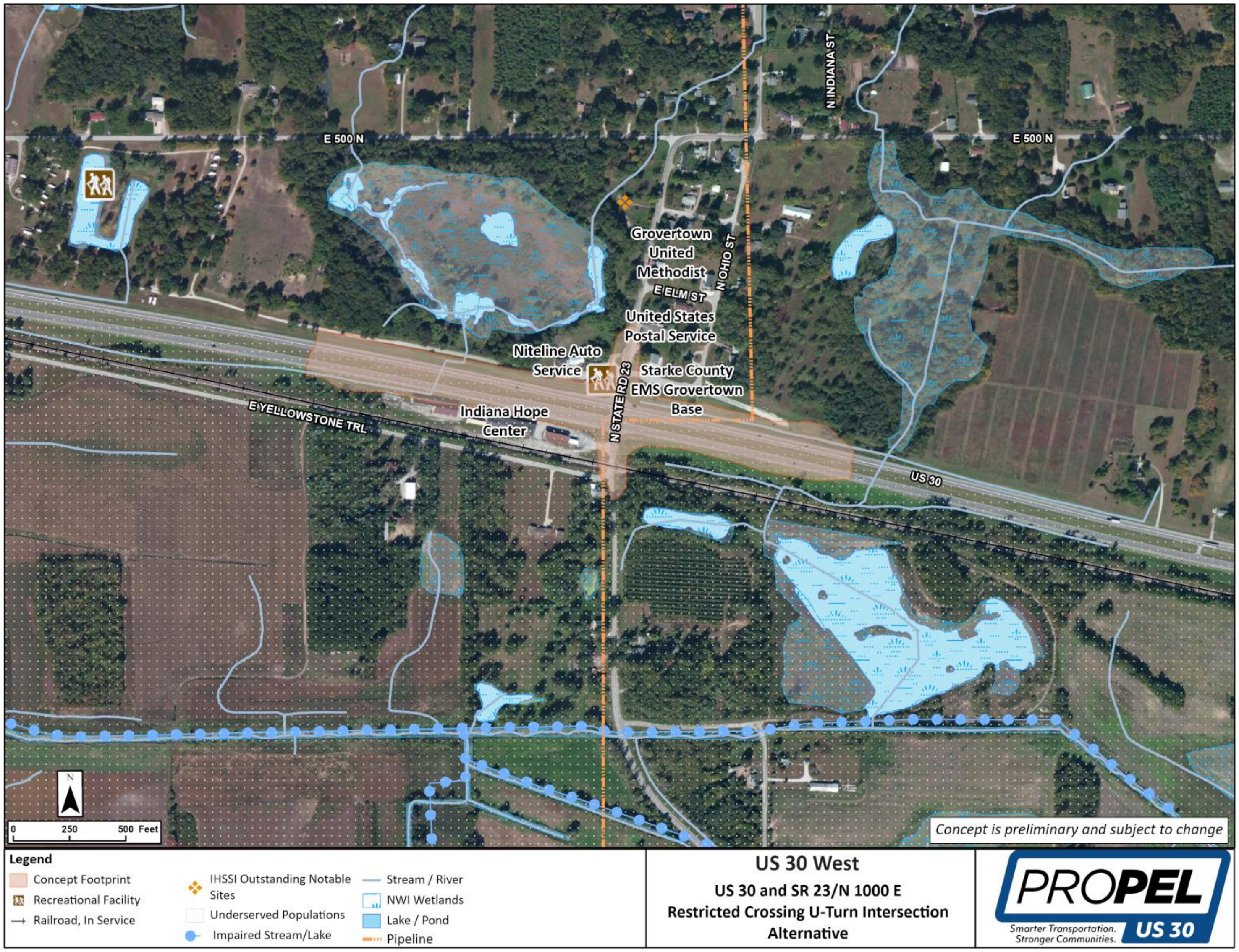
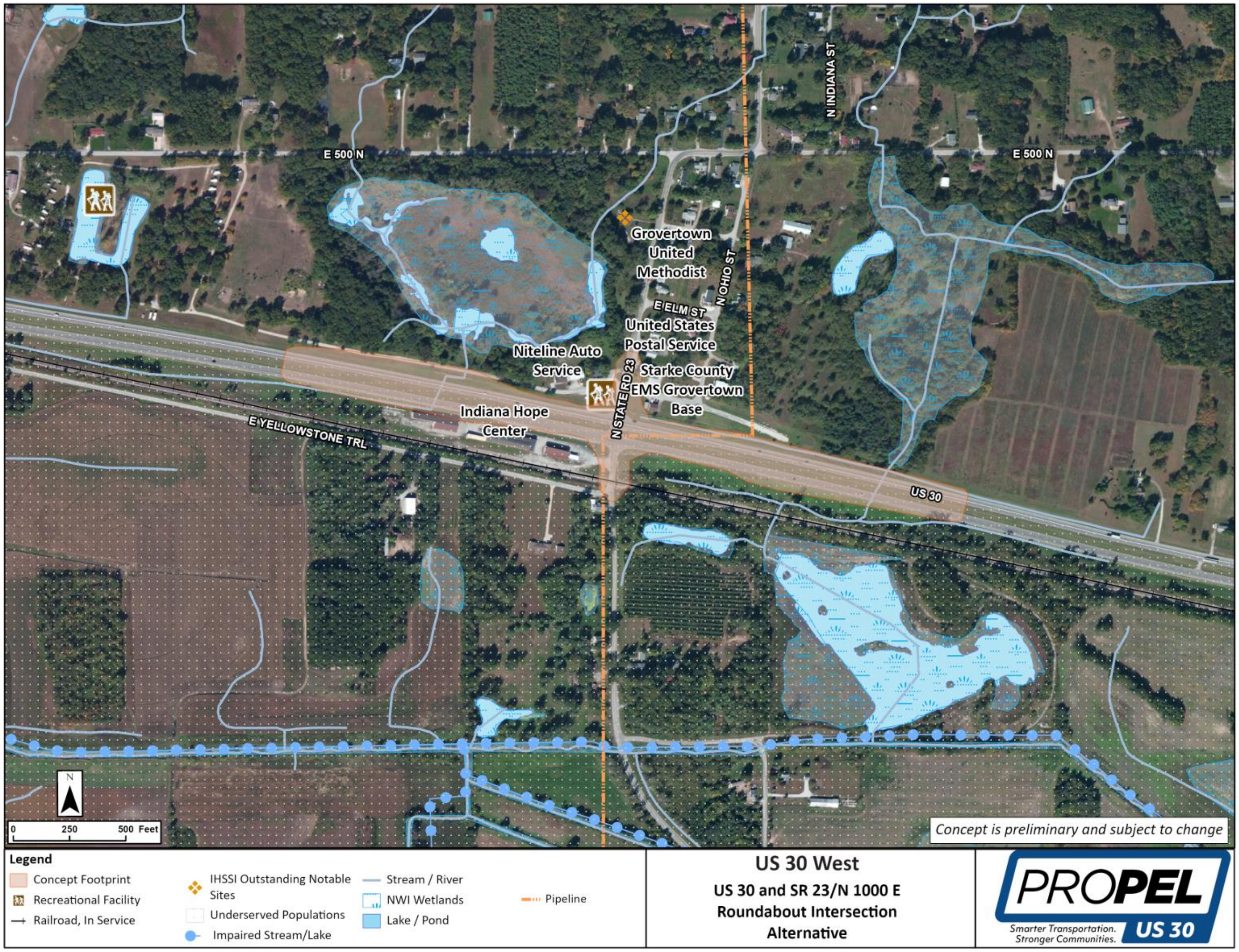


Figure 4-42: US 30 and SR 23 – Roundabout Alternative



4.16. US 30 AND QUEEN ROAD IN MARSHALL COUNTY

4.16.1. OVERVIEW OF LOCATION

This signalized intersection is expected to operate acceptably through the design year of this study. The crash frequency and crash cost indices are both elevated, indicating there are safety concerns at the intersection. The predominant types of crashes are as follows:

- 33% were rear end crashes.
- 14% were right angle crashes.
- 17% were same direction side-swipe crashes.

The US 30 and US 31 Marshall County Plan (2023) notes this intersection is an access point to Yogi Bear Campground and the Swan Lake Resort and should be coordinated with a potential future "West Plymouth" Interchange.

The FY2022-2026 INDOT Transportation Improvement Plan (TIP) includes an intersection improvement project (Des. No. 1801871) to convert this location to a reduced conflict intersection. The project was suspended pending the completion of the ProPEL US 30 West study and recommendations.

Public comments received specific to this location include:

- Concerns regarding access to local businesses.
- Concerns regarding ease of access to US 30 due to semi-traffic.
- Concerns regarding how intersection improvements would impact properties near the intersection.

4.16.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the intersection of US 30 and Queen Road poses numerous constraints that were considered in the development of alternatives. These constraints are summarized as follows:

- There are several businesses located in the southern quadrants of the intersection, including Intra-Lock Self Storage and Frogs One Stop Tire & Auto.
- There is a religious facility located 0.15 miles south of the intersection, House of the Lord Church.
- There are residential properties located in the southwest and northwest quadrant of the intersection.
- Yogi Bear's Jellystone Park is located 0.61 miles west of the intersection.
- The intersection of Queen Road and Plymouth LaPorte Trail is located approximately 50 feet north of the intersection of Queen Road and US 30.
- There are also 5 NWI wetlands located within the vicinity of the intersection.
- Hazardous material concerns are near the intersection, including 1 UST site south of the intersection and 1 LUST site southeast of the intersection.

4.16.3. SCREENING OF ALTERNATIVES

The decision tree indicates that both at-grade and grade-separated alternatives would be applicable, including an interchange alternative. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-16**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Add or Lengthen Turn Lanes – The existing turn lanes do not provide sufficient deceleration length. The turn lanes should be lengthened. This alternative would maintain local access.
- Add/Extend Acceleration Lanes – Crash patterns indicate a potential concern due to not having acceleration lanes. Acceleration lanes should be added. This alternative would maintain local access.
- Cross Road Overpass/Underpass – There are other locations within approximately 2 miles that provide equal or better access based on the functional classification of the route that local traffic can use to access the corridor. Therefore, a crossroad overpass or underpass should be considered , especially when applied alongside a limited access section, to be analyzed in level 3.
- Convert to Interchange – There are no factors that support an interchange as a standalone alternative. However, given future bundled improvements anticipated to be analyzed in Level 3, this location was identified as a potential interchange due to the relatively high traffic volumes and proximity to Plymouth. This alternative would maintain local access.
- Signalized and Unsignalized Intersection Improvements – The intersection is important for access to and from US 30 due to high usage. The high crash cost and frequency indices indicate there are safety concerns. This intersection is already signalized. The CAP-X analysis indicated that the following at-grade intersection types could produce acceptable operating conditions in the design year.
    - Boulevard Left Turn Intersection East-West – This alternative would improve safety at the intersection while also improving operations and maintaining local access.
    - Restricted Crossing U-Turn Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. It would also meet access management guidelines and maintain local access.
    - Roundabout – This alternative would reduce delay and improve intersection operations along US 30 while maintaining all local access. This alternative also improves safety at the intersection by reducing speeds and lowering the risk of right-angle crashes.
    - Reduced Conflict Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. A Reduced Conflict Intersection would meet access management guidelines as well as create free-flow operations on US 30 and maintain local access.

Primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management guidelines.
- Median Safety Improvements – The existing median meets IDM Requirements.
- Other signalized and unsignalized intersection types were eliminated through Cap-X tool analysis because their potential benefits were not substantial enough when compared to the existing conditions. Therefore, they were not further analyzed as part of this process. These intersection types included:
    - Green-T Intersection – This alternative is not applicable to a four-legged intersection.
    - Displaced Left Turn Intersection – Based on low left turning volumes from US 30 and the requirement of additional right-of-way for left turn crossovers, this

alternative would become prohibitively expensive compared to other feasible intersection types.
    - Quadrant Roadway – The CAP-X results indicated a high volume to capacity ratio implying poor operational performance of the intersection.

Complementary concepts to be considered as part of intersection alternatives include:

- Intersection Sight Distance Improvements – Potential to improve safety.
- Signal Timing Updates/Coordination – Potential to improve safety and relieve congestion.
- Spot Roadway Lighting – Provide lighting for intersection alternatives.
- Warning Systems – Potential to raise awareness of approaching traffic.
- Freight Priority System – Potential to reduce delays for trucks.
- Bike/Pedestrian Facilities – Urban environment indicates potential desire for bike and pedestrian facilities.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.16.3.1. Add or Lengthen Turn Lanes Alternative

This alternative involves lengthening the existing left and right turn lanes along US 30. Lengthening the existing turn lanes would improve intersection safety by providing sufficient deceleration lengths, which reduces the likelihood of rear-end crashes, and increased storage space. The proposed turn lanes would meet IDM requirements. The improvement limits for this alternative can be seen in **Figure 4-44**.

This alternative would require no additional right-of-way and would maintain all property access. This alternative would have no impact on the natural resources in the area. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.16.3.2. Add/Extend Acceleration Lanes Alternative

Adding acceleration lanes at this intersection would improve safety by providing vehicles turning onto US 30 from Queen Road with sufficient distance to achieve an appropriate speed to merge onto US 30. This would also improve intersection operations by reducing the differential speed between mainline traffic and traffic entering the mainline from the minor road. The improvement limits for this alternative can be seen in **Figure 4-44**.

This alternative would require minimal right-of-way impacts from all quadrants to accommodate grading. This alternative would have no impact on the natural resources surrounding the intersection. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.16.3.3. Overpass Alternative – Queen Road over US 30

This alternative would require the northbound approach of Queen Road to be shifted west to promote continuous flow on the overpass of Queen Road. The intersection of Queen Road and Plymouth LaPorte Trail is shifted north to maintain access to nearby residential properties.

This alternative would improve safety at the intersection by eliminating all interaction between Queen Road and US 30. This alternative would also improve intersection operations by removing any delays associated with signal timings at the existing intersection. The improvement limits for this alternative can be seen in **Figure 4-45**.

This alternative would require substantial additional right-of-way including the potential relocation of one property. This alternative also has substantial impacts to nearby wetlands. It is considered a medium-cost option.

This alternative is mainly applicable to the improvement packages associated with a limited access section, to be analyzed in Level 3. This grade-separated configuration was preliminarily selected as opposed to elevating US 30 over Queen Road due to the assumed lower impacts given the rural environment. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.16.3.4. Convert to Interchange Alternative

This alternative for the free-flow alternatives allows for US 30 traffic to move without interruption. Queen Road would utilize a bridge over US 30 and on and off ramps to allow access to and from US 30. This is a diamond interchange. The improvement limits for this alternative can be seen in **Figure 4-46**.

Extensive right-of-way is required for this alternative with several potential relocations of adjacent properties. Substantial work would be done in all quadrants of the intersection. This alternative would have substantial impact to right-of-way and numerous potential relocations. This alternative would also have medium impacts to natural resources in the area. It is considered a high-cost option. This alternative would be advanced for further evaluation in the Level 3 screening process for potential use with bundled improvements.

4.16.3.5. Restricted Crossing U-Turn Intersection Alternative

This alternative would improve safety at the intersection by rerouting left turns from Queen Road to US 30, thereby reducing the chance of right-angle crashes. This alternative would also improve intersection operations by reducing the number of signal phases required. This alternative would involve closing the median to Queen Road through and left turn traffic. The intersection of Queen Road and Plymouth LaPorte Trail would be moved north to accommodate increases to the intersection radii. The improvement limits for this alternative can be seen in **Figure 4-47**.

This alternative would require additional right-of-way from all quadrants of the intersection, in addition to one potential relocation. This alternative would have minimal impacts to the surrounding natural resources. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.16.3.6. Boulevard Left Turn Intersection East-West Alternative

This alternative would improve intersection safety by rerouting drivers on US 30 from crossing the opposing lanes, reducing conflict points, thereby reducing the risk of right-angle crashes. This alternative would also improve intersection operations by reducing the number of signal phases required. This alternative may require the potential relocation of the Queen Road and Plymouth LaPorte Trail intersection to the north. The improvement limits for this alternative can be seen in **Figure 4-48**.

This alternative would require substantial additional right-of-way in addition to several potential relocations. This alternative would also introduce impacts to surrounding natural resources. It is considered a low-cost option. This alternative will be advanced to Level 3 screening.

4.16.3.7. Reduced Conflict Intersection Alternative

The RCI alternative would allow the free-flow of through traffic along US 30 while rerouting left turns from Queen Road to US 30 and minor road through movements. This alternative would also improve intersection operations by eliminating the signal. The intersection of Queen Road and Plymouth LaPorte Trail would be moved north to accommodate increases to the intersection radii. The improvement limits for this alternative can be seen in **Figure 4-47**.

This alternative would require additional right-of-way from all quadrants of the intersection, in addition to one potential relocation. This alternative would have minimal impacts to the surrounding natural resources. The RCI has previously been designed by INDOT and was scheduled to begin construction in 2022. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.16.3.8. Roundabout Alternative

This alternative would convert the existing signalized intersection to an unsignalized roundabout. This would involve removing the median near the intersection. This alternative would improve intersection safety by reducing travel speed and the chance for more severe right angle, left turn, and head on collisions, although additional rear-end crashes may occur. The improvement limits for this alternative can be seen in **Figure 4-49**.

This alternative would require substantial additional right-of-way due to relocating the intersection of Queen Road and Plymouth LaPorte Trail to the north. This alternative would also have impacts on the surrounding natural resources. It is considered a medium-cost option. Speed management strategies would have to be paired with the roundabout alternative to mitigate the risk of rear-end crashes. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.16.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Add or Lengthen Turn Lanes.
- Add/Extend Acceleration Lanes.
- Cross Road Overpass/Underpass.
- Convert to Interchange.
- Restricted Crossing U-Turn.
- Reduced Conflict Intersection.
- Roundabout.
- Signal Timing Updates/Coordination – May be incorporated into all alternatives involving signalization.
- Intersection Sight Distance Improvements – May be incorporated into all alternatives.
- Spot Roadway Lighting – May be incorporated into all alternatives involving signalization.
- Warning Systems – May be incorporated into all alternatives.
- Freight Priority System – May be incorporated into all alternatives.
- Bike/Pedestrian Facilities – May be incorporated into all alternatives.

Table 4-16: US 30 and Queen Road – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x Queen Road	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	N/A	Yes	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add or Lengthen Turn Lanes	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Extended WB and EB left right turn lanes provide sufficient deceleration lengths, reducing the likelihood of rear-end crashes. Carried forward due to the potential for improved safety with a small footprint. The proposed turn lanes would meet IDM requirements.
Add/Extend Acceleration/Deceleration Lanes	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Added EB and WB Acceleration Lanes reduce the risk of rear-end crashes. Carried forward due to the potential for improved safety.
Cross Road Overpass / Underpass	Yes	Yes	No	Yes	N/A	Medium	Low	No	High	Medium	N/A	Mediu m	Yes	Intersection of Queen Road and Plymouth LaPorte Trail moved north. Carried forward due to the potential to improve safety and operations in association with grade separation.
Convert to Interchange	Yes	Yes	Yes	Yes	N/A	Medium	Low	No	High	High	N/A	High	Yes	Carried forward as a necessity for a limited access alternative. This alternative is not considered for other bundled improvements.
Signalized Intersection Improvements														
Restricted Crossing U-Turn Intersection E-W	Yes	Yes	Yes	Yes	N/A	Low	Low	No	High	Medium	N/A	Low	Yes	Carried forward due to the potential to improve safety by reducing conflicting movements.
Boulevard Left Intersection E-W	Yes	Yes	Yes	Yes	N/A	Medium	Low	No	High	Medium	N/A	Low	Yes	Carried forward due to the potential to improve safety by reducing conflicting movements
Unsignalized Intersection Improvements														
Reduced Conflict Intersection	Yes	Yes	Yes	Yes	N/A	Low	Low	No	High	Medium	N/A	Low	Yes	Carried forward due to the potential to improve intersection operations by eliminating delay due to signals and improving safety.
Roundabout	Yes	No	Yes	Yes	N/A	Medium	Low	No	High	Medium	N/A	Mediu m	Yes	Carried forward as an alternative to existing signalized intersection while also improving safety by reducing speeds and conflict points at the intersection.
Complementary Concepts														

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x Queen Road	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
Signal Timing Updates/Coordination	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Potential to improve safety and relieve congestion
Intersection Sight Distance Improvements	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Intersection is on a skew. Improvements to sight distance would increase safety.
Spot Roadway Lighting	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Provide lighting for intersection alternatives
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Raises awareness of approaching traffic
Freight Priority System	No	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Can reduce delays for trucks
Bike/Pedestrian Facilities	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Potential to improve safety at the intersection or bike riders and pedestrians

Figure 4-43: US 30 and Queen Road – Add or Lengthen Turn Lanes and Add/Extend Acceleration Lanes Alternatives

Legend

- Turn Lanes Footprint
- Acceleration Lanes Footprint
- Recreational Facility
- UST
- LUST
- Stream / River
- NWI Wetlands
- Lake / Pond

US 30 West

US 30 and Queen Road Acceleration Lanes and Turn Lanes Intersection Alternative

Figure 4-44: US 30 and Queen Road – Cross Road Overpass/Underpass Alternative – Queen Road Over US 30

Figure 4-45: US 30 and Queen Road – Interchange Alternative

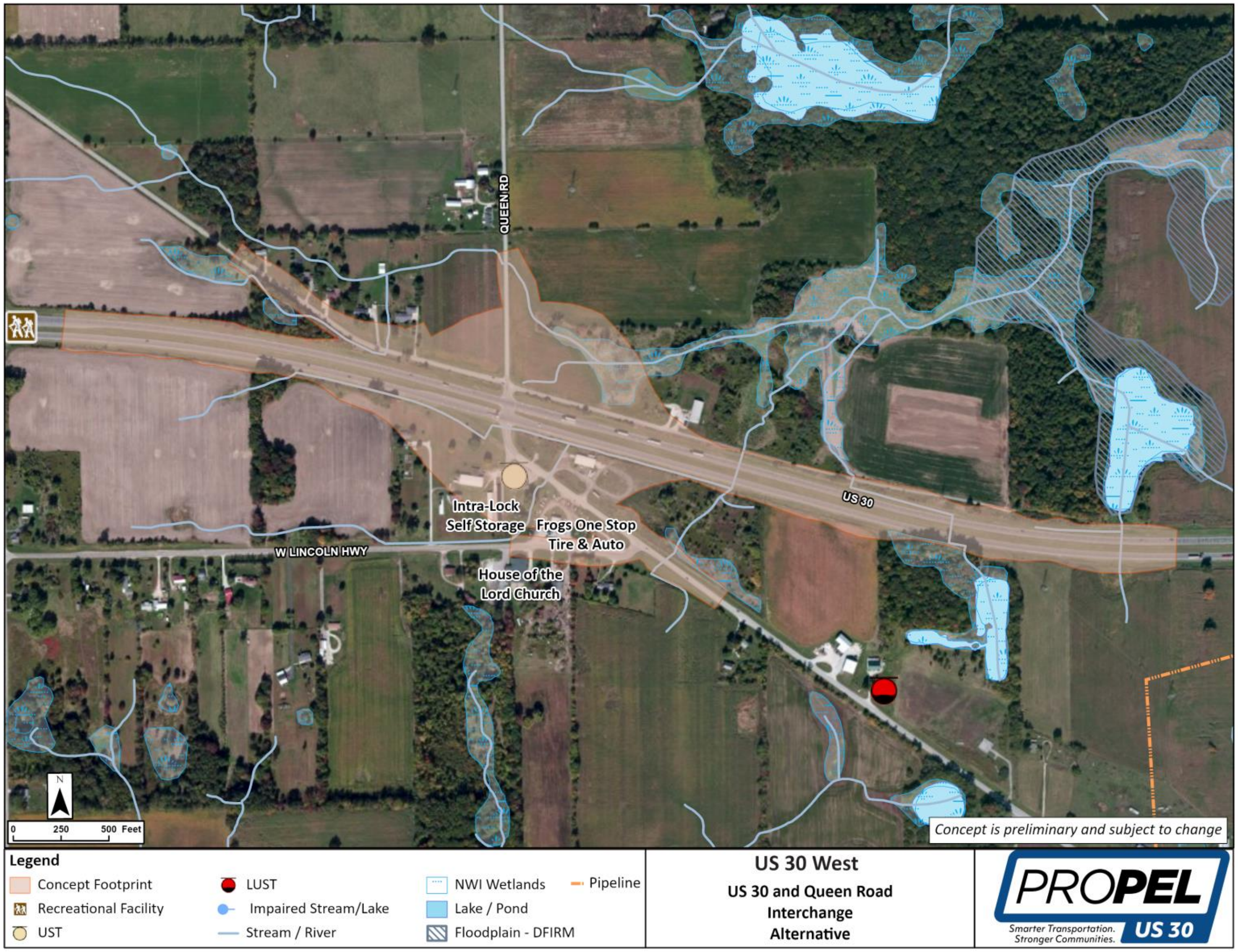


Figure 4-46: US 30 and Queen Road – Restricted Crossing U-Turn Intersection and Reduced Conflict Intersection Alternatives

Figure 4-47: US 30 and Queen Road – Boulevard Left Turn Intersection East-West Alternative

Figure 4-48: US 30 and Queen Road – Roundabout Alternative

4.17. US 30 AND PIONEER DRIVE IN MARSHALL COUNTY

4.17.1. OVERVIEW OF LOCATION

This signalized intersection is expected to operate acceptably through the design year of this study. The crash frequency and crash cost indices are both slightly elevated, indicating there are opportunities for safety improvements at the intersection. Of the intersection crashes occurring, the predominant crash type was rear-end crashes. These crashes may be related to vehicles pulling out in front of on-coming traffic.

This intersection is located on the far west side of the City of Plymouth in a highly commercial and industrial area that is continuing to grow. The US 30 and US 31 Marshall County Plan (2023) notes a new interchange would provide calculated benefit to US 30.

Public comments received to date about this intersection are summarized as follows.

- Convert this intersection to an interchange.

4.17.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the intersection of US 30 and Pioneer Drive poses numerous constraints that were considered in the development of alternatives. These constraints can be summarized as follows:

- There are businesses located in all 4 quadrants surrounding the intersection, including Hacienda Mexican Restaurants, Love's Travel Stop, Pioneer Hi-Bred International, and Plymouth BMV Branch.
- There is a rail line located approximately 0.8 miles east of the intersection.
- Lift Station located in the northwest quadrant.
- Underserved populations are located near the intersection.
    - Family Income Below Poverty Level
    - Non-English Speaking Population
    - Minority Populations
- USDOT Disadvantaged Populations
- There is a refined products pipeline located approximately 0.1 miles north and 0.38 miles west of the intersection.
- Schuh Ditch, listed as an impaired stream, is located approximately 0.1 miles south of the intersection.
- The floodplain of Schuh Ditch comes within approximately 50 feet of eastbound US 30 in one location near the intersection.
- INDOT Plymouth sub district located 0.4 miles north of the intersection.

4.17.3. SCREENING OF ALTERNATIVES

The decision tree indicates that both at-grade and grade-separated alternatives would be applicable. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-17**.

The primary concepts identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Add/Extend Acceleration Lanes – Crash patterns at this intersection are potentially due to missing acceleration lanes. Acceleration lanes should be added. This alternative would maintain local access.
- Cross Road Overpass/Underpass – There are other locations within approximately 2 miles that provide equal or better access based on the functional classification of the route that local traffic would use to access the corridor. Therefore, a crossroad overpass or underpass should be considered, especially when applied alongside a limited access section, to be analyzed in level 3.
- Convert to Interchange – There are no factors that support an interchange at this location as a standalone alternative. However, given further bundled improvements anticipated to be analyzed in Level 3, this location was identified as a potential interchange due to the relatively high traffic volumes as well as the proximity to Plymouth. This alternative would maintain local access.
- Signalized and Unsignalized Intersection Improvements – This intersection is important for access to and from US 30 due to its proximity to commercial properties and high usage. The crash cost and crash frequency indices are above average, indicating safety concerns. This intersection is already signalized. The CAP-X analysis indicated that the following at-grade intersection types could produce acceptable operating conditions in the design year.

    - Partial Displaced Left Turn – This alternative would reduce delay and improve intersection operations along US 30 while maintaining all local access.
    - Restricted Crossing U-Turn Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. A Restricted Crossing U-Turn Intersection would meet access management guidelines as well as improve intersection operations on US 30 while maintaining local access.
    - Reduced Conflict Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. A Reduced Conflict Intersection would meet access management guidelines as well as create free-flow traffic on US 30 and maintain local access.
    - Roundabout – This alternative would reduce delay and improve intersection operations along US 30 while maintaining all local access. This alternative also improves safety at the intersection by reducing speeds and lowering the risk of right-angle crashes.

The primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.
- Median Safety Improvements – The existing median meets IDM requirements.
- Add or Lengthen Turn Lanes – The existing eastbound and westbound left and right turn lanes provide sufficient deceleration length.
- Other signalized and unsignalized intersection types were eliminated through Cap-X tool analysis because their potential benefits were not substantial enough when compared to the existing conditions. Therefore, they were not further analyzed as part of this process. These intersection types included:

    - Green-T Intersection – This alternative is not applicable to a four-legged intersection.

- Boulevard Left Turn Intersection – The CAP-X results indicated a higher volume to capacity ratio implying relatively poor operational performance compared to other similar intersection types such as RCUT.
- Quadrant Roadway – The CAP-X results indicated a high volume to capacity ratio implying poor operational performance of the intersection.

Complementary Concepts to be considered as part of intersection alternatives are as follows:

- Signal Timing Updates/Coordination – Potential to improve safety and reduce delay at the intersection.
- Spot Roadway Lighting – Provide lighting for intersection alternatives.
- Warning Systems – Potential to raise awareness of approaching traffic.
- Freight Priority System – Potential to reduce delays for trucks.
- Bike/Pedestrian Facilities – Urban environment indicates potential desire for bike and pedestrian facilities.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.17.3.1. Add/Extend Acceleration Lanes Alternative

This alternative improves safety at the intersection by providing drivers turning from Pioneer Drive to US 30 with a dedicated lane to allow them to accelerate before merging with through traffic on US 30. This would also improve intersection operations by reducing the differential speed between mainline traffic and traffic entering the mainline from the minor road. The improvement limits for this alternative can be seen in **Figure 4-50**.

This alternative would require minimal additional right-of-way in all quadrants of the intersection, while maintaining all property access. This is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.17.3.2. Cross Road Overpass / Underpass Alternative – US 30 over Pioneer Drive

In this alternative, a bridge would be used to elevate US 30 over Pioneer Drive. The elevation change would be graded on all sides and not use a retaining wall. This alternative would improve safety at the intersection by eliminating all interaction between US 30 and Pioneer Drive. This alternative would also improve intersection operations be eliminating all delay associated with the traffic signal. The underpass alternative would reduce local access while meeting Access Management Guidelines. The improvement limits for this alternative can be seen in **Figure 4-51**.

This alternative would require moderate right-of-way from all quadrants of the intersection, in addition to a potential industrial relocation in the southeast quadrant. There are underserved populations mapped within the Block Group, however no right-of-way impacts to underserved populations are anticipated to occur from this alternative. This is a medium-cost option.

This alternative is mainly applicable to the improvement packages associated with a limited access section, to be analyzed in Level 3. This grade-separated configuration was preliminarily selected as opposed to elevating Pioneer Drive over US 30 due to the assumed lower impacts given the urban environment. This alternative will be advanced for further evaluation in the Level 3 Screening process.

4.17.3.3. *Convert to Interchange Alternative*

This alternative supports a free-flow facility that allows US 30 traffic to move without interruption. US 30 would utilize two bridges over Pioneer Drive and on and off ramps to allow access to and from US 30. The improvement limits for this alternative can be seen in **Figure 4-52**.

Extensive right-of-way is required for this alternative, including several potential relocations. The most substantial portion of work would be in the northeast and southwest quadrants to avoid impacts to the businesses in the northwest and southeast quadrants. This alternative would also substantially impact the wetland located south of the intersection. The potential interchange would introduce potential adverse impacts for underserved populations. It is considered a high-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process for potential use with bundled improvements.

4.17.3.4. *Partial Displaced Left Turn Alternative*

This alternative would involve crossing left turn movements to the outside of US 30 upstream of the main intersection. This would improve intersection safety by reducing the risk of right-angle crashes at the main intersection. This alternative would also improve intersection operations by reducing the number of signal phases at the main intersection. The improvement limits for this alternative can be seen in **Figure 4-53**.

This alternative would require additional right-of-way from all quadrants of the intersection, while maintaining all property access. This is a medium-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.17.3.5. *Restricted Crossing U-Turn Intersection Alternative*

This alternative would involve rerouting through movements from Pioneer Drive and left turns on and off of US 30. This alternative would improve safety at the intersection by reducing the risk of right-angle crashes. This alternative would also improve intersection operations by reducing the number of signal phases. The improvement limits for this alternative can be seen in **Figure 4-54**.

This alternative would require low amounts of additional right-of-way while maintaining all property access, with low impacts to cultural and natural resources. This is a low-cost option . This alternative will be advanced for further evaluation in the Level 3 screening process.

4.17.3.6. *Reduced Conflict Intersection Alternative*

This alternative would involve rerouting through movements from Pioneer Drive and left turns on and off of US 30. This alternative would improve safety at the intersection by reducing the risk of right-angle crashes. This alternative would also eliminate the existing traffic signal. The improvement limits for this alternative would be the same as those shown in **Figure 4-54**.

This alternative would require low amounts of additional right-of-way while maintaining all property access, with low impacts to cultural and natural resources. This is a low-cost option. This alternative will be advanced for further evaluation in the level 3 screening process.

4.17.3.7. *Roundabout Alternative*

This alternative would improve intersection operations by reducing travel speed and the chance for more severe right angle, left turn, and head on collisions, although additional rear-end crashes may occur. The improvement limits for this alternative can be seen in **Figure 4-55**.

This alternative would require high amounts of additional right-of-way while maintaining all property access. This is a medium-cost option. Speed management strategies would have to be paired with the roundabout alternative to mitigate the risk of rear-end crashes. This alternative will advance for further evaluation in the Level 3 screening process.

4.17.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Add/Extend Acceleration Lanes.
- Cross Road Overpass/Underpass.
- Convert to Interchange.
- Partial Displaced Left Turn.
- Restricted Crossing U-Turn.
- Roundabout.
- Signal Timing Updates/Coordination – May be incorporated into all alternatives involving signalization.
- Spot Roadway Lighting – May be incorporated into all alternatives involving signalization.
- Warning Systems – May be incorporated into all alternatives.
- Freight Priority System – May be incorporated into all alternatives.
- Bike/Pedestrian Facilities – May be incorporated into all alternatives.

Table 4-17: US 30 and Pioneer Drive – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x Pioneer Drive	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Mee t Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	Yes	Yes	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add/Extend Acceleration/Deceleration Lanes	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Add acceleration lanes. Carried forward due to the potential to improve safety by limiting rear-end crashes at the intersection with a relatively low cost.
Cross Road Overpass / Underpass	Yes	Yes	No	Yes	N/A	Low	Low	No	Medium	Medium	N/A	Medium	Yes	Carried forward due to the potential for safety and operational improvements associated with grade separation.
Convert to Interchange	Yes	Yes	Yes	Yes	N/A	Medium	Low	Yes	High	Medium	N/A	High	Yes	Carried forward due to necessity for a limited access alternative. This concept is not considered in other bundled improvements.
Signalized Intersection Improvements														
Partial DLT E-W	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Medium	Low	N/A	Medium	Yes	Intersection shifted slightly east to avoid impacts to utilities on NW corner. Carried forward due to potential to improve intersection operations by reducing the number of signal phases at the intersection.
Restricted Crossing U-Turn Intersection E-W	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Retaining wall used as needed in NW corner of intersection to avoid impacts to utilities. Carried forward as a result of the potential to improve intersection safety by reducing the number of conflicting movements within a small footprint.
Unsignalized Intersection Improvements														
Roundabout	Yes	Yes	Yes	Yes	N/A	Low	Low	No	High	Low	N/A	Medium	Yes	Retaining wall used as needed in NW corner of intersection to avoid impacts to utilities. Carried forward as a potential solution to eliminate the signal at the intersection while also maintaining safety by reducing speeds.
Complementary Concepts														
Signal Timing Updates/Coordination	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Potential to improve safety and relieve congestion
Spot Roadway Lighting	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Provide lighting for primary concepts
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Raises awareness of approaching traffic

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x Pioneer Drive	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Mee t Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
Freight Priority System	No	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Can reduce delays for trucks
Bike/Pedestrian Facilities	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Potential to improve safety at the intersection or bike riders and pedestrians

Figure 4-49: US 30 and Pioneer Road – Add/Extend Acceleration Lanes Alternative

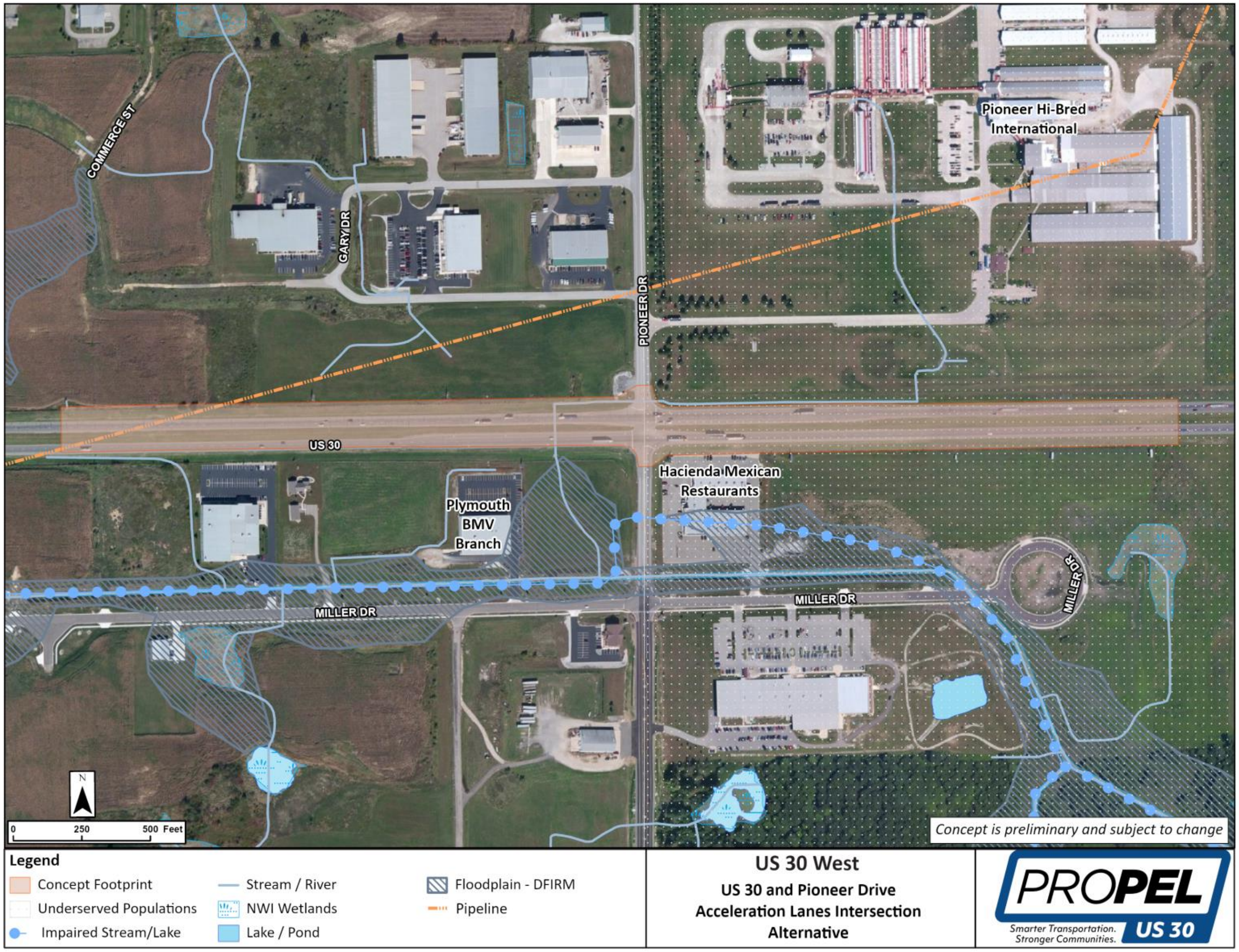


Figure 4-50: US 30 and Pioneer Road – Cross Road Overpass/Underpass Alternative – US 30 Over Pioneer Drive

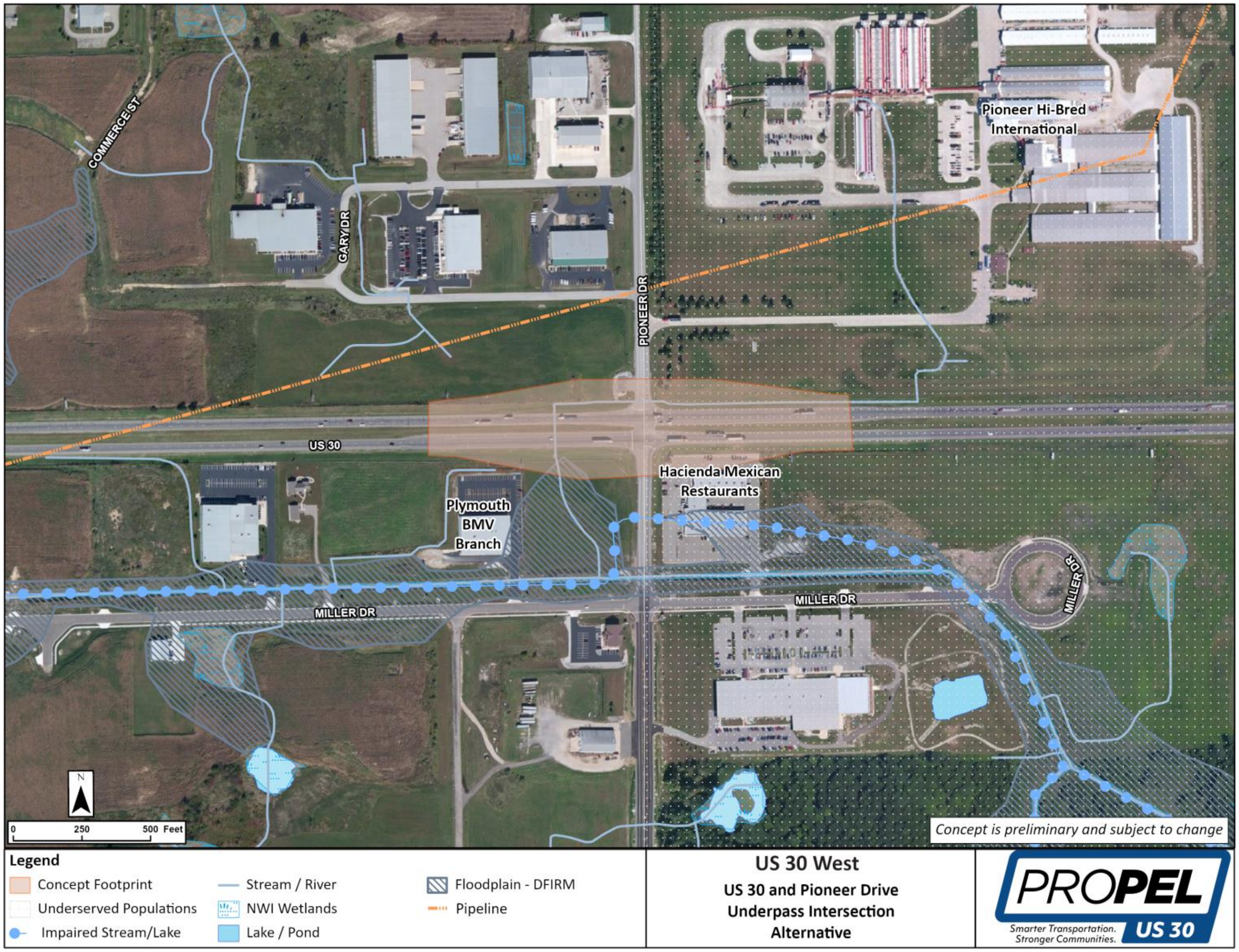


Figure 4-51: US 30 and Pioneer Road – Convert to Interchange Alternative

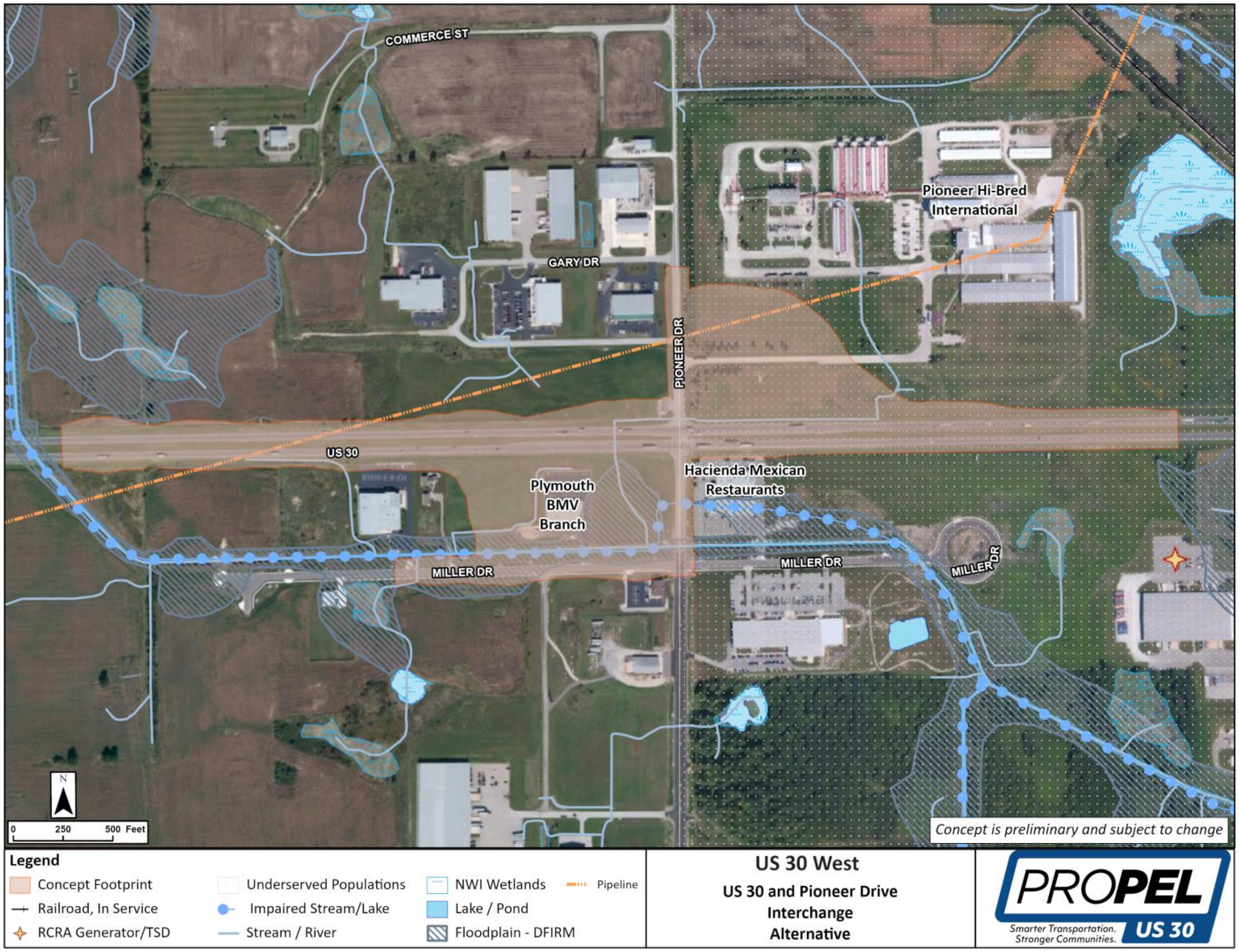


Figure 4-52: US 30 and Pioneer Road – Partial Displaced Left Turn Alternative

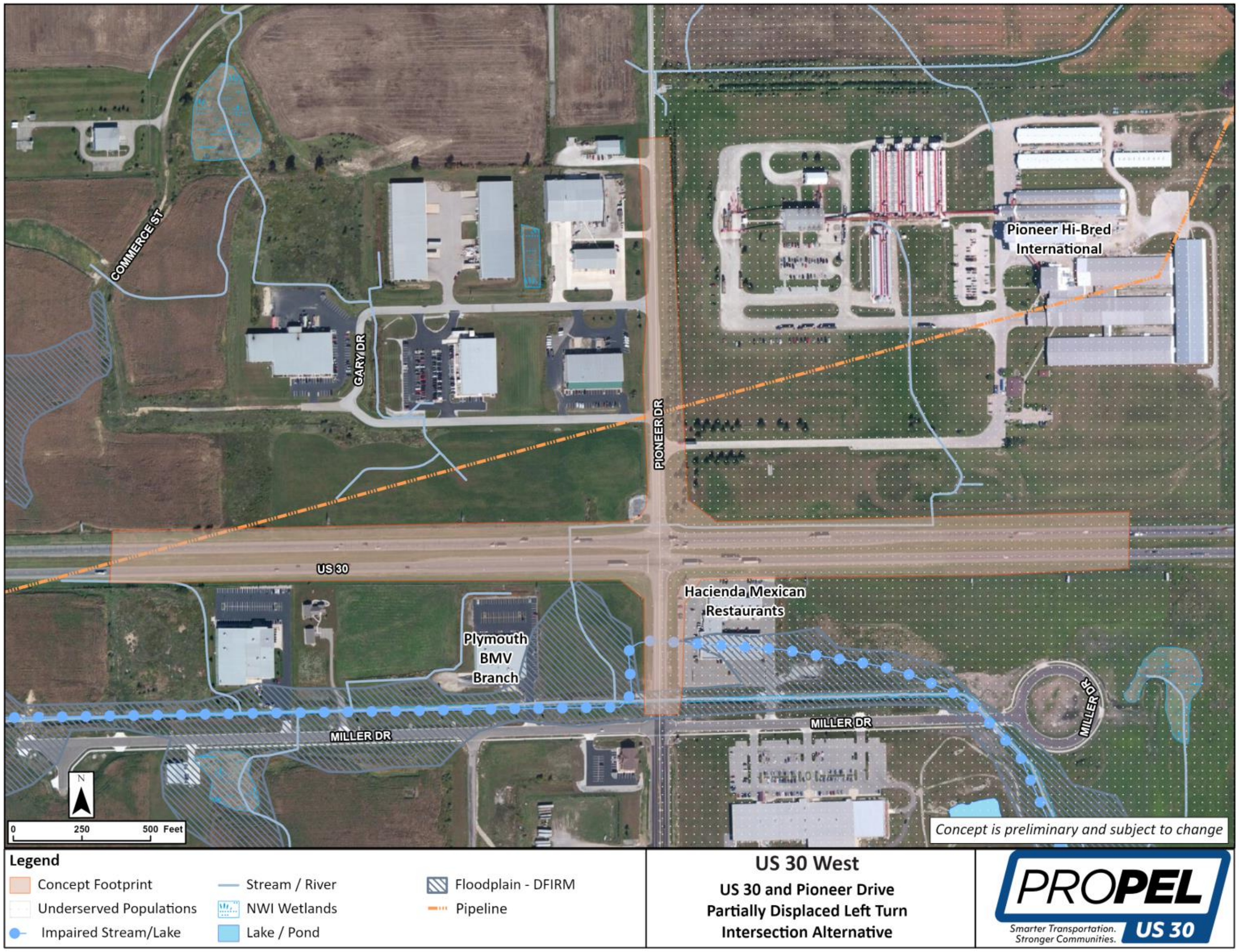


Figure 4-53: US 30 and Pioneer Road – Restricted Crossing U-Turn Intersection and Reduced Conflict Intersection Alternatives

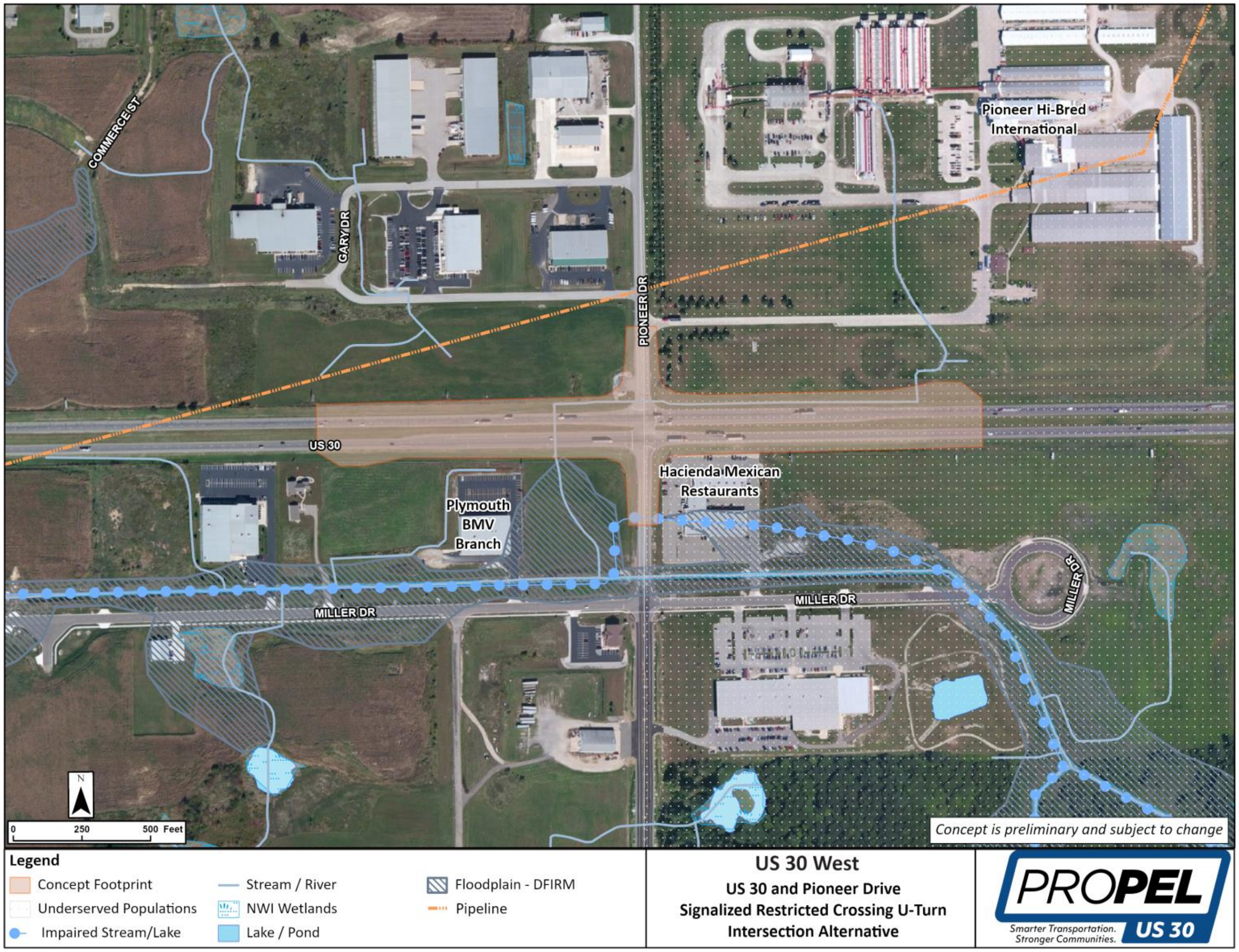
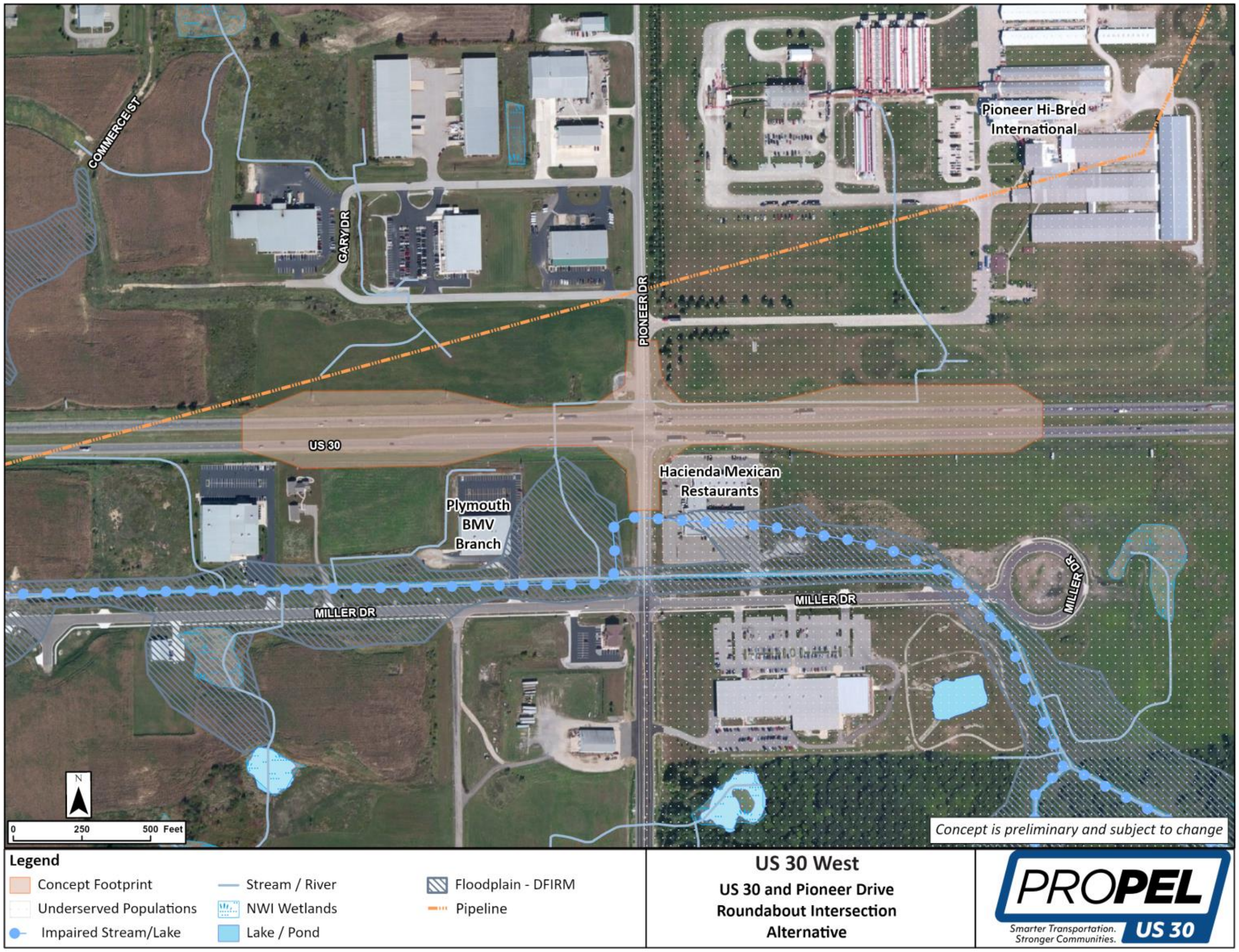


Figure 4-54: US 30 and Pioneer Road – Roundabout Alternative



4.18. US 30 AND OAK DRIVE IN MARSHALL COUNTY

4.18.1. OVERVIEW OF LOCATION

This signalized intersection is expected to operate acceptably through the design year of this study. The crash frequency and crash cost indices are both elevated, indicating there are safety concerns at the intersection. The predominant types of crashes are as follows:

- 56% were rear end crashes
- 20% were right angle crashes
- 15% were same direction side-swipe crashes

This intersection is located within the city limits of Plymouth with high commercial and industrial development. There is a railroad crossing on US 30 located 950' west of the intersection. The US 30 and US 31 Marshall County Plan (2023) notes that available space for an interchange may be problematic and that a grade separated solution may be more beneficial given the other costs.

Public comments received to date about this intersection are summarized as follows.

- Convert this intersection to an interchange.

4.18.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the US 30 and Oak Drive intersection poses numerous constraints that were considered in the development of alternatives. The constraints are summarized as follows:

- Commercial centers are located to both the north and south of the intersection.
- Love's Travel Stop is located 1.0 miles west of the intersection.
- An at-grade railroad crossing is located 0.2 miles west of the intersection, crossing US 30.
- The Michigan Street interchange is located 0.9 miles east of this intersection.
- Underserved populations are located near the intersection.
- Family Income Below Poverty Level
    - Non-English Speaking Population
    - Minority Populations
    - USDOT Disadvantaged Populations
- A natural gas pipeline is located approximately 0.1 miles north and 0.06 miles west of the intersection.
- The Murphy Gas Station located 0.12 miles northwest of the intersection is listed as a UST and LUST..
- There is a floodplain to the west of the intersection; the floodplain comes within 0.12 miles of the intersection at its nearest point.

4.18.3. SCREENING OF ALTERNATIVES

The decision tree indicates that both at-grade and grade-separated alternatives would be applicable, although an interchange is unnecessary. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-18**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Add or Lengthen Turn Lanes – Existing turn lanes do not provide sufficient deceleration length. Turn lanes should be lengthened. This alternative would maintain local access.
- Add/Extend Acceleration Lanes – Crash patterns at the intersection indicate a potential concern due to not having acceleration lanes. Acceleration lanes should be added. This alternative would maintain local access.
- Cross Road Overpass/Underpass – There are other locations within approximately 2 miles of the intersection with equal or better access based on the functional classification of the route that local traffic can use to access the corridor. Therefore, a crossroad overpass or underpass should be considered, especially when applied alongside a limited access section, to be analyzed in level 3.
- Signalized and Unsignalized Intersection Improvements – This intersection is important for access to and from US 30 due to its location near Plymouth's main commercial center. The above average crash frequency and cost indices indicate safety concerns. This intersection is currently signalized. The CAP-X analysis indicated that the following at-grade intersection types could produce acceptable operating conditions in the design year.
    - Partial Displaced Left Turn – This alternative would improve safety and intersection operations while retaining the existing signal. The DLT alternative would maintain local access.
    - Boulevard Left Turn Intersection East-West – This alternative would improve safety and intersection operations while retaining the existing signal. This alternative would maintain local access.

Primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.
- Median Safety Improvements – The median meets IDM requirements
- Convert to Interchange – There are no volumes of other factors that support an interchange. An interchange exists at Michigan Street which precludes an interchange here for spacing reasons.
- Other signalized and unsignalized intersection types were eliminated through Cap-X tool analysis because their potential benefits were not substantial enough when compared to the existing conditions. Therefore, they were not further analyzed as part of this process. These intersection types included:
    - Green-T Intersection – This alternative is not applicable to a four-legged intersection.
    - Restricted Crossing U-Turn Intersection – The CAP-X results indicated a high volume to capacity ratio implying poor operational performance of the intersection.
    - Quadrant Roadway – The CAP-X results indicated a high volume to capacity ratio implying poor operational performance of the intersection.
    - RCI/ RCUT – The CAP-X results indicated a high volume to capacity ratio implying poor operational performance of the intersection.

Complementary Concepts to be considered as part of intersection alternatives are as follows:

- Signal Timing Updates / Coordination – Signal timing updates and coordination have the potential to improve safety and relieve congestion.

- Railroad Crossing Improvements – Provide deceleration and acceleration lanes for vehicles required to stop. The Railroad Crossing Improvement concept is included in the footprints for the following alternatives:
    - Add and Lengthen Turn Lanes Alternative
    - Add/Extend Acceleration Lanes Alternative
    - Underpass Alternative
    - Displaced Left Turn Alternative
    - Boulevard Left Turn Alternative
- Spot Roadway Lighting – Provide lighting for intersection alternatives.
- Warning Systems – Potential to raise awareness for approaching traffic.
- Freight Priority System – Potential to reduce delay for trucks.
- Bike / Pedestrian Facilities – Urban environment indicates potential desire for bike and pedestrian facilities. The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.18.3.1. Add and Lengthen Turn Lanes Alternative

This alternative involves lengthening the existing eastbound and westbound left and right turn lanes. Lengthening the existing turn lanes would improve safety by providing sufficient deceleration lengths and increasing storage space, reducing the risk of rear-end crashes. The proposed turn lanes will meet IDM requirements. The improvement limits of this alternative can be seen in **Figure 4-56**.

With the eastbound and westbound turn lanes lengthened there are potential right-of-way impacts in all four quadrants of the intersection. The railroad crossing improvements further push out the required right-of-way along US 30. By requiring additional grading, a wetland north of US 30 may be impacted. This alternative would have potential adverse impacts to underserved populations. Potential relocations may be required in the northeast and southwest quadrants. This is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.18.3.2. Add/Extend Acceleration Lanes Alternative

Extended acceleration lanes would improve intersection safety by providing dedicated lanes for vehicles turning onto US 30 from Oak Drive to achieve sufficient speed before entering the travel lanes. This alternative would also improve intersection operations by reducing the differential speed between mainline traffic and traffic entering the mainline from the minor road. The improvement limits for this alternative can be seen in **Figure 4-56**.

This alternative is expected to require additional right-of-way from all quadrants. Potential relocations may be required in the northeast and southwest quadrants. The railroad crossing improvements further push out the required right-of-way along US 30. The extended acceleration turn lane requires additional grading east of the intersection causing a wetland south of US 30 to be impacted. This alternative would have potential adverse impacts to underserved populations. This is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.18.3.3. Underpass Alternative – US 30 over Oak Drive

Reconfiguring this intersection so that US 30 goes over Oak Drive increases safety by eliminating access from Oak Drive and vice versa. In this alternative US 30 traffic would be routed over top of Oak Drive by the use of two bridges. To reduce conflicts with the railroad crossing west of the existing intersection, bridges would be utilized to route traffic over top of the existing railroad. The improvement limits of this alternative can be seen in **Figure 4-57**.

By constructing an underpass to reach the necessary clearance over Oak Drive the wetland and streams in the immediate area as well as several businesses would be impacted by grading. The potential right-of-way impacts of an underpass configured this way at this intersection are along the north and south sides of US 30. With this alternative there are potential relocations to the north and south of US 30. This alternative would have potential adverse impacts to underserved populations. This is a medium-cost option.

This alternative is mainly applicable to the improvement packages associated with a limited access section, to be analyzed in level 3. This grade-separated configuration was preliminarily selected as opposed to elevating Oak Drive over US 30 due to the assumed lower impacts given the urban environment. This alternative will be advanced for further evaluation in the level 3 screening process.

4.18.3.4. Partial Displaced Left Turn Alternative

The Partial Displaced Left Turn alternative would reroute left turns from US 30 and Oak Drive upstream of the main intersection, thereby eliminating the left turn signal phase for both approaches at the main intersection. This would improve operations and reduce delay at the intersection of US 30 and Oak Drive. The improvement limits for this alternative are shown in **Figure 4-58**.

The DLT alternative would require additional right-of-way in all four quadrants of the intersection and along Oak Drive and US 30. There would also be substantial impacts to nearby natural resources. This alternative would also result in several potential relocations. This alternative would have potential adverse impacts to underserved populations. The railroad crossing improvements further push out the required right-of-way along US 30. This is a medium-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.18.3.5. Boulevard Left Turn Intersection East-West Alternative

This alternative would improve intersection safety by rerouting drivers on US 30 from crossing the opposing lanes, reducing conflict points, thereby reducing the risk of right-angle crashes. This alternative would also improve intersection operations by reducing the number of signal phases required. This alternative requires the turning radii to be enlarged to accommodate truck turning movements. The improvement limits for this alternative can be seen in **Figure 4-59**.

This alternative is expected to require additional right-of-way from all four quadrants. Potential relocations may be required in the northeast and southwest quadrants. There is also potential impacts to the surrounding wetlands. This alternative would have potential adverse impacts to underserved populations. The railroad crossing improvements further push out the required right-of-way along US 30. This is a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.18.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Add or Lengthen Turn Lanes.
- Add/Extend Acceleration Lanes.
- Cross Road Overpass/Underpass.
- Partial Displaced Left Turn.
- Boulevard Left Turn Intersection.
- Signal Timing Updates/Coordination – May be incorporated into all alternatives involving signalization.
- Railroad Crossing Improvements – May be incorporated into all alternatives.
- Spot Roadway Lighting – May be incorporated into all alternatives.
- Warning Systems – May be incorporated into all alternatives.
- Freight Priority System – May be incorporated into all alternatives involving signalization.
- Bike/Pedestrian Facilities – May be incorporated into all alternatives.

Table 4-18: US 30 and Oak Drive – Qualitative Analysis of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x Oak Dr	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	Yes	Yes	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add or Lengthen Turn Lanes	Yes	No	Yes	Yes	N/A	Medium	Low	Yes	Low	Medium	Medium	Low	Yes	Extend EB and WB turn lanes to provide sufficient deceleration lengths. Carried forward due to the potential to improve safety at a relatively low cost.
Add/Extend Acceleration/Deceleration Lanes	Yes	Yes	Yes	Yes	N/A	Medium	Low	Yes	Low	Medium	Medium	Low	Yes	Extend EB and WB acceleration to potentially reduce the likelihood of rear-end crashes, which were observed to be a concern. Carried forward due to the potential to improve safety at a relatively low cost. The proposed turn lanes will meet IDM standards.
Cross Road Overpass / Underpass	Yes	Yes	No	Yes	N/A	Medium	Low	Yes	High	High	High	Medium	Yes	Carried forward due to safety improvements associated with grade separation and applicability to a limited access concept.
Signalized Intersection Improvements														
Partial DLT E-W	Yes	Yes	Yes	Yes	N/A	Medium	Low	Yes	High	High	Medium	Medium	Yes	Turning radii designed to Indiana Design Vehicle (IDV) can reduce potential ROW impacts with another design vehicle. Carried forward as a result of the potential to improve intersections safety and operations.
Boulevard Left Intersection E-W	Yes	Yes	Yes	Yes	N/A	Medium	Low	Yes	Medium	High	Medium	Low	Yes	Turning radii designed to IDV, but can reduce potential ROW impacts with another design vehicle. Carried forward as a result of the potential to improve intersection safety and operations.
Complementary Concepts														
Signal Timing Updates/Coordination	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Potential to improve safety and relieve congestion
Railroad Crossing Improvement	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Medium	Medium	Yes	Decel accel lanes for vehicles stopping. Increases footprint of all alternatives when applied.
Spot Roadway Lighting	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Provide lighting for intersection alternatives
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Raises awareness of approaching traffic
Freight Priority System	No	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Can reduce delays for trucks
Bike/Pedestrian Facilities	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	Low	Low	Yes	Potential to improve safety at the intersection or bike riders and pedestrians

Figure 4-55: US 30 and Oak Drive – Add and Lengthen Turn Lanes and Add/Extend Acceleration Lanes Alternatives

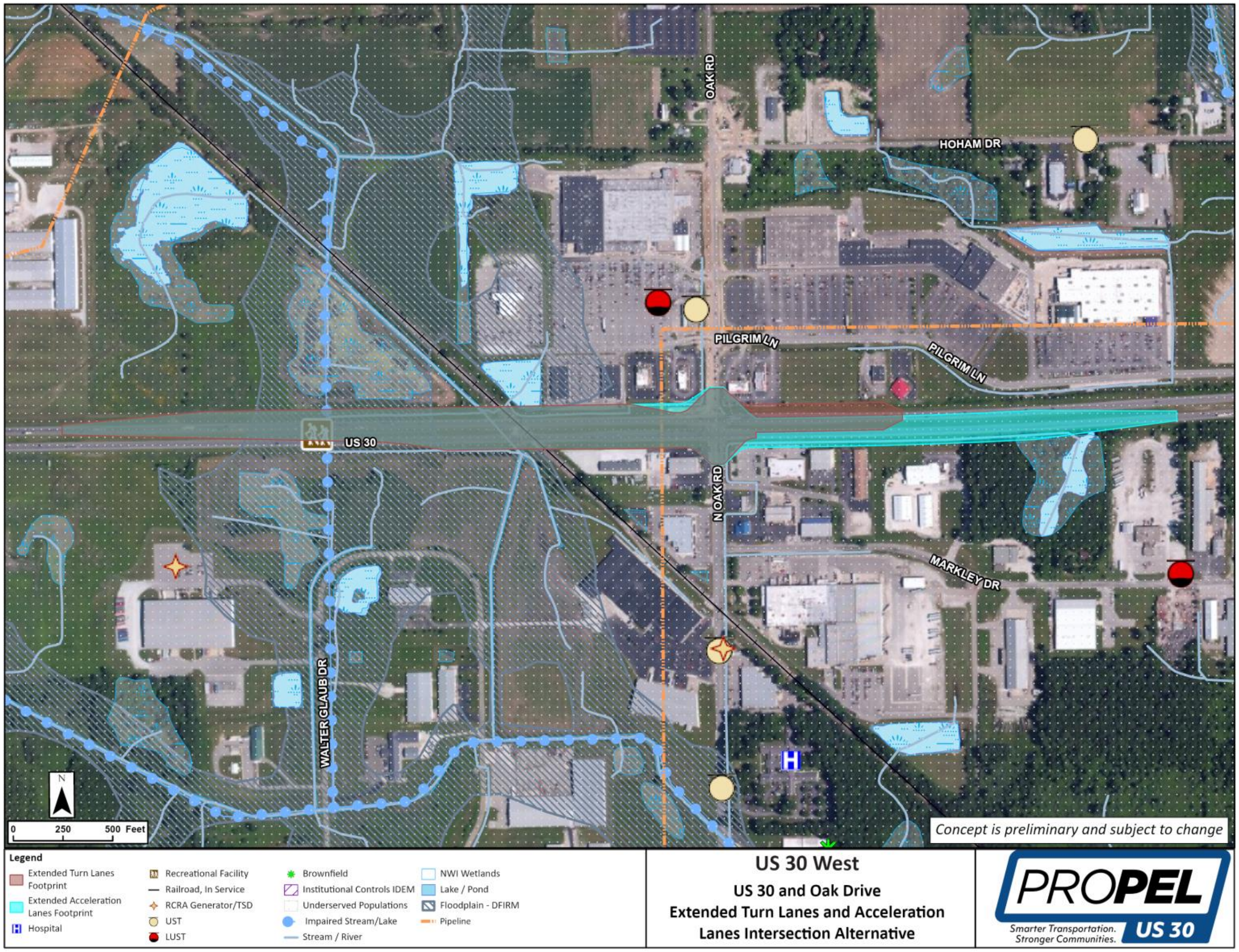


Figure 4-56: US 30 and Oak Drive – Cross Road Overpass/Underpass Alternative – US 30 Over Oak Drive

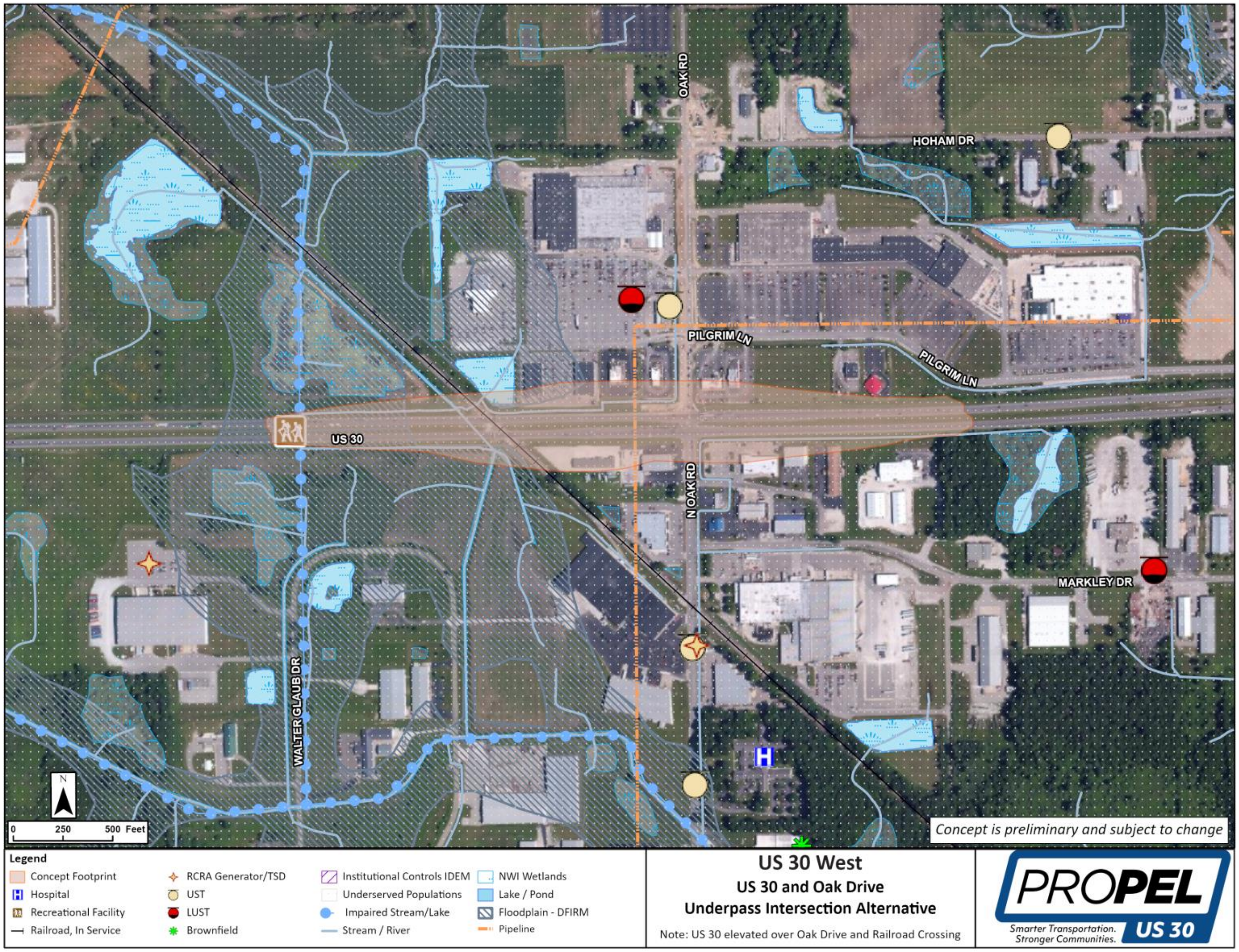


Figure 4-57: US 30 and Oak Drive – Partial Displaced Left Turn Alternative

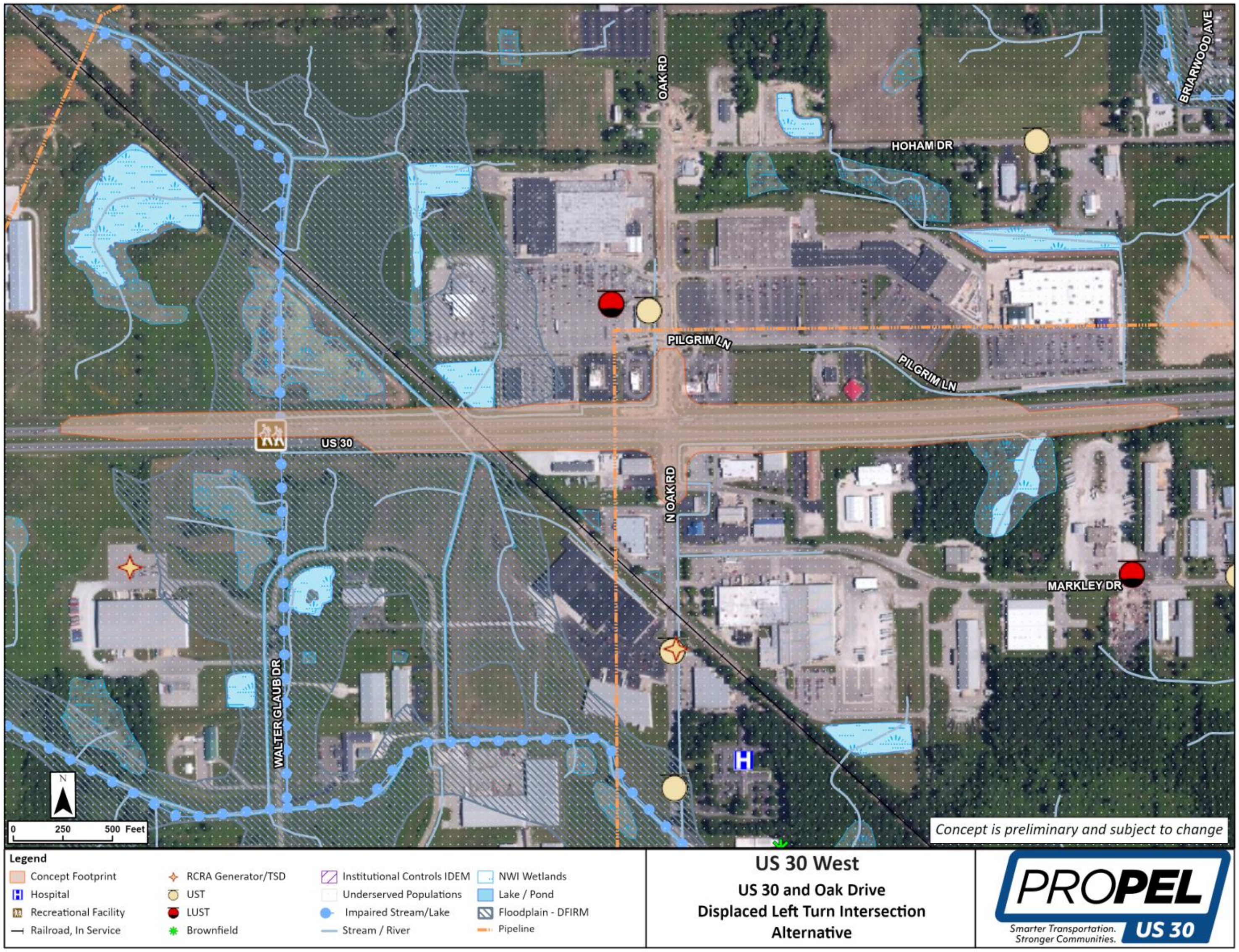
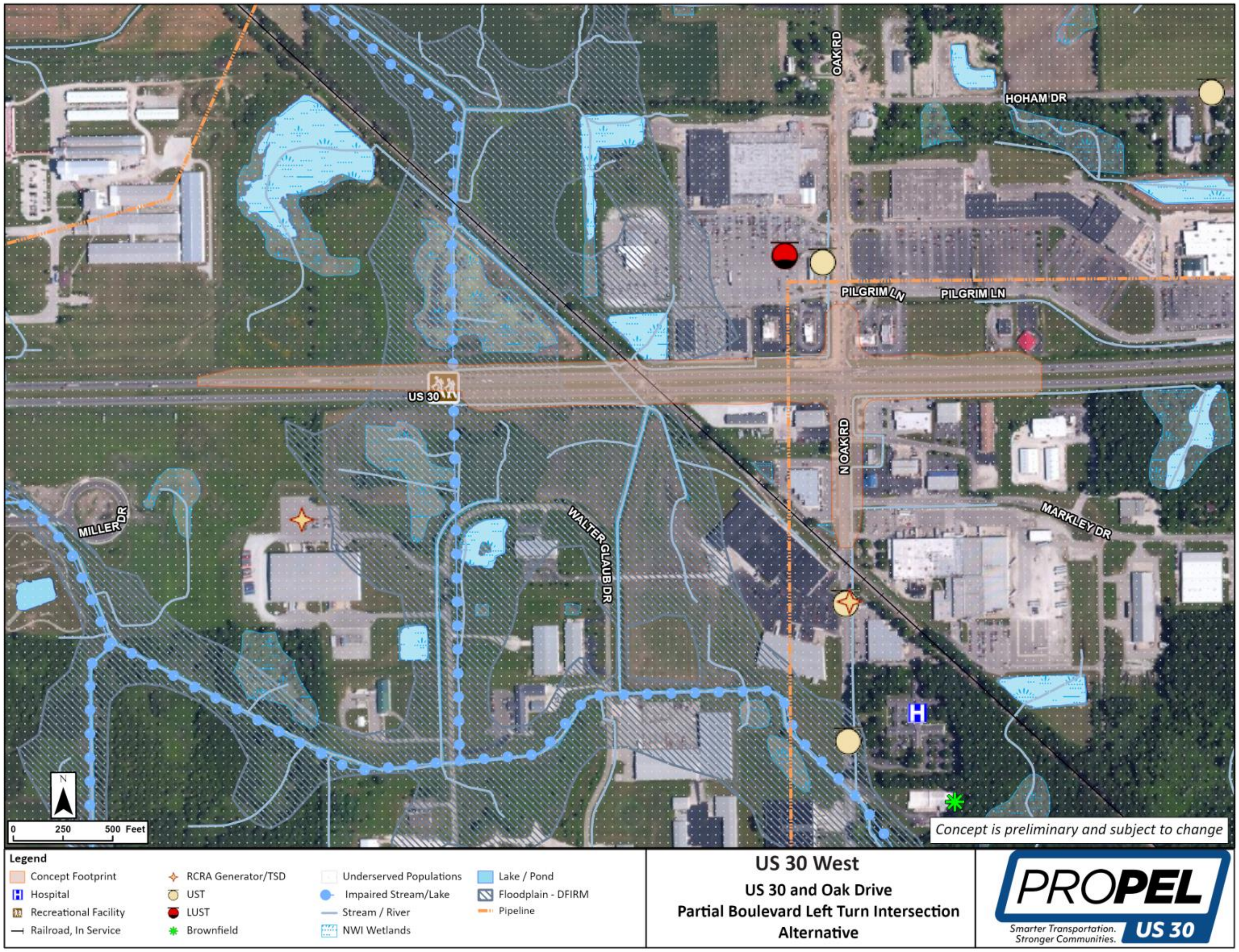


Figure 4-58: US 30 and Oak Drive – Boulevard Left Turn Intersection East-West Alternative



4.19. US 30 AND MICHIGAN STREET IN MARSHALL COUNTY

4.19.1. OVERVIEW OF LOCATION

This folded diamond interchange is expected to operate acceptably through the design year of this study for all ramp and mainline movements. The crash severity index for the interchange is slightly elevated, indicating there are opportunities for safety improvements at the interchange.

This interchange is located within the city limits of Plymouth. There have been no specific public comments to date regarding concerns at this interchange.

No specific improvements are noted in the US 30 and US 31 Marshall County Plan (2023) other than upgrades to Michigan Street proper.

4.19.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the US 30 and Michigan Street interchange poses numerous constraints that were considered in the development of alternatives. The constraints are summarized as follows:

- A stream is located 0.3 miles east of the interchange.
- A commercial area surrounds the interchange.
- Underserved populations are located near the interchange.
    - Family Income Below Poverty Level
    - Non-English Speaking Population
    - Minority Populations
    - USDOT Disadvantaged Populations
- Plymouth Municipal Airport is located in the northeast quadrant of the interchange.

4.19.3. SCREENING OF ALTERNATIVES

This interchange is important for access to and from US 30 as it is in an urban region. As this is an existing interchange, at-grade and new grade-separated alternatives are not appropriate. The evaluation of alternatives from the decision tree are summarized in **Table 4-19**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Extend Acceleration/Deceleration Lanes – The existing US 30 westbound acceleration and deceleration lanes as well as the US 30 eastbound acceleration lane are substandard and should be lengthened. This alternative would maintain local access.

Complementary Concepts to be considered at this interchange are as follows:

- Add Capacity to Movements – Potential to improve mobility at the interchange.
- Ramp Terminal Intersection Improvement – Potential to improve traffic operations at the interchange.
- Bike/Pedestrian Facilities – Urban environment indicates potential desire for bike and pedestrian facilities.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these interchange alternatives where applicable.

4.19.3.1. Extend Acceleration Lanes Alternative

At this interchange the US 30 westbound acceleration and deceleration lanes as well as the US 30 eastbound acceleration lane were all found to be substandard. This alternative would improve the safety at the interchange of US 30 and Michigan Street by providing longer dedicated lanes for vehicles entering US 30 from Michigan Street to reach the design speed before merging with through traffic on US 30. This would decrease the risk of rear-end and side-swipe crashes. This alternative would also improve operations by reducing the differential speed between mainline traffic and traffic entering the mainline from the minor road. Safety at this interchange would improve by providing drivers a longer lane to decelerate so that they can safely exit US 30 westbound. The improvement limits for this alternative are shown in **Figure 4-60**.

This alternative would require minimal additional right-of-way but does potentially require a relocation. This alternative requires the US 30 bridges directly east of Michigan Street as well as the westbound US 30 bridge just west of Michigan Street to be widened which increases impacts on the surrounding natural resources and cost of the alternative. This is a medium-cost option due to the need to widen the existing structure to accommodate the extension of the acceleration and deceleration lanes. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.19.4. INTERCHANGE ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

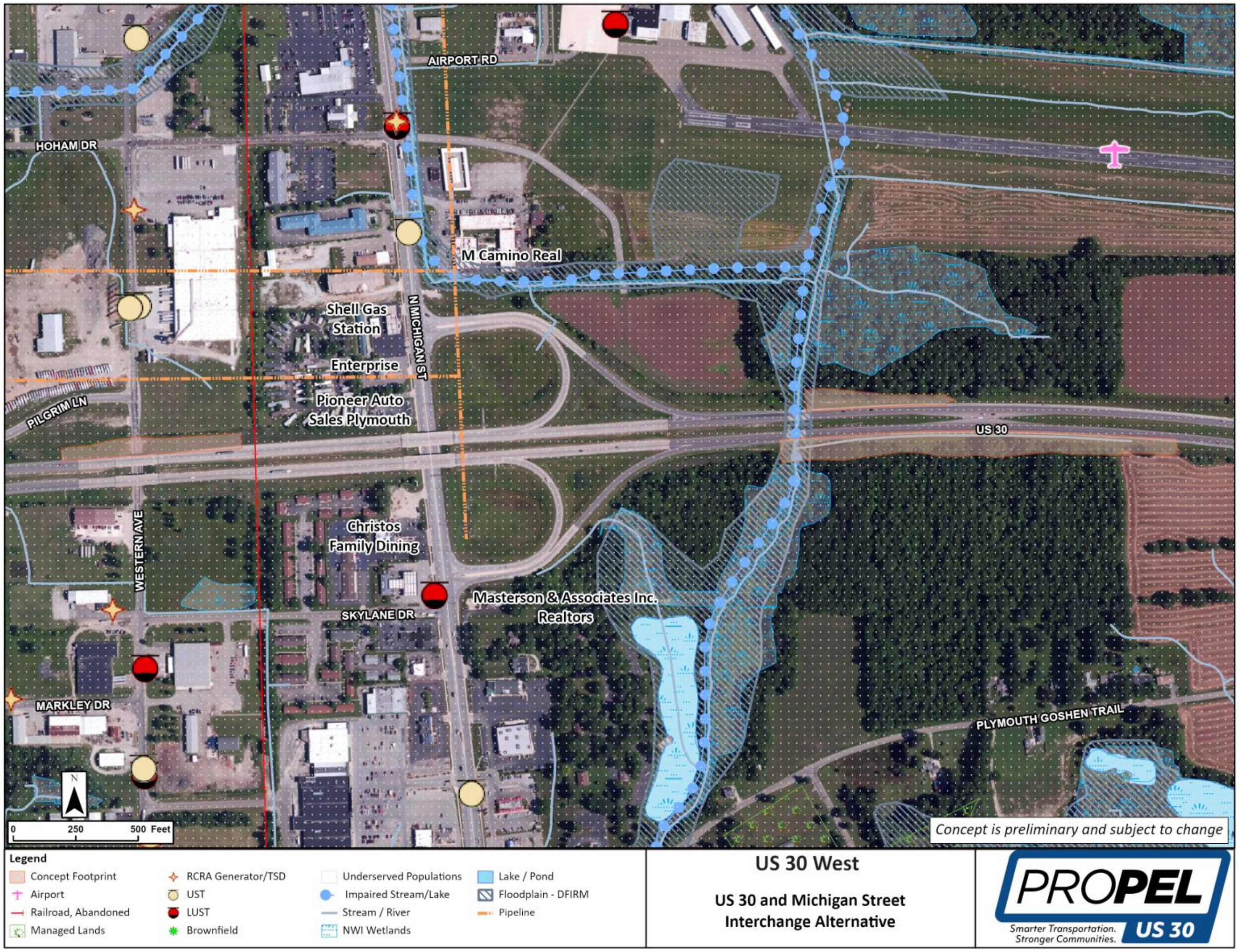
The following interchange alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Add/Extend Acceleration Lanes.
- Ramp Terminal Intersection Improvements – May be incorporated into all alternatives.
- Bike/Pedestrian Facilities – May be incorporated into all alternatives.

Table 4-19: US 30 and Michigan Street – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x Michigan Street	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	Yes	Yes	No	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add/Extend Acceleration/Deceleration Lanes	Yes	Yes	Yes	Yes	Yes	Medium	Low	Yes	Low	Medium	N/A	Medium	Yes	Requires widening of the existing WB and EB bridges over Elmer Seltenright Ditch to extend EB acceleration and WB deceleration lane. This alternative will be carried forward due to the potential to improve operations and safety at the interchange with a relatively small footprint.
Complementary Concepts														
Add Capacity to Movements	Yes	Yes	Yes	Yes	No	Low	Low	No	Low	Low	N/A	Medium	No	Additional capacity for this facility is not needed. This concept will not be advanced for further evaluation.
Ramp Terminal Intersection Improvements	Yes	Yes	Yes	Yes	No	Low	Low	No	Low	Low	N/A	Low	Yes	Would Improve interchange safety and operations by improving existing deficiencies at the ramp terminals.
Bike/Pedestrian Facilities	Yes	Yes	Yes	Yes	No	Low	Low	No	Low	Low	N/A	Low	Yes	Potential to improve safety for bike users and pedestrians using Michigan Street.

Figure 4-59: US 30 and Michigan Street – Extend Acceleration Lanes Alternative



4.20. US 30 AND PLYMOUTH GOSHEN TRAIL IN MARSHALL COUNTY

4.20.1. OVERVIEW OF LOCATION

This intersection is expected to operate acceptably through the design year of this study. The crash frequency index is slightly elevated and the crash cost index is elevated, indicating there are opportunities for safety improvements at this intersection.

- 60% of the crashes were right angle

In 2019 the intersection was modified into a directional access intersection, thus most likely reducing the number of right-angle crashes.

Public comments received to date about this intersection are summarized as follows.

- This intersection is a safety concern.
- Right angle crashes and crossing fatalities have occurred here.

The US 30 and US 31 Marshall County Plan (2023) notes that an additional bridge overpass could/should be constructed to maintain cross-connectivity from south of US 30 to north of US 30.

4.20.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the intersection of US 30 and Plymouth Goshen Trail poses numerous constraints that were considered in the development of these alternatives. These constraints are summarized as follows:

- Stockberger Trucking is in the northwest quadrant of the intersection, and Darling Ingredients is in the southeast quadrant.
- There are residential properties in the southwest and northeast quadrants of the intersection.
- Plymouth Municipal Airport is located approximately 0.30 miles northwest of the intersection.
- Underserved populations are located near the intersection.
    - Family Income Below Poverty Level
    - Non-English Speaking Population
- There is 1 NWI wetland located in the southeast quadrant of the intersection.
- Hazardous material concerns are near the intersection, including 2 UST sites north of the intersection; 1 LUST site east of the intersection. There is also an IDEM institutional control site east of the intersection.
- There is a floodplain south of the intersection.

4.20.3. SCREENING OF ALTERNATIVES

The decision tree indicates that that both at-grade and grade-separated alternatives would be applicable, although an interchange is unnecessary. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in Table 4-20.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Add or Lengthen Turn Lanes – Right turn lanes are not present. Turn lanes should be added. This alternative would maintain local access.
- Add/Extend Acceleration Lanes – Crash patterns at the intersection are potentially due to not having acceleration lanes. Acceleration lanes should be added. This alternative would maintain local access.
- Cross Road Overpass/Underpass – There are other locations within approximately 2 miles of the intersection that provide equal or better access based on the functional classification of the route that local traffic would use to access the corridor. Therefore, a crossroad overpass or underpass should be considered, especially when applied alongside a limited access section, to be analyzed in level 3.
- Unsignalized Intersection Improvements – This intersection is important for access to and from US 30 due to the high usage of the intersection. The above average crash frequency and crash cost indices indicate the potential for safety improvements. This intersection is two-way stop controlled and forecasted traffic volumes do not warrant signalization. The CAP-X analysis indicated that of the following at-grade intersection types could produce acceptable operating conditions in the design year.
    - Reduced Conflict Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. A Reduced Conflict Intersection would meet access management guidelines as well as preserve free-flow operations on US 30 and maintain local access. Due to a recent project at this intersection, an RCI would only need the U-Turns constructed.

The primary concepts eliminated from eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT access management guidelines.
- Median Safety Improvements – The existing median meets IDM requirements.
- Convert to Interchange – There are no volumes or other factors that support an interchange here. The location of this intersection relative to the US 30 and US 31 and US 30 and Michigan Street interchanges also preclude an interchange here.
- Signalized Intersection Improvements – This intersection is important for access to and from US 30 and has safety and/or operational concerns, but it is currently unsignalized and does not meet a warrant for a signal.

Complementary concepts to be considered as part of intersection alternatives are as follows:

- Spot Roadway Lighting – Provide lighting for intersection alternatives.
- Warning Systems – Potential to raise awareness for approaching traffic.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.20.3.1. Add or Lengthen Turn Lanes Alternative

This alternative involves adding eastbound and westbound right turn lanes. Adding turn lanes improves intersection operations and improves safety by providing sufficient deceleration length in a dedicated lane. The proposed turn lanes will meet IDM standards. The improvement limits of this alternative can be seen in **Figure 4-61**.

With the eastbound and westbound right turn lanes added, there are potential right-of-way impacts in all four quadrants of the intersection. This is a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.20.3.2. Add/Extend Acceleration Lanes Alternative

Adding acceleration lanes at the intersection of US 30 and Plymouth Goshen Trail would improve intersection operations by reducing the differential speed between mainline traffic and traffic entering the mainline from the minor road. This alternative would also improve safety at the intersection by providing a dedicated lane for vehicles turning from Plymouth Goshen Trail to accelerate to the speed of vehicles traveling on US 30, thereby reducing the risk of rear-end crashes. The improvement limits of this alternative can be seen in **Figure 4-61**.

The addition of acceleration lanes to the eastbound and westbound legs of the intersection would result in low right-of-way impacts in the northwest and southeast quadrants of the intersection. There would also be impacts to wetlands located in the southeast quadrant. This is a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.20.3.3. Cross Road Overpass / Underpass Alternative – Plymouth Goshen Trail over US 30

Reconfiguring this intersection so that Plymouth Goshen Trail goes over US 30 increases safety by eliminating access from Plymouth Goshen Trail to US 30 and vice versa. In this alternative traffic would be routed over top of US 30 by use of a bridge. The improvement limits of this alternative can be seen in **Figure 4-62**.

Constructing an overpass for Plymouth-Goshen Trail would require grading to elevate the roadway. This grading would have substantial impacts all quadrants of the intersection. In addition, there would be numerous potential relocations in the southern quadrants. New access would also be provided where necessary in the southeast and northwest quadrants. This alternative would have potential adverse impacts to underserved populations. This alternative would also have impacts to the wetland located in the southeast quadrant. This is a medium-cost option.

This alternative is mainly applicable to the improvement packages associated with a limited access section, to be analyzed in Level 3. This grade-separated configuration was preliminarily selected as opposed to elevating US 30 over Plymouth Goshen Trail due to the assumed lower impacts given the rural environment.

4.20.3.4. Reduced Conflict Intersection Alternative

The RCI alternative would retain the free-flow of through traffic along US 30 while rerouting left turns from Plymouth Goshen Trail to US 30 and minor road through movements. This would improve safety by reducing the risk of right-angle crashes. The addition of truck loons was included in the conceptual design. The improvement limits for this alternative are identical to that of what is shown in **Figure 4-63**.

Potential right-of-way impacts are expected in all quadrants of the intersection. New access would be provided in the southeast quadrant as needed. Additionally, the alternative may require relocations in the southeast quadrant. This alternative would have potential adverse impacts to underserved populations. This is a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.20.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Add or Lengthen Turn Lanes.
- Add/Extend Acceleration Lanes.

- Cross Road Overpass/Underpass.
- Reduced Conflict Intersection.
- Spot Roadway Lighting – May be applied to all alternatives.
- Warning Systems – May be applied to all alternatives.

Table 4-20: US 30 and Plymouth Goshen Trail – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x Plymouth Goshen Trail	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potentia l ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	Yes	Yes	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add or Lengthen Turn Lanes	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Add EB and WB right turn lanes to provide sufficient deceleration length, reducing the likelihood of rear-end crashes. Carried forward because of the potential for improved safety. The proposed turn lanes will meet IDM requirements.
Add/Extend Acceleration/Deceleration Lanes	Yes	Yes	Yes	Yes	N/A	Medium	Low	No	Low	Low	N/A	Low	Yes	Extend EB and WB acceleration lanes, reducing the likelihood of rear-end crashes which were observed to be a concern at this intersection. Carried forward due to the potential to improve safety with a relatively small footprint.
Cross Road Overpass / Underpass	Yes	Yes	No	Yes	N/A	High	Low	Yes	High	High	N/A	Medium	Yes	Carried forward due to the potential for improvements to safety and operations associated with grade separation and applicability to a limited access alternative.
Unsignalized Intersection Improvements														
Reduced Conflict Intersection E-W	Yes	Yes	Yes	Yes	N/A	Medium	Low	Yes	Medium	Medium	N/A	Low	Yes	Turning radii designed to IDV can reduce potential R/W impacts with another design vehicle. Carried forward due to the potential to improve intersection safety and operations by limiting conflicting movements within a small footprint.
Complementary Concepts														
Spot Roadway Lighting	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Provide lighting for intersection alternatives
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Raises awareness of approaching traffic

Figure 4-60: US 30 and Plymouth Goshen Trail – Add or Lengthen Turn Lanes and Add/Extend Acceleration Lanes Alternatives

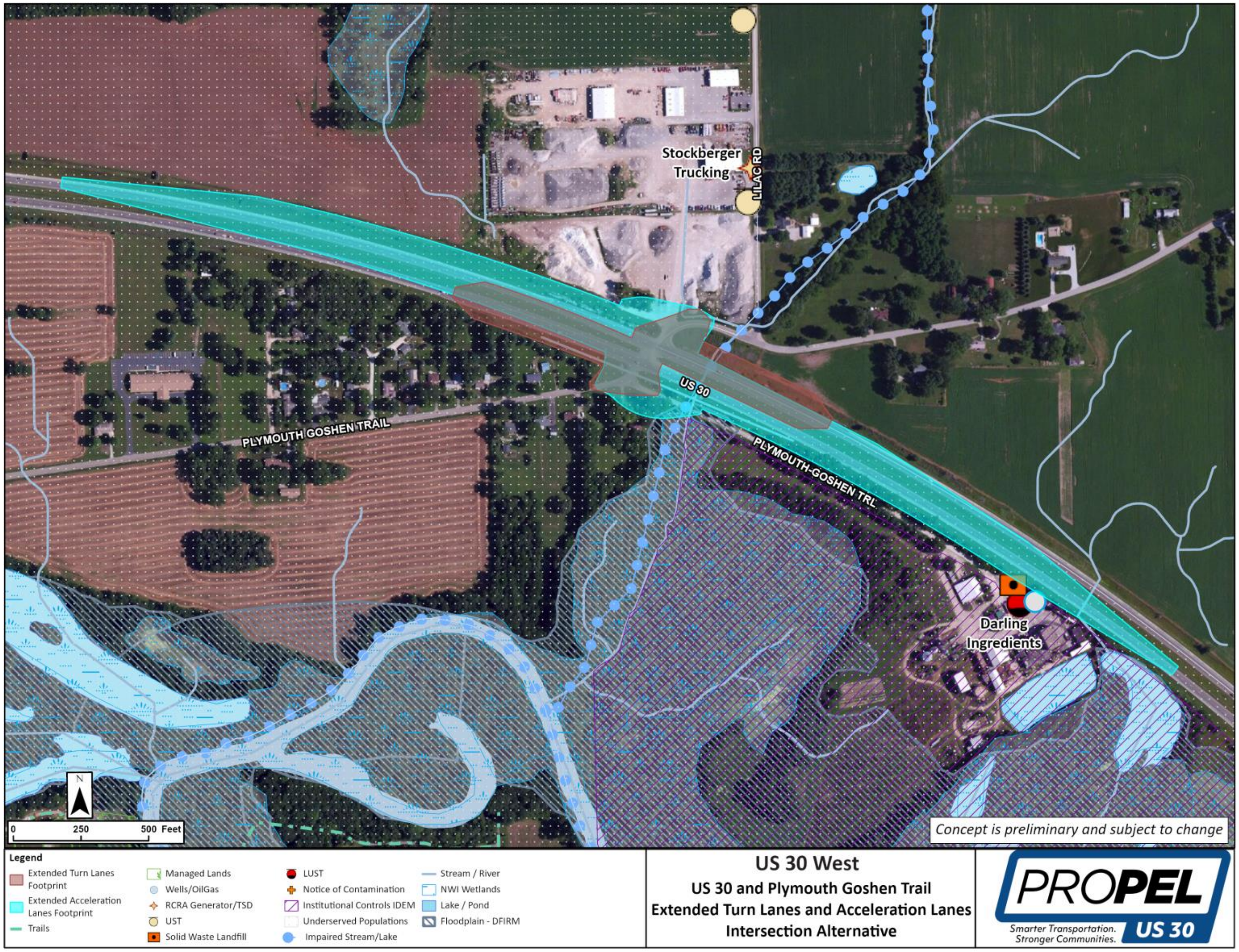


Figure 4-61: US 30 and Plymouth Goshen Trail – Cross Road Overpass/Underpass Alternative – Plymouth Goshen Trail over US 30

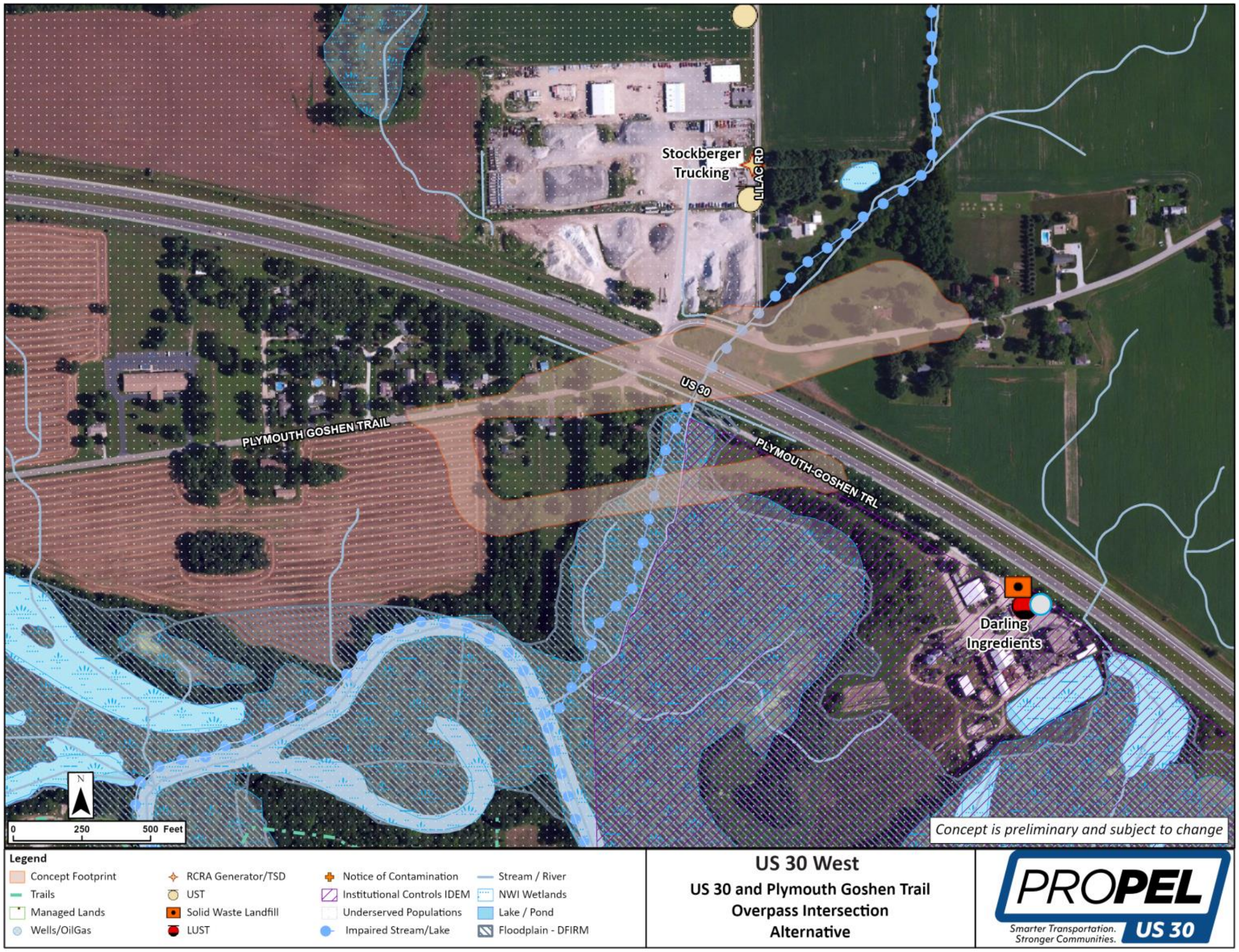
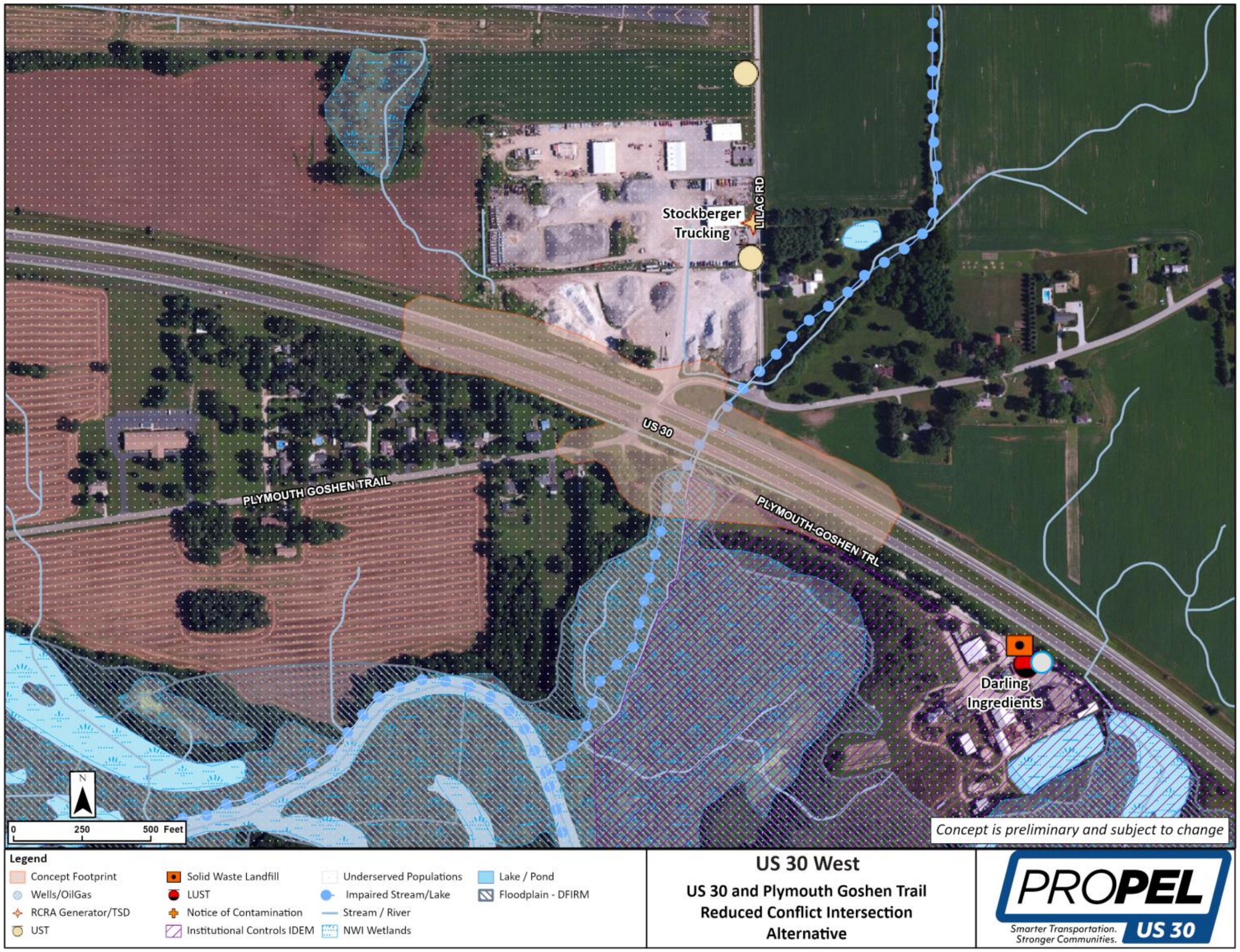


Figure 4-62: US 30 and Plymouth Goshen Trail – Reduced Conflict Intersection Alternative



4.21. US 30 AND US 31 IN MARSHALL COUNTY

4.21.1. OVERVIEW OF LOCATION

This cloverleaf interchange is expected to operate acceptably through the design year of this study for all ramp and mainline movements. The crash frequency and crash cost indices for all ramps and indicate that there are no major safety concerns at the interchange. Improvements were still considered at this interchange as a part of safety or operational improvements along this segment of US 30, to be further considered in level 3.

This interchange is located at the eastern limits of the City of Plymouth.

- Public comments received specific to this location include: Maintain access to Plymouth around this interchange.

4.21.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The interchange of US 30 and US 31 poses numerous constraints. These constraints are summarized as follows:

- Several NWI Wetlands are in the northwest, northeast, and southeast quadrants of the interchange.
- Underserved populations are located near the interchange.
    - Family Income Below Poverty Level
    - Non-English Speaking Population
- There are several residential properties located in the southwest and southeast quadrants of the intersection.
- There are 2 religious institutions, Kingdom Hall of Jehovah's Witnesses and Plymouth Baptist Church, in the southwest quadrant.
- There is a truck stop located 0.60 miles east of the interchange on US 30.

4.21.3. SCREENING OF ALTERNATIVES

The interchange of US 30 and US 31 is important for access to and from both US 30 and US 31, due to the interchange's high usage. As this is an existing interchange, at-grade and new grade-separated alternatives are not appropriate. The evaluation of alternatives from the decision tree are summarized in **Table 4-21**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Extend Acceleration/Deceleration Lanes – The existing acceleration lanes are substandard and should be extended. This alternative would maintain local access.

Complementary concepts to be considered as a part of interchange alternatives include:

- Add capacity to movements – Potential to improve mobility at the interchange.

The interchange alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these interchange alternatives where applicable.

4.21.3.1. *Extend Acceleration Lanes Alternative*

At this interchange the US 30 eastbound and westbound diagonal ramp acceleration lanes from US 31 to US 30 were found to be substandard. This alternative would improve the safety at the interchange of US 30 and US 31 by providing longer dedicated lanes for vehicles entering US 30 from US 31 to reach the design speed before merging with through traffic on US 30. This would decrease the risk of rear-end and side-swipe crashes. This alternative would also improve operations reducing the differential speed between mainline traffic and traffic entering the mainline from the minor road. The improvement limits for this alternative are shown in **Figure 4-64**.

This alternative would require minimal additional right-of-way and access to all parcels would be maintained. This alternative requires the westbound US 30 bridge directly west of US 31 to be widened which increases impacts on the surrounding natural resources and cost of the alternative. This is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.21.4. INTERCHANGE ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

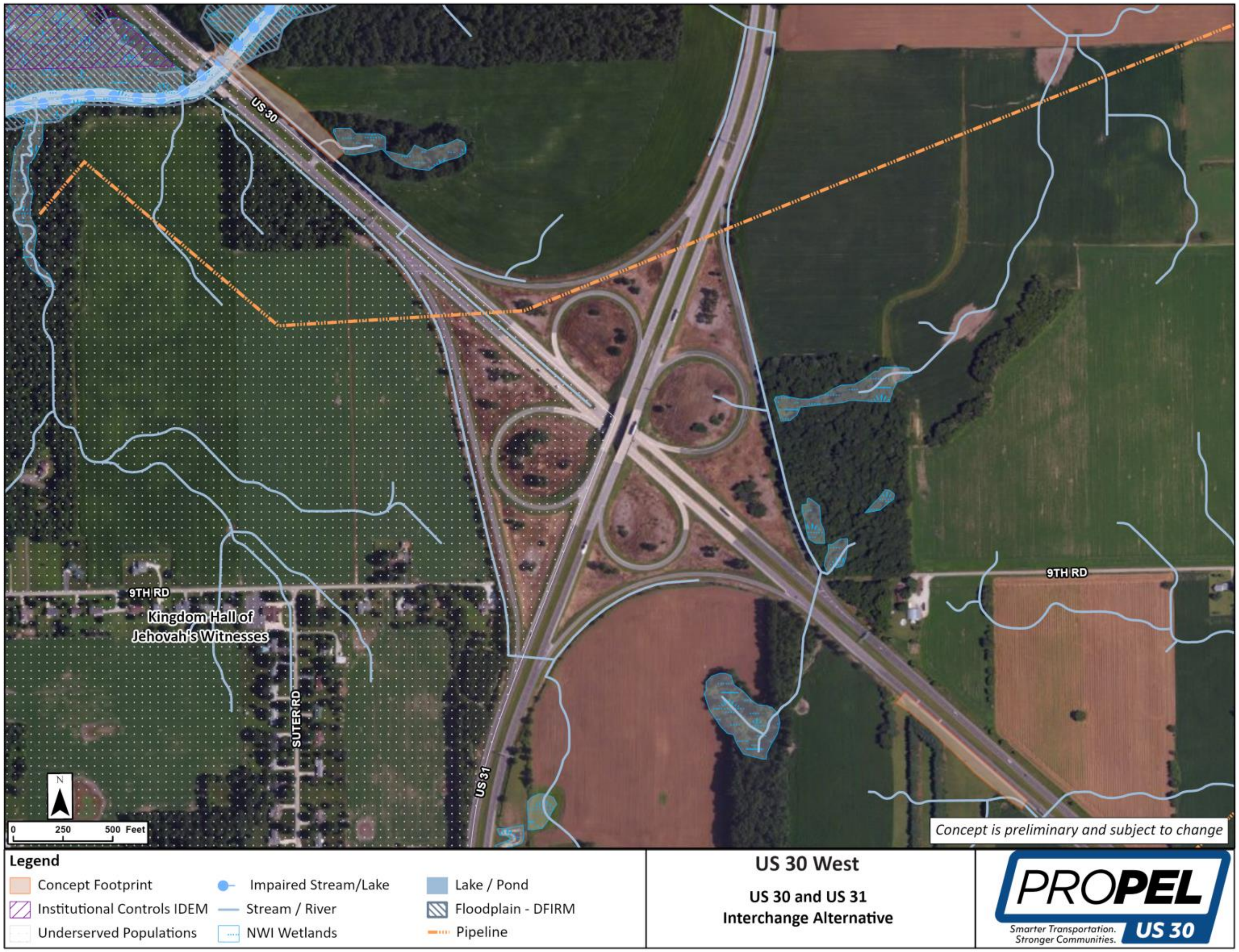
The following interchange alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Add/Extend Acceleration Lanes.

Table 4-21: US 30 and US 31 – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x US 31	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Managemen t Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	Yes	Yes	No	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add/Extend Acceleration/Deceleration Lanes	Yes	Yes	Yes	Yes	Yes	Medium	Low	No	Low	Low	N/A	Low	Yes	Would have to widen bridge over Yellow river o extend WB acceleration lane. Carried forward due to the potential to improve safety and operations of this interchange.
Complementary Concepts														
Add Capacity to Movements	Yes	Yes	Yes	Yes	No	Low	Low	No	Low	Low	N/A	Medium	No	Additional capacity for this facility is not needed. This concept will not be advanced for further evaluation.

Figure 4-63: US 30 and US 31 – Extend Acceleration Lanes Alternative



4.22. US 30 AND 9A ROAD IN MARSHALL COUNTY

4.22.1. OVERVIEW OF LOCATION

This signalized intersection is expected to operate acceptably through the design year of this study. The crash frequency index is slightly elevated indicating there are opportunities to improve safety at the intersection.

Public comments received to date about this intersection are summarized as follows.

- This intersection is a heavily travelled intersection. Access should be maintained if possible.
- If not possible, a bike/ped overpass or underpass should be considered. Non-motorized vehicle facilities should be implemented.
- Safety concerns regarding red-light running. Maintain access and mobility for semi-trucks and trailers when completing intersection improvements. Safety concerns associated with reducing US 30 access at this intersection.
- Safety concerns regarding emergency response vehicles.

The US 30 and US 31 Marshall County Plan (2023) notes that an interchange is recommended at this intersection. There is a recently constructed truck stop located at the intersection and the area is slated for low density residential zoning.

4.22.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the US 30 and King and 9A Road intersection poses numerous constraints that were considered in the development of alternatives. The constraints are summarized as follows:

- Farm fields are located to the north of the intersection.
- Pilot Travel Center is adjacent to the intersection.
- Greyhound Bus Stop is located at the Pilot Travel Center
- Marshall County Highway Garage is on King Road, just south of the intersection.
- The interchange of US 30 and US 31 is 0.8 miles west of the intersection.
- 1 NWI wetland is in the vicinity of the intersection.
- Hazardous material concerns are near the intersection, including 2 LUST sites and an IDEM institutional control site located just south of the intersection.
- Intersections of King Road and 9A Road located closely on both north and south legs of the intersection.

4.22.3. SCREENING OF ALTERNATIVES

The decision tree indicates that both at-grade and grade separated alternatives would be applicable. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-22**.

The primary alternatives that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Add or Lengthen Turn Lanes – The existing turn lanes do not provide sufficient deceleration length. The turn lanes should be lengthened. This alternative would maintain local access.
- Add/Extend Acceleration Lanes – Crash patterns at the intersection indicate a potential concern due to missing acceleration lanes. Acceleration lanes should be added. This alternative would maintain local access.
- Cross Road Overpass/Underpass – There are other locations within approximately two miles of the intersection with equal or better access, based on the functional classification of the route that local traffic can use to access the corridor. Therefore, a crossroad overpass or underpass should be considered, especially when applied alongside a limited access section, to be analyzed in level 3.
- Signalized and Unsignalized Intersection Improvements – This intersection is important for access to and from US 30 due to the high usage. The above average crash frequency index indicates a need for safety improvements. This intersection is currently signalized. The CAP-X analysis indicated that the following at-grade intersection types could produce acceptable operating conditions in the design year.
    - Boulevard Left Turn Intersection East-West – This alternative would improve intersection safety and operations while maintaining local access.
    - Restricted Crossing U-Turn Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. A Restricted Crossing U-Turn Intersection would meet access management guidelines as well as improve intersection operations on US 30 and maintain local access.
    - Reduced Conflict Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. It would also meet access management guidelines as well as create free-flow operations on US 30 and maintain local access.
    - Roundabout – This alternative would improve intersection safety while maintaining local access. This alternative also improves safety at the intersection by reducing speeds and lowering the risk of right-angle crashes.

Primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.
- Median Safety Improvements – The median meets IDM requirements
- Convert to Interchange – While this intersection is a location listed as a possible interchange in the Marshall County Plan (2023), an interchange was not considered at this intersection due to its proximity to the existing US 30 and US 31 interchange.
- Other signalized intersection types were eliminated through Cap-X tool analysis because their potential benefits were not substantial enough when compared to the existing conditions. Therefore, they were not further analyzed as part of this process. These intersection types included:
    - Green-T Intersection – This alternative is not applicable to a four-legged intersection.
    - Displaced Left Turn Intersection – Based on low left turning volumes from US 30 and the requirement of additional right-of-way for left turn crossovers, this

alternative would become prohibitively expensive compared to other feasible intersection types such as RCI.

- Quadrant Roadway – The CAP-X results indicated a high volume to capacity ratio implying poor operational performance of the intersection.

Complementary Concepts to be considered as part of intersection alternatives are as follows:

- Signal Timing Updates / Coordination – Signal timing updates and coordination have the potential to improve safety and relieve congestion.
- Spot Roadway Lighting – Provide lighting for intersection alternatives.
- Warning Systems – Potential to raise awareness for approaching traffic.
- Freight Priority System – Potential to reduce delay for trucks.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.22.3.1. Add and Lengthen Turn Lanes Alternative

This alternative involves lengthening the existing eastbound and westbound left and right turn lanes. Lengthening the existing turn lanes improves safety by providing sufficient deceleration length and increasing storage space, reducing the likelihood of rear-end crashes. The proposed turn lanes will meet IDM standards. The improvement limits of this alternative can be seen in **Figure 4-65**.

Lengthening of eastbound and westbound turn lanes can fit inside the existing pavement. There are no potential right-of-way impacts because of this. No changes to property access are expected. This is a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.22.3.2. Add/Extend Acceleration Lanes Alternative

Added acceleration lanes would improve intersection safety by providing dedicated lanes for vehicles turning onto US 30 from King and 9A Road to achieve sufficient speed before entering the travel lanes. This alternative would also improve intersection operations by reducing the differential speed between mainline traffic and traffic entering the mainline from the minor road. The improvement limits for this alternative can be seen in **Figure 4-65**.

This alternative is expected to require additional right-of-way from all quadrants but is not expected to require any potential relocations. All property access would be maintained. This is a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.22.3.3. Cross Road Overpass / Underpass Alternative – King and 9A Road over US 30

Reconfiguring this intersection so that King and 9A Road goes over US 30 increases safety by eliminating access from King and 9A Road to US 30 and vice versa. In this alternative traffic would be routed over top of US 30 by use of a bridge. The improvement limits of this alternative can be seen in **Figure 4-66**.

King Road south of the Pilot Travel Center would be realigned so that it creates a T-intersection with the existing King Road just before the overpass begins on the south approach. The potential right-of-way impacts of a minor road overpass at this intersection are along the east and west sides of King and 9A Road with the largest impacts coming closer to US 30. This is where the potential roadway is the highest before the bridge. Right-of-way Impacts then taper back into the existing limits as the potential road profile ties back into the existing profile. With this alternative there are no potential relocations. This is a medium-cost option.

This alternative is mainly applicable to the improvement packages associated with a limited access section, to be analyzed in Level 3. This grade-separated configuration was preliminarily selected as opposed to elevating

US 30 over Fir Road due to the assumed lower impacts given the rural environment. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.22.3.4. Boulevard Left Turn Intersection East-West Alternative

This alternative would reroute left turns from US 30 to King and 9A Road and vice versa. This alternative would improve intersection safety by rerouting left turns on US 30 and King Road, reducing conflict points, thereby reducing the risk of right-angle crashes. This alternative would also improve intersection operations by reducing the number of signal phases required. This alternative requires the turning radii to be enlarged to accommodate truck turning movements. The improvement limits for this alternative can be seen in **Figure 4-67**.

This alternative is expected to require additional right-of-way from all four quadrants. No potential relocations are expected and the alternative can predominately fit within the existing footprint with the exception of the loons and grading. No wetland impacts are expected. This is a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.22.3.5. Restricted Crossing U-turn Intersection Alternative

The RCUT alternative keeps all existing movements for US 30 while rerouting left turns and through movements from King and 9A Road to US 30 which would improve safety by eliminating conflict points. The improvement limits for this alternative are shown in **Figure 4-68**.

Potential right-of-way impacts are expected in all quadrants of the intersection. No potential relocations or wetland impacts are expected with this alternative. This is a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.22.3.6. Reduced Conflict Intersection Alternative

The RCI alternative would allow the free-flow of through traffic along US 30 while rerouting left turns from King and 9A Road to US 30 and minor road through movements. This would improve safety by reducing the risk of right-angle crashes. The addition of truck loons was included in the conceptual design. The improvement limits for this alternative are the same as those shown in **Figure 4-68**.

Potential right-of-way impacts are expected in all quadrants of the intersection. No potential relocations or wetland impacts are expected with this alternative. The RCI was previously designed by INDOT at this location and was scheduled for construction in 2022. This is a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.22.3.7. Roundabout Alternative

Reconfiguring the US 30 and King and 9A Road intersection into a roundabout alternative would require the center of the roundabout to be located northeast of the existing center of the intersection. The roundabout alternative would increase safety by reducing travel speed and the chance for more severe right angle, left turn, and head on collisions, although additional rear-end crashes may occur. The improvement limits of this alternative can be seen in **Figure 4-69**.

The potential right-of-way impacts for this alternative affects the northeast and northwest quadrants of the intersection. This alternative was configured so that no wetland impacts, or potential relocations would be required. This a medium-cost option. Speed management strategies would have to be paired with the roundabout alternative to mitigate the risk of rear-end crashes. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.22.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Add or Lengthen Turn Lanes.
- Add/Extend Acceleration Lanes.
- Cross Road Overpass/Underpass.
- Boulevard Left Intersection.
- Restricted Crossing U-Turn.
- Reduced Conflict Intersection.
- Roundabout.
- Spot Roadway Lighting – May be incorporated into any alternative.
- Signal Timing Updates/Coordination – May be incorporated into any alternatives involving signalization.
- Warning Systems – May be incorporated into any alternative.
- Freight Priority System – May be incorporated into any alternatives involving signalization.

Table 4-22:US 30 and King Road and 9A Road – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x King/ 9A Road	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add or Lengthen Turn Lanes	Yes	No	Yes	Yes	N/A	Low	Low	N/A	Low	Low	N/A	Low	Yes	Lengthen EB and WB Turn Lanes, Carried forward due to improved safety by reducing the risk of rear-end crashes. The proposed turn lanes meet IDM standards.
Add/Extend Acceleration/Deceleration Lanes	Yes	Yes	Yes	Yes	N/A	Low	Low	N/A	Low	Low	N/A	Low	Yes	Add Acceleration Lanes for EB and WB directions. WB Acceleration Lane ties into WB to NB ramp of US 30 and US 31 Interchange. Carried forward due to Improved safety by reducing the likelihood of rearend crashes
Cross Road Overpass / Underpass	Yes	Yes	No	Yes	N/A	Low	Low	N/A	High	Low	N/A	Medium	Yes	Overpass shifted southeast to avoid impacts to truck stop. Impacts are to the surrounding fields. Carried forward due to low impacts on cultural and natural resources while also improving safety.
Signalized Intersection Improvements														
Boulevard Left Intersection E-W	Yes	Yes	Yes	Yes	N/A	Low	Low	N/A	Low	Low	N/A	Low	Yes	Add median U-turns. Carried forward because this alternative maintains local access while improving safety and intersection operations while having a limited footprint. Truck stop is not impacted
Restricted Crossing U-Turn Intersection	Yes	Yes	Yes	Yes	N/A	Low	Low	N/A	Low	Low	N/A	Low	Yes	Close median to minor road thru and left turns and add U turn medians. Truck stop is not impacted. Carried forward due to low impacts on cultural and natural resources.
Unsignalized Intersection Improvements														
Reduced Conflict Intersection	Yes	Yes	Yes	Yes	N/A	Low	Low	N/A	Low	Low	N/A	Low	Yes	Already designed by INDOT. Similar footprint to the RCUT. Carried forward due to low impacts on cultural and natural resources.
Roundabout	Yes	Yes	Yes	Yes	N/A	Low	Low	N/A	High	Low	N/A	Medium	Yes	Larger footprint required to avoid impacts to truck stop. Carried forward due to low impacts on cultural and natural resources.
Complementary Concepts														
Spot Roadway Lighting	Yes	No	Yes	Yes	N/A	Low	Low	N/A	Low	Low	N/A	Low	Yes	Provide lighting for intersection alternatives
Signal Timing Updates/Coordination	Yes	Yes	Yes	Yes	N/A	Low	Low	N/A	Low	Low	N/A	Low	Yes	
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	N/A	Low	Low	N/A	Low	Yes	Raises awareness of approaching traffic
Freight Priority System	No	Yes	Yes	Yes	N/A	Low	Low	N/A	Low	Low	N/A	Low	Yes	Can reduce delays for trucks

Figure 4-64: US 30 and King Road and 9A Road – Add and Lengthen Turn Lanes and Add/Extend Acceleration Lanes Alternatives

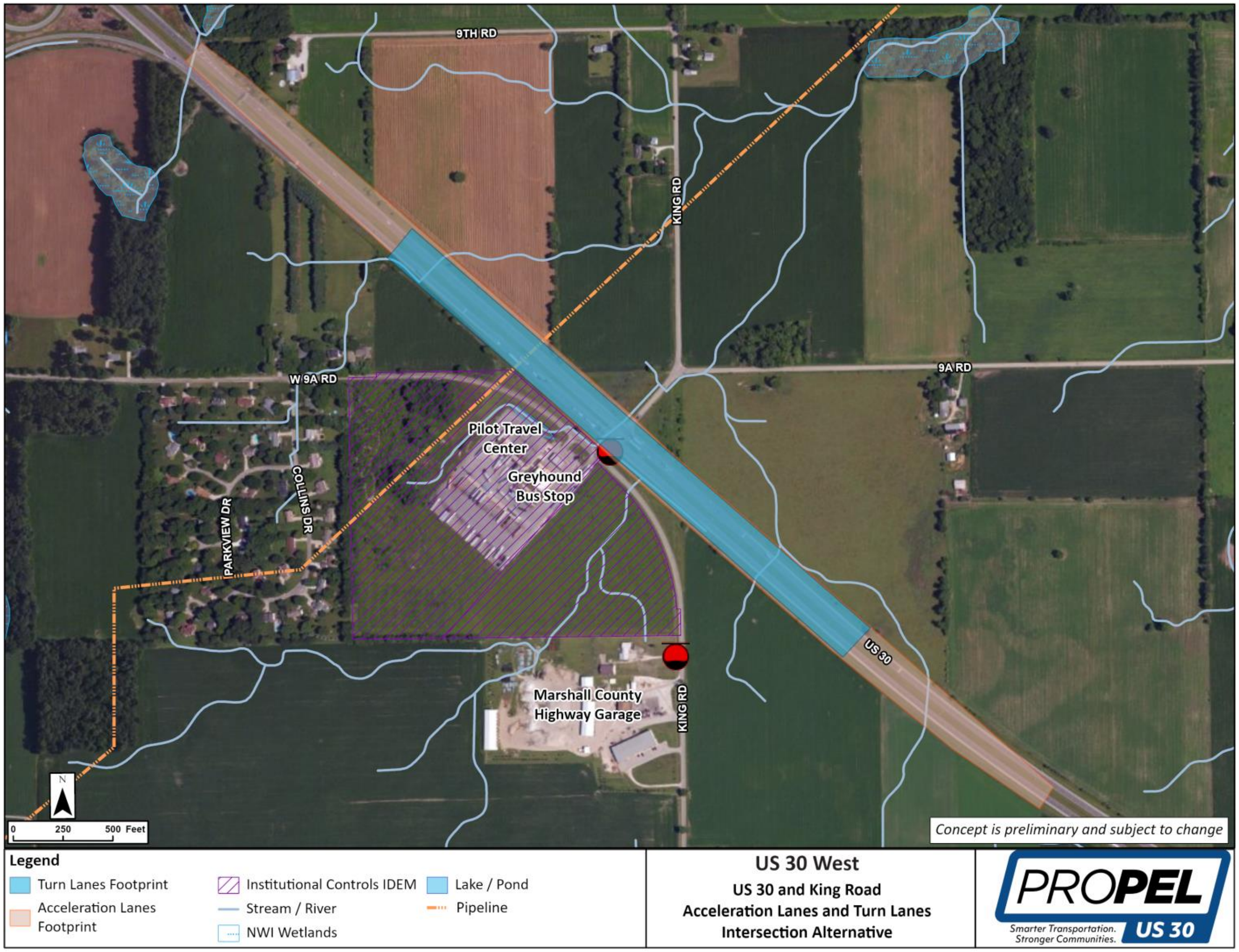
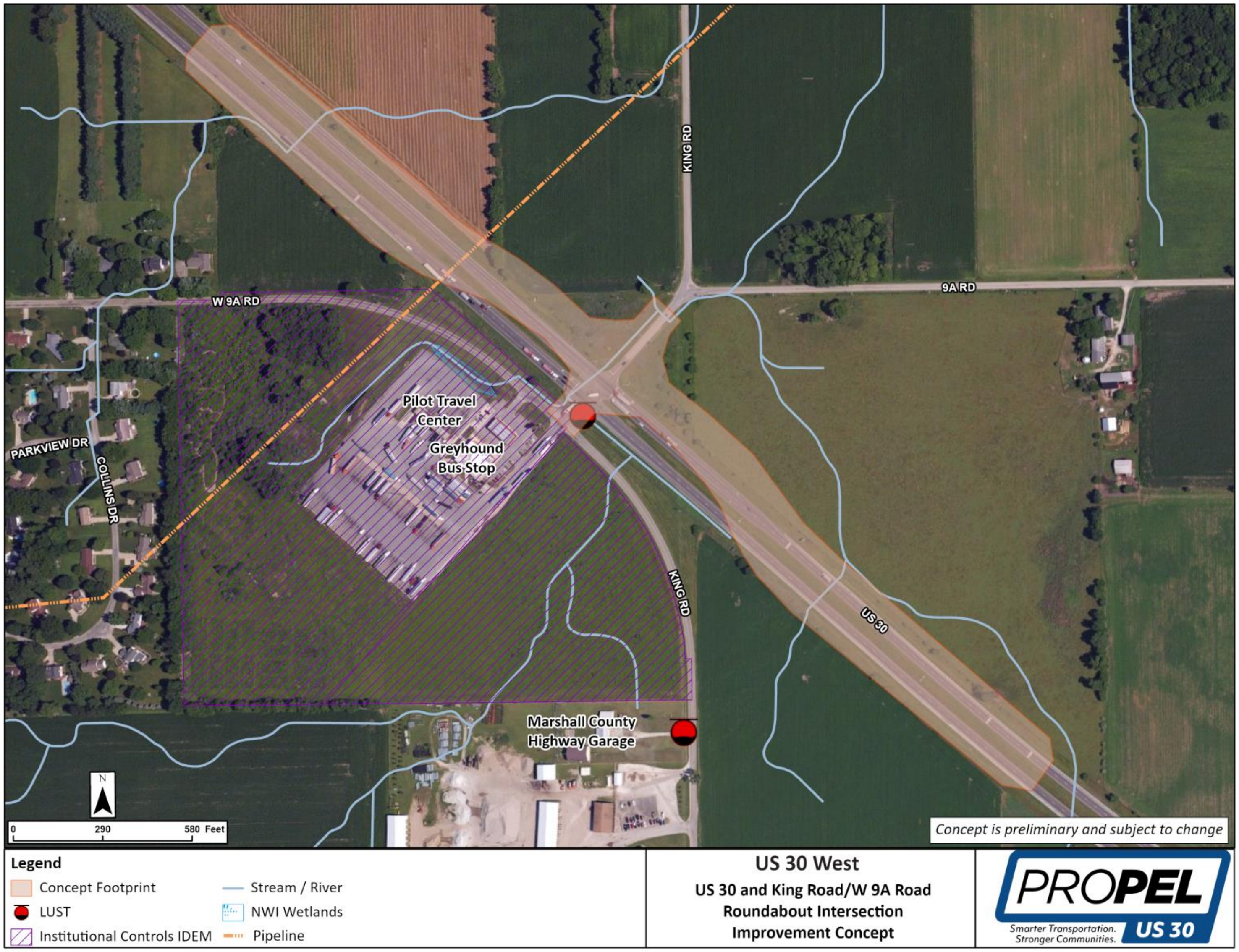


Figure 4-65: US 30 and King Road and 9A Road – Cross Road Overpass / Underpass Alternative – King Road Over US 30

Figure 4-66: US 30 and King Road and 9A Road – Boulevard Left Turn Intersection East-West Alternative

Figure 4-67: US 30 and King Road and 9A Road – Restricted Crossing U-Turn Intersection and Reduced Conflict Intersection Alternatives

Figure 4-68: US 30 and King Road and 9A Road – Roundabout Alternative



4.23. US 30 AND FIR ROAD IN MARSHALL COUNTY

4.23.1. OVERVIEW OF LOCATION

This intersection is expected to operate acceptably through the design year of this study. The crash frequency and crash cost indices indicate that there are no major safety concerns at the intersection. Alternatives were still considered at this intersection as a part of safety or operational improvements along this segment of US 30, to be further considered in level 3.

Public comments received to date about this intersection are summarized as follows.

- An overpass is needed at Fir Road.
- Right angle crashes and crossing fatalities have occurred here.
- Concerns regarding negative impacts to nearby agricultural businesses.

The US 30 and US 31 Marshall County Plan (2023) notes that an interchange is recommended at this intersection. The region is slated for low density residential, based on the Comprehensive Plan.

4.23.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the intersection of US 30 and Fir Road poses constraints. These constraints are summarized as follows:

- There is a farming operation located 0.11 miles north of the intersection.
- There are several streams located in the vicinity of the intersection.

4.23.3. SCREENING OF ALTERNATIVES

The decision tree indicates that both at-grade and grade-separated alternatives would be applicable, while an interchange would be unnecessary. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-23**.

The preliminary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Add or Lengthen Turn Lanes – The existing turn lanes do not provide sufficient deceleration length. The existing turn lanes should be extended. This alternative would maintain local access.
- Cross Road Overpass/Underpass – There are other locations within approximately 2 miles of the intersection with equal or better access, based on the functional classification of the route that local traffic would use to access the corridor. Therefore, grade separated alternatives should be considered, especially when applied alongside a limited access section, to be analyzed in level 3.

Primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.
- Median Safety Improvements – The existing median meets IDM requirements.
- Add/Extend Acceleration Lanes – Crash patterns do not indicate a concern with acceleration distances.

- Convert to Interchange – This is a location identified by the Marshall County Plan (2023) as a location for an interchange, however, due to the proximity of this intersection to the existing interchange of US 30 and SR 331, an interchange is not considered.
- Signalized Intersection Improvements – While this intersection is important for access to and from US 30, this intersection is currently unsignalized and a signal is not warranted in the design year.
- Unsignalized Intersection Improvements – While this intersection is important for access to and from US 30, there are no safety or operational concerns that indicate a need for intersection improvements.
    - If conditions change in the future and there are safety or operational concerns, solutions such as a reduced conflict intersection should be considered at this location as it is known to reduce severe crashes at intersections with similar physical characteristics. .

Complementary concepts to be considered as part of intersection alternatives include:

- Spot Roadway Lighting – Provide lighting for intersection alternatives.
- Warning Systems – Potential to raise awareness for approaching traffic.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.23.3.1. Add or Lengthen Turn Lanes Alternative

This alternative involves lengthening the existing eastbound and westbound left and right turn lanes. Lengthening the existing turn lanes would improve safety by providing sufficient deceleration lengths and increased storage space, reducing the likelihood of rear-end crashes. The proposed turn lanes would meet IDM standards. The improvement limits for this alternative can be seen in **Figure 4-70**.

This alternative would have minimal right-of-way impacts to all quadrants of the intersection due to grading. All property access would be maintained in this alternative. No potential relocations are anticipated. This alternative is a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.23.3.2. Cross Road Overpass / Underpass Alternative – Fir Road over US 30

This alternative would involve elevating Fir Road over US 30 by use of a bridge. This alternative would improve intersection safety by removing all movements from Fir Road to US 30 and vice versa. This overpass would also improve intersection operation by eliminating any delay. The improvement limits for this alternative can be seen in **Figure 4-71**.

This alternative would require substantial additional right-of-way to accommodate the grading associated with the elevating of Fir Road. This alternative would maintain all property access and no potential relocations are expected. This is a medium-cost option.

This alternative is mainly applicable to the improvement packages associated with a limited access section, to be analyzed in level 3. This grade-separated configuration was preliminarily selected as opposed to elevating US 30 over Fir Road due to the assumed impacts given the rural environment. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.23.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Add or Lengthen Turn Lanes.
- Cross Road Overpass/Underpass.
- Spot Roadway Lighting – May be incorporated into any alternative.
- Warning Systems – May be incorporated into any alternative.

Table 4-23: US 30 and Fir Road – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x Fir Road	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add or Lengthen Turn Lanes	Yes	No	Yes	Yes	N/A	Low	Low	N/A	Low	Low	N/A	Low	Yes	Lengthened EB and WB Left and Right Turn Lanes. Carried forward due to improved safety by reducing the likelihood of rear-end crashes.
Cross Road Overpass / Underpass	Yes	Yes	No	Yes	N/A	Low	Low	N/A	Medium	Low	N/A	Medium	Yes	Crossroad overpass grading impacts surrounding farmland, no residential properties. Carried forward due to the improved safety and low impacts to cultural and natural resources.
Complementary Concepts														
Spot Roadway Lighting	Yes	No	Yes	Yes	N/A	Low	Low	N/A	Low	Low	N/A	Low	Yes	Provide lighting for intersection alternatives
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	N/A	Low	Low	N/A	Low	Yes	Raises awareness of approaching traffic

Figure 4-69: US 30 and Fir Road – Add or Lengthen Turn Lanes Alternative

Figure 4-70: US 30 and Fir Road – Cross Road Overpass / Underpass Alternative – Fir Road Over US 30

4.24. US 30 AND SR 331 IN MARSHALL COUNTY

4.24.1. OVERVIEW OF LOCATION

This diamond interchange is expected to operate acceptably through the design year of this study for all ramp and mainline movements. The crash frequency and crash cost indices for all ramps and mainline indicate that there are no major safety concerns at the interchange. Improvements were still considered at this interchange as a part of safety or operational improvements along this segment of US 30, to be further considered in level 3.

This interchange is located just north of the Town of Bourbon.

The US 30 and US 31 Marshall County Plan (2023) does not recommend any changes to this interchange.

The Bourbon 2030 Comprehensive Plan noted a TIF District is located in the southeast quadrant of the interchange.

There have been no public comments to date regarding this intersection.

4.24.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the interchange of US 30 and SR 331 poses numerous constraints. These constraints are summarized as follows:

- There is an IHBBC Cemetery north of the interchange.
- There are Indiana Historic Sites and Structures Inventory (IHSSI) notable properties located south of the interchange.
- NWI Wetlands are north of the interchange.

4.24.3. SCREENING OF ALTERNATIVES

The decision tree at this location indicates that major changes to the existing interchange are unnecessary. This location is already an interchange and acceleration and deceleration lanes / distances exist which provide sufficient distances. As such, no interchange alternatives, beyond the No-Build alternative, were considered for evaluation as at-grade and new grade-separated alternatives would reduce operations and safety at this intersection. The evaluation is summarized in **Table 4-24**.

Only complementary concepts were considered. These alternatives can be summarized as follows:

- Add Capacity to Movements – Potential to improve mobility at the interchange.
- Ramp Terminal Intersection Improvements – Potential to improve traffic operations at the interchange.
- Warning Systems – Potential to raise awareness for approaching traffic.

It is assumed these complementary concepts could be applied within the existing right-of-way, thereby limiting impacts to right-of-way and natural and cultural resources.

4.24.4. INTERCHANGE ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following interchange alternatives will be advanced to the Level 3 screening:

- Ramp Terminal Intersection Improvements – May be applied to all alternatives.
- Warning Systems – May be applied to all alternatives.

Table 4-24: US 30 and SR 331 – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US30 x SR 331	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	Yes	Yes	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Complementary Concepts														
Add Capacity to Movements	No	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Medium	No	Additional capacity for this facility is not needed. This concept will not be advanced for further evaluation.
Ramp Terminal Intersection Improvements	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Would Improve interchange safety and operations by improving existing deficiencies at the ramp terminals.
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Raises awareness of approaching traffic to improve safety

4.25. US 31 AND 9A ROAD IN MARSHALL COUNTY

4.25.1. OVERVIEW OF LOCATION

This intersection is expected to operate acceptably through the design year of this study. The crash frequency and crash cost indices indicate that there are no major safety concerns at the intersection. Improvements were still considered at this intersection as a part of safety or operational improvements along this segment of US 31, to be further considered in level 3.

The US 30 and US 31 Marshall County Plan (2023) notes that a grade-separated solution is recommended at this intersection to maintain connectivity across US 31 for emergency services and school routes.

Public comments received specific to this location include:

- Concerns regarding access to cultural facilities in the area surrounding this intersection.

4.25.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the intersection of US 31 and West 9A Road poses numerous constraints that were considered in the development of alternatives. These constraints are summarized as follows:

- There are residential properties located in the northwest and northeast quadrants of the intersection.
- There is a religious center, Plymouth Baptist Church, located in the southwest quadrant of the intersection.
- There are 2 NWI wetlands located in the northwest quadrant of the intersection.
- Underserved populations are located near the intersection.
    - Family Income Below Poverty Level
    - Non-English Speaking Population

4.25.3. SCREENING OF ALTERNATIVES

The decision tree at this location indicates that at-grade alternatives would not be appropriate for this intersection, but grade-separated alternatives would be appropriate. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-25**.

The primary concepts identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Crossroad Overpass/Underpass – There are other locations within approximately 2 miles of the intersection that provide equal or better access, based on the functional classification of the route that local traffic would use to access the corridor. Therefore, a crossroad overpass or underpass should be considered, especially when applied alongside a limited access section, to be analyzed in level 3.

Primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.

- Add or Lengthen Turn Lanes – Existing turn lanes provide sufficient deceleration length.
- Convert to Interchange – Traffic volumes or other factors do not support an interchange.
- Unsignalized Intersection Improvements – While this intersection is important to access to and from US 31, there are no safety or operational concerns requiring improvements.
    - If conditions change in the future and there are safety or operational concerns, solutions such as a reduced conflict intersection should be considered as it is known to reduce severe crashes at intersections with similar physical characteristics.

Complementary concepts to be considered as part of intersection alternatives include:

- Warning Systems – Potential to raise awareness of approaching traffic.
- Bike/Pedestrian Facilities – Nearby residential neighborhoods indicate a potential desire for bike and pedestrian facilities. The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.25.3.1. Cross Road Overpass / Underpass Alternative – W 9A Road over US 31

This alternative would involve elevating W 9A Road over US 31 by use of a bridge. This alternative would also involve the lowering of US 31 to minimize impacts to nearby residential properties. This alternative would improve safety at the intersection by eliminating movements from W 9A Road to US 31 and vice versa. This alternative would also improve intersection operations by eliminating delay. The improvement limits for this alternative can be seen in **Figure 4-72**.

This alternative would require additional right-of-way in all quadrants of the intersection as well as one potential relocation in the northeast quadrant. This alternative would also have impacts to the surrounding wetlands and could adversely impact underserved populations. This is a medium-cost option.

This alternative is mainly applicable to the improvement packages associated with a limited access section, to be analyzed in Level 3. This grade-separated configuration was preliminarily selected as opposed to elevating US 31 over W 9A Road due to the assumed lowed impacts given the rural environment. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.25.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

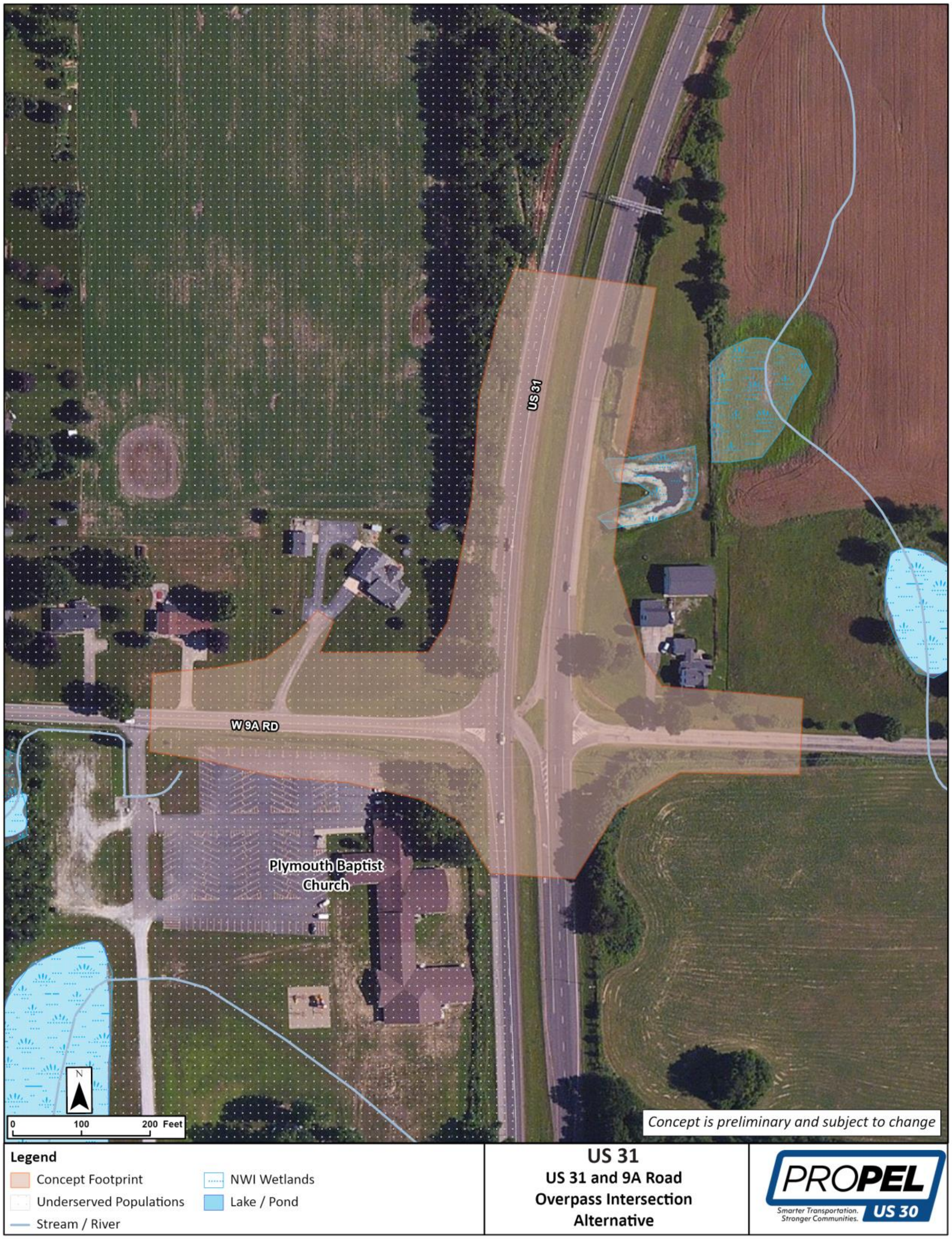
The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Cross Road Overpass/Underpass.
- Warning Systems – May be incorporated into any alternative.
- Bike/Pedestrian Facilities – May be incorporated into any alternative.

Table 4-25: US 31 and W 9A Road – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US31 x 9A Road	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	Yes	Yes	N/A	N/A	N/A	No	N/A	N/A	N/A	Yes		
Primary Concepts														
Cross Road Overpass / Underpass	Yes	Yes	No	Yes	N/A	Medium	Medium	Yes	Medium	Medium	N/A	Medium	Yes	Cross street overpass grading minimized by lowering the mainline profile to maintain driveway access along 9A Road. Carried forward due to the improved safety and intersection operations while not having any adverse impacts to underserved populations.
Complementary Concepts														
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Raises awareness of approaching traffic
Bike/Pedestrian Facilities	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Potential to improve safety and relieve congestion

Figure 4-71: US 31 and W 9A Road – Cross Road Overpass / Underpass Alternative – W 9A Road Over US 31



4.26. US 31 AND MICHIGAN ROAD NORTH JUNCTION IN MARSHALL COUNTY

4.26.1. OVERVIEW OF LOCATION

This north junction of US 31 and Michigan Road is expected to operate acceptably through the design year of this study. The crash frequency and crash cost indices indicate that there are no major safety concerns at the intersection. Improvements were still considered at this intersection as a part of safety or operational improvements along this segment of US 31, to be further considered in level 3.

There have been no specific public comments to date regarding concerns at this intersection.

The US 31 Corridor Existing Conditions Report (2017) noted the need for an overpass at Michigan Road and potentially leaking underground storage tanks at Michigan Road.

The US 30 and US 31 Marshall County Plan (2023) recommends an interchange at this location.

4.26.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The land surrounding the intersection of US 31 and Michigan Road poses numerous constraints that were considered in the development of alternatives. These constraints are summarized as follows:

- There is a IHSSI notable historic property in the northwest quadrant.
- Underserved populations are located near the intersection.
    - Non-English Speaking Population
    - Minority Populations
- There are residential properties located in the southwest quadrant.
- One business, Jennifer's Gifts, is in the southeast quadrant.
- Marshall County REMC is located 0.27 miles north of the intersection.
- Hazardous material concerns are near the intersection, including 2 LUST sites north of the intersection and an IDEM institutional control site.

4.26.3. SCREENING OF ALTERNATIVES

The decision tree at this location indicates that intersection improvements would not be appropriate. This location was determined to be a suitable location for an interchange for a limited access alternative. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-26**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Add or Lengthen Turn Lanes – The northbound left turn lane and southbound right turn lane do not include adequate deceleration length. Lengthen northbound left turn and southbound right turn lane. This alternative would maintain local access.
- Convert to Interchange – There are no factors that support an interchange at this location as a standalone alternative. However, given further bundled improvements anticipated to be analyzed in

Level 3, this location was identified as a potential interchange due to the relatively high traffic volumes and proximity to Plymouth.

Primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.
- Add/Extend Acceleration Lanes – Crash patterns do not indicate a concern with acceleration distances.
- Cross Road Overpass/Underpass – There are no locations within approximately two miles of the intersection that provide equal or better access based on the functional classification of the route that local traffic can use to access the corridor. This is also a 3-leg intersection, making an overpass unfeasible.
- Unsignalized Intersection Improvements – While this intersection is important for access to and from US 31, there are no safety or operational concerns to indicate a need for intersection improvements.
    - If conditions change in the future and there are safety or operational issues, solutions such as a reduced conflict intersection should be considered as a solution as it is known to reduce severe crashes at intersections with similar physical characteristics.

Complementary concepts to be considered as part of intersection alternatives include:

- Intersection Sight Distance Improvements – Potential to improve safety.
- Warning Systems – Potential to raise awareness for approaching traffic.
- Bike/Pedestrian Facilities – Nearby residential properties indicate a potential desire for bike and pedestrian facilities.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.26.3.1. Add or Lengthen Turn Lanes Alternative

In this alternative, the existing northbound left and southbound right turn lanes would be lengthened. Lengthening the existing turn lanes would improve safety by providing sufficient deceleration lengths and increasing storage space, thereby reducing the likelihood of rear-end crashes. The proposed turn lanes would meet IDM standards. The improvement limits for this alternative can be seen in **Figure 4-73**.

This is a low-cost alternative but lengthening the existing turn lanes would require additional right-of-way due to grading. All property access would be maintained. The IHSSI notable historic property located in the northwest quadrant of the intersection would be impacted by the grading associated with lengthened turn lanes. This is a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.26.3.2. Convert to Interchange Alternative

This alternative for the free-flow alternatives allows for US 31 traffic to move without interruption. US 31 would utilize one bridge over Michigan road in the southbound direction and on and off ramps to allow access to and from US 31. The improvement limits for this alternative can be seen in **Figure 4-74**.

This is a high-cost alternative due to the need for grade-separation, realignment, as well as right-of-way impacts and potential relocations. Extensive right-of-way is required for this alternative with the potential for relocations of one or more properties in the northwest quadrant including potential adverse impacts to underserved populations. This alternative would require substantial additional right-of-way. This alternative would also require medium impacts to natural resources and high impacts to cultural resources in the area. It is considered a high-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process for potential use with bundled improvements.

4.26.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Add or Lengthen Turn Lanes.
- Convert to Interchange.
- Intersection Sight Distance Improvements – May be incorporated into any alternative.
- Warning Systems – May be incorporated into any alternative.
- Bike/Pedestrian Facilities – May be incorporated into any alternative.

Table 4-26: US 31 and Michigan Road – Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US31 x Michigan Road	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	Yes	Yes	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add or Lengthen Turn Lanes	Yes	No	Yes	Yes	N/A	Low	Medium	No	Low	Low	N/A	Low	Yes	Lengthened NB Left Turn Lane and SB Right Turn Lane. Carried forward due to improved safety of the intersection by reducing the likelihood of rear-end crashes. The proposed turn lanes meet IDM requirements.
Convert to Interchange	Yes	Yes	No	Yes	N/A	Medium	High	Yes	High	Medium	N/A	High	Yes	Carried forward due to necessity for a limited access alternative. This alternative is not considered in other bundled improvements. Causes the relocation of a IHSSI notable property.
Complementary Concepts														
Intersection Sight Distance Improvements	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Intersection is on a skew. Improvements to sight distance would increase safety.
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Raises awareness of approaching traffic
Bike/Pedestrian Facilities	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Potential to improve safety and relieve congestion

Figure 4-72: US 31 and Michigan Road – Added Turn Lanes Intersection Improvement Alternative

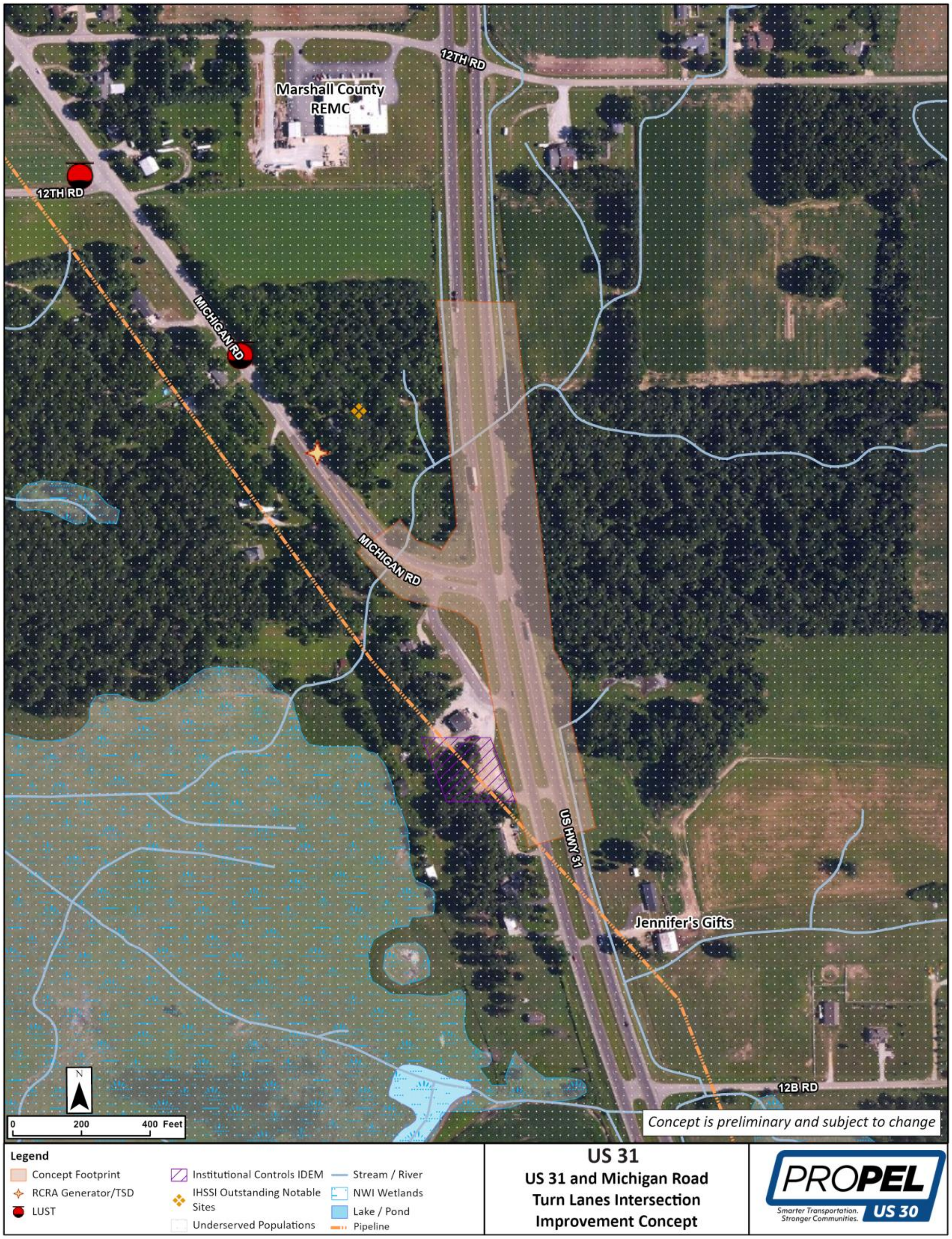


Figure 4-73: US 31 and Michigan Road – Interchange Alternative

4.27. US 31 AND 13TH ROAD IN MARSHALL COUNTY

4.27.1. OVERVIEW OF LOCATION

This intersection is expected to operate acceptably through the design year of this study. The crash frequency index is slightly elevated and the crash severity index is elevated, indicating there are safety concerns at the intersection. The predominant types of crashes are as follows:

- 29% were run-off-road crashes
- 16% were rear end crashes
- 16% were same direction side-swipe crashes
- 13% were right angle crashes

Public comments received specific to this location include:

- Concerns regarding property access around this intersection
- Comments regarding improving connectivity in the region and how it relates to projects at this intersection.

4.27.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

The intersection of US 31 and 13th Road poses numerous constraints that were considered in the development of intersection alternatives. These constraints are summarized as follows:

- There are several businesses located near the intersection, including Marshall County Humane Society.
- There are residential properties located in the southeast quadrant of the intersection.
- There is an at-grade rail crossing located 0.5 miles south of the intersection, crossing US 31. This crossing is currently under construction to become grade separated.
- There is 1 NWI wetland located near the intersection.
- Underserved populations are located near the intersection.
    - Non-English Speaking Population
    - Minority Populations

4.27.3. SCREENING OF ALTERNATIVES

The decision tree at this location indicates that both at-grade and grade-separated alternatives would be appropriate for this intersection. The alternatives from the decision tree were then evaluated qualitatively based on study needs, environmental impacts, and relative project cost, with the results of this screening provided in **Table 4-27**.

The primary concepts that were identified to be advanced to the conceptual footprint comparison from the decision tree are as follows:

- Add or Lengthen Turn Lanes – Northbound and southbound right and left turn lanes do not include the proper deceleration distance. Lengthen northbound and southbound right and left turn lanes. This alternative would maintain local access.

- Add/Extend Acceleration Lanes – Crash patterns potentially due to not having acceleration lanes. Acceleration lanes should be added for vehicles turning onto US 31. This alternative would maintain local access.
- Cross Road Overpass/Underpass – There are other locations within around 2 miles with equal or better access to US 31, based on the functional classification of the route that local traffic would use to access the corridor. Therefore, a crossroad overpass or underpass should be considered, especially when applied alongside a limited access section, to be analyzed in level 3.
- Convert to Interchange – There are no traffic volumes or other factors that support an interchange at this location as a standalone alternative. However, given further bundled improvements anticipated to be analyzed in Level 3, this location was identified as a potential interchange due to the relatively high traffic volumes and location between Plymouth and Argos. This alternative would maintain local access.
- Unsignalized Intersection Improvements – The intersection is important for access to and from US 31 due to high usage of this intersection. This intersection has higher than average crash frequency and crash severity indices, the following improvements were considered as a part of segment safety and operational improvements, to be further considered in level 3. This intersection is currently two-way stop controlled and forecasted traffic volumes do not warrant signalization. The CAP-X analysis at this intersection indicated that the following intersection types would produce acceptable operating conditions in the design year.
    - Reduced Conflict Intersection – This alternative would improve safety by rerouting minor road crossing and left turn right angle conflicts that often result in incapacitating and fatal crashes. A Reduced Conflict Intersection would meet access management guidelines as well as preserve free-flow operations on US 30 while maintaining local access.

Primary concepts eliminated from further consideration are as follows:

- Access Management – The intersection functional area is consistent with INDOT Access Management Guidelines.
- Unsignalized Intersection Improvements –The CAP-X results of the Reduced Conflict Intersection alternative showed relatively poor volume to capacity ratio compared the current two-way stop configuration.

Complementary concepts to be considered as part of intersection alternatives include:

- Intersection Sight Distance Improvements – Potential to improve safety and reduce the risk of right-angle and rear-end crashes.
- Warning Systems – Potential to raise awareness of approaching traffic.
- Bike/Pedestrian Facilities – Nearby residential properties indicate a potential desire for bike and pedestrian facilities.

The intersection alternatives advancing to the conceptual footprint comparison are described below. Complementary concepts have been incorporated into these intersection alternatives where applicable.

4.27.3.1. Add or Lengthen Turn Lanes Alternative

This alternative involves lengthening the existing northbound and southbound left and right turn lanes. Lengthening the existing turn lanes would improve safety by providing sufficient deceleration lengths and increasing storage space, reducing the likelihood of rear-end crashes. The proposed turn lanes will meet IDM standards. The improvement limits for this alternative can be seen in **Figure 4-**75.

This is a low-cost option. This alternative would require no potential relocations, while also limiting impacts to the surrounding natural resources. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.27.3.2. Add/Extend Acceleration Lanes Alternative

Adding acceleration lanes to US 31 would improve safety at the intersection by providing dedicated lanes for vehicles entering the mainline to achieve proper speed. This would reduce the risk of rear-end crashes at the intersection. This alternative would also improve intersection operations by reducing the differential speed between mainline traffic and traffic entering the mainline from the minor road. The improvement limits for this alternative can be seen in **Figure 4-75**.

This is a low-cost option. This alternative has the potential for adverse impacts to underserved populations. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.27.3.3. Cross Road Overpass / Underpass Alternative – 13th Road over US 31

This alternative would involve elevating 13th Road over US 31 by use of a bridge. This alternative would improve intersection safety by eliminating all movements from 13th road to US 31 and vice versa. This alternative would improve intersection operations by eliminating all delay on the side street. The improvement limits for this alternative can be seen in **Figure 4-76**.

This is a medium-cost option. This alternative would involve shifting the alignment of 13th Road north to avoid potential relocations around the intersection. Substantial additional right-of-way would be required for this alternative which could impact underserved populations, and all property access would be maintained, with new access provided where needed. This alternative would also introduce substantial impacts to the natural resources in the area.

This alternative is mainly applicable to the improvement packages associated with a limited access section, to be analyzed in level 3. This grade-separated configuration was preliminarily selected as opposed to elevating US 31 over 13th Road due to the assumed lower impacts given the rural environment. This alternative will be advanced for further evaluation in level 3.

4.27.3.4. Convert to Interchange Alternative

This alternative for the free-flow alternatives allows for US 31 traffic to move without interruption. US 31 would utilize two bridges over 13th road in the southbound direction and on and off ramps to allow access to and from US 31. The improvement limits for this alternative can be seen in **Figure 4-77**.

This is considered a high-cost option. Extensive right-of-way is required for this alternative with the potential relocation of one or more properties in the northeast, southwest, and southeast quadrants. This alternative would require substantial additional right-of-way. This alternative would also require medium impacts to natural resources and high impacts to cultural resources in the area and has the potential for adverse impacts to underserved populations. This alternative will be advanced for further evaluation in the Level 3 screening process for potential use with bundled improvements.

4.27.3.5. Reduced Conflict Intersection

The RCI alternative would allow the free-flow of through traffic along US 30 while rerouting left turns from 13th Road to US 31 and minor road through movements. This would improve safety by reducing the risk of right-angle crashes. The addition of truck loons was included in the conceptual design. The improvement limits for this alternative can be seen in **Figure 4-78**.

This alternative would require low amounts of additional right-of-way and would have low impacts to natural resources. It is considered a low-cost option. This alternative will be advanced for further evaluation in the Level 3 screening process.

4.27.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

The following intersection alternatives will be advanced to the Level 3 screening:

- No-Build Alternative will be carried forward to serve as a baseline for comparison to all build alternatives.
- Add or Lengthen Turn Lanes.
- Add or Extend Acceleration Lanes.
- Reduced Conflict Intersection.
- Crossroad Overpass/Underpass.
- Convert to Interchange.
- Reduced Conflict Intersection.
- Intersection Sight Distance Improvements – May be incorporated into all alternatives.
- Warning Systems – May be incorporated into all alternatives.
- Bike/Pedestrian Facilities – May be incorporated into all alternatives.

Table 4-27: US 31 and 13th Road - Qualitative Comparison of Alternatives

	Safety	Traffic	Access		Deficiencies	Environmental Impacts			ROW		Railroad	Cost	Advance	
US31 x 13th Road / Michigan Road	Applies Safety Counter-Measures	Reduces Delay or Improves Intersection Operations	Maintain or Improve Local Access	Meet Access Management Guidelines	Improves Substandard Elements	Potential for Adverse Impacts to Natural Resources?	Potential for Adverse Impacts to Cultural Resources?	Potential for Adverse Impacts to Underserved Populations?	Potential ROW Impacts	Potential Relocations	Impacts to Railroad	Relative Cost	Carry Forward?	Notes/ Comments
No build	N/A	N/A	Yes	Yes	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes	
Primary Concepts														
Add or Lengthen Turn Lanes	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Lengthen NB and SB Left and Right Turn Lanes. Right turn lanes fit within existing pavement. Left turn lanes encroach into median. Carried forward due to improved safety associated with reduced likelihood of rear-end crashes.
Add/Extend Acceleration/Deceleration Lanes	Yes	Yes	Yes	Yes	N/A	Low	Low	Yes	Medium	Low	N/A	Low	Yes	NB Acceleration Lane ends at US 31 12 B Road Intersection. Carried forward due to improved safety and intersection operations
Cross Road Overpass / Underpass	Yes	Yes	No	Yes	N/A	High	Low	Yes	High	Low	N/A	Medium	Yes	Shift overpass north and provide new access points to nearby businesses. Provides free flow conditions for both the mainline and crossroad.
Convert to Interchange	Yes	Yes	Yes	Yes	N/A	Low	Low	Yes	High	High	N/A	High	Yes	Carried forward due to necessity for a limited access alternative. This concept is not considered in other bundled improvements.
Unsignalized Intersection Improvements														
Reduced Conflict Intersection	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Increased intersection radii and truck loons to assist completion of U-Turns. Carried forward due to improves safety and intersection operations while maintaining free-flow along US 31
Complementary Concepts														
Intersection Sight Distance Improvements	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Intersection is on a skew. Improvements to sight distance would increase safety.
Warning Systems	Yes	No	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Raises awareness of approaching traffic
Bike/Pedestrian Facilities	Yes	Yes	Yes	Yes	N/A	Low	Low	No	Low	Low	N/A	Low	Yes	Potential to improve safety and relieve congestion

Figure 4-74: US 31 and 13th Road - Acceleration Lanes and Turn Lanes Intersection Improvement Alternatives

Figure 4-75: US 31 and 13th Road – Cross Road Overpass / Underpass Intersection Improvement Alternative

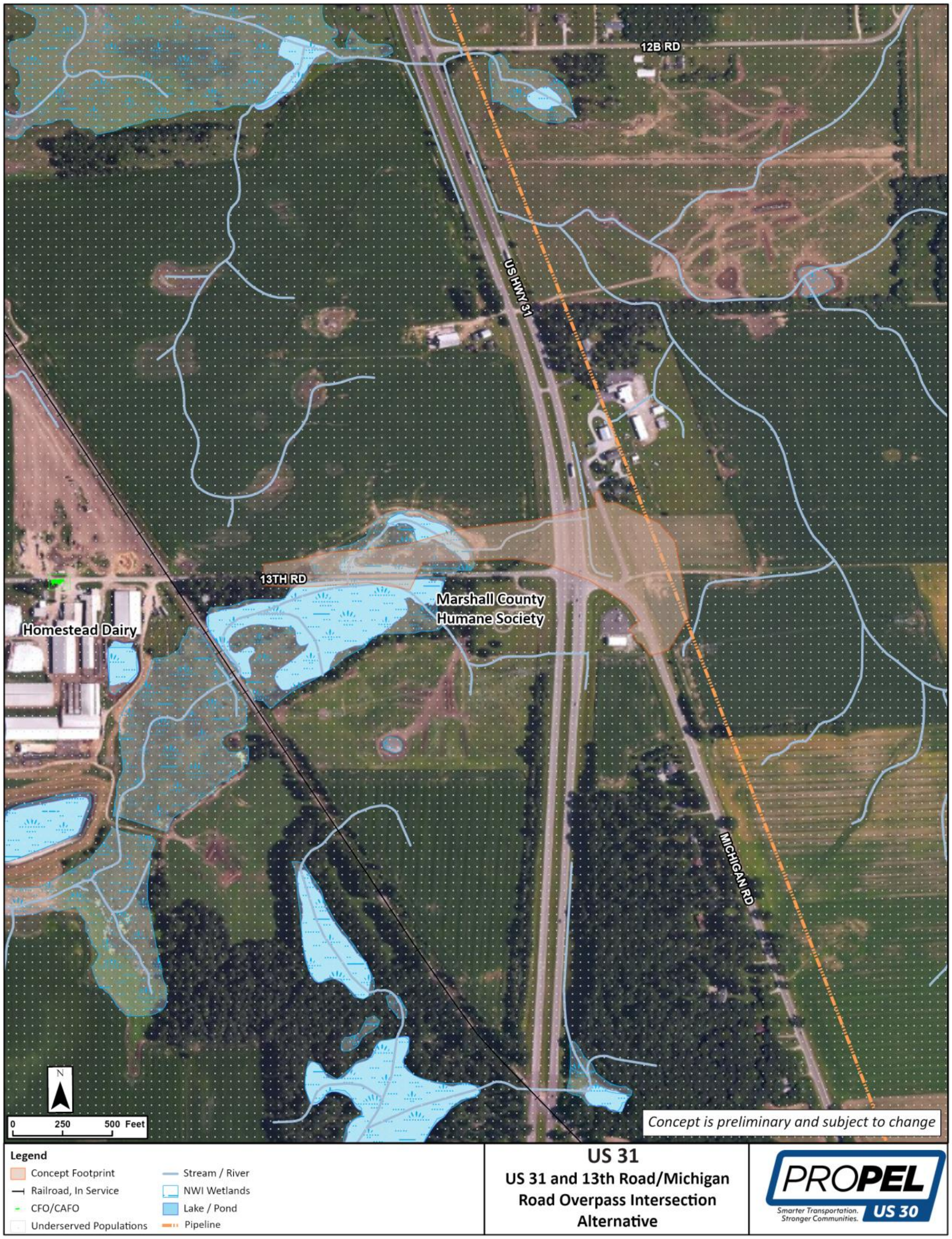


Figure 4-76: US 31 and 13th Road - Interchange Alternative

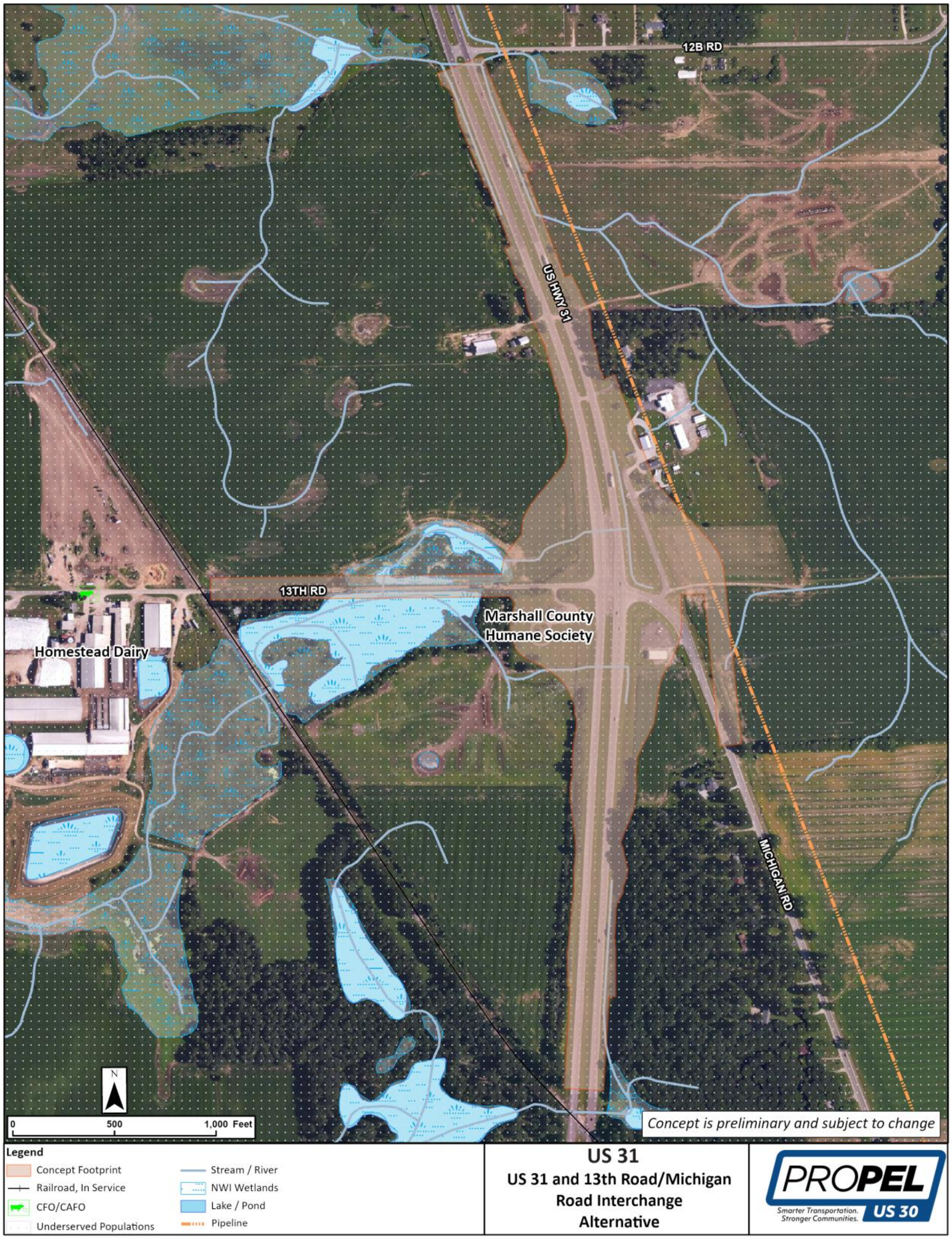


Figure 4-77: US 31 and 13th Road - Reduced Conflict Intersection

4.28. US 31 AND SR 10 IN MARSHALL COUNTY

4.28.1. OVERVIEW OF LOCATION

An interchange is planned for construction in 2027 at this intersection.

Public comments received for this location include the following:

- Comments requesting bike and pedestrian facilities be considered at this intersection.
- Concerns regarding improvements to safety at the intersection

4.28.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

Social, economic, and environmental constraints have not been identified for this intersection.

4.28.3. SCREENING OF ALTERNATIVES

The programmed interchange is expected to improve access, improve operations, and reduce crashes at this intersection. This study provides no further recommendations for this location.

4.28.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

No improvements were identified beyond that of the interchange that is currently programmed.

4.29. US 31 AND SR 110 IN MARSHALL COUNTY

4.29.1. OVERVIEW OF LOCATION

An interchange is planned for construction in 2027 at this intersection.

Public comments received for this location include the following:

- Comments requesting the addition of bike and pedestrian facilities at this intersection.
- Concerns regarding safety at this intersection.

4.29.2. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

Social, economic, and environmental constraints have not been identified for this intersection.

4.29.3. SCREENING OF ALTERNATIVES

The programmed interchange is expected to improve access, improve operations, and reduce crashes at this intersection. This study provides no further recommendations for this location.

4.29.4. INTERSECTION ALTERNATIVES ADVANCING TO LEVEL 3 SCREENING

No improvements were identified beyond that of the interchange that is currently programmed.

5. LEVEL 2 SCREENING SUMMARY

5.1. LEVEL 2 SCREENING SUMMARY

The Level 2 Screening has identified a wide range of intersection alternatives to improve operations and safety at the primary intersections. These intersection alternatives have been screened qualitatively and quantitatively based on their ability to meet study area needs, relative cost, and social, economic, and environmental impacts. Alternatives not able to meet study area needs and/or with substantial environmental impacts that could not be avoided or minimized were eliminated from further consideration.

The intersection alternatives advancing from this evaluation are depicted in **Table 5-1** and graphically in **Figure 5-1**, **Figure 5-2**, and **Figure 5-3**. The No-Build alternative is also advanced at every location but is not shown in **Table 5-1**, **Figure 5-1, Figure 5-2,** or **Figure 5-3**.

Table 5-1: Advanced to Level 3 Screening

Location	Advanced to Level 3 Screening
US 30 and SR 49	• Add/Extend Acceleration/Deceleration Lanes
US 30 and Industrial Drive	• Median Safety Improvements • Add or Lengthen Turn Lanes • Signalized Intersection Improvements • Unsignalized Intersection Improvements
US 30 and Porter CR 325 E	• Median Safety Improvements • Add or Lengthen Turn Lanes • Cross Road Overpass/Underpass • Signalized Intersection Improvements • Unsignalized Intersection Improvements
US 30 and Porter CR 400 E	• Median Safety Improvements • Add or Lengthen Turn Lanes • Cross Road Overpass/Underpass • Convert to Interchange • Unsignalized Intersection Improvements
US 30 and County Line Road	• Median Safety Improvements • Add or Lengthen Turn Lanes • Cross Road Overpass/Underpass • Unsignalized Intersection Improvements
US 30 and Main Street	• Access Management • Add or Lengthen Turn Lanes

Location	Advanced to Level 3 Screening
US 30 and US 421	• Access Management • Add or Lengthen Turn Lanes • Add/Extend Acceleration/Deceleration Lanes • Convert to Interchange • Signalized Intersection Improvements • Unsignalized Intersection Improvements
US 30 and LaPorte CR 600 W	• Add or Lengthen Turn Lanes • Cross Road Overpass/Underpass
US 30 and Thompson Street	• Add or Lengthen Turn Lanes • Unsignalized Intersection Improvements
US 30 and Old US 30 West	• Add or Lengthen Turn Lanes • Convert to Interchange • Limit Access
US 30 and Laporte CR 300 W	• Add or Lengthen Turn Lanes • Cross Road Overpass/Underpass
US 30 and SR 39	• Add or Lengthen Turn Lanes • Add/Extend Acceleration/Deceleration Lanes • Convert to Interchange • Signalized Intersection Improvements • Unsignalized Intersection Improvements
US 30 and US 35	• Add/Extend Acceleration/Deceleration Lanes
US 30 and Starke CR 750 E	• Add or Lengthen Turn Lanes • Cross Road Overpass/Underpass
US 30 and SR 23	• Add or Lengthen Turn Lanes • Add/Extend Acceleration/Deceleration Lanes • Convert to Interchange • Signalized Intersection Improvements • Unsignalized Intersection Improvements
US 30 and Queen Road	• Add or Lengthen Turn Lanes • Add/Extend Acceleration/Deceleration Lanes • Cross Road Overpass/Underpass • Convert to Interchange • Signalized Intersection Improvements • Unsignalized Intersection Improvements
US 30 and Pioneer Drive	• Add/Extend Acceleration/Deceleration Lanes • Cross Road Overpass/Underpass • Convert to Interchange • Signalized Intersection Improvements • Unsignalized Intersection Improvements
US 30 and Oak Drive	• Add or Lengthen Turn Lanes • Add/Extend Acceleration/Deceleration Lanes

Location	Advanced to Level 3 Screening
	• Cross Road Overpass/Underpass • Signalized Intersection Improvements
US 30 and Michigan Street	• Add/Extend Acceleration/Deceleration Lanes
US 30 and Plymouth Goshen Trail	• Add or Lengthen Turn Lanes • Add/Extend Acceleration/Deceleration Lanes • Cross Road Overpass/Underpass • Unsignalized Intersection Improvements
US 30 and US 31	• Add/Extend Acceleration/Deceleration Lanes
US 30 and King Road	• Add or Lengthen Turn Lanes • Add/Extend Acceleration/Deceleration Lanes • Cross road Overpass/Underpass • Signalized Intersection Improvements • Unsignalized Intersection Improvements
US 30 and Fir Road	• Add or Lengthen Turn Lanes • Cross Road Overpass/Underpass
US 30 and SR 331	• No Intersection Alternatives
US 31 and 9A Road	• Cross Road Overpass/Underpass
US 31 and Michigan Road	• Add or Lengthen Turn Lanes • Convert to Interchange
US 31 and 13th Road	• Add or Lengthen Turn Lanes • Add/Extend Acceleration/Deceleration Lanes • Cross Road Overpass/Underpass • Convert to Interchange • Unsignalized Intersection Improvements
US 31 and SR 10	• Interchange Project Already Planned
US 31 and SR 110	• Interchange Project Already Planned

Figure 5-1:US 30 Intersection Alternatives Map

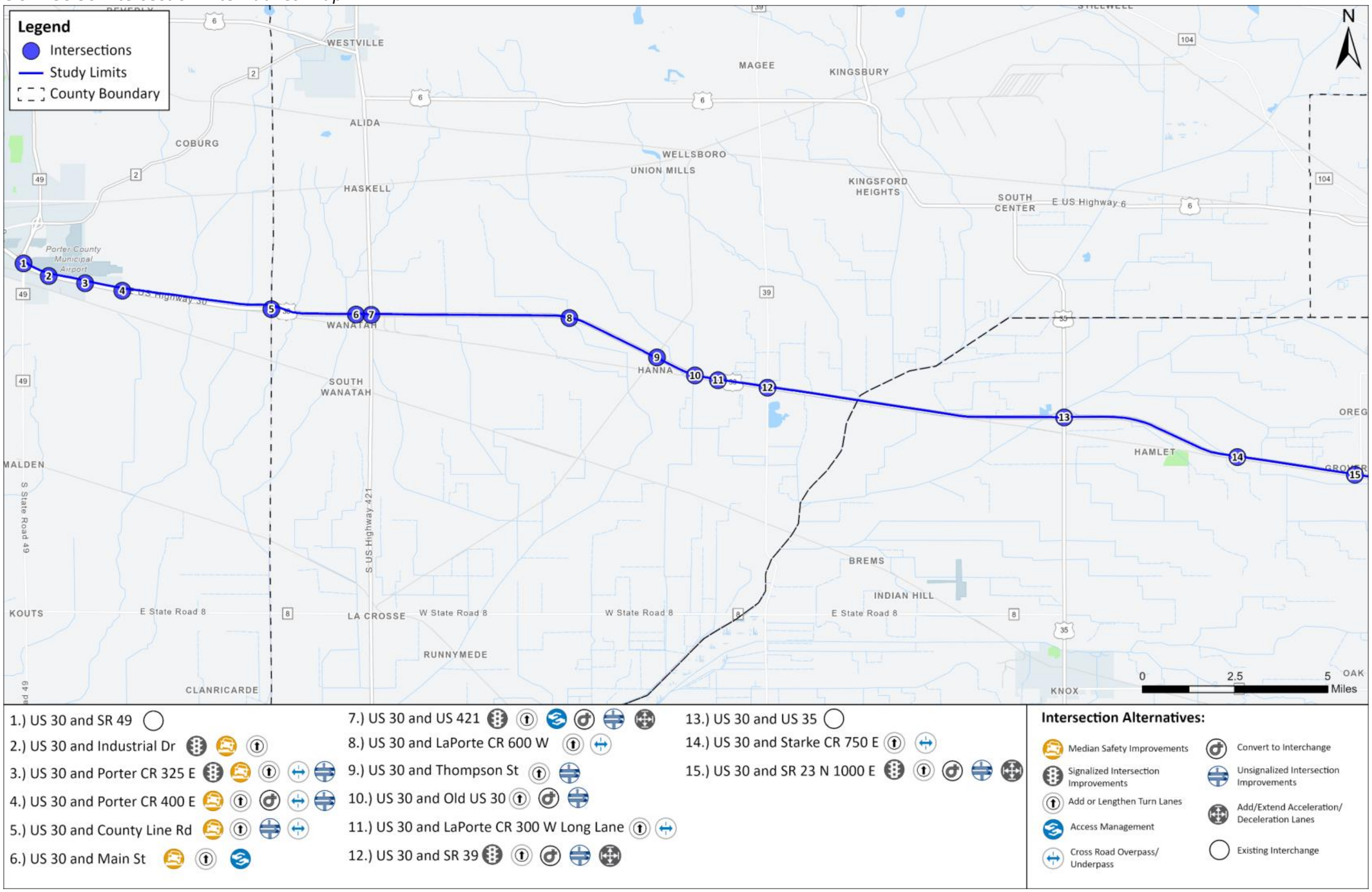


Figure 5-2:US 30 Intersection Alternatives Map

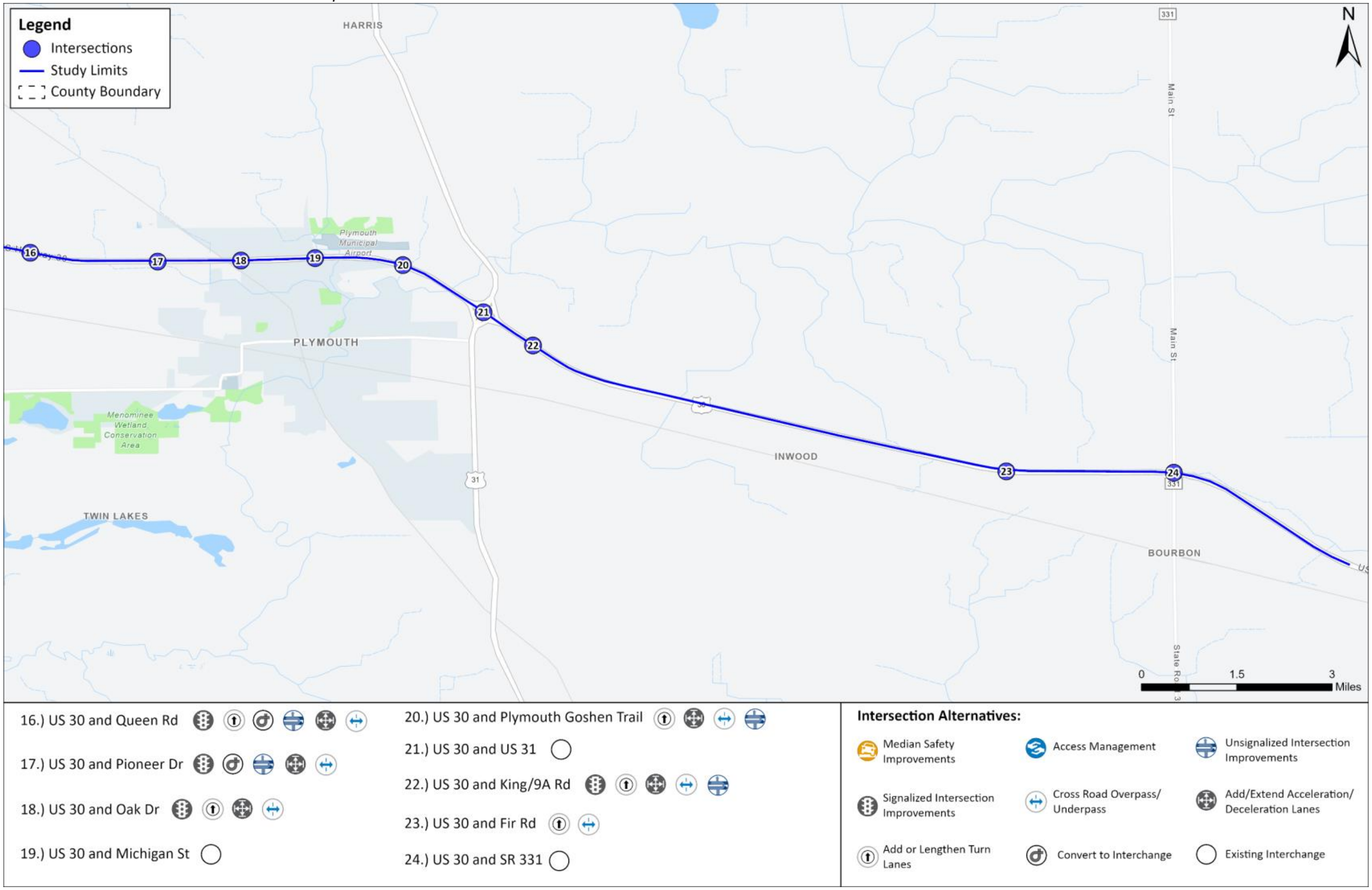
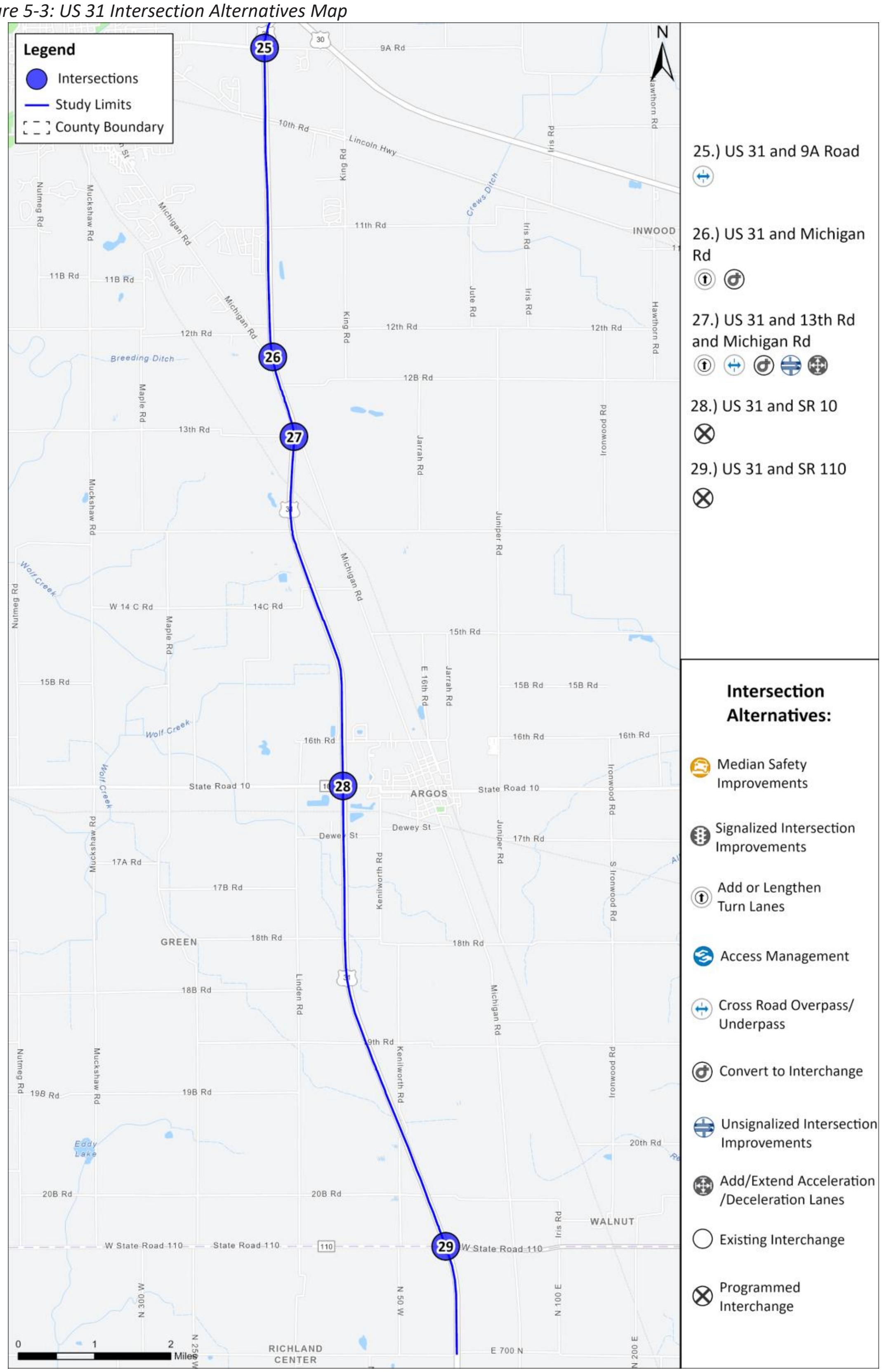


Figure 5-3: US 31 Intersection Alternatives Map



5.2. SHORT TERM IMPROVEMENTS

Rear-end crashes and right-angle crashes have been identified as being prevalent at several intersections in the study area. The frequency of these crash types may be reduced through implementation/upgrade of intersection warning systems at these intersections. Warning systems can be used at signalized intersections to warn motorists of a stop condition that lies ahead and can be activated only when the appropriate US 30 phase is active. Warning systems can also be used at unsignalized intersections to warn motorist on US 30 or US 31 of the presence of a vehicle on the side street and to warn motorist on the side street of traffic approaching on US 30 or US 31. These locations where the warning system concept is recommended for further study as a low-cost, short-term improvement are:

- US 30 and US 421 (LaPorte County), where there is a traffic signal at the entrance to Wanatah for westbound traffic where the land use changes from rural to urban and many of the crashes are rear-end collisions.US 30 and SR 39 (LaPorte county), where driver expectancy seems to be a concern as drivers were unable to brake in time to avoid rear-end collisions when other vehicles were stopped at the red light. Failure to yield to through traffic was also reported.
- US 30 and Truck Stop Driveway (approx. 1,070 feet east of SR 39 in LaPorte County) where rear-end crashes occurred at the red light and failure to yield to through traffic was also reported. This intersection is not a primary intersection included in Level 2 screening.
- US 30 and SR 23 (Starke County), where right-angle and turning crashes occurred at this unsignalized intersection.
- US 30 and Queen Road (Marshall County), where right-angle and rear-end crashes due to failing to yield were a common cause of crashes.
- US 30 and Pioneer Drive (Marshall County), where right-angle and rear-end crashes due to failing to yield or red-light running were a common cause of crashes.
- US 30 and Oak Road (Marshall County), where rear-end crashes due to failing to yield or red light running were a common cause of crashes.
- US 31 and 11th Road (Marshall County), where right-angle and left turn angle crashes were reported due to failing to yield. This intersection is not a primary intersection and is not in the Level 2 screening.
- US 31 and Michigan Road (Marshall County), where right-angle, left turn, and rear end crashes were reported due to failing to yield as a common cause.
- US 31 and SR 10 (Marshall County), where right-angle and left turn crashes were reported due to failing to yield. This intersection has an interchange currently programmed for construction in 2027.

The locations above have been identified as areas where low-cost, short-term safety improvement concepts (i.e., warning systems) could provide more immediate safety benefits, without complicating long term planning goals. The Level 3 screening will further identify and analyze which advancing concepts could be implemented in the near, intermediate, or long-term, in order to support both short-term and long-term planning goals.

6. NEXT STEPS

6.1. PUBLIC COMMENT PERIOD

Comments on the *ProPEL US 30 West Level 2 Screening Report* will be received for a period of 30 days following the publication of this document. The opportunity to comment will be provided via the project website (https://propelus30.com/us-30-west/) and through various community office hours outreach events held by the study team. Dates, times, and locations of community office hours will be announced on the website and through social media channels. Copies of the report will also be available for review throughout the public comment period at the locations listed below:

- Argos Public Library – Marshall County
- Knox Branch of the Starke County Library
- Hanna Public Library – LaPorte County
- Christopher Center Library – Valparaiso, Porter County
- Porter County Public Library - Valparaiso

6.2. LEVEL 3 SCREENING

After consideration of public comments, the Level 3 screening will begin. The goal of this screening process will be to identify a reasonable range of alternatives to advance from this PEL study.

Given the needs identified within the study area, a reasonable alternative could consist of improvements at a single intersection; it could also consist of improvements at multiple intersections and/or the roadway sections in between them. Depending on multiple factors, including statewide priorities and funding availability, improvements considered as part of this PEL study could be combined in different ways to address the identified transportation needs and goals of the study area.

While the Level 2 screening focused on alternatives at the Primary Intersections, the Level 3 screening will develop and analyze improvement packages for smaller pieces of the study area. These smaller pieces, which will be called planning segments, will include improvements at the primary intersections, the secondary intersections, as well as the roadway sections between them.

Each of the primary intersection improvement alternatives advancing from the Level 2 screening will be included in at least one of the improvement packages considered in the Level 3 screening.

Improvements to the roadway sections will focus on access management strategies. Decisions regarding access management will be made during project development and will be analyzed and documented as part of the NEPA environmental review process. For the purposes of this PEL study, INDOT will develop and evaluate basic access management criteria for roadway sections in the study area to better understand costs, benefits, and impacts of different access management strategies. The criteria for the Level 3 screening will be based on the INDOT access management guidelines, and will consider differing levels of access control ranging from existing conditions (i.e., the No-Build) to full control of access. The access management criteria considered in the Level 3 analysis will support a range of facility types that address safety, mobility, and access needs within the study area.

Due to the high number of combinations possible (i.e., several thousand improvement packages), it is not feasible to evaluate every single permutation. Professional judgement will be used to create representative improvement packages for each planning segment that will constitute a reasonable range of alternatives.

In forming the improvement packages for each planning segment, the following will be considered:

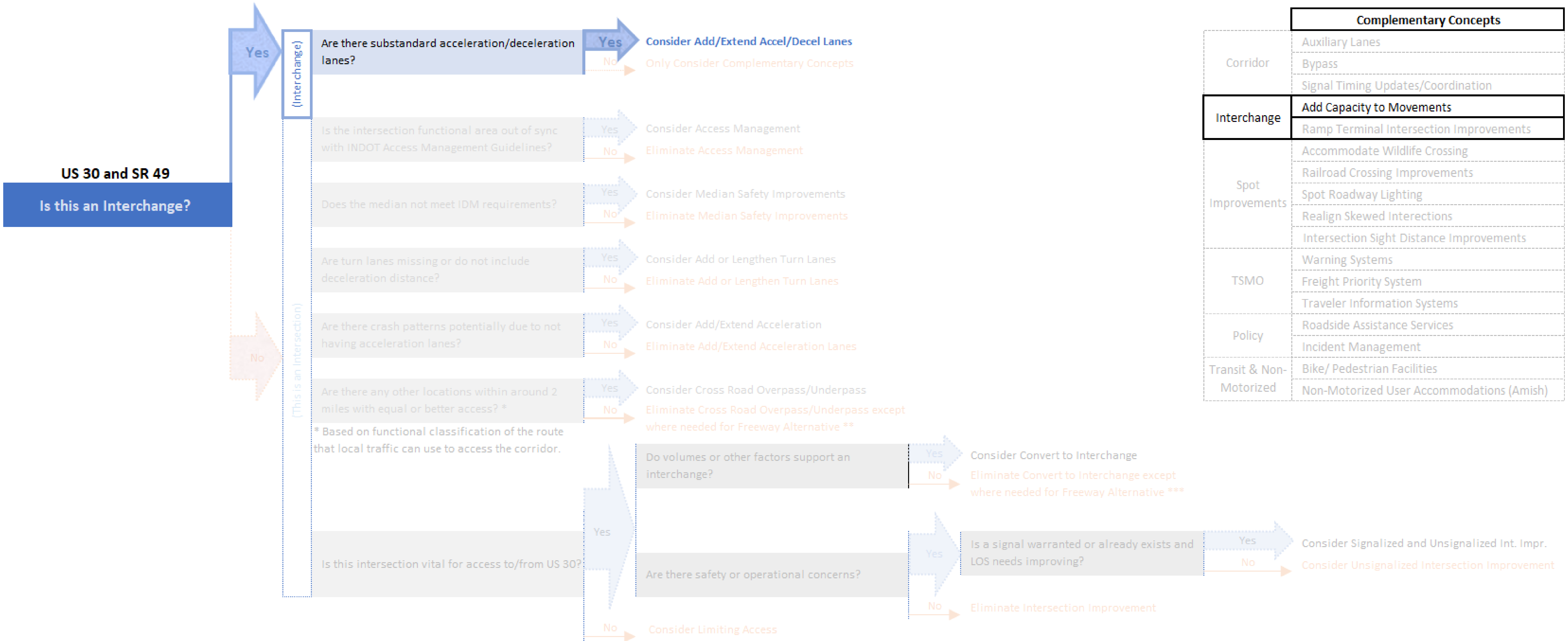
- **Influence of adjacent intersections:** The influence of recommended improvements at a specific location on the adjacent intersections will be considered. For example, if an interchange alternative is considered at a primary intersection, consolidation of access to/from US 30 through closure of adjacent secondary intersections will likely be recommended along with it.
- **Interchange spacing guidelines:** INDOT prefers to have a minimum of 3 miles between adjacent interchanges in rural areas; however, this will be examined for the context of each section and location.
- **Access management principles:** Driveway treatments and recommendations on the spacing of median openings will be considered when developing the improvement packages for each planning segment.
- **Improvements at secondary intersections:** There are 56 secondary intersections within the study limits where no detailed evaluation was performed in the Level 2 screening due to the low volumes carried by the intersecting roadways. Access management principles will be evaluated in the Level 3 screening to align the treatments at intersections within the study area with the appropriate access management strategies. The improvements to Secondary Intersections will typically consist of restricting turning movements or closure of the intersection. At locations where an intersection may be considered for closure, a review of mitigation measures to retain access, such as local access roads, may be considered when certain conditions are met. These conditions would be identified as part of the Level 3 screening process, as needed.

The Level 3 screening process will include further analysis and more detail than Level 2. The alternatives that advance from the Level 2 analysis will be further refined based on public comments and to further avoid or minimize impacts, where possible.

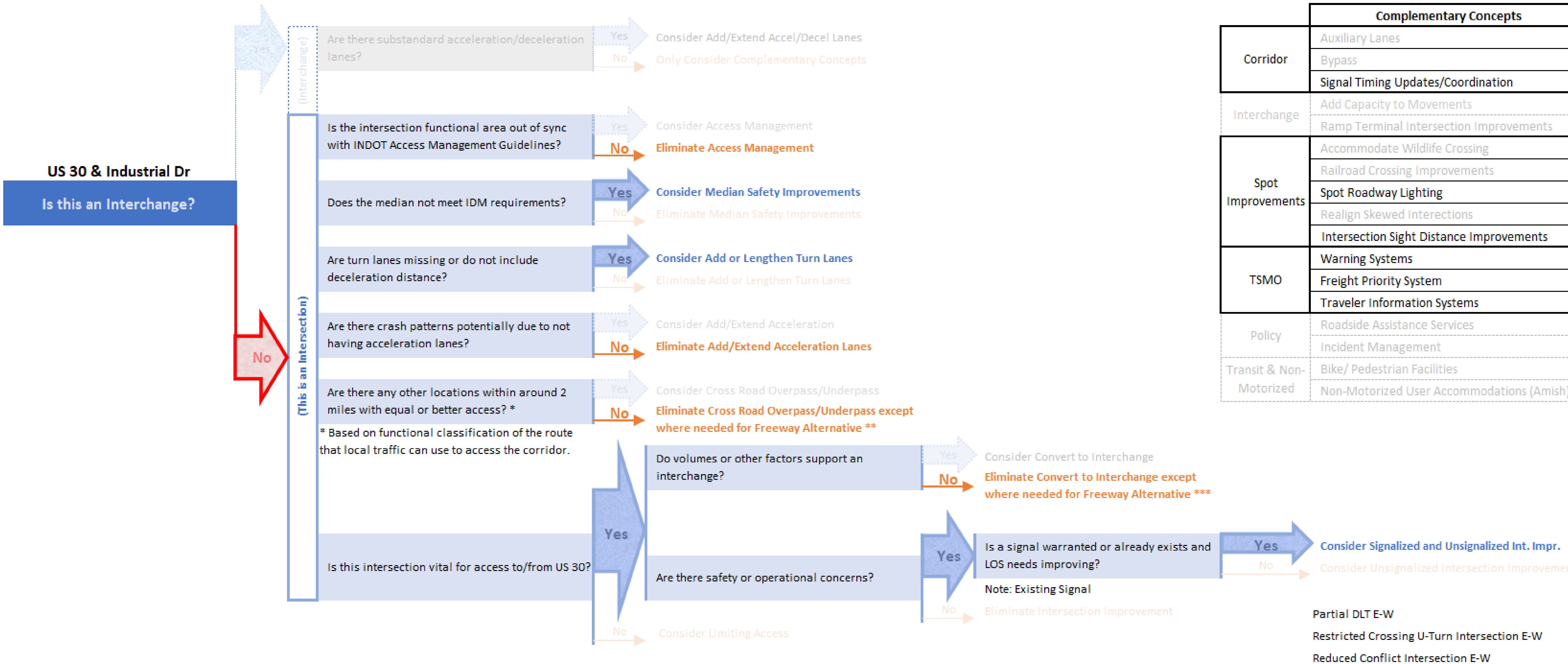
Finally, the improvement packages for each planning segment will be compared against the performance measures identified in the *US 30 West Purpose and Need Report* to assess an improvement package's ability to both meet study needs and accomplish study goals. Alternatives will also be compared based on relative cost, safety, and operational benefits, as well as social, economic, environmental impacts. The results of this comparison will be used to develop recommendations on reasonable alternatives for further study, which will ultimately be released for public comment.

APPENDIX A: DECISION TREES

APPENDIX A - DECISION TREES
US 30 & SR 49

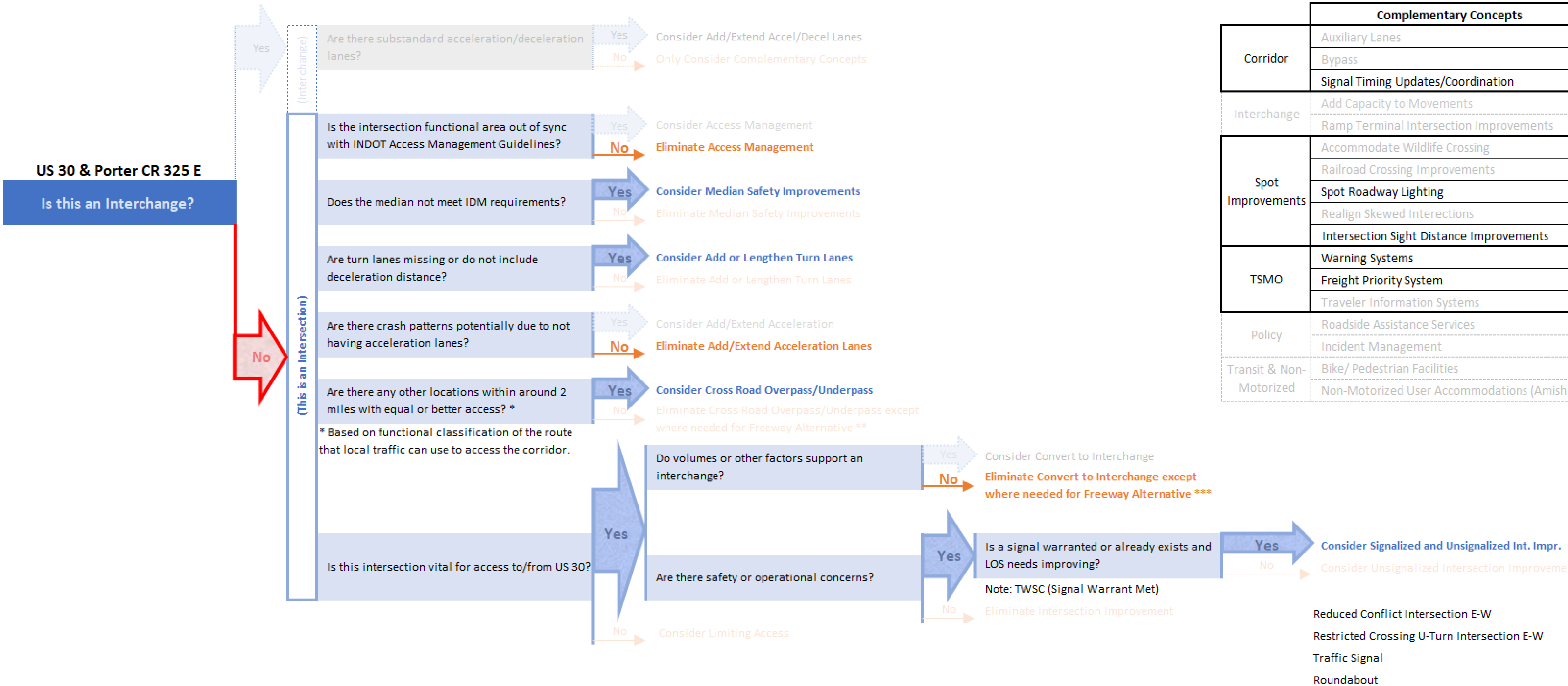


APPENDIX A - DECISION TREES
US 30 & INDUSTRIAL DR



	Complementary Concepts
Corridor	Auxiliary Lanes
	Bypass
	Signal Timing Updates/Coordination
Interchange	Add Capacity to Movements
	Ramp Terminal Intersection Improvements
Spot Improvements	Accommodate Wildlife Crossing
	Railroad Crossing Improvements
	Spot Roadway Lighting
	Realign Skewed Interections
	Intersection Sight Distance Improvements
TSMO	Warning Systems
	Freight Priority System
	Traveler Information Systems
Policy	Roadside Assistance Services
	Incident Management
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)

APPENDIX A - DECISION TREES
US 30 & PORTER CR 325 E



	Complementary Concepts
Corridor	Auxiliary Lanes
	Bypass
	Signal Timing Updates/Coordination
Interchange	Add Capacity to Movements
	Ramp Terminal Intersection Improvements
Spot Improvements	Accommodate Wildlife Crossing
	Railroad Crossing Improvements
	Spot Roadway Lighting
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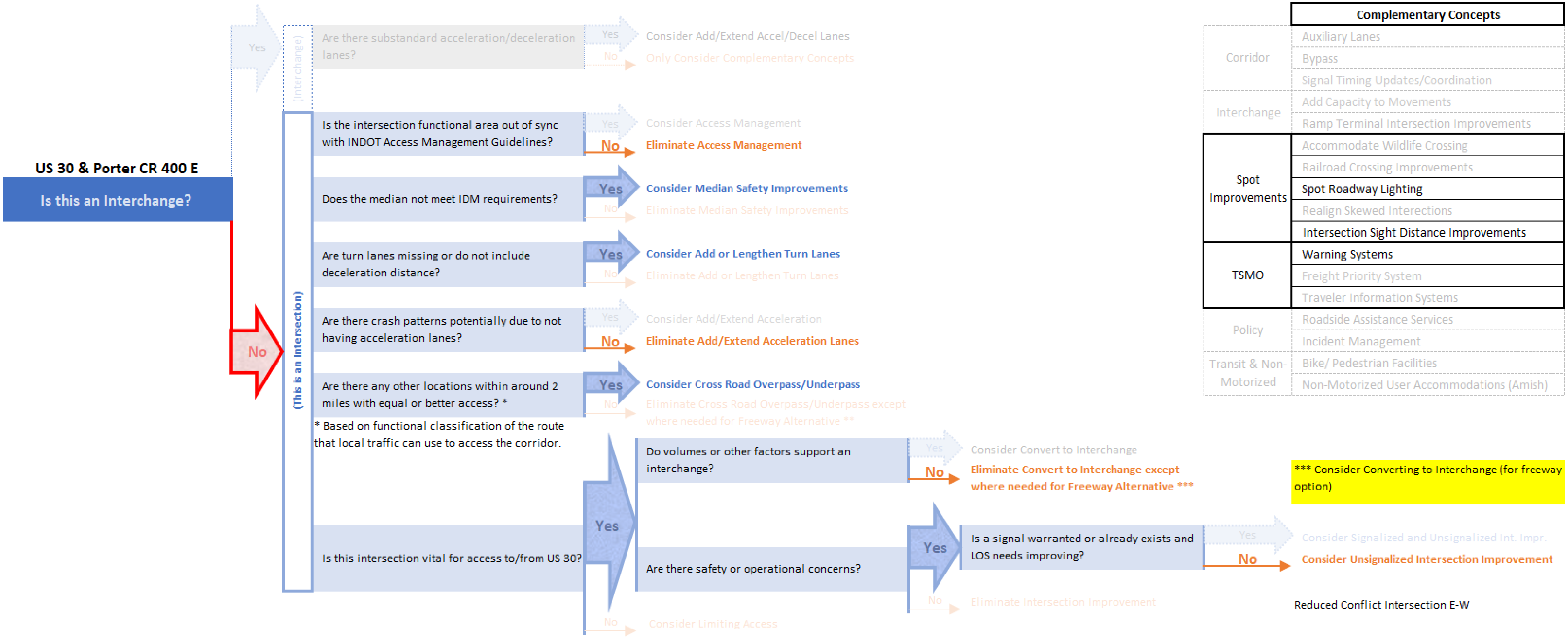
	Intersection Sight Distance Improvements
TSMO	Warning Systems
	Freight Priority System
	Traveler Information Systems
Policy	Roadside Assistance Services
	Incident Management
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)

PROPEL US 30 Smarter Transportation. Stronger Communities.



	Complementary Concepts
Corridor	Auxiliary Lanes
	Bypass
	Signal Timing Updates/Coordination
Interchange	Add Capacity to Movements
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Spot Improvements	Accommodate Wildlife Crossing
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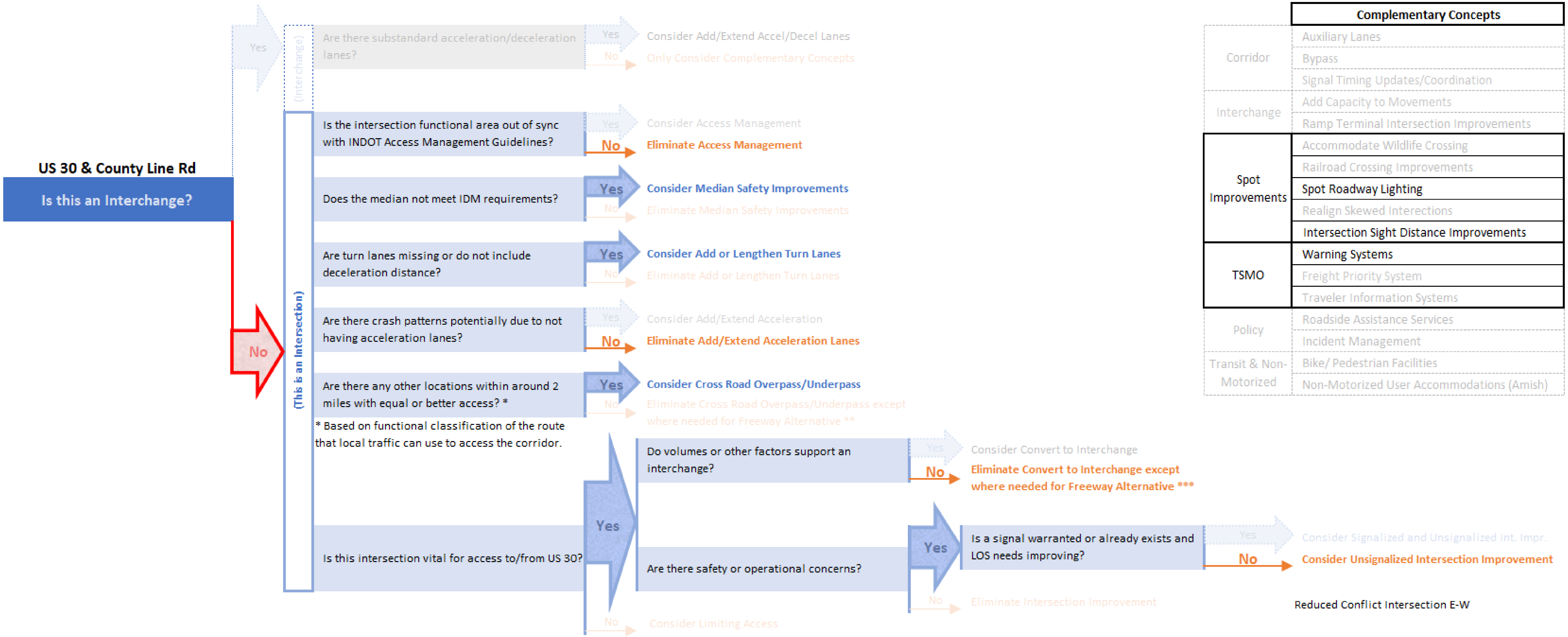
	Incident Management
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)

APPENDIX A - DECISION TREES
US 30 & COUNTY LINE RD



	Complementary Concepts
Corridor	Auxiliary Lanes
	Bypass
	Signal Timing Updates/Coordination
Interchange	Add Capacity to Movements
	Ramp Terminal Intersection Improvements
Spot Improvements	Accommodate Wildlife Crossing
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	Traveler Information Systems
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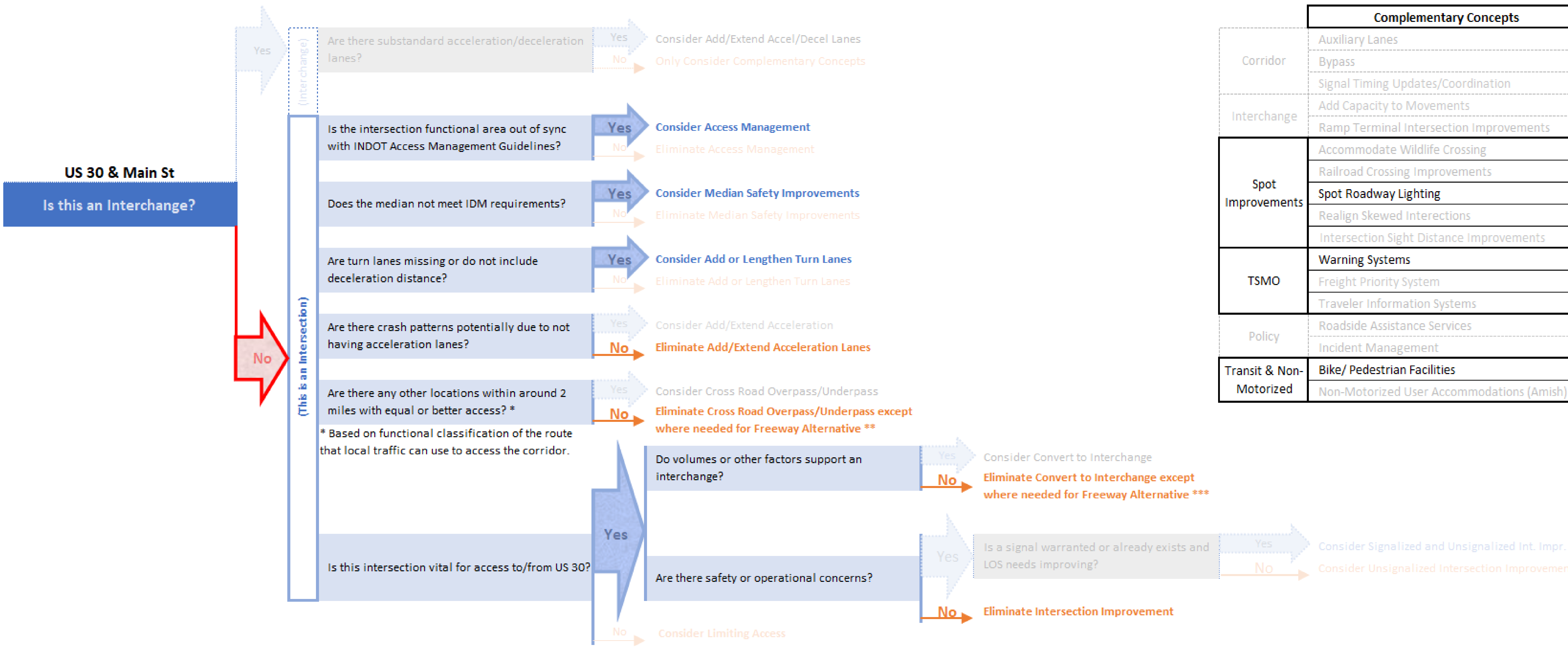
	Incident Management
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)

APPENDIX A - DECISION TREES
US 30 & MAIN ST



	Complementary Concepts
Corridor	Auxiliary Lanes
	Bypass
	Signal Timing Updates/Coordination
Interchange	Add Capacity to Movements
	Ramp Terminal Intersection Improvements
Spot Improvements	Accommodate Wildlife Crossing
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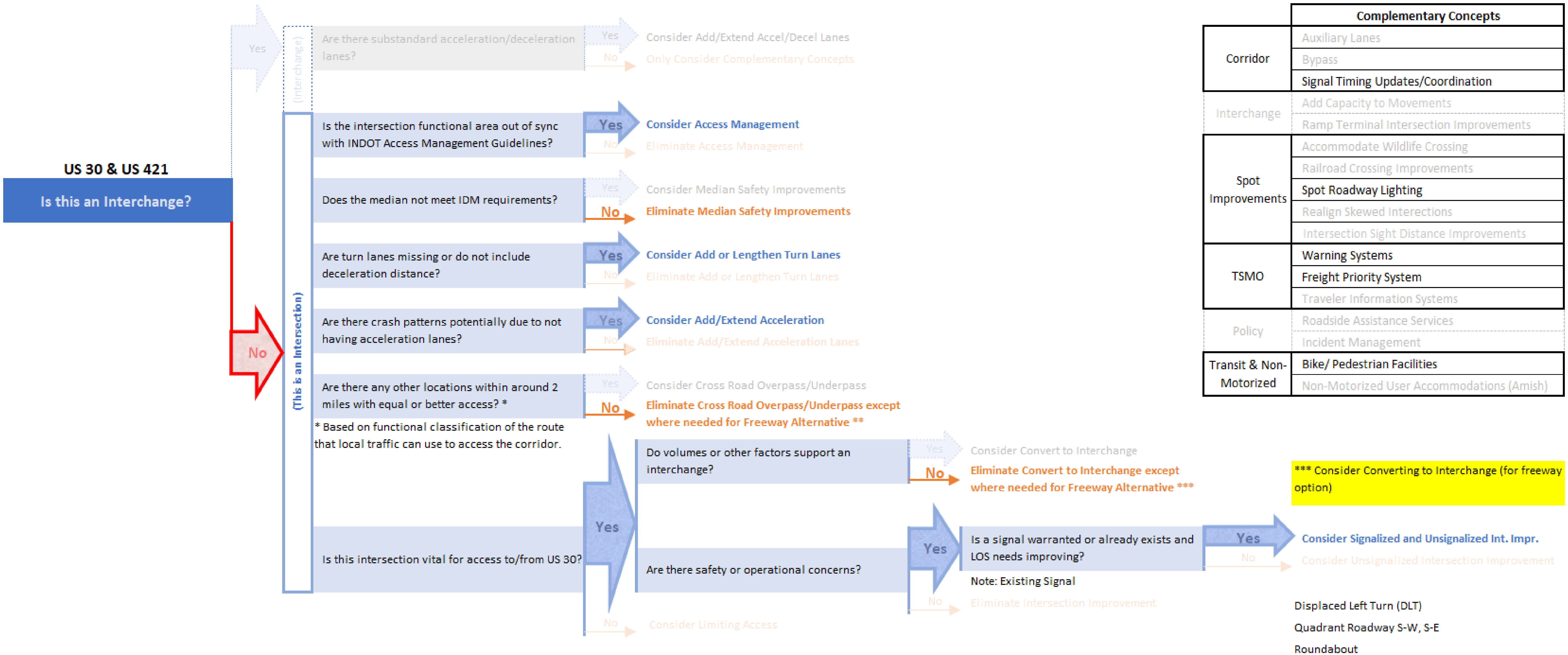
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)

APPENDIX A - DECISION TREES
US 30 & US 421



	Complementary Concepts
Corridor	Auxiliary Lanes
	Bypass
	Signal Timing Updates/Coordination
Interchange	Add Capacity to Movements
	Ramp Terminal Intersection Improvements
Spot Improvements	Accommodate Wildlife Crossing
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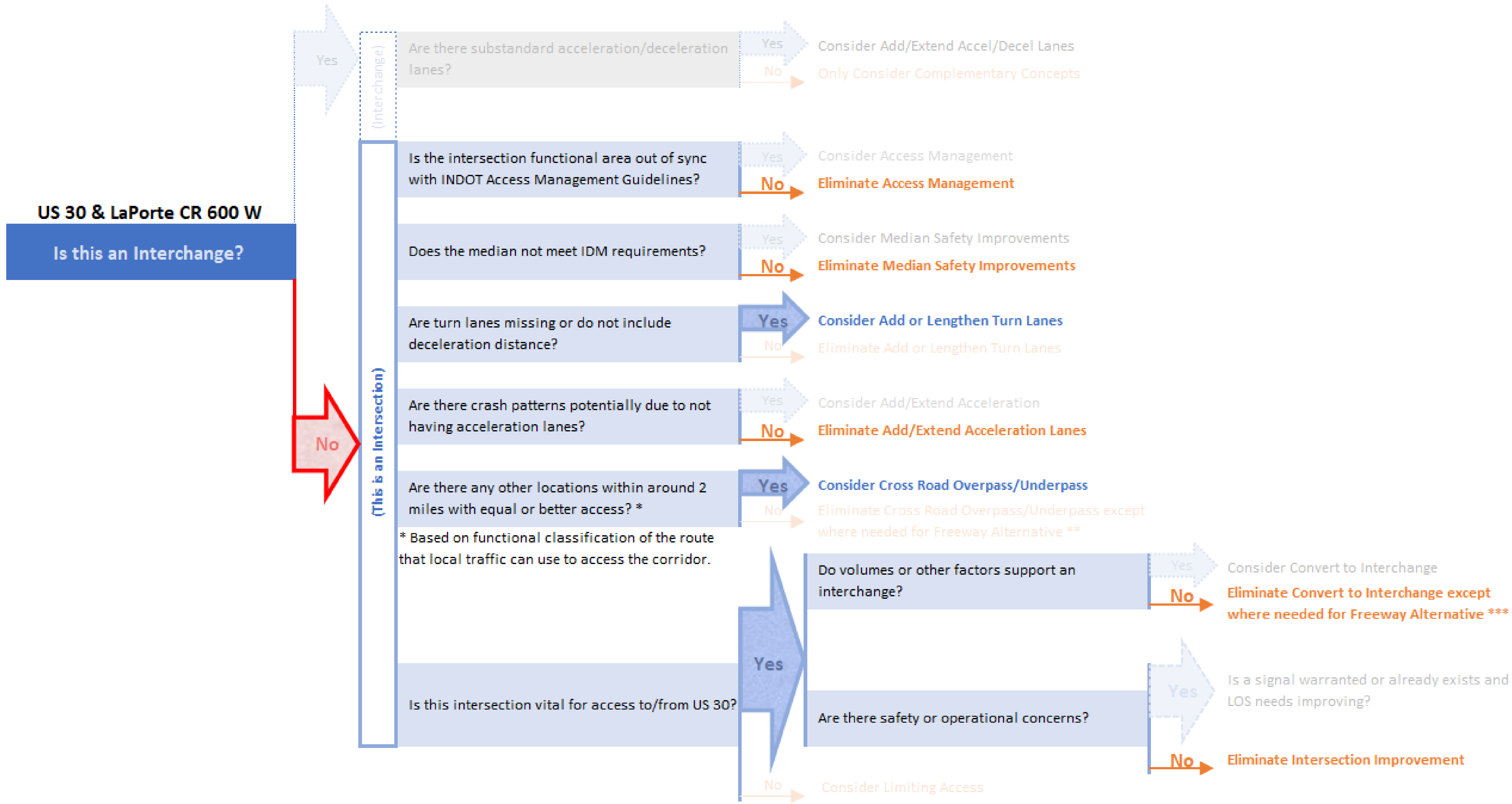
	Incident Management
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)

APPENDIX A - DECISION TREES
US 30 & LAPORTE CR 600 W



	Complementary Concepts
Corridor	Auxiliary Lanes
	Bypass
	Signal Timing Updates/Coordination
Interchange	Add Capacity to Movements
	Ramp Terminal Intersection Improvements
Spot Improvements	Accommodate Wildlife Crossing
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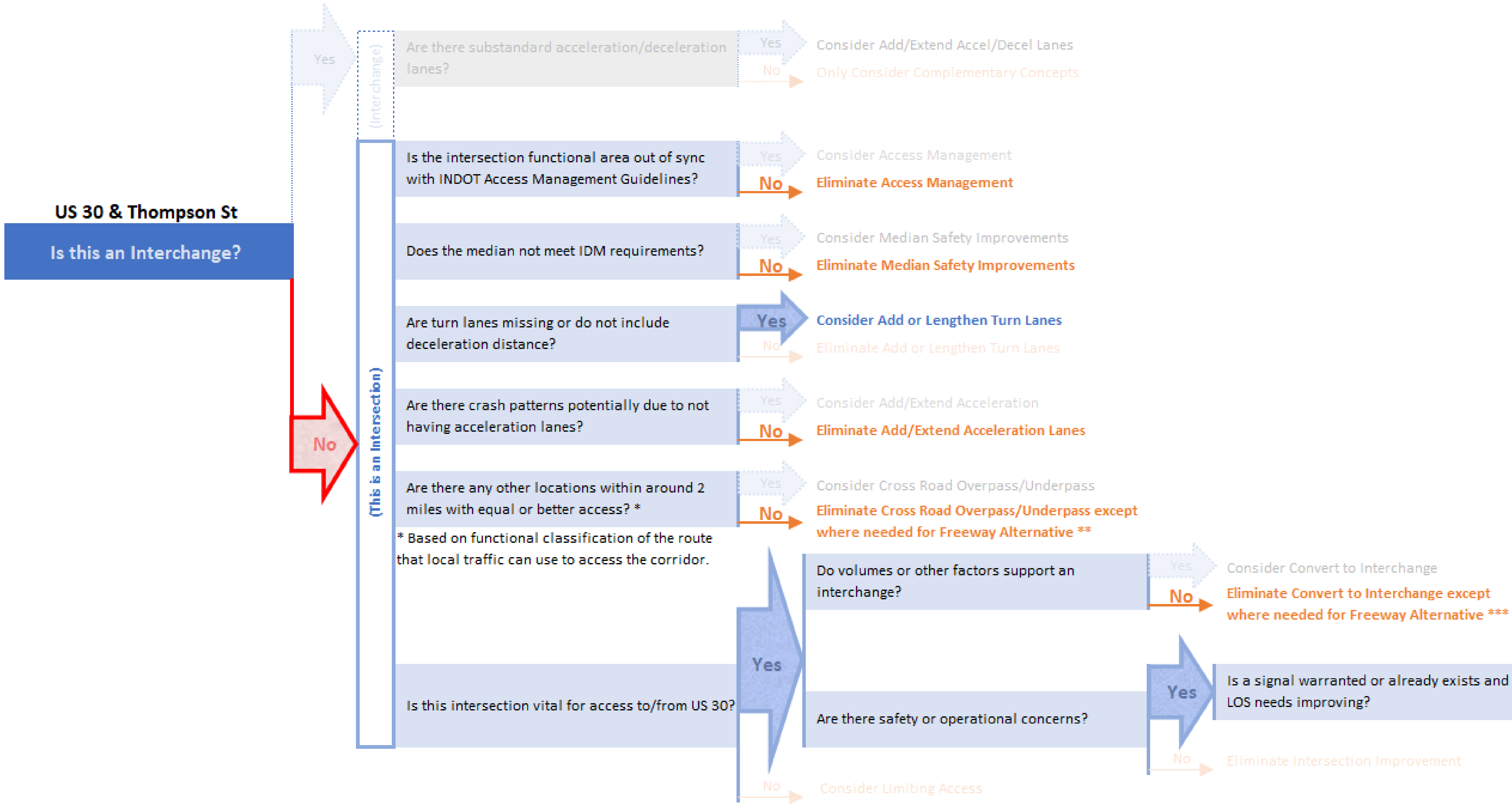
	Traveler Information Systems
Policy	Roadside Assistance Services
	Incident Management
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)



	Complementary Concepts
Corridor	Auxiliary Lanes
	Bypass
	Signal Timing Updates/Coordination
Interchange	Add Capacity to Movements
	Ramp Terminal Intersection Improvements
Spot Improvements	Accommodate Wildlife Crossing
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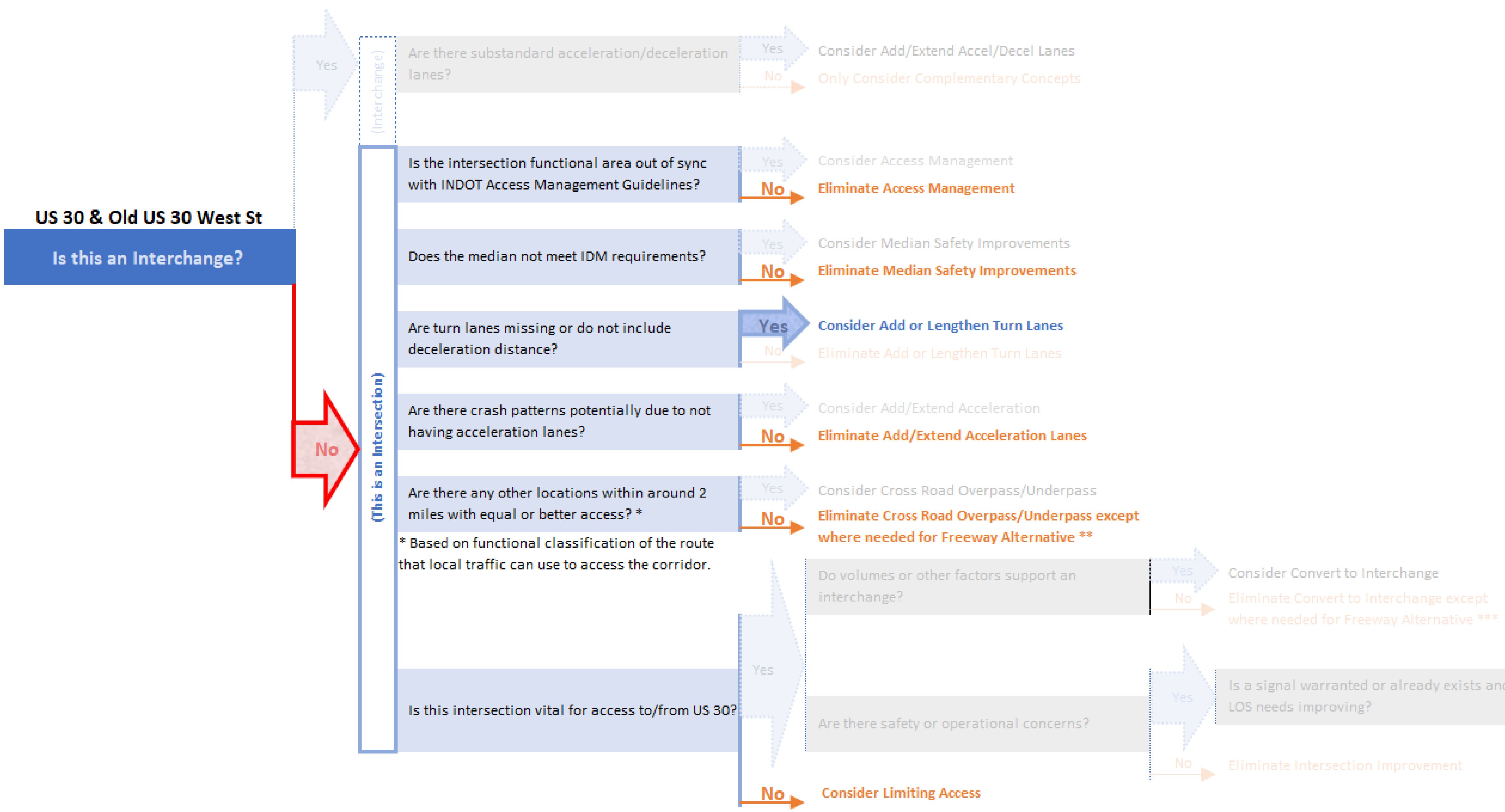
Policy	Roadside Assistance Services
	Incident Management
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)

US 30 & OLD US 30 WEST ST



	Complementary Concepts
Corridor	Auxiliary Lanes
	Bypass
	Signal Timing Updates/Coordination
Interchange	Add Capacity to Movements
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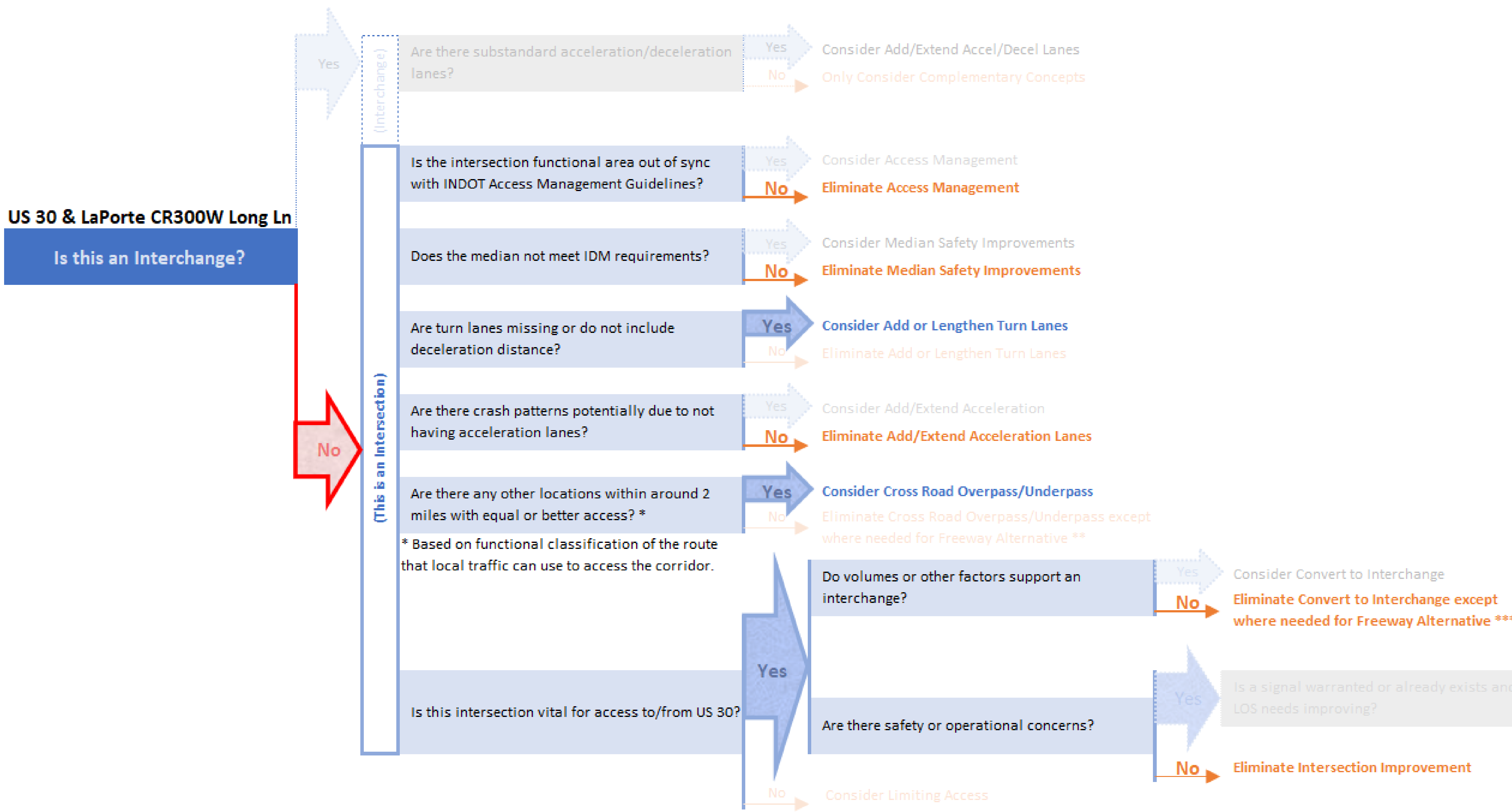
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)

*** Consider Converting to Interchange (for freeway option)

APPENDIX A - DECISION TREES
US 30 & LAPORTE CR 300 W LONG LN



	Complementary Concepts
Corridor	Auxiliary Lanes
	Bypass
	Signal Timing Updates/Coordination
Interchange	Add Capacity to Movements
	Ramp Terminal Intersection Improvements
Spot Improvements	Accommodate Wildlife Crossing
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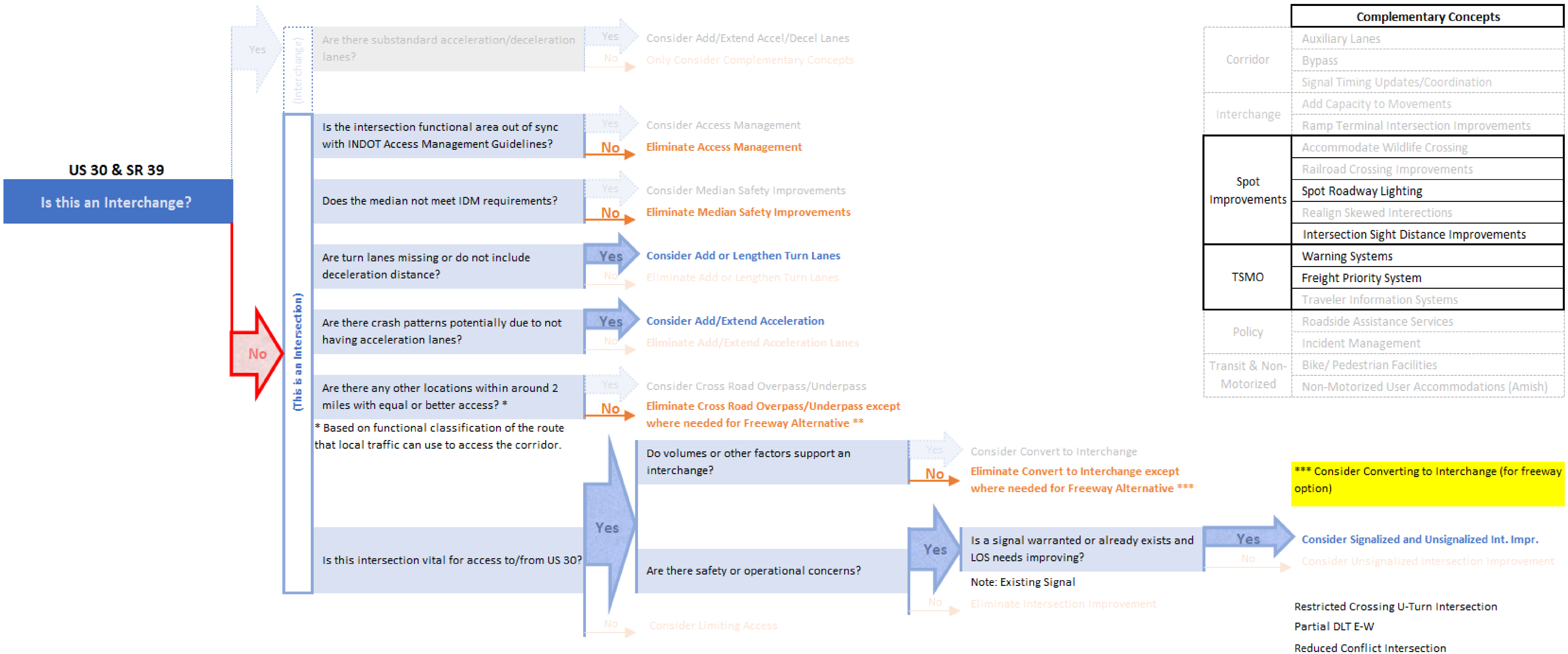
	Non-Motorized User Accommodations (Amish)



	Complementary Concepts
Corridor	Auxiliary Lanes
	Bypass
	Signal Timing Updates/Coordination
Interchange	Add Capacity to Movements
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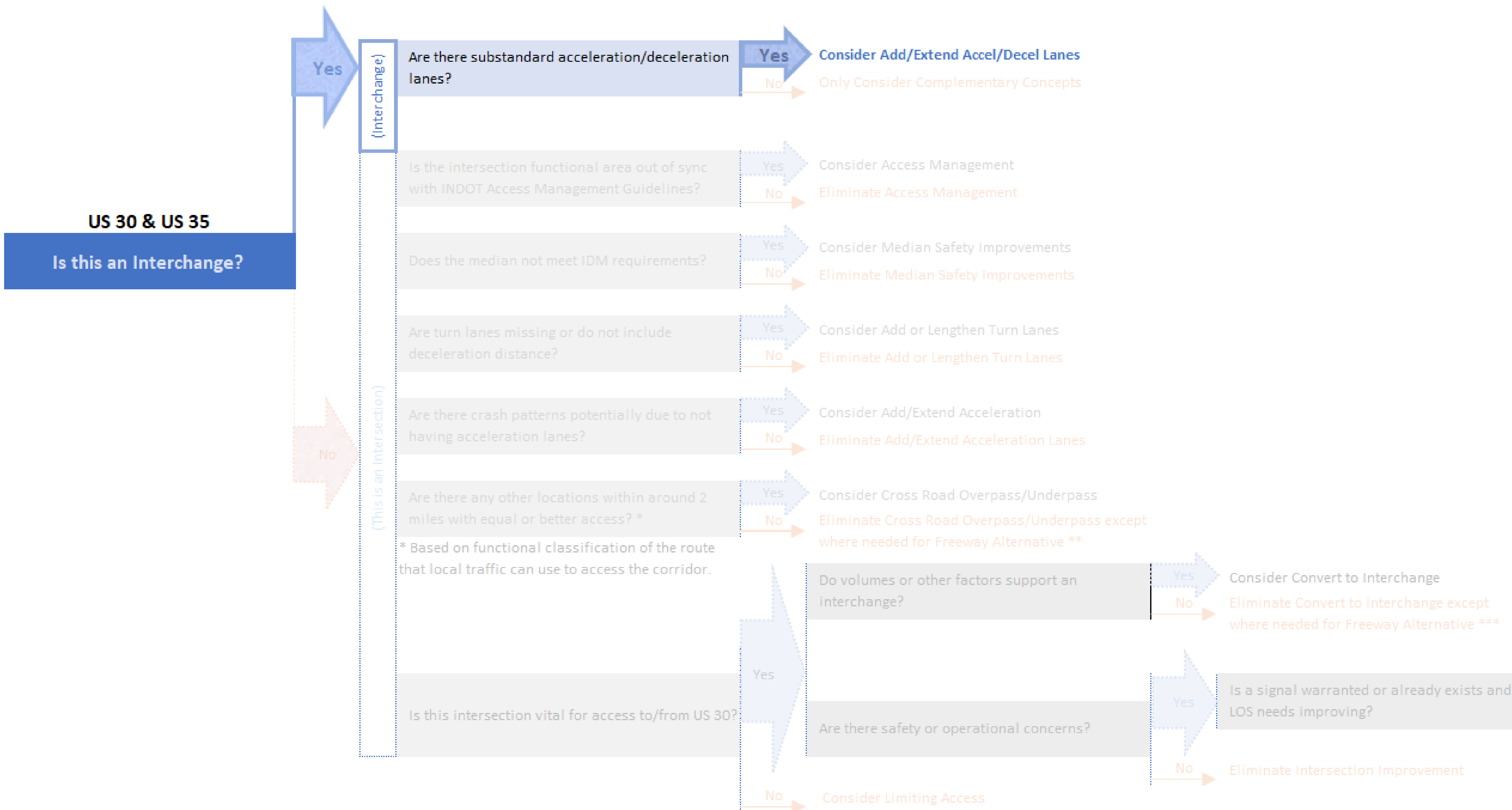

	Complementary Concepts
Corridor	Auxiliary Lanes
	Bypass
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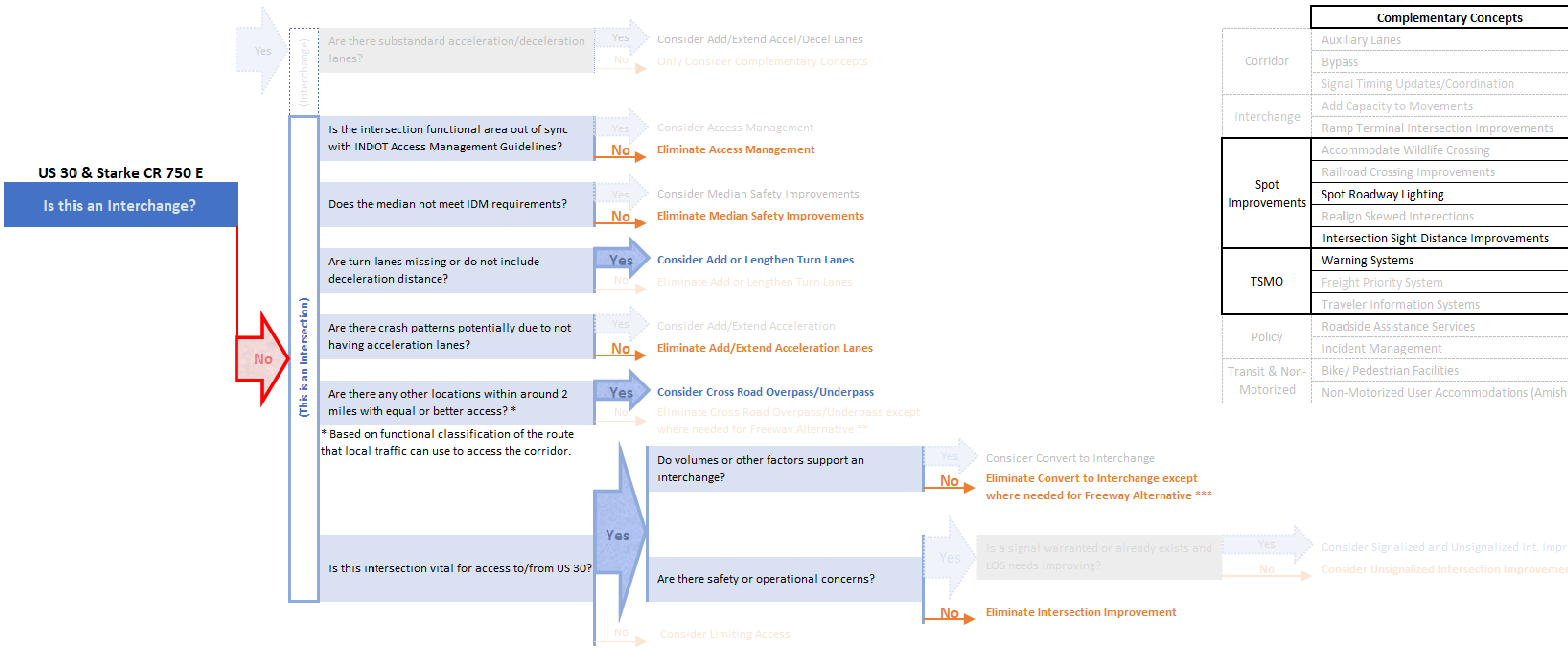

	Complementary Concepts
Corridor	Auxiliary Lanes
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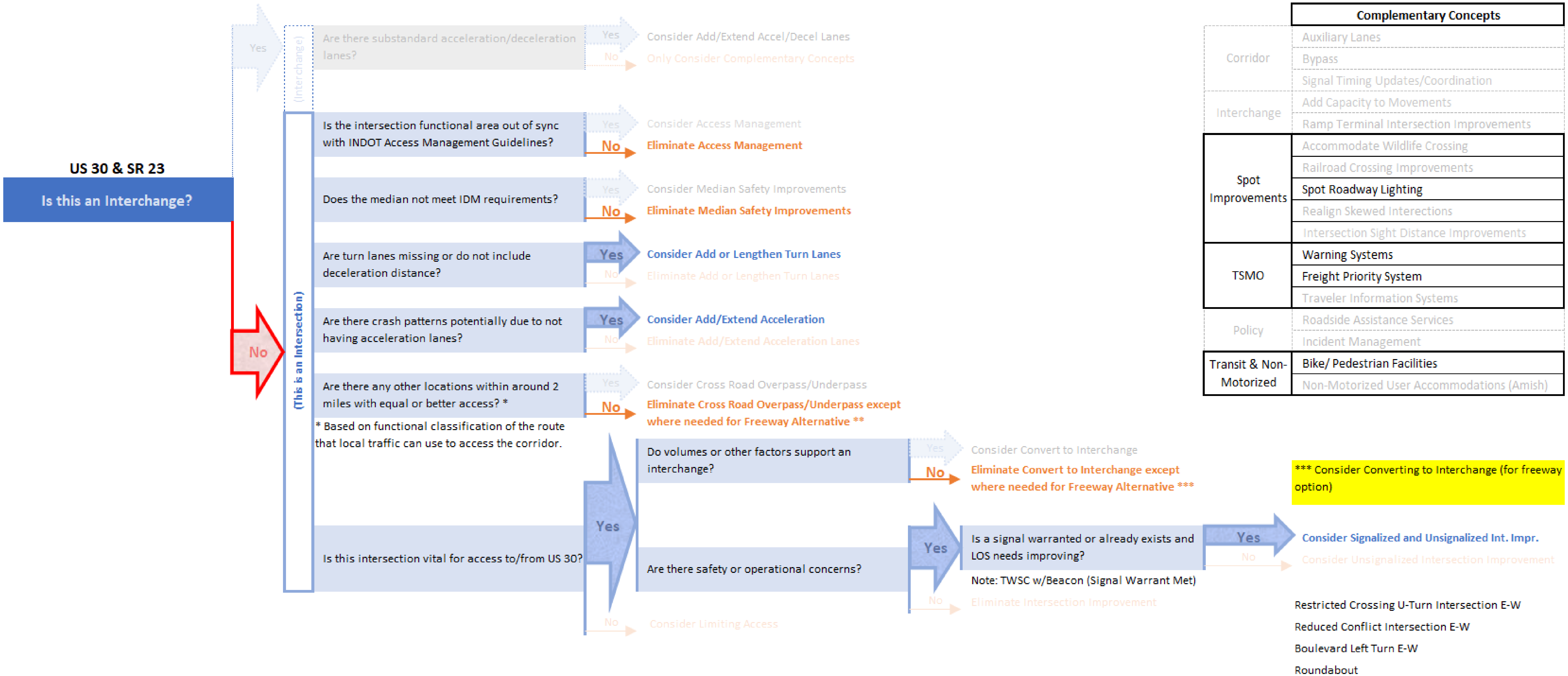
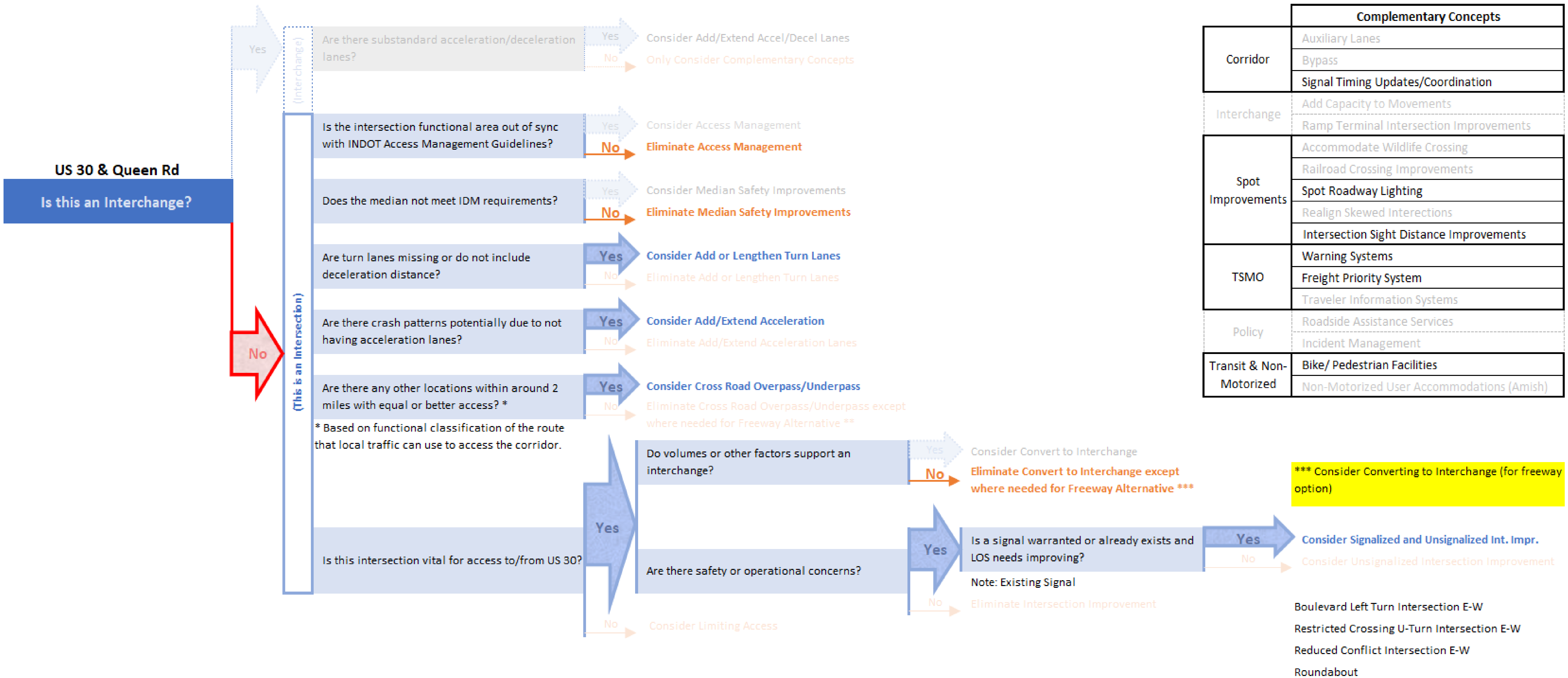
APPENDIX A - DECISION TREES
US 30 & US 23



APPENDIX A - DECISION TREES
US 30 & QUEEN RD



	Complementary Concepts
Corridor	Auxiliary Lanes
	Bypass
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Interchange	Add Capacity to Movements
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APPENDIX A - DECISION TREES
US 30 & PIONEER DR

US 30 & Pioneer Dr

Is this an Interchange?

Yes (Interchange)

- Are there substandard acceleration/deceleration lanes?
  - Yes → Consider Add/Extend Accel/Decel Lanes
  - No → Only Consider Complementary Concepts

No (This is an Intersection)

- Is the intersection functional area out of sync with INDOT Access Management Guidelines?
  - Yes → Consider Access Management
  - No → **Eliminate Access Management**
- Does the median not meet IDM requirements?
  - Yes → Consider Median Safety Improvements
  - No → **Eliminate Median Safety Improvements**
- Are turn lanes missing or do not include deceleration distance?
  - Yes → Consider Add or Lengthen Turn Lanes
  - No → **Eliminate Add or Lengthen Turn Lanes**
- Are there crash patterns potentially due to not having acceleration lanes?
  - **Yes → Consider Add/Extend Acceleration**
  - No → Eliminate Add/Extend Acceleration Lanes
- Are there any other locations within around 2 miles with equal or better access? *
  - **Yes → Consider Cross Road Overpass/Underpass**
  - No → Eliminate Cross Road Overpass/Underpass except where needed for Freeway Alternative **

* Based on functional classification of the route that local traffic can use to access the corridor.

- Is this intersection vital for access to/from US 30?
  - **Yes** →
    - Do volumes or other factors support an interchange?
      - Yes → Consider Convert to Interchange
      - No → **Eliminate Convert to Interchange except where needed for Freeway Alternative *****
    - Are there safety or operational concerns?
      - **Yes** → Is a signal warranted or already exists and LOS needs improving?
        - **Yes → Consider Signalized and Unsignalized Int. Impr.**
        - No → Consider Unsignalized Intersection Improvement
      - No → Eliminate Intersection Improvement
  - No → Consider Limiting Access

Note: Existing Signal

Partial DLT E-W

Restricted Crossing U-Turn Intersection E-W

Roundabout

Reduced Conflict Intersection E-W

*** Consider Converting to Interchange (for freeway option)

	Complementary Concepts
Corridor	Auxiliary Lanes
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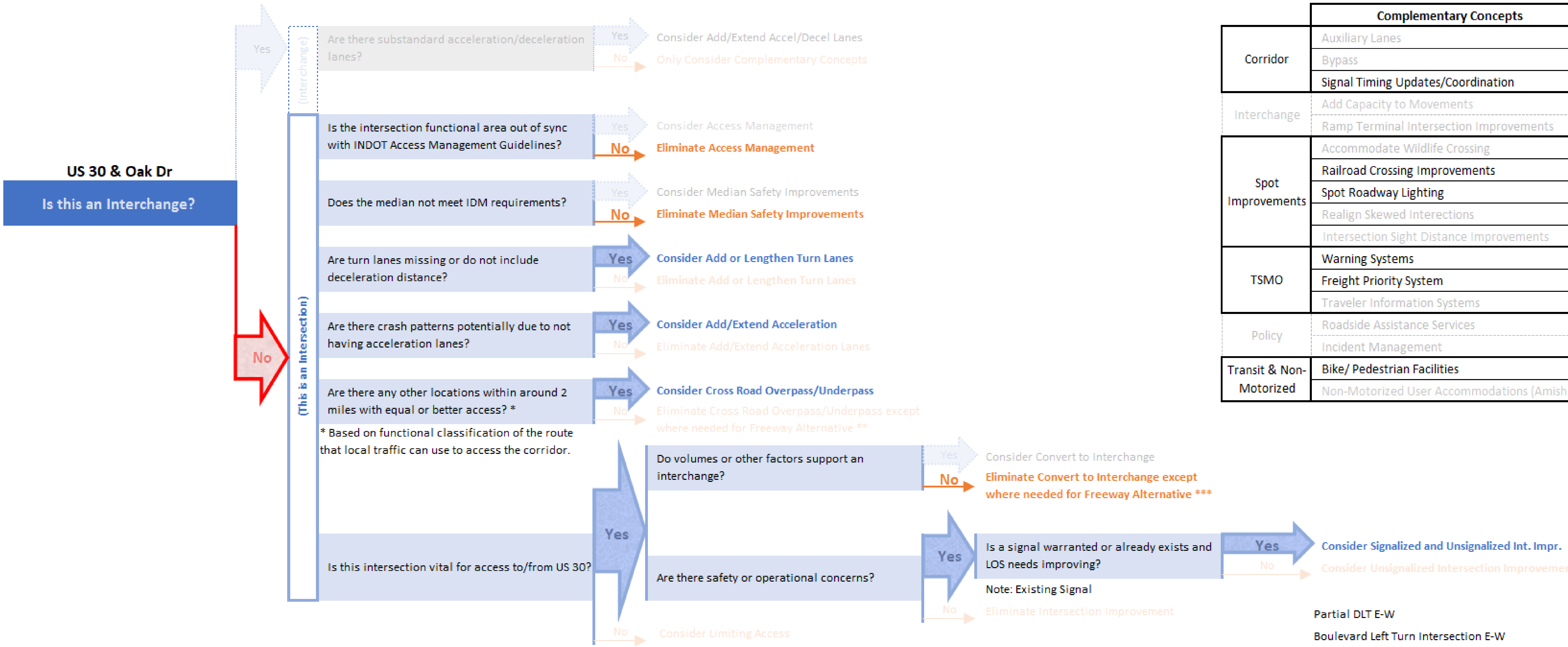

	Complementary Concepts
Corridor	Auxiliary Lanes
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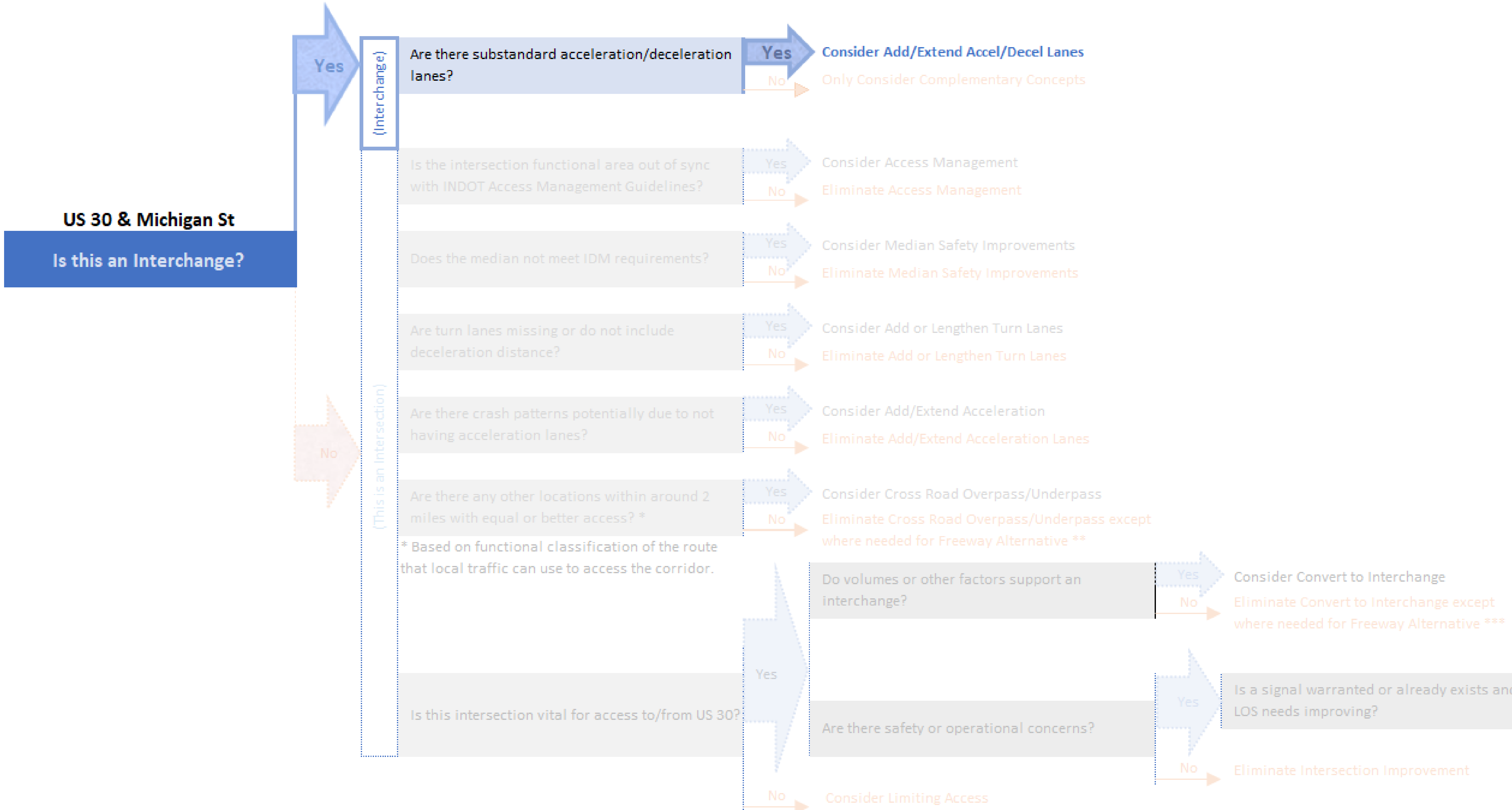
	Non-Motorized User Accommodations (Amish)

APPENDIX A - DECISION TREES
US 30 & MICHIGAN ST



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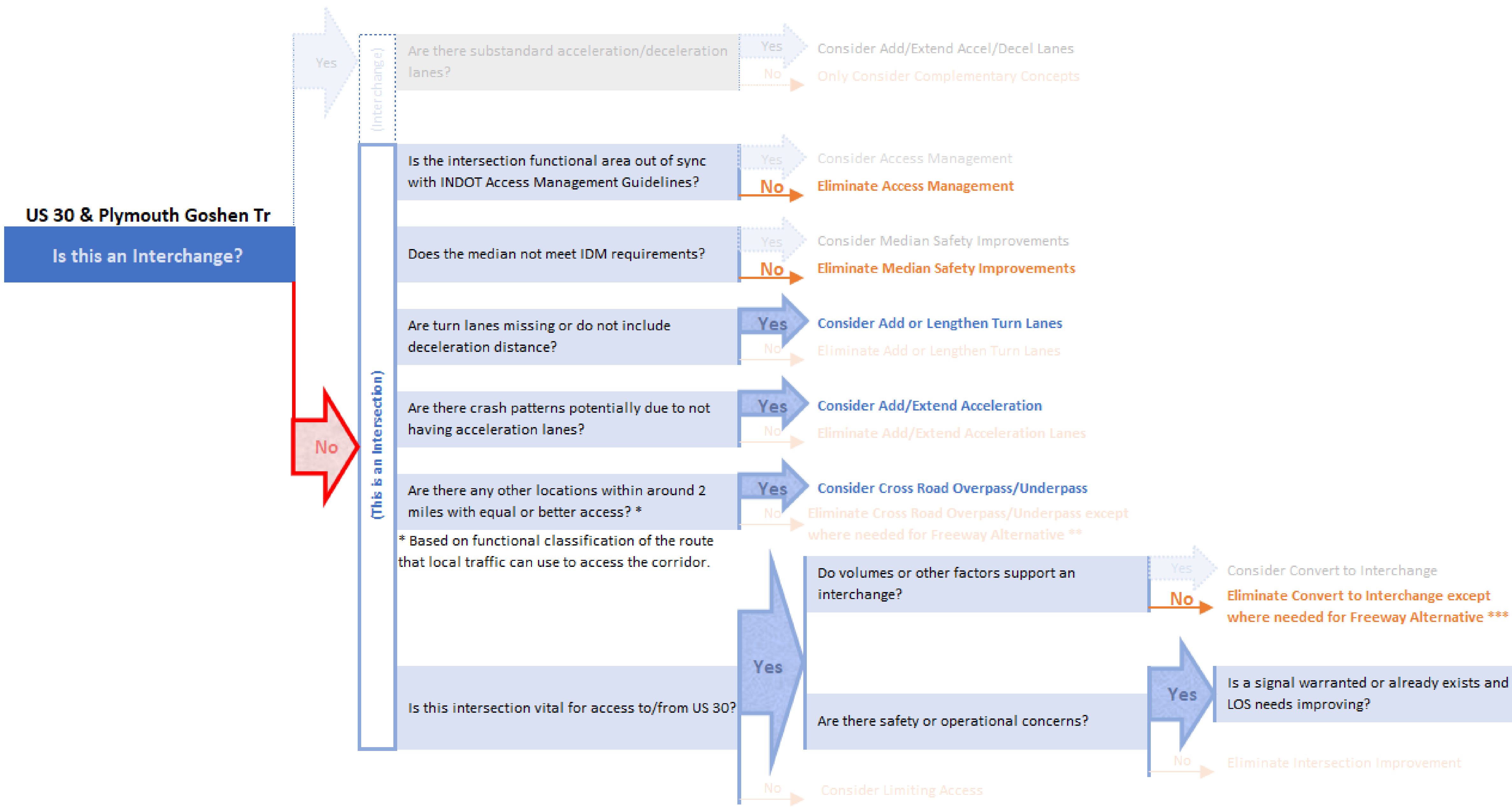

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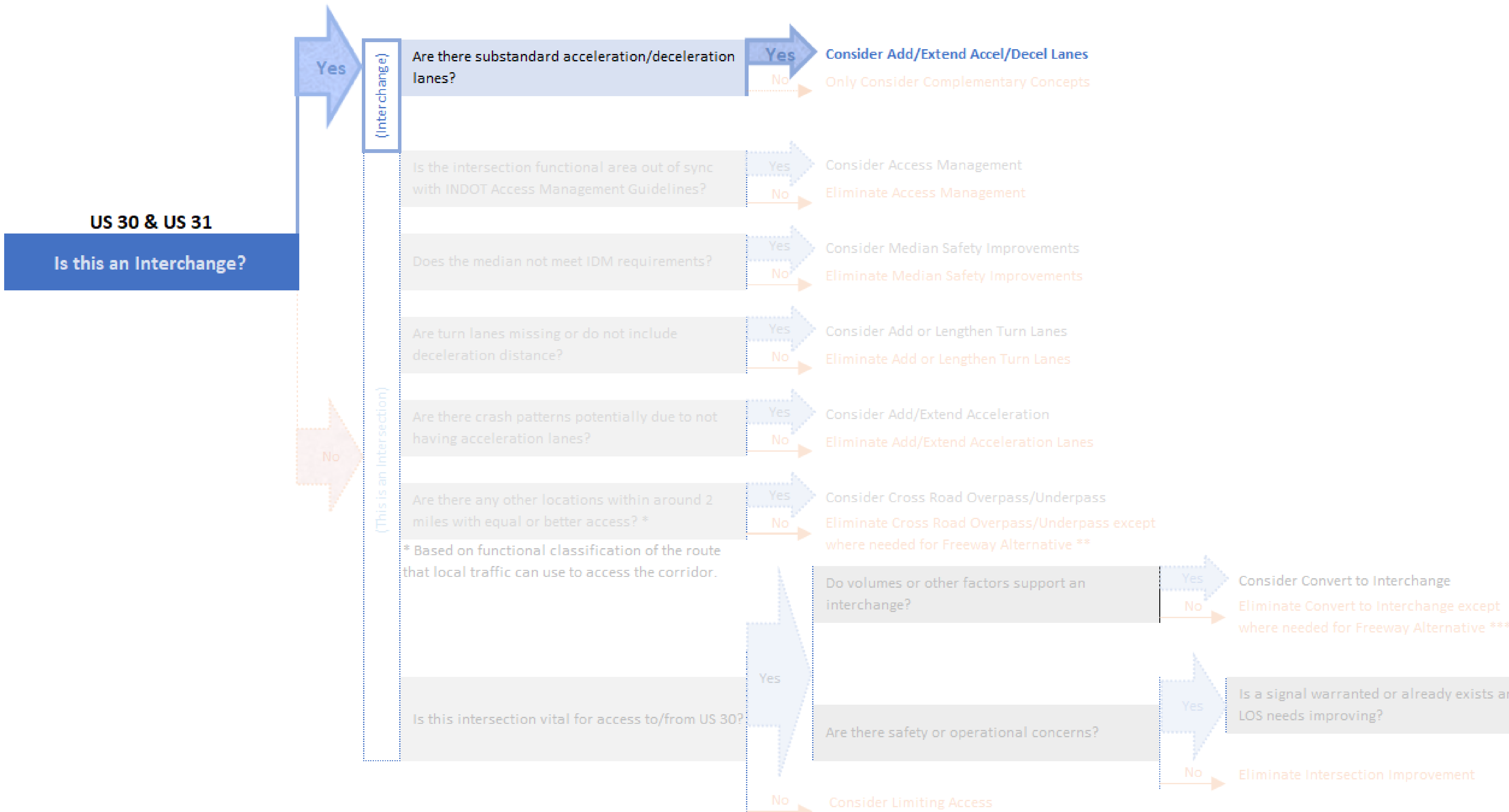
APPENDIX A - DECISION TREES
US 30 & US 31



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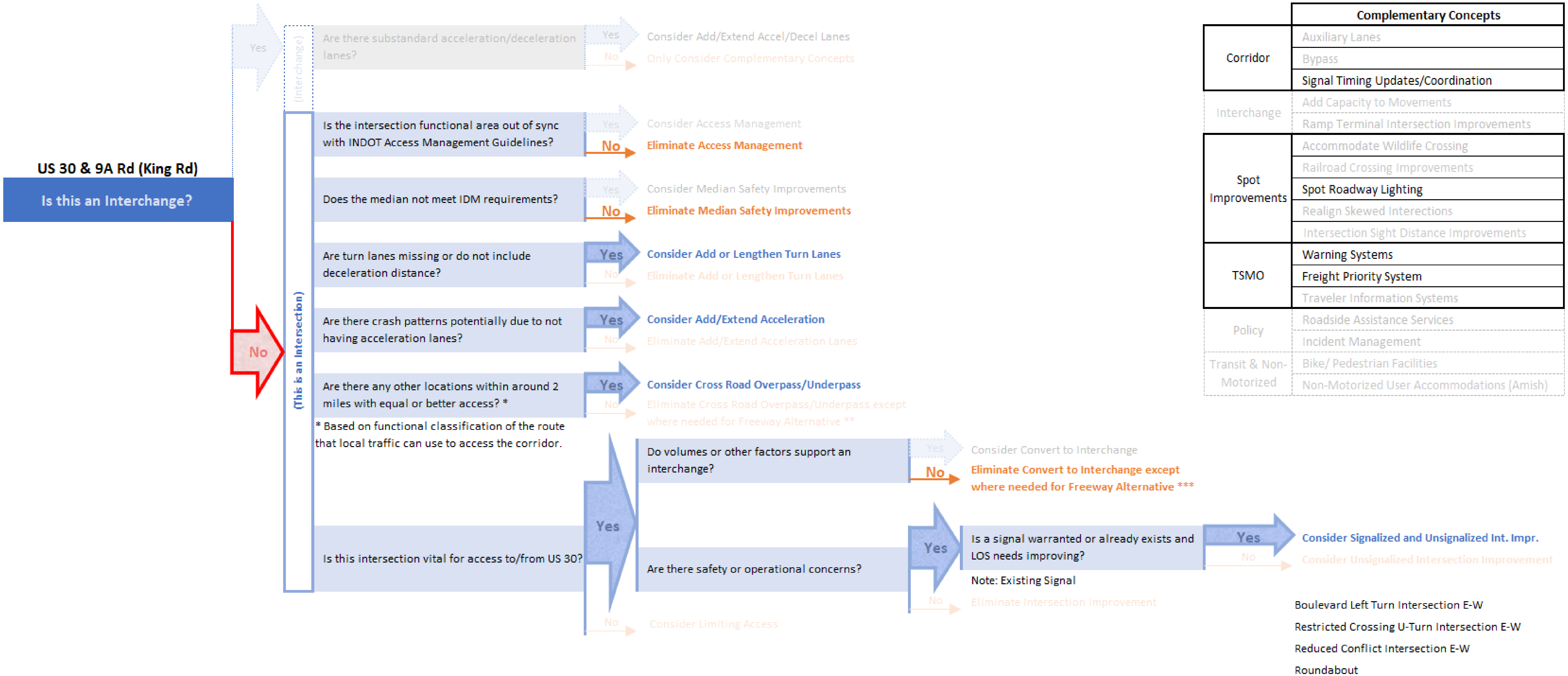
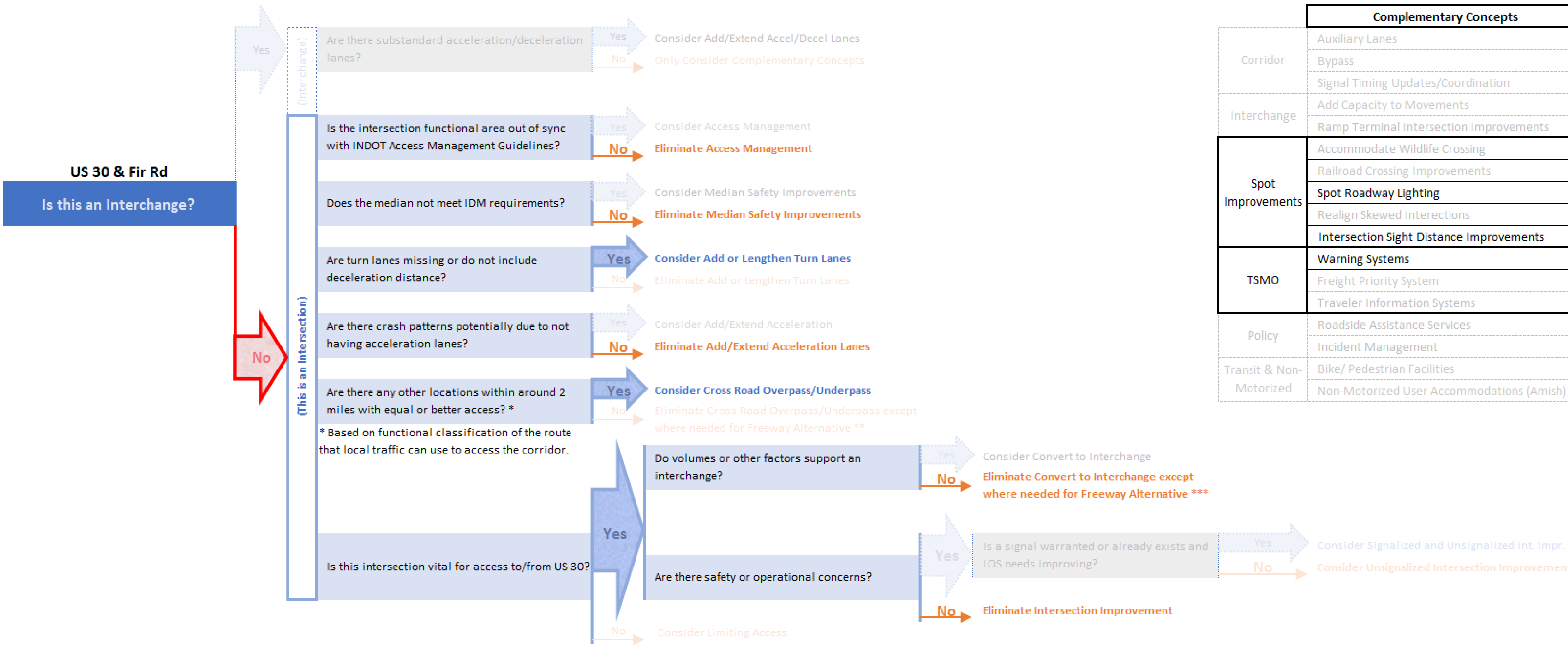
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)

APPENDIX A - DECISION TREES
US 30 & KING RD & 9A RD

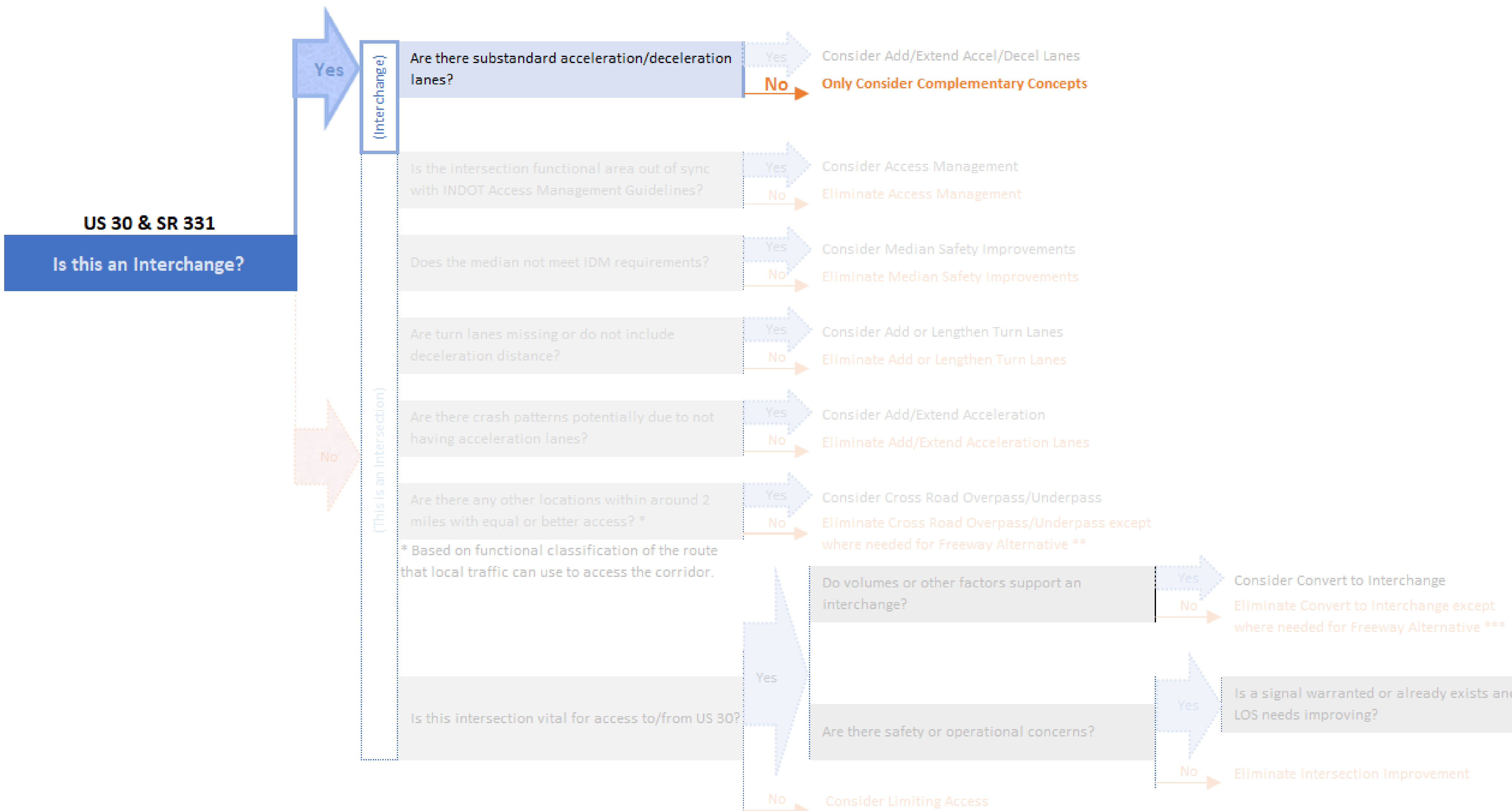


	Complementary Concepts
Corridor	Auxiliary Lanes
	Bypass
	Signal Timing Updates/Coordination
Interchange	Add Capacity to Movements
	Ramp Terminal Intersection Improvements
Spot Improvements	Accommodate Wildlife Crossing
	Railroad Crossing Improvements
	Spot Roadway Lighting
	Realign Skewed Interections
	Intersection Sight Distance Improvements
TSMO	Warning Systems
	Freight Priority System
	Traveler Information Systems
Policy	Roadside Assistance Services
	Incident Management
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)

APPENDIX A - DECISION TREES
US 30 & FIR RD

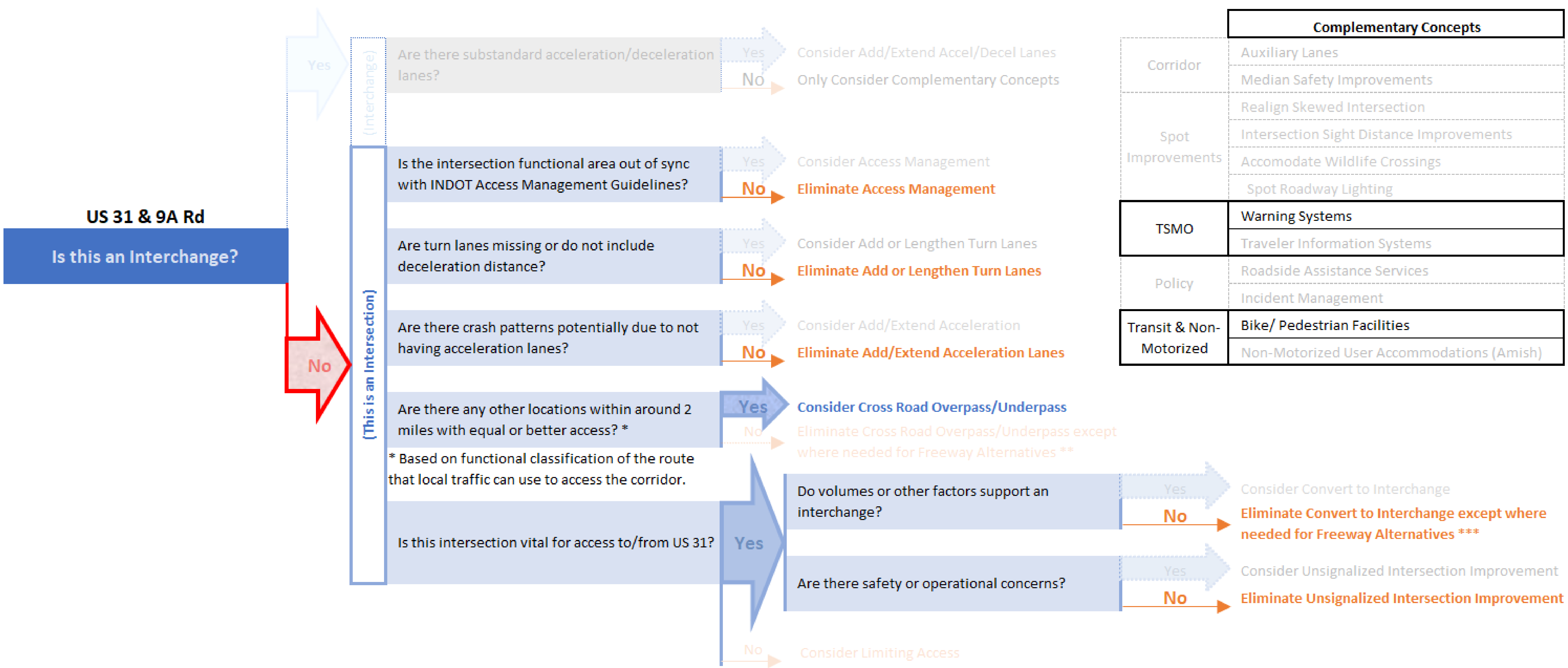


	Complementary Concepts
Corridor	Auxiliary Lanes
	Bypass
	Signal Timing Updates/Coordination
Interchange	Add Capacity to Movements
	Ramp Terminal Intersection Improvements
Spot Improvements	Accommodate Wildlife Crossing
	Railroad Crossing Improvements
	Spot Roadway Lighting
	Realign Skewed Interections
	Intersection Sight Distance Improvements
TSMO	Warning Systems
	Freight Priority System
	Traveler Information Systems
Policy	Roadside Assistance Services
	Incident Management
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)

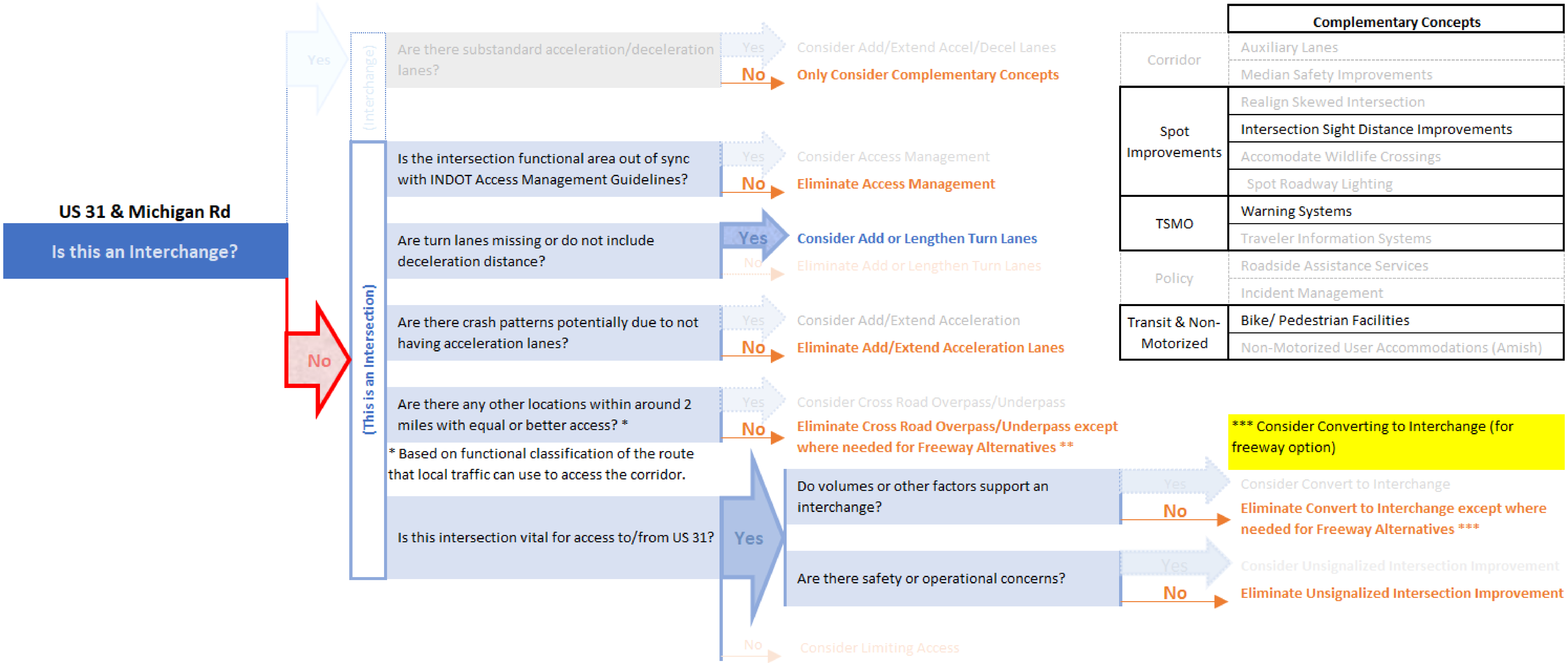


	Complementary Concepts
Corridor	Auxiliary Lanes
	Bypass
	Signal Timing Updates/Coordination
Interchange	Add Capacity to Movements
	Ramp Terminal Intersection Improvements
Spot Improvements	Accommodate Wildlife Crossing
	Railroad Crossing Improvements
	Spot Roadway Lighting
	Realign Skewed Interections
	Intersection Sight Distance Improvements
TSMO	Warning Systems
	Freight Priority System
	Traveler Information Systems
Policy	Roadside Assistance Services
	Incident Management
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)

APPENDIX A - DECISION TREES
US 31 & 9A RD

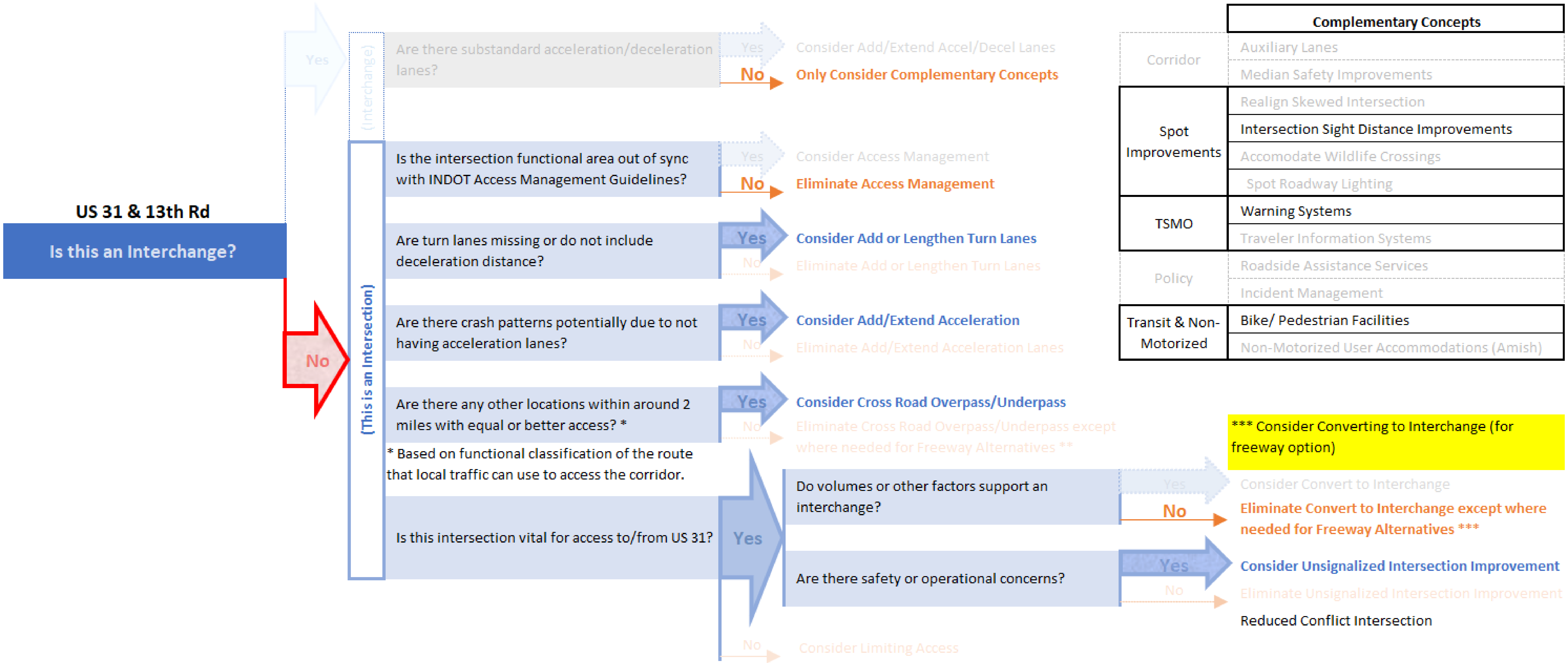


	Complementary Concepts
Corridor	Auxiliary Lanes
	Median Safety Improvements
Spot Improvements	Realign Skewed Intersection
	Intersection Sight Distance Improvements
	Accomodate Wildlife Crossings
	Spot Roadway Lighting
TSMO	Warning Systems
	Traveler Information Systems
Policy	Roadside Assistance Services
	Incident Management
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)



Complementary Concepts	
Corridor	Auxiliary Lanes
	Median Safety Improvements
Spot Improvements	Realign Skewed Intersection
	Intersection Sight Distance Improvements
	Accomodate Wildlife Crossings
	Spot Roadway Lighting
TSMO	Warning Systems
	Traveler Information Systems
Policy	Roadside Assistance Services
	Incident Management
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)

APPENDIX A - DECISION TREES
US 31 & 13TH RD



	Complementary Concepts
Corridor	Auxiliary Lanes
	Median Safety Improvements
Spot Improvements	Realign Skewed Intersection
	Intersection Sight Distance Improvements
	Accomodate Wildlife Crossings
	Spot Roadway Lighting
TSMO	Warning Systems
	Traveler Information Systems
Policy	Roadside Assistance Services
	Incident Management
Transit & Non-Motorized	Bike/ Pedestrian Facilities
	Non-Motorized User Accommodations (Amish)

APPENDIX B: CAP-X RESULTS

Table 1: Intersection Nomenclature for Cap-X and INDOT Systems.

Intersection Type	
Cap-X	**INDOT**
Median U-Turn (MUT)	Boulevard Left Turn
Partial Median U-Turn	Boulevard Left Turn with Cross-Street Lefts
Signalized Restricted Crossing U-Turn (Signalized RCUT)	RCUT
Unsignalized RCUT	Reduced Conflict Intersection (RCI)

FHWA’s Cap-X tool uses slightly different nomenclature for intersection types than INDOT. Table-1 in Appendix B shows the treatment name used in Cap-X and the equivalent name as used by INDOT. For all other intersection types, Cap-X and INDOT use the same name. This report will refer to the intersection types using the names that INDOT uses.

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Industrial Drive
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	253	636	187	20.82%	0.00%
Westbound	0	10	907	41	20.09%	0.00%
Southbound	0	3	8	118	1.82%	0.00%
Northbound	0	86	10	15	14.16%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Partial Displaced Left Turn E-W	**0.51**	**1**	**Good**	**Excellent**
Displaced Left Turn	**0.51**	**1**	**Good**	**Excellent**
Signalized Restricted Crossing U-Turn E-W	**0.51**	**1**	**Good**	**Excellent**
Partial Median U-Turn E-W	**0.53**	**4**	**Good**	**Excellent**
Median U-Turn E-W	**0.60**	**5**	**Good**	**Excellent**
Traffic Signal	**0.65**	**6**	**Good**	**Excellent**
Bowtie E-W	**0.86**	**7**	**Good**	**Excellent**
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Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Industrial Drive
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	129	965	49	19.87%	0.00%
Westbound	0	2	930	27	24.50%	0.00%
Southbound	0	32	3	300	1.79%	0.00%
Northbound	0	106	12	24	8.27%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

# # # # # # # # # # # # #

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Displaced Left Turn	**0.44**	**1**	Good	Excellent
Partial Displaced Left Turn E-W	**0.51**	**2**	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	**0.58**	**3**	Good	Excellent
Median U-Turn E-W	**0.59**	**4**	Good	Excellent
Partial Median U-Turn E-W	**0.65**	**5**	Good	Excellent
Traffic Signal	**0.69**	**6**	Good	Excellent
1NS X 2EW Roundabout	**0.71**	**7**	Good	Excellent
Bowtie E-W	**0.94**	**8**	Good	Excellent
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Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Porter CR 325 E
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	26	901	7	21.22%	0.00%
Westbound	0	49	508	4	28.51%	0.00%
Southbound	0	15	3	11	3.79%	0.00%
Northbound	0	12	5	41	7.78%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

# # # # # # # # # # # # #

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.32	1	Good	Excellent
Partial Displaced Left Turn E-W	0.34	2	Good	Excellent
Displaced Left Turn	0.34	2	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.35	4	Good	Excellent
Partial Median U-Turn E-W	0.36	5	Good	Excellent
Traffic Signal	0.37	6	Good	Excellent
Median U-Turn E-W	0.37	6	Good	Excellent
1NS X 2EW Roundabout	0.45	8	Good	Excellent
Two-Way Stop Control E-W	0.59	9	Fair	Good
Quadrant Roadway S-W	0.67	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Porter CR 325 E
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	16	871	11	24.25%	0.00%
Westbound	0	37	885	15	17.00%	0.00%
Southbound	0	12	10	20	0.00%	0.00%
Northbound	0	0	10	45	0.00%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold			
	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

# # # # # # # # # # # # #

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.26	1	Good	Excellent
Partial Displaced Left Turn E-W	0.33	2	Good	Excellent
Displaced Left Turn	0.33	2	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.34	4	Good	Excellent
Median U-Turn E-W	0.35	5	Good	Excellent
Partial Median U-Turn E-W	0.35	5	Good	Excellent
Traffic Signal	0.36	7	Good	Excellent
1NS X 2EW Roundabout	0.44	8	Good	Excellent
Quadrant Roadway S-W	0.64	9	Good	Excellent
Quadrant Roadway S-E	0.66	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Porter CR 400 E
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	18	556	6	21.09%	0.00%
Westbound	0	1	802	6	32.71%	0.00%
Southbound	0	1	1	14	0.00%	0.00%
Northbound	0	10	1	14	0.00%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

# # # # # # # # # # # # #

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.07	1	Good	Excellent
Two-Way Stop Control E-W	0.30	2	Fair	Good
Displaced Left Turn	0.38	3	Good	Excellent
Partial Displaced Left Turn E-W	0.39	4	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.39	4	Good	Excellent
Median U-Turn E-W	0.39	4	Good	Excellent
Bowtie E-W	0.40	7	Good	Excellent
Traffic Signal	0.41	8	Good	Excellent
Partial Median U-Turn E-W	0.41	8	Good	Excellent
All-Way Stop Control	1.01	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Porter CR 400 E
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	9	987	11	17.86%	0.00%
Westbound	0	12	773	6	24.58%	0.00%
Southbound	0	4	1	13	0.00%	0.00%
Northbound	0	16	1	5	0.00%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.09	1	Good	Excellent
Displaced Left Turn	0.66	2	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.66	2	Good	Excellent
Two-Way Stop Control E-W	0.67	4	Fair	Good
Partial Displaced Left Turn E-W	0.67	5	Good	Excellent
Median U-Turn E-W	0.67	5	Good	Excellent
Partial Median U-Turn E-W	0.68	7	Good	Excellent
Bowtie E-W	0.68	7	Good	Excellent
Traffic Signal	0.70	9	Good	Excellent
All-Way Stop Control	1.24	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	County Line Road
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	1	533	2	32.82%	0.00%
Westbound	0	1	711	2	21.91%	0.00%
Southbound	0	2	3	5	0.00%	0.00%
Northbound	0	11	6	9	23.08%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold			
	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.08	1	Good	Excellent
Two-Way Stop Control E-W	0.24	2	Fair	Good
Quadrant Roadway N-E	0.40	3	Good	Excellent
Quadrant Roadway N-W	0.40	3	Good	Excellent
Displaced Left Turn	0.40	3	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.40	3	Good	Excellent
Median U-Turn E-W	0.40	3	Good	Excellent
Partial Displaced Left Turn E-W	0.41	8	Good	Excellent
Partial Median U-Turn E-W	0.41	8	Good	Excellent
Bowtie E-W	0.42	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	County Line Road
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	3	936	10	16.90%	0.00%
Westbound	0	22	664	0	21.93%	0.00%
Southbound	0	0	17	5	12.00%	0.00%
Northbound	0	3	17	22	7.84%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold		
2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.18	1	Good	Excellent
Two-Way Stop Control E-W	0.37	2	Fair	Good
1NS X 2EW Roundabout	0.43	3	Good	Excellent
Quadrant Roadway N-W	0.62	4	Good	Excellent
Displaced Left Turn	0.62	4	Good	Excellent
Quadrant Roadway N-E	0.63	6	Good	Excellent
Partial Displaced Left Turn E-W	0.63	6	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.63	6	Good	Excellent
Quadrant Roadway S-E	0.64	9	Good	Excellent
Median U-Turn E-W	0.64	9	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Main Street
Date:	2045 AM
Number of Intersection Legs:	3
Which leg is the minor street?	S

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	1	608	23	31.75%	0.00%
Westbound	0	18	683	1	23.35%	0.00%
Southbound	0	0	0	0	0.00%	0.00%
Northbound	0	20	0	34	8.19%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level		**Low**

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

# # # # # # # # # # # # #

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.19	1	Good	Excellent
Partial Displaced Left Turn E-W	0.25	2	Good	Excellent
Traffic Signal	0.26	3	Good	Excellent
Continuous Green T S	0.26	3	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.26	3	Good	Excellent
Partial Median U-Turn E-W	0.27	6	Good	Excellent
Median U-Turn E-W	0.28	7	Good	Excellent
Two-Way Stop Control E-W	0.29	8	Fair	Good
All-Way Stop Control	0.97	9	Good	Excellent
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Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Main Street
Date:	2045 PM
Number of Intersection Legs:	3
Which leg is the minor street?	S

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	1	1043	28	17.51%	0.00%
Westbound	0	26	641	1	22.98%	0.00%
Southbound	0	0	0	0	0.00%	0.00%
Northbound	0	17	0	43	2.15%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold		
2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

# # # # # # # # # # # # #

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.36	1	Good	Excellent
Partial Displaced Left Turn E-W	0.36	2	Good	Excellent
Traffic Signal	0.38	3	Good	Excellent
Continuous Green T S	0.38	3	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.38	3	Good	Excellent
Median U-Turn E-W	0.38	3	Good	Excellent
Partial Median U-Turn E-W	0.38	3	Good	Excellent
Two-Way Stop Control E-W	0.40	8	Fair	Good
All-Way Stop Control	1.18	9	Good	Excellent
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Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	US 421
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	136	452	55	32.81%	0.00%
Westbound	0	15	448	81	29.54%	0.00%
Southbound	0	48	86	60	26.86%	0.00%
Northbound	0	121	96	22	15.85%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor		**Suggested = 2.00**	2.00
Multimodal Activity Level		**Low**	
Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Displaced Left Turn	0.38	1	Good	Excellent
1NS X 2EW Roundabout	0.40	2	Good	Excellent
Partial Displaced Left Turn E-W	0.42	3	Good	Excellent
Quadrant Roadway S-W	0.46	4	Good	Excellent
Traffic Signal	0.48	5	Good	Excellent
Quadrant Roadway S-E	0.48	5	Good	Excellent
Quadrant Roadway N-E	0.50	7	Good	Excellent
Bowtie E-W	0.50	7	Good	Excellent
Median U-Turn E-W	0.53	9	Good	Excellent
Partial Median U-Turn E-W	0.54	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	US 421
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	222	651	136	17.60%	0.00%
Westbound	0	18	519	83	28.59%	0.00%
Southbound	0	93	139	85	15.54%	0.00%
Northbound	0	66	87	6	5.47%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold			
	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Displaced Left Turn	0.50	1	Good	Excellent
Quadrant Roadway S-W	0.51	2	Good	Excellent
Quadrant Roadway S-E	0.51	2	Good	Excellent
Partial Displaced Left Turn E-W	0.53	4	Good	Excellent
Traffic Signal	0.56	5	Good	Excellent
1NS X 2EW Roundabout	0.57	6	Good	Excellent
Bowtie E-W	0.60	7	Good	Excellent
Quadrant Roadway N-E	0.63	8	Good	Excellent
Partial Median U-Turn E-W	0.68	9	Good	Excellent
Median U-Turn E-W	0.75	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	LaPorte CR 600 W
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	48	471	10	39.81%	0.00%
Westbound	0	1	517	27	27.71%	0.00%
Southbound	0	6	27	51	4.61%	0.00%
Northbound	0	20	40	1	0.00%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	0.80	0.95		0.85		

Truck to PCE Factor	Suggested = 2.00	2.00
Multimodal Activity Level	Low	

Critical Lane Volume Threshold	2-phase signal	Suggested = 1800 (Urban), 1650 (Rural)	1800
	3-phase signal	Suggested = 1750 (Urban), 1600 (Rural)	1750
	4-phase signal	Suggested = 1700 (Urban), 1550 (Rural)	1700

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.22	1	Good	Excellent
Partial Displaced Left Turn E-W	0.23	2	Good	Excellent
Displaced Left Turn	0.23	2	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.25	4	Good	Excellent
Median U-Turn E-W	0.25	4	Good	Excellent
Traffic Signal	0.26	6	Good	Excellent
Partial Median U-Turn E-W	0.26	6	Good	Excellent
1NS X 2EW Roundabout	0.29	8	Good	Excellent
Two-Way Stop Control E-W	0.36	9	Fair	Good
Quadrant Roadway N-W	0.38	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	LaPorte CR 600 W
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	50	621	83	21.16%	0.00%
Westbound	0	2	549	3	38.65%	0.00%
Southbound	0	14	26	63	8.99%	0.00%
Northbound	0	33	11	0	10.75%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Partial Displaced Left Turn E-W	0.26	1	Good	Excellent
Displaced Left Turn	0.26	1	Good	Excellent
Median U-Turn E-W	0.28	3	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.29	4	Good	Excellent
Traffic Signal	0.30	5	Good	Excellent
Partial Median U-Turn E-W	0.30	5	Good	Excellent
1NS X 2EW Roundabout	0.35	7	Good	Excellent
Unsignalized Restricted Crossing U-Turn E-W	0.36	8	Good	Excellent
Quadrant Roadway N-W	0.43	9	Good	Excellent
Split Intersection E-W	0.45	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Thompson Street
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	1	477	10	36.39%	0.00%
Westbound	0	2	572	2	30.78%	0.00%
Southbound	0	1	3	6	22.20%	0.00%
Northbound	0	23	3	3	11.45%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold			
Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.08	1	Good	Excellent
Displaced Left Turn	0.22	2	Good	Excellent
Partial Displaced Left Turn E-W	0.23	3	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.23	3	Good	Excellent
Median U-Turn E-W	0.23	3	Good	Excellent
Partial Median U-Turn E-W	0.23	3	Good	Excellent
Traffic Signal	0.24	7	Good	Excellent
Two-Way Stop Control E-W	0.30	8	Fair	Good
Quadrant Roadway N-E	0.37	9	Good	Excellent
Quadrant Roadway N-W	0.37	9	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Thompson Street
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	6	558	25	19.15%	0.00%
Westbound	0	8	633	4	34.98%	0.00%
Southbound	0	0	8	4	25.33%	0.00%
Northbound	0	10	9	4	0.00%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold			
	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.06	1	Good	Excellent
Two-Way Stop Control E-W	0.24	2	Fair	Good
Displaced Left Turn	0.24	3	Good	Excellent
Partial Displaced Left Turn E-W	0.25	4	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.25	4	Good	Excellent
Median U-Turn E-W	0.25	4	Good	Excellent
Traffic Signal	0.26	7	Good	Excellent
Partial Median U-Turn E-W	0.26	7	Good	Excellent
Quadrant Roadway N-E	0.38	9	Good	Excellent
Quadrant Roadway N-W	0.38	9	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Old US 30 West
Date:	2045 AM
Number of Intersection Legs:	3
Which leg is the minor street?	S

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	1	468	0	37.00%	0.00%
Westbound	0	5	573	0	28.75%	0.00%
Southbound	0	0	0	0	0.00%	0.00%
Northbound	0	0	9	0	0.00%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level		**Low**

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.02	1	Good	Excellent
Continuous Green T S	0.19	2	Good	Excellent
Two-Way Stop Control E-W	0.21	3	Fair	Good
Traffic Signal	0.21	4	Good	Excellent
Partial Displaced Left Turn E-W	0.21	4	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.21	4	Good	Excellent
Median U-Turn E-W	0.21	4	Good	Excellent
Partial Median U-Turn E-W	0.22	8	Good	Excellent
Quadrant Roadway N-E	0.36	9	Good	Excellent
Quadrant Roadway N-W	0.36	9	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Old US 30 West
Date:	2045 PM
Number of Intersection Legs:	3
Which leg is the minor street?	S

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	1	575	0	20.00%	0.00%
Westbound	0	6	633	0	33.68%	0.00%
Southbound	0	0	0	0	0.00%	0.00%
Northbound	0	0	4	0	50.00%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

# # # # # # # # # # # # #

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.02	1	Good	Excellent
Continuous Green T S	0.20	2	Good	Excellent
Two-Way Stop Control E-W	0.24	3	Fair	Good
Traffic Signal	0.24	4	Good	Excellent
Partial Displaced Left Turn E-W	0.24	4	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.24	4	Good	Excellent
Median U-Turn E-W	0.24	4	Good	Excellent
Partial Median U-Turn E-W	0.25	8	Good	Excellent
Quadrant Roadway N-E	0.39	9	Good	Excellent
Quadrant Roadway N-W	0.39	9	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	LaPorte CR 300 W / Long Lane
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	2	457	3	37.04%	0.00%
Westbound	0	1	541	0	33.00%	0.00%
Southbound	0	1	0	6	0.00%	0.00%
Northbound	0	11	2	0	7.69%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold		
2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.03	1	Good	Excellent
Two-Way Stop Control E-W	0.20	2	Fair	Good
Displaced Left Turn	0.21	3	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.21	3	Good	Excellent
Median U-Turn E-W	0.21	3	Good	Excellent
Traffic Signal	0.22	6	Good	Excellent
Partial Displaced Left Turn E-W	0.22	6	Good	Excellent
Partial Median U-Turn E-W	0.22	6	Good	Excellent
Quadrant Roadway N-E	0.35	9	Good	Excellent
Quadrant Roadway N-W	0.35	9	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	LaPorte CR 300 W / Long Lane
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				**Percent (%)**	
	U-Turn	**Left**	**Thru**	**Right**	Heavy Vehicles	Volume Growth
Eastbound	0	2	559	8	19.87%	0.00%
Westbound	0	1	623	2	34.99%	0.00%
Southbound	0	2	3	1	0.00%	0.00%
Northbound	0	2	1	0	33.33%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

# # # # # # # # # # # # #

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.02	1	Good	Excellent
Two-Way Stop Control E-W	0.23	2	Fair	Good
Partial Displaced Left Turn E-W	0.24	3	Good	Excellent
Displaced Left Turn	0.24	3	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.24	3	Good	Excellent
Median U-Turn E-W	0.24	3	Good	Excellent
Partial Median U-Turn E-W	0.24	3	Good	Excellent
Traffic Signal	0.25	8	Good	Excellent
Quadrant Roadway N-E	0.37	9	Good	Excellent
Quadrant Roadway N-W	0.37	9	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	SR 39
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	3	432	27	40.01%	0.00%
Westbound	0	77	393	15	38.74%	0.00%
Southbound	0	14	45	2	12.31%	0.00%
Northbound	0	56	87	13	10.08%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Partial Displaced Left Turn E-W	0.24	1	Good	Excellent
Displaced Left Turn	0.24	1	Good	Excellent
Partial Median U-Turn E-W	0.25	3	Good	Excellent
Median U-Turn E-W	0.27	4	Good	Excellent
1NS X 2EW Roundabout	0.29	5	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.30	6	Good	Excellent
Traffic Signal	0.35	7	Good	Excellent
Quadrant Roadway N-E	0.38	8	Good	Excellent
Quadrant Roadway N-W	0.38	8	Good	Excellent
Split Intersection E-W	0.41	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	SR 39
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	2	479	97	25.21%	0.00%
Westbound	0	132	502	32	27.41%	0.00%
Southbound	0	15	111	3	5.30%	0.00%
Northbound	0	49	52	22	2.86%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold			
	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Partial Displaced Left Turn E-W	0.27	1	Good	Excellent
Displaced Left Turn	0.27	1	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.31	3	Good	Excellent
Partial Median U-Turn E-W	0.32	4	Good	Excellent
Median U-Turn E-W	0.33	5	Good	Excellent
1NS X 2EW Roundabout	0.35	6	Good	Excellent
Traffic Signal	0.36	7	Good	Excellent
Quadrant Roadway N-E	0.37	8	Good	Excellent
Quadrant Roadway N-W	0.41	9	Good	Excellent
Split Intersection E-W	0.42	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Starke CR 750 E
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	47	468	2	37.39%	0.00%
Westbound	0	5	423	43	34.40%	0.00%
Southbound	0	18	2	31	8.84%	0.00%
Northbound	0	1	3	8	3.25%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00** — 2.00
Multimodal Activity Level	**Low**

Critical Lane Volume Threshold		
2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.13	1	Good	Excellent
Partial Displaced Left Turn E-W	0.20	2	Good	Excellent
Displaced Left Turn	0.20	2	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.21	4	Good	Excellent
Traffic Signal	0.22	5	Good	Excellent
Two-Way Stop Control E-W	0.22	6	Fair	Good
Median U-Turn E-W	0.23	7	Good	Excellent
Partial Median U-Turn E-W	0.23	7	Good	Excellent
Quadrant Roadway S-E	0.39	9	Good	Excellent
Bowtie E-W	0.41	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Starke CR 750 E
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	3	565	8	32.37%	0.00%
Westbound	0	7	671	7	38.38%	0.00%
Southbound	0	12	1	19	3.38%	0.00%
Northbound	0	6	1	2	13.33%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold		
2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

# # # # # # # # # # # # #

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.13	1	Good	Excellent
Two-Way Stop Control E-W	0.26	2	Fair	Good
Displaced Left Turn	0.27	3	Good	Excellent
Partial Displaced Left Turn E-W	0.28	4	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.28	4	Good	Excellent
Median U-Turn E-W	0.28	4	Good	Excellent
Traffic Signal	0.29	7	Good	Excellent
Partial Median U-Turn E-W	0.29	7	Good	Excellent
Quadrant Roadway N-E	0.43	9	Good	Excellent
Quadrant Roadway S-E	0.54	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	SR 23 / N 1000 E
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	9	468	7	43.23%	0.00%
Westbound	0	12	416	5	36.05%	0.00%
Southbound	0	12	19	17	7.23%	0.00%
Northbound	0	11	13	36	9.00%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	0.80	0.95		0.85		

Truck to PCE Factor	Suggested = 2.00	2.00
Multimodal Activity Level	Low	

Critical Lane Volume Threshold	2-phase signal	Suggested = 1800 (Urban), 1650 (Rural)	1800
	3-phase signal	Suggested = 1750 (Urban), 1600 (Rural)	1750
	4-phase signal	Suggested = 1700 (Urban), 1550 (Rural)	1700

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.17	1	Good	Excellent
Two-Way Stop Control E-W	0.19	2	Fair	Good
Displaced Left Turn	0.20	3	Good	Excellent
Partial Displaced Left Turn E-W	0.22	4	Good	Excellent
Median U-Turn E-W	0.22	4	Good	Excellent
Traffic Signal	0.23	6	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.23	6	Good	Excellent
Partial Median U-Turn E-W	0.23	6	Good	Excellent
1NS X 2EW Roundabout	0.27	9	Good	Excellent
Split Intersection E-W	0.41	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	SR 23 / N 1000 E
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	22	526	10	34.31%	0.00%
Westbound	0	51	625	29	35.63%	0.00%
Southbound	0	7	52	22	5.85%	0.00%
Northbound	0	9	30	30	1.74%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

# # # # # # # # # # # # #

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Partial Displaced Left Turn E-W	0.26	1	Good	Excellent
Displaced Left Turn	0.26	1	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.29	3	Good	Excellent
Unsignalized Restricted Crossing U-Turn E-W	0.29	3	Good	Excellent
Median U-Turn E-W	0.29	3	Good	Excellent
Partial Median U-Turn E-W	0.29	6	Good	Excellent
Traffic Signal	0.32	7	Good	Excellent
1NS X 2EW Roundabout	0.38	8	Good	Excellent
Split Intersection E-W	0.44	9	Good	Excellent
Quadrant Roadway S-E	0.51	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Queen Road
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	**Left**	**Thru**	**Right**	Heavy Vehicles	Volume Growth
Eastbound	0	3	428	74	33.79%	0.00%
Westbound	0	0	336	18	47.46%	0.00%
Southbound	0	48	80	4	1.82%	0.00%
Northbound	0	33	23	4	6.12%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

# # # # # # # # # # # # #

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Displaced Left Turn	0.19	1	Good	Excellent
Partial Displaced Left Turn E-W	0.21	2	Good	Excellent
Partial Median U-Turn E-W	0.21	2	Good	Excellent
Median U-Turn E-W	0.22	4	Good	Excellent
Traffic Signal	0.25	5	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.28	6	Good	Excellent
1NS X 2EW Roundabout	0.28	7	Good	Excellent
Quadrant Roadway N-E	0.34	8	Good	Excellent
Quadrant Roadway N-W	0.34	8	Good	Excellent
Quadrant Roadway S-E	0.36	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Queen Road
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	7	538	47	37.44%	0.00%
Westbound	0	2	592	51	31.36%	0.00%
Southbound	0	32	50	6	0.00%	0.00%
Northbound	0	50	48	6	0.96%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

# # # # # # # # # # # # #

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Displaced Left Turn	0.25	1	Good	Excellent
Partial Displaced Left Turn E-W	0.27	2	Good	Excellent
Partial Median U-Turn E-W	0.27	2	Good	Excellent
Median U-Turn E-W	0.28	4	Good	Excellent
Traffic Signal	0.30	5	Good	Excellent
Unsignalized Restricted Crossing U-Turn E-W	0.30	5	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.30	7	Good	Excellent
1NS X 2EW Roundabout	0.35	8	Good	Excellent
Quadrant Roadway N-E	0.44	9	Good	Excellent
Quadrant Roadway N-W	0.44	9	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Pioneer Drive
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	32	363	40	40.89%	0.00%
Westbound	0	92	319	56	34.84%	0.00%
Southbound	0	50	22	40	44.38%	0.00%
Northbound	0	77	24	63	9.16%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

# # # # # # # # # # # # #

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Partial Displaced Left Turn E-W	0.23	1	Good	Excellent
Displaced Left Turn	0.23	1	Good	Excellent
Partial Median U-Turn E-W	0.26	3	Good	Excellent
1NS X 2EW Roundabout	0.28	4	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.28	5	Good	Excellent
Median U-Turn E-W	0.31	6	Good	Excellent
Traffic Signal	0.33	7	Good	Excellent
Quadrant Roadway N-E	0.35	8	Good	Excellent
Split Intersection E-W	0.39	9	Good	Excellent
Quadrant Roadway S-W	0.42	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Pioneer Drive
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	41	507	24	27.77%	0.00%
Westbound	0	124	594	70	25.22%	0.00%
Southbound	0	49	38	68	32.10%	0.00%
Northbound	0	38	29	142	2.33%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

# # # # # # # # # # # # #

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Partial Displaced Left Turn E-W	0.29	1	Good	Excellent
Displaced Left Turn	0.29	1	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.35	3	Good	Excellent
Median U-Turn E-W	0.37	4	Good	Excellent
Partial Median U-Turn E-W	0.39	5	Good	Excellent
1NS X 2EW Roundabout	0.41	6	Good	Excellent
Traffic Signal	0.43	7	Good	Excellent
Quadrant Roadway N-E	0.48	8	Good	Excellent
Split Intersection E-W	0.48	8	Good	Excellent
Bowtie E-W	0.58	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Oak Drive
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	113	373	66	35.77%	0.00%
Westbound	0	86	399	41	34.45%	0.00%
Southbound	0	30	151	83	8.42%	0.00%
Northbound	0	35	152	46	11.58%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

# # # # # # # # # # # # #

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Partial Displaced Left Turn E-W	0.25	1	Good	Excellent
Displaced Left Turn	0.25	1	Good	Excellent
Partial Median U-Turn E-W	0.30	3	Good	Excellent
Median U-Turn E-W	0.33	4	Good	Excellent
Traffic Signal	0.35	5	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.35	5	Good	Excellent
1NS X 2EW Roundabout	0.36	7	Good	Excellent
Bowtie E-W	0.51	8	Good	Excellent
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Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Oak Drive
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	148	422	66	24.42%	0.00%
Westbound	0	43	451	93	34.19%	0.00%
Southbound	0	80	260	214	3.25%	0.00%
Northbound	0	77	288	110	2.99%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level		**Low**

Critical Lane Volume Threshold			
	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Displaced Left Turn	**0.30**	1	Good	Excellent
Partial Displaced Left Turn E-W	**0.31**	2	Good	Excellent
Median U-Turn E-W	**0.40**	3	Good	Excellent
Partial Median U-Turn E-W	**0.40**	3	Good	Excellent
Traffic Signal	**0.49**	5	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	**0.60**	6	Good	Excellent
Bowtie E-W	**0.67**	7	Good	Excellent
1NS X 2EW Roundabout	**0.76**	8	Good	Excellent
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Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Plymouth Goshen Trail
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	1	456	10	38.08%	0.00%
Westbound	0	1	536	8	33.44%	0.00%
Southbound	0	0	0	20	13.00%	0.00%
Northbound	0	0	0	36	3.00%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

# # # # # # # # # # # # #

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.09	1	Good	Excellent
Two-Way Stop Control E-W	0.20	2	Fair	Good
Signalized Restricted Crossing U-Turn E-W	0.21	3	Good	Excellent
Displaced Left Turn	0.22	4	Good	Excellent
Median U-Turn E-W	0.22	4	Good	Excellent
Partial Displaced Left Turn E-W	0.23	6	Good	Excellent
Partial Median U-Turn E-W	0.23	6	Good	Excellent
Traffic Signal	0.24	8	Good	Excellent
Quadrant Roadway N-E	0.37	9	Good	Excellent
Bowtie E-W	0.43	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Plymouth Goshen Trail
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	1	742	13	30.03%	0.00%
Westbound	0	1	720	11	35.71%	0.00%
Southbound	0	0	0	41	3.00%	0.00%
Northbound	0	0	0	49	5.00%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.20	1	Good	Excellent
Two-Way Stop Control E-W	0.27	2	Fair	Good
Displaced Left Turn	0.30	3	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.30	3	Good	Excellent
Partial Displaced Left Turn E-W	0.31	5	Good	Excellent
Median U-Turn E-W	0.31	5	Good	Excellent
Partial Median U-Turn E-W	0.31	5	Good	Excellent
Traffic Signal	0.32	8	Good	Excellent
Quadrant Roadway N-E	0.57	9	Good	Excellent
Bowtie E-W	0.59	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	King Road / W 9A Road
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	19	363	75	39.79%	0.00%
Westbound	0	46	321	1	38.34%	0.00%
Southbound	0	0	24	39	3.71%	0.00%
Northbound	0	88	19	50	36.76%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level		**Low**

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Displaced Left Turn	0.21	1	Good	Excellent
Partial Displaced Left Turn E-W	0.23	2	Good	Excellent
Partial Median U-Turn E-W	0.25	3	Good	Excellent
1NS X 2EW Roundabout	0.26	4	Good	Excellent
Median U-Turn E-W	0.27	5	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.28	6	Good	Excellent
Traffic Signal	0.31	7	Good	Excellent
Quadrant Roadway N-W	0.33	8	Good	Excellent
Quadrant Roadway N-E	0.34	9	Good	Excellent
Split Intersection E-W	0.35	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	King Road / W 9A Road
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	30	463	105	32.13%	0.00%
Westbound	0	45	385	2	32.43%	0.00%
Southbound	0	0	25	38	9.22%	0.00%
Northbound	0	73	33	45	40.00%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level		**Low**

Critical Lane Volume Threshold			
	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Displaced Left Turn	0.23	1	Good	Excellent
Partial Displaced Left Turn E-W	0.24	2	Good	Excellent
Partial Median U-Turn E-W	0.28	3	Good	Excellent
Median U-Turn E-W	0.29	4	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.31	5	Good	Excellent
1NS X 2EW Roundabout	0.32	6	Good	Excellent
Traffic Signal	0.34	7	Good	Excellent
Quadrant Roadway N-W	0.38	8	Good	Excellent
Quadrant Roadway N-E	0.40	9	Good	Excellent
Split Intersection E-W	0.41	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Fir Road
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	1	443	3	38.65%	0.00%
Westbound	0	1	384	10	31.11%	0.00%
Southbound	0	10	7	5	10.45%	0.00%
Northbound	0	4	12	1	0.00%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.05	1	Good	Excellent
Two-Way Stop Control E-W	0.17	2	Fair	Good
Displaced Left Turn	0.18	3	Good	Excellent
Median U-Turn E-W	0.18	3	Good	Excellent
Traffic Signal	0.19	5	Good	Excellent
Partial Displaced Left Turn E-W	0.19	5	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.19	5	Good	Excellent
Partial Median U-Turn E-W	0.19	5	Good	Excellent
Quadrant Roadway N-E	0.35	9	Good	Excellent
Quadrant Roadway N-W	0.35	9	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Fir Road
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	East-West

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	7	598	4	33.39%	0.00%
Westbound	0	1	514	15	33.94%	0.00%
Southbound	0	13	19	10	2.71%	0.00%
Northbound	0	4	3	2	11.11%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold			
	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Unsignalized Restricted Crossing U-Turn E-W	0.11	1	Good	Excellent
Two-Way Stop Control E-W	0.22	2	Fair	Good
Displaced Left Turn	0.23	3	Good	Excellent
Traffic Signal	0.24	4	Good	Excellent
Partial Displaced Left Turn E-W	0.24	4	Good	Excellent
Median U-Turn E-W	0.24	4	Good	Excellent
Partial Median U-Turn E-W	0.24	4	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.25	8	Good	Excellent
Quadrant Roadway N-E	0.45	9	Good	Excellent
Quadrant Roadway N-W	0.45	9	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	9A Road
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	North-South

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	0	0	79	8.00%	0.00%
Westbound	0	0	0	7	0.00%	0.00%
Southbound	0	1	487	120	21.05%	0.00%
Northbound	0	153	674	12	24.81%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Two-Way Stop Control N-S	0.26	1	Fair	Good
Unsignalized Restricted Crossing U-Turn N-S	0.26	1	Good	Excellent
Partial Displaced Left Turn N-S	0.28	3	Good	Excellent
Displaced Left Turn	0.28	3	Good	Excellent
Signalized Restricted Crossing U-Turn N-S	0.29	5	Good	Excellent
Traffic Signal	0.30	6	Good	Excellent
Median U-Turn N-S	0.34	7	Good	Excellent
Partial Median U-Turn N-S	0.35	8	Good	Excellent
Quadrant Roadway S-E	0.48	9	Good	Excellent
Bowtie N-S	0.59	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	9A Road
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	North-South

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	0	0	93	2.00%	0.00%
Westbound	0	0	0	9	0.00%	0.00%
Southbound	0	1	837	121	16.85%	0.00%
Northbound	0	82	831	6	17.45%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	0.80	0.95		0.85		

Truck to PCE Factor	Suggested = 2.00	2.00
Multimodal Activity Level	Low	

Critical Lane Volume Threshold	2-phase signal	Suggested = 1800 (Urban), 1650 (Rural)	1800
	3-phase signal	Suggested = 1750 (Urban), 1600 (Rural)	1750
	4-phase signal	Suggested = 1700 (Urban), 1550 (Rural)	1700

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Two-Way Stop Control N-S	0.27	1	Fair	Good
Partial Displaced Left Turn N-S	0.33	2	Good	Excellent
Displaced Left Turn	0.33	2	Good	Excellent
Signalized Restricted Crossing U-Turn N-S	0.33	2	Good	Excellent
Traffic Signal	0.36	5	Good	Excellent
Median U-Turn N-S	0.38	6	Good	Excellent
Unsignalized Restricted Crossing U-Turn N-S	0.38	6	Good	Excellent
Partial Median U-Turn N-S	0.38	8	Good	Excellent
Quadrant Roadway S-E	0.61	9	Good	Excellent
Bowtie N-S	0.62	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Michigan Road
Date:	2045 AM
Number of Intersection Legs:	3
Which leg is the minor street?	W

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	3	0	113	2.92%	0.00%
Westbound	0	0	0	0	0.00%	0.00%
Southbound	0	1	636	2	22.93%	0.00%
Northbound	0	141	740	0	22.32%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold			
	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Two-Way Stop Control N-S	0.25	1	Fair	Good
Partial Displaced Left Turn N-S	0.32	2	Good	Excellent
Displaced Left Turn	0.32	2	Good	Excellent
Signalized Restricted Crossing U-Turn N-S	0.32	2	Good	Excellent
Traffic Signal	0.33	5	Good	Excellent
Continuous Green T W	0.33	5	Good	Excellent
Unsignalized Restricted Crossing U-Turn N-S	0.36	7	Good	Excellent
Quadrant Roadway N-W	0.37	8	Good	Excellent
Median U-Turn N-S	0.38	9	Good	Excellent
Partial Median U-Turn N-S	0.39	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	Michigan Road
Date:	2045 PM
Number of Intersection Legs:	3
Which leg is the minor street?	W

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	6	0	141	4.80%	0.00%
Westbound	0	0	0	0	0.00%	0.00%
Southbound	0	1	817	6	19.85%	0.00%
Northbound	0	152	827	0	22.89%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold			
Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Two-Way Stop Control N-S	0.32	1	Fair	Good
Partial Displaced Left Turn N-S	0.38	2	Good	Excellent
Displaced Left Turn	0.38	2	Good	Excellent
Signalized Restricted Crossing U-Turn N-S	0.38	2	Good	Excellent
Traffic Signal	0.40	5	Good	Excellent
Continuous Green T W	0.40	5	Good	Excellent
Quadrant Roadway N-W	0.43	7	Good	Excellent
Median U-Turn N-S	0.43	7	Good	Excellent
Partial Median U-Turn N-S	0.44	9	Good	Excellent
Unsignalized Restricted Crossing U-Turn N-S	0.63	10	Good	Excellent

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	275750
Location:	13th Road / Michigan Road
Date:	2045 AM
Number of Intersection Legs:	4
Major Street Direction	North-South

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	20	4	4	4.86%	0.00%
Westbound	0	2	9	132	6.24%	0.00%
Southbound	0	89	648	8	19.92%	0.00%
Northbound	0	4	697	1	25.81%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level		**Low**

Critical Lane Volume Threshold			
	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Partial Displaced Left Turn N-S	0.31	1	Good	Excellent
Displaced Left Turn	0.31	1	Good	Excellent
Quadrant Roadway N-W	0.34	3	Good	Excellent
Median U-Turn N-S	0.34	3	Good	Excellent
Signalized Restricted Crossing U-Turn N-S	0.35	5	Good	Excellent
Partial Median U-Turn N-S	0.36	6	Good	Excellent
Traffic Signal	0.37	7	Good	Excellent
Unsignalized Restricted Crossing U-Turn N-S	0.55	8	Good	Excellent
Bowtie N-S	0.61	9	Good	Excellent
Two-Way Stop Control N-S	1.01	10	Fair	Good

Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	US 30 West PEL Studies
Project Number:	0
Location:	13th Road / Michigan Road
Date:	2045 PM
Number of Intersection Legs:	4
Major Street Direction	North-South

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	3	4	1	0.00%	0.00%
Westbound	0	0	2	97	9.80%	0.00%
Southbound	0	102	846	19	17.17%	0.00%
Northbound	0	1	860	0	24.97%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
Multimodal Activity Level	**Low**	

Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800 (Urban), 1650 (Rural)**	**1800**
	3-phase signal	**Suggested = 1750 (Urban), 1600 (Rural)**	**1750**
	4-phase signal	**Suggested = 1700 (Urban), 1550 (Rural)**	**1700**

Capacity Analysis for Planning of Junctions

Summary Report

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TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
Two-Way Stop Control N-S	0.30	1	Fair	Good
Quadrant Roadway N-W	0.37	2	Good	Excellent
Partial Displaced Left Turn N-S	0.37	2	Good	Excellent
Displaced Left Turn	0.37	2	Good	Excellent
Signalized Restricted Crossing U-Turn N-S	0.37	2	Good	Excellent
Median U-Turn N-S	0.38	6	Good	Excellent
Partial Median U-Turn N-S	0.39	7	Good	Excellent
Traffic Signal	0.40	8	Good	Excellent
Unsignalized Restricted Crossing U-Turn N-S	0.54	9	Good	Excellent
Bowtie N-S	0.69	10	Good	Excellent

APPENDIX C: DESIGN CRITERIA

MEMORANDUM

Date: October 2, 2023

To: INDOT and Consultant Advisor Team

From: US 30 West ProPEL Study Consultant Team

US 30 WEST DESIGN CRITERIA AND PREFERENCES

The intent of this memorandum is to outline the design criteria and preferences for conceptual design to be used in the US 30 West ProPEL Study, which includes segments of both US 30 and US 31. The main design criteria and preferences for US 30 and US 31 are described below to guide the conceptual design efforts of this study. The premise of the topics enclosed are taken from HNTB's US 31 South Design Criteria and Preferences document and modified accordingly for the US 30 West ProPEL Study.

DESIGN CRITERIA

US 30 and US 31 design criteria for three separate scenarios from the Indiana Design Manual (IDM) are necessary for this study. The three design criteria utilized were Rural Arterial (IDM Fig 55-3A), Rural Freeway (3R) (IDM Fig 54-2A), and Rural Freeway New Construction (IDM Fig 53-1). The design criteria from the IDM are included in Attachment A. The three design criteria tables each serve different purposes within the study outlined below.

Table 1: Design Criteria for Concepts

Rural Arterial 3R	Rural Freeway (3R or 4R)	Rural Freeway New Construction
• New Signalized Intersections • Upgrades to Existing Traffic Signals • Reduced Conflict Intersections • Boulevard Left Intersections • Roundabouts • Adding or Extending Turn Lanes • Jughandle Intersections • Right-In/Right-Out & Two-Way Stop Controlled (TWSC) Intersections • Quadrant Roadways • Median Safety Improvements	• Auxiliary Lanes • Adding/Extending Accelerations Lanes • Green T or Offset T Intersections • Displaced Left Turn Intersections • Modifications to Existing Interchange Ramps or Ramp Terminals	• New Interchange • New Overpass/Underpass • Freeway

Other existing roadways within the study area should use 4R design criteria for the appropriate functional classification as provided in Chapter 54 of the IDM. New local access roads should use design criteria for rural or urban local roads provided in Chapter 53 of the IDM.

ACCESS MANAGEMENT

US 30 and US 31 are designated as a Tier 1 facility per the INDOT Access Classification System. The type and spacing of driveways, intersections, and interchanges are governed by current access management and driveway permitting guidelines along with IDM Chapters 46 and 48. These guidelines are summarized in Table 2 below. These guidelines have been expanded to apply to freeways and expressways, which are being considered in this study.

Table 2: Access Management Guidelines

Facility Type	Driveways	Unsignalized Intersections	Signalized Intersections	Interchanges
Arterials	• Residential; Right In/Right Out Only • Commercial; Full Access (1 per parcel) • 495 ft (min) spacing for all driveways for posted speed 60 mph	670 ft (min) spacing	½ mile (min) spacing	• Rural: 3 miles (min) spacing • Urban; 1 mile (min) spacing
Expressways	No Driveways allowed	• Right-In/Right-Out Access Only • ¼ mile (min) spacing	½ mile (min) spacing	• Rural: 3 miles (min) spacing* • Urban; 1 mile (min) spacing
Freeways	No Driveways allowed	No unsignalized Intersections Allowed	No signalized Intersections Allowed	• Rural: 3 miles (min) spacing* • Urban; 1 mile (min) spacing

*The Guide states 2 miles minimum spacing, but coordination with INDOT resulted in the desire for 3 mile minimum spacing for rural interchanges.

Additionally, the INDOT Access Management Guide specifies that median openings may exist along a Tier 1A Mobility Corridor, such as US 30 and US 31, where all of the following conditions exist:

- A 400 ft (min) spacing between median openings is provided
- The median opening will improve safety
- There is sufficient space for left turn lanes and recovery tapers
- The median opening will operate acceptably

ANTICIPATED DESIGN EXCEPTIONS

The ProPEL US 30 West study is a planning study. As a result, the study team will not prepare or request design exceptions as part of the study. However, the study team will develop design concepts assuming some design exceptions will be requested and received as part of any reasonable alternatives advanced from the PEL study. These assumptions are detailed in this subsection.

US 30 has three different median widths along the corridor:

- US 30 from SR 49 to US 421 = 26’-0”
- US 30 from US 421 to 1900’ W. of CR S 900 W = 40’-0”
- US 30 from 1900’ W. of CR S 900 W to Beech Road = 50’-0”

US 31 has two different median widths along the corridor

- US 31 from US 30 to 13th Road = 50'-0" to 52'-0"
- US 31 from 13th Road to CR 700 N = 60'-0"

These median widths meet design criteria for Rural Arterials (3R) and Rural Freeway (3R and 4R) but does not meet criteria for Rural Freeway New Construction. Should alternatives requiring Rural Freeway New Construction design criteria advance beyond this PEL study, it is assumed the designer will prepare and receive a Level 2 Design Exception for not meeting the required median width of 54.5 ft.

The right-of-way width requirements for the US 30 corridor ranges from 188 ft (min) for Rural Arterials to 192.5 ft (min). These widths are based on the design criteria provided in Attachment A and clear zone requirements provided in IDM Fig 49-2A. The need for new ditches, as described in a subsequent discussion on drainage, is not accounted for in these cross sections. Existing right-of-way widths were determined using existing plans. This information indicates that the existing right of way width is 200 ft, 100 ft either side of the centerline of the roadway. Should alternatives advance beyond this PEL study that require additional acquisition of right of way to satisfy clear zone requirements, it is assumed the designer would utilize guardrail to avoid acquiring right of way, if possible. The only exception may be right of way being required for frontage roads and other access connections.

The right-of-way width requirements for the US 31 corridor ranges from 188 ft (min) for Rural Arterials to 192.5 ft (min). These widths are based on the design criteria provided in Attachment A and clear zone requirements provided in IDM Fig 49-2A. The need for new ditches, as described in a subsequent discussion on drainage, is not accounted for in these cross sections. Existing right-of-way widths were determined from existing plans. This information indicates that the existing right of way widths vary from 150 ft to 300 ft. Should alternatives advance beyond this PEL study that require additional acquisition of right of way to satisfy clear zone requirements, it is assumed the designer would utilize guardrail to avoid acquiring right of way, if possible. The only exception may be right of way being required for frontage roads and other access connections.

There are several horizontal curves along each of the US 30 and US 31 corridors within the study limits. All existing curve radii exceed the required radius values based on a maximum superelevation rate of 8%.

Superelevation rates for interchange ramps vary widely from a minimum of 4.3% to a maximum of 9.8%. IDM Chapter 48 references 8% as the maximum for rural settings.

There are a substantial number of vertical curves within the US 30 W study limits. These vertical curves meet/exceed the design speeds along each corridor.

Along the mainline of US 30 there is one substandard vertical clearance where SR 331 crosses over US 30. The current vertical clearance is 15.33' while the requirement is 16.5 ft. Should the PEL study alternatives identify improvements in this area, it is assumed the designer will address the vertical clearance deficiency by lowering US 30 under the bridge.

Along the mainline of US 31 there is one substandard vertical clearance where US 31 crosses over the CFE Railroad and two adjacent county roads. The current vertical clearance is 13.56 ft over the county roads while the requirement is 16.5 ft. Should the PEL study alternatives identify improvements in this area, it is assumed the designer would prepare and receive a Level 1 Design Exception to avoid full reconstruction of US 31 over the county roads.

DESIGN ASSUMPTIONS

Pavement Treatments

Pavement treatments along US 30 and US 31 in the study area may vary slightly based on intersection, interchange, and corridor improvements. Table 3 below summarizes the anticipated pavement treatments according to the improvement type. All improvements with full depth widening are assumed to include resurfacing of existing pavement within the limits of the improvement.

Table 3: Pavement Treatments per Improvement Type

Resurfacing **Single Lift Mill and Overlay**	**Full Depth Widening** **Multi-Lift Mill and Overlay**	**Full Reconstruction and New Construction** **Full Depth Replacement**
• New Signalized Intersections • Upgrades to Existing Traffic Signals	• Adding or Extending Turn Lanes • Auxiliary Lanes • Added/Extending Acceleration Lanes • Reduced Conflict Intersections • Modifications to Existing Interchange Ramps or Ramp Terminals • Green T or Offset-T Intersections • Median Safety Improvements	• Roundabouts • New Interchange • New Overpass/Underpass • New/Modified Local Access Road • Freeway

US 30 and US 31 Cross Sections

In addition to the design criteria in Attachment A, the following assumptions apply to the cross sections of US 30 and US 31.

- All open medians should be depressed and should include cable barrier to prevent cross over crashes
- Maximum side slope behind guardrail or beyond the clear zone will be 2:1
- Retaining walls should be used to avoid impacts to environmental sensitive areas (e.g. historic properties, churches, cemeteries, resources). Retaining walls should not be used to avoid impacts to commercial or residential properties, unless there are concerns associated with underserved populations.

Crossroads

Design speed for crossing roadways will be the posted speed limit if posted within a ½ mile of US 30 or US 31. If not posted, a 55 mph miles per hour (mph) design speed will be used.

Right of Way Acquisition

Total takes of parcels shall be assumed when the proposed right of way line falls within 10 ft of an existing house or when the remaining parcel is considered unusable.

Drainage

The existing drainage patterns should be maintained along the corridor with the use of a roadside ditch on each side of US 30 and US 31, along with a median ditch. Existing ditches are assumed to be sufficient depth for underdrain outlet where required for pavement construction.

If no new additional impervious areas are being added, the existing drainage network is assumed to be sufficient, and no ditch modifications will be needed.

Drainage detention needs will not be analyzed as part of the study. Runoff from additional impervious area should be routed via an 8' flat bottom ditch with 2:1 side slopes and a depth of 2 ft. Runoff should be routed to an interchange area utilized for both post construction storm water measures and to mitigate additional run-off from new impervious area, or additional right of way must be provided to account for post construction stormwater measures and peak flow mitigation. This applies to both existing roads and additional pavement or new local access roads.

All new or existing infrastructure must have a minimum elevation above the 100-year flood elevation (1% exceedance probability) plus an additional 2 ft of freeboard throughout the corridor at or near any waterbody.

Existing culverts are assumed to be extended or replaced in-kind in pavement replacement or new pavement areas.

Bridges

It is anticipated that existing bridges throughout the study limits will not require full replacement by the time construction occurs based on current overall sufficiency ratings. The typical section of any required new bridges shall match that of the adjacent roadway. The length of new bridges should be sized based on the following guidelines.

- Bridge over roadways
  - Bridge openings should, if possible, satisfy the required clear zone width for the roadway it crosses
  - Bridges should include slope walls that eliminate the need for guardrail along the underpass road
- Bridges over Waterways
  - For new bridges near an existing bridge
    - If less than 50 ft from an existing bridge, the utilize 1:1 expansion ratio based on the distance from the existing bridge
    - If more than 50 ft from existing bridge, then utilize a 2:1 expansion ratio based on the distance from the existing bridge
  - For new bridges not near an adjacent bridge:
    - If the new bridge length is greater than the mapped floodway or stream, utilize the floodway limits as the bridge length

    - If there is no mapped floodway but a mapped floodplain, utilize the floodplain limits as a bridge length if the calculated value is greater than the floodplain width.
- In almost no case should a proposed bridge be smaller than an existing bridge over the same waterway.

Bridges are assumed to be prestressed precast concrete beams with a structure depth of 8 ft or composite steel plate girders with a structure depth of 6 ft. Two span structures are assumed for bridges spanning over US 30 and US 31. Wall pier shall be utilized in the median. All new bridges shall assume slopewall for cost estimating purposes. Bridge aesthetics are not anticipated as part of this study.

Interchanges

For freeway alternatives, the preferred interchange type for use in the corridor is a diamond interchange unless other interchange types are required for capacity requirements or adjacent impacts are significant. Along US 30, there is an airport adjacent to US 30 near the SR 49 interchange. Throughout a significant portion of US 30 west of Plymouth, there is an active railroad line running parallel along the south side of the roadway. For the interchange terminals, the spacing shall be 800'. The interchange type is assumed to be the starting point for all interchange concepts developed in this PEL study. Refinements to this interchange type should be made, as necessary, to minimize impacts to the surroundings. The amount of design refinement suggested for the Level 2 and Level 3 screenings are documented in the ProPEL US 30/31 Conceptual Design and Cost Estimating Memorandum prepared by HNTB.

For non-freeway alternatives, low-cost interchange solutions are preferred over that of a diamond interchange. An example of a low-cost interchange type is the US 35 and Old SR 25 interchange near Logansport where right-in/right-out freeway ramps connect to the side streets at full access intersections.

Regardless of interchange type or facility type, the first access point along the crossroad should be located 750 ft or more from the off ramp of the interchange per IDM 48-6.06. The first full access point along US 30 or US 31 from the ramp terminal should be a minimum of 1,320 ft and the first right-in/right-out access point should be 750 ft minimum.

Roadway Lighting and ITS

Roadway lighting and ITS will not be included in the conceptual design process of this PEL study as it has no significant impact on the cost or footprint of the alternatives being evaluated.

Intersections At-Grade

All intersections should be designed using the Indiana Design Vehicle (WB-65) per IDM Fig 46-1E.

Intersections are intended to provide adequate intersection sight distance per IDM 46-10.

Acceleration and deceleration lanes will be provided for all intersections with right-in-right-out access per IDM 46-3.02(05).

Reduced Conflict Intersections (RCI)

The study corridors, including both US 30 and US 31, provide a U-turning radius of 62 ft for U-turns originating in a left turn lane when the median is 50 ft. wide. This width is less than 82 ft radius required for a WB-65 design vehicle as stated in IDM Figure 46-12K. For this reason, all U-turn movements at Reduced Conflict Intersections (RCI) should provide a 20 ft bulb out for accommodating U-Turns. Should median openings be closed, considerations should also be given to providing this bulb-out at remaining median openings where U-turn movements are expected.

Acceleration lanes should be provided to aid accelerating upon completion of their U-turn movement. These should be provided due to the high-speed nature of the US 30 and US 31 corridors. These acceleration lanes may also serve dual purpose as right turn lanes at RCI's.

Spacing of U-turn lanes at RCI's should be 800 ft (max) based on INDOT's 2022 presentation for Design Considerations for RCI Intersections at the INDOT Highway Design Conference.

Left turn lanes from the mainline to the crossroad should not be provided unless capacity issues are expected at the downstream U-turn movement.

Attachment A

US 30 West ProPEL
Design Criteria

US 30 West ProPEL Design Criteria	Rural Arterial (3R)	Rural Freeway (3R)	Rural Freeway (Recon)	Rural Local Road
IDM Design Criteria	IDM Fig 55-3A	IDM Fig 54-2A	IDM Fig 53-1	IDM Fig 53-5
Design Speed, mph	60 (posted speed)	60 (posted speed)	70	35
Travel Lane Width	12 ft	12 ft	12 ft	10 ft
Travel Lane Cross slope	2%	2%	2%	2%
Shoulder Right	Paved: Desirable 10 ft / Min 8 ft Usable: Desirable 11 ft / Min 9 ft	Usable: 11 ft / Paved 10 ft	Usable: 11 ft / Paved 10 ft	Usable: 2 ft
Shoulder Left	Paved: Min 4 ft Useable: Min 5 ft	Paved: Min 4 ft Useable: Min 5 ft	Paved: Desirable 8 ft / Min 4 ft Usable: Desirable 9 ft / Min 5 ft	N/A
Shoulder Cross slope	Paved Width ≤ 4 ft: 2% Paved Width > 4 ft: 4% 6% Sealed Aggregate	Paved Width ≤ 4 ft: 2% Paved Width > 4 ft: 4%	Paved Width ≤ 4 ft: 2% Paved Width > 4 ft: 4%	2%
Auxiliary Lane Width	Des: 12 ft / Min: 11 ft	12 ft	12 ft	10 ft
Auxiliary Shoulder Width	Same as next to travel lane (Min 2 ft)	Left & Right: Des: 12 ft / Min: 6 ft	Right 10 ft (6 ft Min) / Left 4 ft	4 ft
Median Width Depressed	Existing	Existing	Des: 100 ft / Min: 54.5 ft	N/A
Median Flush w/ CMB	Existing	Existing	Des: 30.5 ft / Min: 26.5 ft	N/A
Ditch and Sideslope (cut)	2:1 or flatter, existing, 2:1 or flatter	2:1 or flatter, existing, 2:1 or flatter	6:1 , 4 ft , 4:1	4:1 , 4 ft , 4:1
Sideslopes (fill)	2:1 or flatter	2:1 or flatter	6:1 to clear zone, 3:1 max to toe	4:1
Median Slopes	Des: 8:1 / Max: 4:1	Des: 8:1 / Max: 4:1	Des: 8:1 / Max: 5:1	N/A