I-10 LAKE CHARLES
CALCASIEU RIVER BRIDGE

APPENDIX A

Purpose and Need Technical Memorandum

I-10 CALCASIEU RIVER BRIDGE

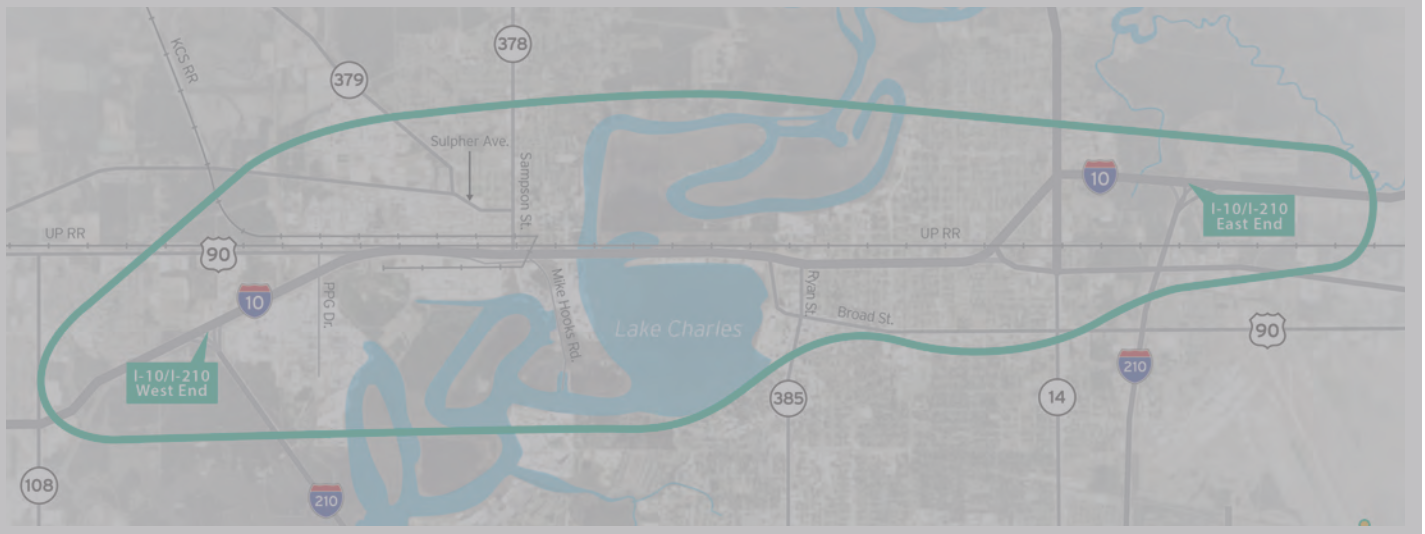
I-10/I-210 West End - I-10/I-210 East End

I-10 LAKE CHARLES
CALCASIEU RIVER BRIDGE

PURPOSE AND NEED TECHNICAL MEMORANDUM

State Project Number: H.003931
Calcasieu Parish, Louisiana

November 2017



U.S. Department of Transportation
Federal Highway Administration

DOTD
LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

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1.0 INTRODUCTION

1.1 Purpose and Need

A purpose and need statement is a fundamental requirement when developing a proposal that will require future National Environmental Policy Act (NEPA) documentation – such as an Environmental Impact Statement (EIS). Clarity of purpose and confirmation of need are sound practices when developing large scale projects requiring public expenditure.

It has three parts: the purpose, the need, and other objectives of the project.

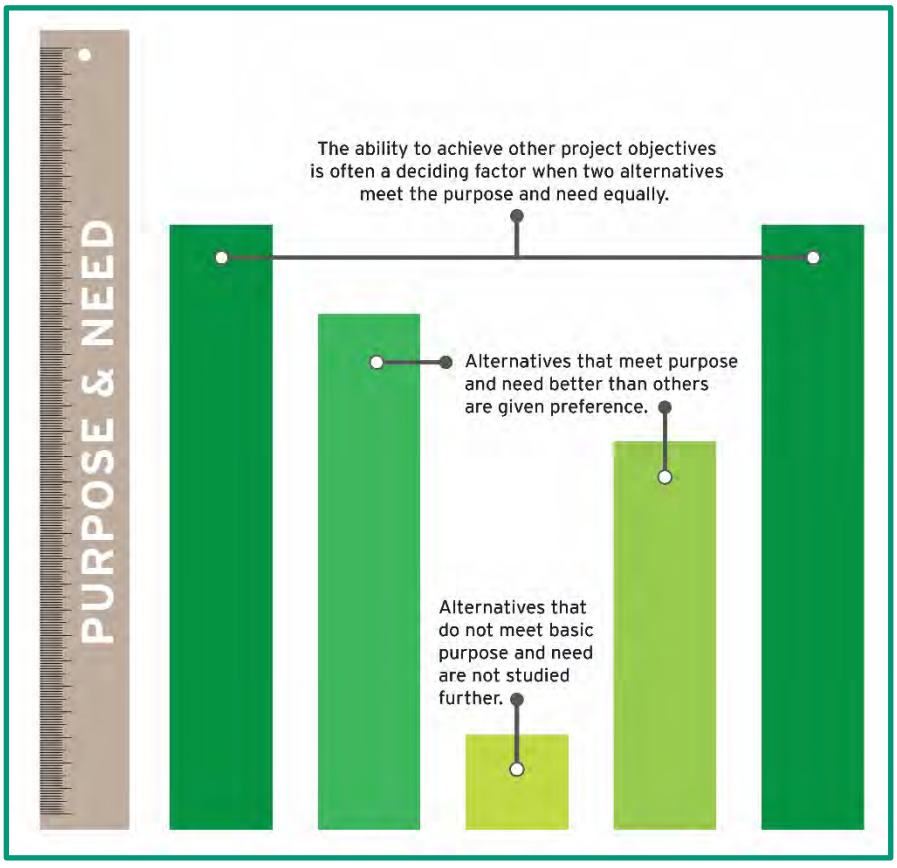
- The *purpose* defines the transportation problem to be solved.
- The *need* provides data to support the problem statement (purpose).
- The other *objectives* describe other issues that need to be addressed as part of a successful solution to the problem.

The purpose and need statement is intended to clarify the expected outcome of public expenditure and to justify that expenditure - *what is to be accomplished and why it is necessary.* It is used to guide the development of alternatives, and is a fundamental element when developing evaluation criteria for selection between alternatives. The purpose and need can be thought of as a 'measuring stick' for the project alternatives, helping determine to what extent each alternative meets each project need (**Figure 1**).

Alternatives that do not meet the basic needs of a project are not studied further. Assuming all other concerns are equal, if one alternative meets the purpose and need better than another, then that alternative is likely favored as the project moves forward.

Other established objectives of the project are used to sharpen the decision framework when two or more alternatives meet the purpose and need and other criteria need to be employed to further screen and evaluate alternatives. In general, alternatives that best achieve the project objectives are advanced forward for more detailed evaluation through the NEPA process. Other project goals are identified in **Section 3.2**.

Figure 1: Measuring Alternatives Using Purpose and Need



This document provides the background information and data to support the purpose and need for improvements to Interstate 10 (I-10) between the I-10/Interstate 210 (I-210) west and I-10/I-210 east interchanges, including the Calcasieu River Bridge in Lake Charles, Louisiana (henceforth referred to as the "Project").

In summary, the purpose and need of the proposed Project is to:
(a) address the lack of system connectivity on I 10;
(b) reduce congestion and improve mobility on I 10 and along Sampson St.;
(c) address structural and functional roadway and bridge deficiencies; and
(d) address safety concerns on I 10 and the Calcasieu River Bridge.

1.2 Study Area

The proposed Project is in an urbanized area of Calcasieu Parish, Louisiana. The study area limits include and follow various natural and man-made structural features that are influential to the existing landscape. The study area is large enough to encompass the range of alternatives developed to meet the purpose and need of the project, and represents the area for assessing direct impacts of the proposed Project.

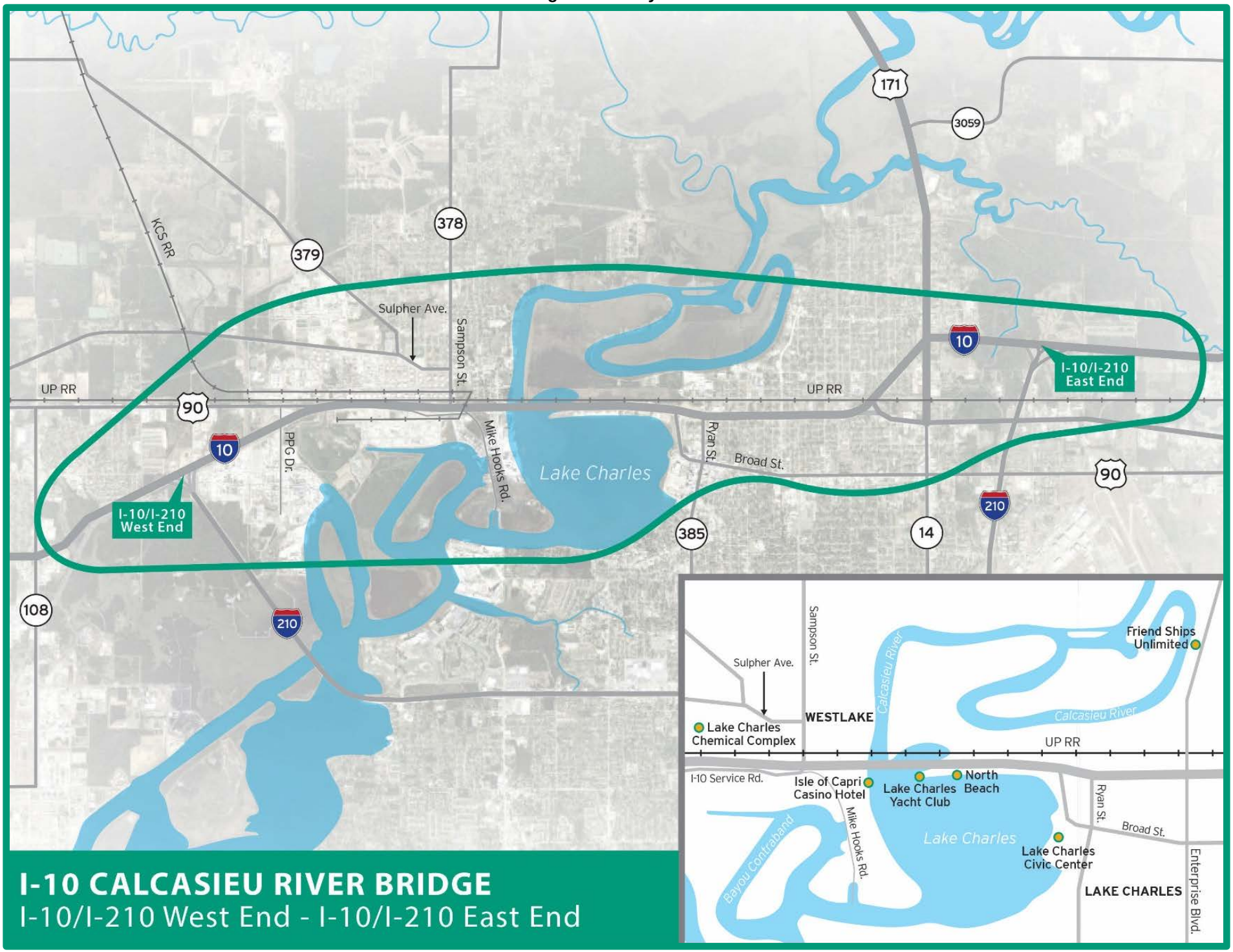
As shown in **Figure 2**, the west and east limits of the study area encompass the project's logical termini: I-10/I-210 west end interchange to I-10/I-210 east end interchange. The northern study area boundary includes the Lake Charles Chemical Complex (Sasol/Phillips 66), portions of the City of Westlake, and Friend Ships Unlimited, a non-profit organization located on the banks of the Calcasieu River. The southern study area boundary encompasses large industrial/chemical complexes west of the lake, and generally follows along the banks of the lake to Broad Street (St.), bounding residential areas located adjacent to existing I-10.

Lake Charles, Bayou Contraband and the Calcasieu River, along with areas of marshland, make up the center portion of the study area. The study area is predominantly residential to the east of the lake and industrial to the west of the lake. Other prominent features include the Lake Charles Civic Center on the east bank of the lake; the Lake Charles Yacht Club and North Beach on the north bank; and the Isle of Capri Casino Hotel on the west bank. There are two at-grade railroad crossings at Sampson St. north of I-10 - the Union Pacific (UP) and Kansas City Southern (KCS) railroad lines.

1.3 Background

The I-10 Calcasieu River Bridge opened to traffic in 1952. It was constructed as a part of the United States Highway 90 (US 90) system but was integrated as part of I-10 in the 1960s. The Calcasieu River Bridge helped ease congestion in the Lake Charles region by eliminating traffic delays caused by the drawbridge near the port on Shell Beach Dr. The new bridge also allowed ships to pass freely beneath its 135-foot (ft.) vertical span. The growth in the area over the last 60-plus years has increased demand along I-10, especially between the east and west interchanges with I-210, including the Calcasieu River Bridge.

Figure 2: Study Area



In the late 1970s, there were numerous accidents on the Calcasieu River Bridge that led to an investigation of skid resistance by the Louisiana Department of Transportation and Development (DOTD). There was also a consideration for placing an epoxy overlay on the bridge. An inspection of the bridge identified that there were numerous corrosion-induced structural deficiencies as well as concerns about impact safety of the existing river piers. Consideration of an overlay was abandoned in favor of a replacement feasibility study in the 1980s. A brief study at that time indicated that the bridge height may be lowered and that continuous steel or concrete spans could be placed across the channel with the additional lanes to carry traffic that utilize the bridge.

An engineering and environmental feasibility study was commissioned by DOTD in 2000 for I-10 between PPG Dr. and US 90. The feasibility study examined numerous project alternatives for the replacement of the existing high-level bridge with different bridge profiles and heights, as well as replacing the existing Sampson St. interchange with an interchange grade-separated from the at-grade railroad mainline crossings. Six technical memoranda were produced culminating in a *Comprehensive Preliminary Alternatives Report* dated May 2002. The feasibility study concluded that replacement of the existing bridge on a new parallel alignment with a lower level bridge (73-ft vertical clearance) was the best solution, was feasible, and should be advanced.

Since the feasibility study, several environmental studies have been started for I-10 and Sampson St. and subsequently put on hold due to the need for additional bridge height studies and the discovery of hazardous materials contamination near the Sampson St. interchange. A timeline of events through present-day is presented in **Attachment A.**

2.0 NEED FOR THE PROPOSED ACTION

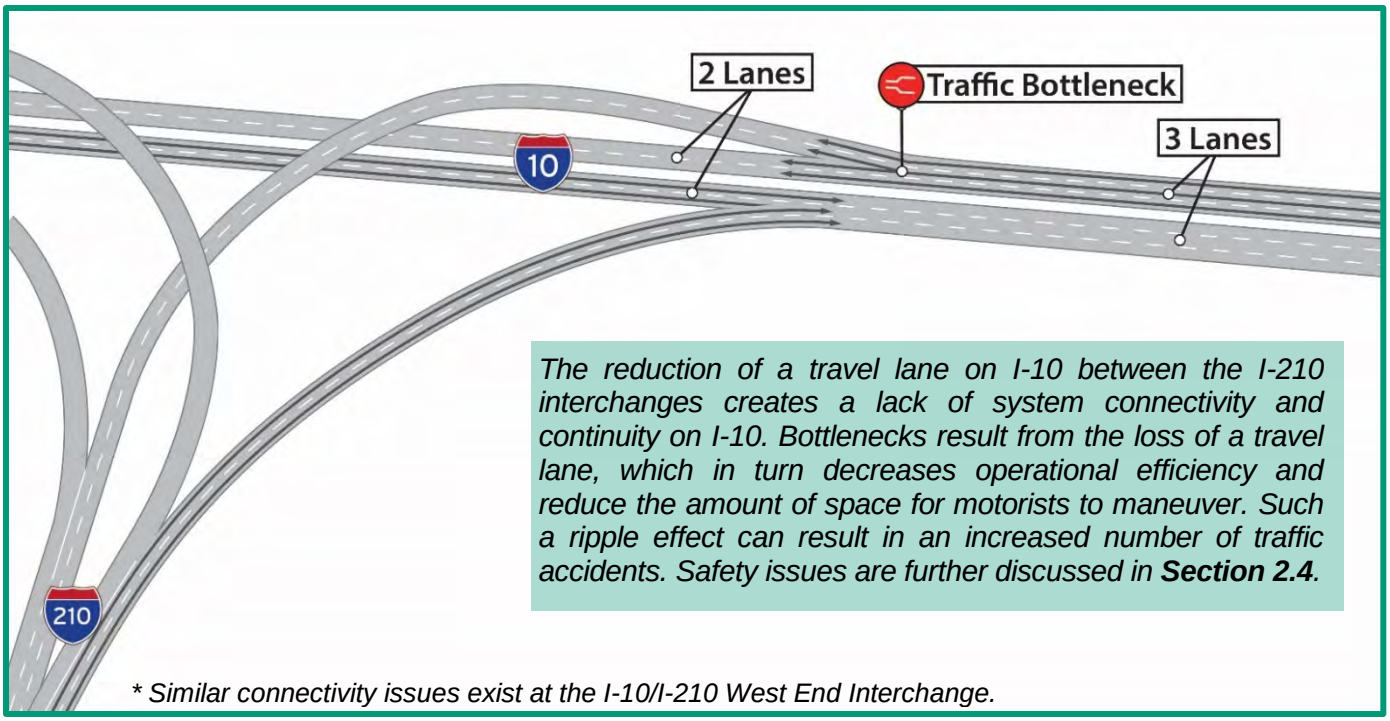
The following sections provide a summary of the current and future conditions in the study area which support the need for improvements to the I-10 corridor. These needs include:

- Inadequate System Connectivity (**Section 2.1**);
- Increased Traffic Congestion (**Section 2.2**);
- Roadway Deficiencies (**Section 2.3**); and
- Safety Concerns on I-10 and the Calcasieu River Bridge (**Section 2.4**).

2.1 Inadequate System Connectivity

As shown in **Figure 3**, the existing I-10 typical roadway section outside of the I-210 west end and east end interchanges is a six-lane facility (three in each direction), whereas I-10 within the I-210 west end and east end interchanges, including the Calcasieu River Bridge, is a four-lane facility (two lanes in each direction).

Figure 3: System Connectivity Problems at the I-10/I-210 East End Interchange *



** Similar connectivity issues exist at the I-10/I-210 West End Interchange.*

2.2 Increased Traffic Congestion

Transportation Demand

The Imperial Calcasieu Regional Planning and Development Commission (IMCAL) serves as the Metropolitan Planning Organization (MPO) for the Lake Charles area and is responsible for transportation planning activities within the region. The Metropolitan Transportation Plan (MTP) for the Lake Charles Urbanized Area (MTP 2040)[1] identifies both Sampson St. and I-10 in the study area as roadways in need of improvement due to transportation demand. Sampson St. from the I-10 Frontage Rd. to Sulphur Avenue (Ave.) are forecast to be deficient by the year 2030, and I-10 from LA 27 (located approximately two miles west of the study area) to Ryan St. (located immediately east of Lake Charles) is forecast to be deficient by 2040. This stretch of I-10 includes the Calcasieu River Bridge. Improvements to the Calcasieu River Bridge are also included in the MTP as a *test project*, or high-priority project as identified by the public, local government agencies, and MPO committee members that is outside of the financially constrained roadway network.

Likewise, proposed improvements along I-10 in the study area are listed as *Priority A Megaprojects* in the 2015 Louisiana Statewide Transportation Plan (STP). *Priority A Megaprojects* include large-scale transportation improvement projects that are considered of the highest priority to the state, having regional and/or statewide impact and requiring special funding outside of normal DOTD funding mechanisms. *Priority A Megaprojects* associated with the proposed Project include:

[1] *Lake Charles Urbanized Area MTP 2040, Calcasieu Parish Transportation Plan, Final Report, July 2014.*

- Widening I-10 from the I-10/I-210 west end interchange (west Project limit) to US 90, and replacing the I-10 Calcasieu River Bridge and approaches; and
- Widening I-10 from the UP railroad overpass (located east of the Calcasieu River Bridge) to the I-10/I-210 east end interchange (east Project limit).

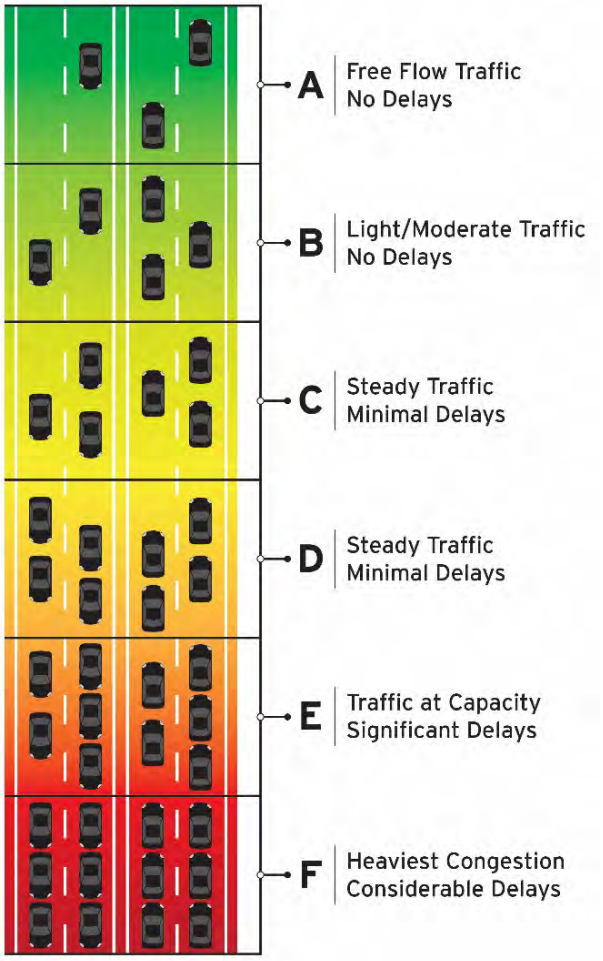
Capacity and Traffic Operations

The capacity of a transportation facility is defined as the maximum number of vehicles which can be accommodated under given conditions with a reasonable expectation of occurrence. The number of daily vehicles on the Calcasieu River Bridge currently exceeds capacity of the facility, with approximately 71,940 vehicles per day (vpd) travelling on the bridge compared to its capacity of 70,876 vpd. The number of vehicles traveling on the bridge is anticipated to increase to 108,628 vpd in 2040 under No-Build conditions, exceeding the bridge's safe capacity by 37,752 vpd.[2]

The number of vehicles travelling per day on Sampson St. in the study area is also anticipated to exceed capacity in the future. Approximately 28,186 vpd travel on Sampson St. between Sulphur Ave. and I-10 under existing conditions. This number is anticipated to increase to an average 40,039 vpd in 2040 under No-Build conditions, exceeding the existing 34,636 vpd capacity threshold of Sampson St.[2]

Level of Service (LOS) is a qualitative measure used to depict operational conditions within a traffic stream or at an intersection. It is generally described in terms of speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. LOS is designated by letters "A" through "F", with LOS A representing free-flow traffic conditions and LOS F representing heavily congested traffic operating conditions. A graphical representation of LOS is presented in **Figure 4.**

Figure 4: Level of Service Designations



The operational analysis was conducted based Highway Capacity Manual 2010 procedures. Highway Capacity Software 2010 and Synchro 8 were used to conduct the existing and future operational analyses.

LOS D is typically considered the threshold of acceptable traffic conditions in an urban area. The study area is considered an urbanized area. **Table 1** below shows the results of the operational analysis for existing and 2040 future-year conditions for I-10 segments operating below LOS D (LOS E or LOS F)

[2] *Source: IMCAL Travel Demand Model, 2013.*

in existing or future conditions.[3,4]

Table 1: I-10 Segments Operating at LOS E or F in Existing and/or Future Conditions

Roadway Segment	LOS	Peak Period
Existing Conditions (2012)		
EB I-10 between LA 108 & I-10/I-210 west end interchange	F	PM
WB I-10 between Veterans Memorial Blvd. & Sampson St.	E	PM
No Build Conditions (2040)		
EB I-10 between I-10 Frontage Rd. (south of I-10 & west of Sampson St.) & Veterans Memorial Blvd.	E	PM
WB I-10 between I-10/I-210 west end interchange & LA 108	F	AM PM
EB I-10 between LA 108 & I-10/I-210 west end interchange	F	AM PM
WB I-10 between Sampson St. & PPG Dr.	F	AM
WB I-10 between Veterans Memorial Blvd. & Sampson St.	F	PM

AM PM

*[3] Traffic and safety analysis study area extends slightly farther west (approximately 3 miles) from the Project study area (**Figure 2**).*
[4] Operational analysis based on May 2012 Field Count Data.

As shown in **Table 1**, westbound I-10 between Veterans Memorial Blvd. and Sampson St., which includes the Calcasieu River Bridge, operates at LOS E in the PM peak travel period under existing conditions. At LOS E, motorists have little room to maneuver as vehicles are closely spaced and driver comfort is generally considered poor. Conditions in this area are anticipated to worsen in the future, with traffic operating at LOS F in 2040. Motorists would experience heavy traffic jams while traveling on the steep-inclined Calcasieu River Bridge.

The analysis also shows heavy congestion under existing conditions located immediately outside of the west end project limits (I-10/I-210 interchange). Motorists traveling eastbound on I-10 in this area experience LOS F operational conditions. These heavily congested conditions on I-10 continue as motorists travel eastbound inside the project limits and experience the loss of one lane. Even with this lane loss, many motorists still choose to use I-10 (instead of I-210) for not only through travel, but also to reach popular destinations such as downtown Lake Charles, the City of Westlake, the chemical complexes immediately adjacent to I-10 that serve as important employment centers, and other destinations such as the Isle of Capri Casino. The resulting heavily congested conditions, along with the lane reduction on I-10 at the I-210 interchange and resulting bottleneck, further impair both operational and safety conditions in the study area. Under No-Build conditions, operations in the area are expected to remain functioning at LOS F.

The two at-grade railroad crossings at Sampson St. north of I-10 adversely affect local traffic. Per the DOTD railroad inventory, approximately 16 trains a day cross Sampson St. on the UP railroad and approximately 2 trains a day cross Sampson St. on the KCS railroad. Frequent delays at these crossings impede not only commercial and passenger vehicles, but also emergency response vehicles from entering or exiting the City of Westlake. These frequent blockages diminish the operational efficiency of Sampson St., creating congestion and delay.

2.3 Roadway Deficiencies

Structural Deficiencies

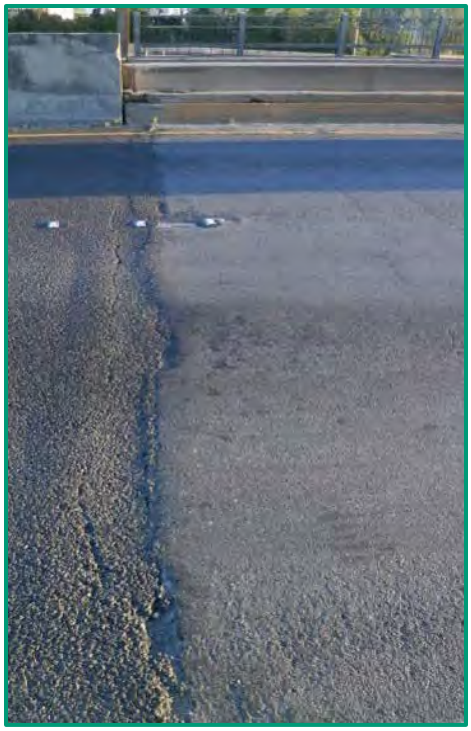
Structurally deficient is a status used to describe a bridge that has one or more structural defects that require attention. Existing structural integrity issues of the Calcasieu River Bridge include, but are not limited to:

- Corrosion and loss of bridge steel sections[5];
- Corrosion of pin-type connections on bridge approach spans;
- Damaged electrical wiring;
- Warping of plates;
- Inadequate load limit for an interstate highway; and
- Cracking, spalling[6], and exposed aggregate on the bridge deck (**Figures 5 and 6**).

[5] Section loss is the loss of a bridge member's cross sectional area usually by corrosion or decay.
[6] A spall is a depression in a concrete member resulting from the separation and removal of a volume of the surface concrete. Spalls can be caused by corroding reinforcement, friction from thermal movement and overstress.

Figure 5: Large Spall in Bridge Overhang

Figure 6: Typical Widespread Traverse Cracking in Bridge Deck



The structurally deficient status does not indicate the severity of the defect, but rather that a defect is present. The primary considerations in classifying structural deficiencies are the bridge component condition ratings. The National Bridge Inventory (NBI) database contains condition ratings on three primary components of a bridge: the deck, superstructure, and substructure.

- The bridge deck is the supporting surface of the bridge.
- The bridge superstructure includes the structural elements that support the bridge deck, such as steel beams and concrete frames.
- The bridge substructure is essentially the bridge's foundation supporting the Superstructure, such as abutments and piers.

Bridge inspectors assign condition ratings by evaluating the severity of any deterioration of bridge components relative to their as-build condition, and the extent to which this deterioration affects the performance of the deck, superstructure and/or substructure being rated. These ratings provide an overall characterization of the general condition of the entire component being rated; the condition of specific individual bridge elements may be higher or lower. Bridge condition ratings range from 9 – excellent condition to 0 – failed. **Table 2** describes the bridge condition ratings in more detail.

A detailed inspection of the bridge, conducted in April 2016, provides insight into the condition (nature and severity) of these structural defects of the Calcasieu River Bridge. The inspection outlines the general conditions of the bridge deck, superstructure, and substructure elements of the west approach, main bridge, and east approach. A copy of the bridge inspection report is on file at the DOTD[7].

[7] *I-10 Calcasieu River Bridge, In-Depth Bridge Inspection Report, August 2016.*

Table 2: National Bridge Inventory (NBI) Bridge Condition Rating Categories

Rating	Condition Category	Example Description
9	Excellent	--
8	Very Good	No problems noted.
7	Good	Some minor problems.
6	Satisfactory	Structural elements show some minor deterioration.
5	Fair	All primary structural elements are sound but may have minor section loss, cracking, spalling, or scour.
4	Poor	Loss of section, deterioration, spalling, or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
3	Serious	Advanced section loss, deterioration, spalling, or scour.
2	Critical	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored, it may be necessary to close the bridge until corrective action is taken.
1	Imminent Failure	Major deterioration or section loss present in critical structural components, or obvious loss present in critical structural components, or obvious vertical or horizontal movement affecting structural stability. Bridge is closed to traffic, but corrective action may be sufficient to put the bridge back in light service.
0	Failed	Bridge is out of service and is beyond corrective action.

Source: Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges, Report No. FHWA-PD-96-001; 2010 Status of the Nation's Highways, Bridges, and Transit: Conditions & Performance, FHWA. https://www.fhwa.dot.gov/policy/2010cpr/chap3.cfm

According to the 2016 bridge inspection report, the elements identified in either poor or serious per the NBI rating scale (**Table 2**) include:

- The west and east approach superstructures (rated serious condition);
- The west and east approach substructures (rated serious condition);
- The main bridge superstructure (rated in poor condition); and
- The east approach deck (rated in poor condition).

The fact that a bridge is classified as structurally deficient does not imply that it is unsafe. A structurally deficient bridge, when left open to traffic, typically requires maintenance and repair to remain in service and eventual rehabilitation or replacement to address deficiencies. The bridge has undergone several major repair projects over the years, the most recent completed in 2013. Even still, costly additional improvements to the existing bridge would be necessary in the future, most likely on an annual basis. Based on the deficiencies identified during the April 2016 in-depth inspection, it is anticipated that $25 million to $30 million would be needed to cover recommended bridge repairs[8].

Functional Deficiencies

Functional deficiencies include features that prevent the roadway from handling the normal traffic volume expected of a major highway such as sharp curves, inadequate shoulder widths, and inadequate ramp lengths. Functional deficiencies exist along existing I-10 in the study area.

[8] *I-10 Calcasieu River Bridge Bride Repair Scoping Document, DOTD, October 2016.*

Functionally obsolete is a status used to describe a bridge that is no longer by design functionally adequate for its task. While structural deficiencies are generally the result of deterioration of the conditions of a facilities components, functional obsolescence generally results from changing traffic demands on the facility. The existing Calcasieu River Bridge is functionally obsolete.

Functional deficiencies along existing I-10 and the Calcasieu River Bridge are listed below[9] and shown graphically in **Attachment B**.

- There are not enough lanes to accommodate traffic flow.
- Roadway shoulder widths are below minimum design criteria throughout the I-10 corridor. This includes a one-foot offset from the edge of the travel lanes on the bridge, leaving no room for shoulders or sidewalks (**Figures 7 and 8**).
- Width of the I-10 median from the PPG Dr. to the Calcasieu River Bridge is below minimum design criteria.
- Acceleration and deceleration lanes do not meet required lengths per design criteria.
- I-10 exit and entrance ramps at Sampson St. do not meet design criteria for horizontal curve radius minimums or acceleration and deceleration lengths.
- I-10 entrance and exit ramp spacing and weaving distances do not meet design criteria.
- Steep bridge approach grades (5% on the east approach) exceed the recommended 3% maximum grade of design criteria (**Figure 7**).
- Vertical clearance above the bridge is 15 feet 5 inches, which does not meet the design criteria recommended 16.5 feet of vertical clearance over the entire roadway width, including the useable width of a shoulder (**Figure 8**).

Figure 7: Steep Bridge Grade

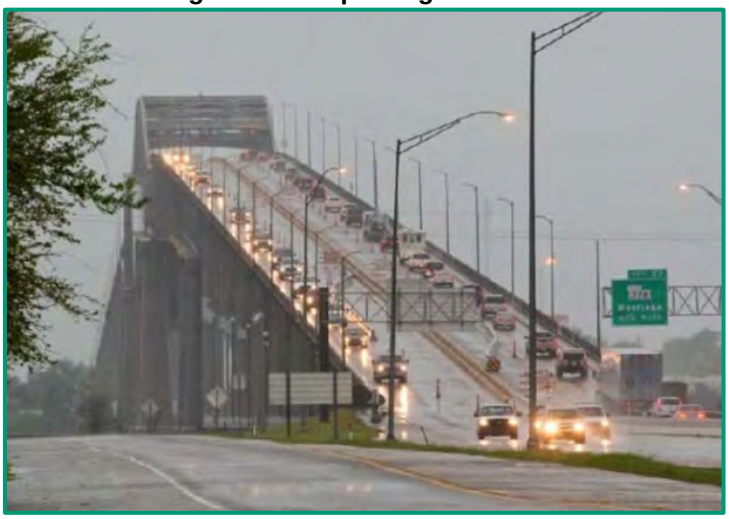


Figure 8: No Shoulders and Low Vertical Clearance

[9] *Referenced design criteria: LADOTD Design Criteria, 2017.*

Bridge Sufficiency Rating

The sufficiency rating of a bridge is a single numerical representation of the sufficiency of the bridge that ranges from 0 to 100, 0 representing an entirely insufficient or deficient bridge and 100 representing an entirely sufficient bridge. In calculating the rating, consideration is given to the structural adequacy and safety, serviceability and functional obsolescence, and essentiality of traffic service. A low sufficiency rating may be due to structural defects, narrow lanes, low vertical clearance, etc. Based on the results from the April 2016 in-depth inspection, the Calcasieu River Bridge was assigned a sufficiency rating of 6.6, making it eligible for replacement or rehabilitation using federal funding.

2.4 Safety Concerns on I-10 and the Calcasieu River Bridge

A conflict point is the point at which a motorist crossing, merging with or diverging from a road conflicts with another motorist using the same road. Conflict points are associated with increased levels of roadway accidents as motorists can only safely negotiate so many conflict points within a given area. Example conflict points in the study area include:

- **I-10/I-210 Interchanges (i.e., project limits)** – Conflict points result when I-10 is reduced from three-lanes in each direction outside of the project limits to two-lanes in each direction inside the project limits, thus creating bottleneck conditions and an increased possibility for traffic accidents (**Section 2.1**).
- **Weaving Segments on I-10** – When motorists merge and diverge on an interstate, the movements create conflict points as they interact with each other in a weaving pattern. Several of the I-10 entrance and exit ramps are spaced too close to each other and create conflict points as motorists have little room to maneuver across travel lanes. Segments of I-10 with weaving conflict points are shown in **Attachment B.**
- **I-10 Frontage Road** - The I-10 frontage road located south of existing I-10 and west of Lake Charles is generally bi-directional. Conflict points result when motorists traveling west on the frontage road need to turn left across on-coming traffic to access the roadways and commercial driveways extending directly off the frontage road.
- **Sampson St. -** Conflict points exist where Sampson St. crosses at-grade with both the UP and KCS railroad lines north of existing I-10. As previously mentioned, approximately 16 trains a day cross Sampson St. on the UP railroad; and approximately 2 trains a day cross Sampson St. on the KCS railroad.

The functional roadway and bridge deficiencies described in **Section 2.3** also create safety hazards for motorists. For example, due to the lack of shoulders on the Calcasieu River Bridge, vehicles that experience difficulties are not able to safely pull over out of the way of other motorists and potential hazards. The steep grades of the Calcasieu River Bridge (**Figure 7**) slow traffic on the up-slope and make it more difficult to stop on the down-slope. This is especially the case for heavy trucks that have difficulty ascending and descending the steep bridge slope. Collisions have also occurred with the existing bridge portals[10] by over-height vehicles because of low vertical clearance (**Figure 8**).

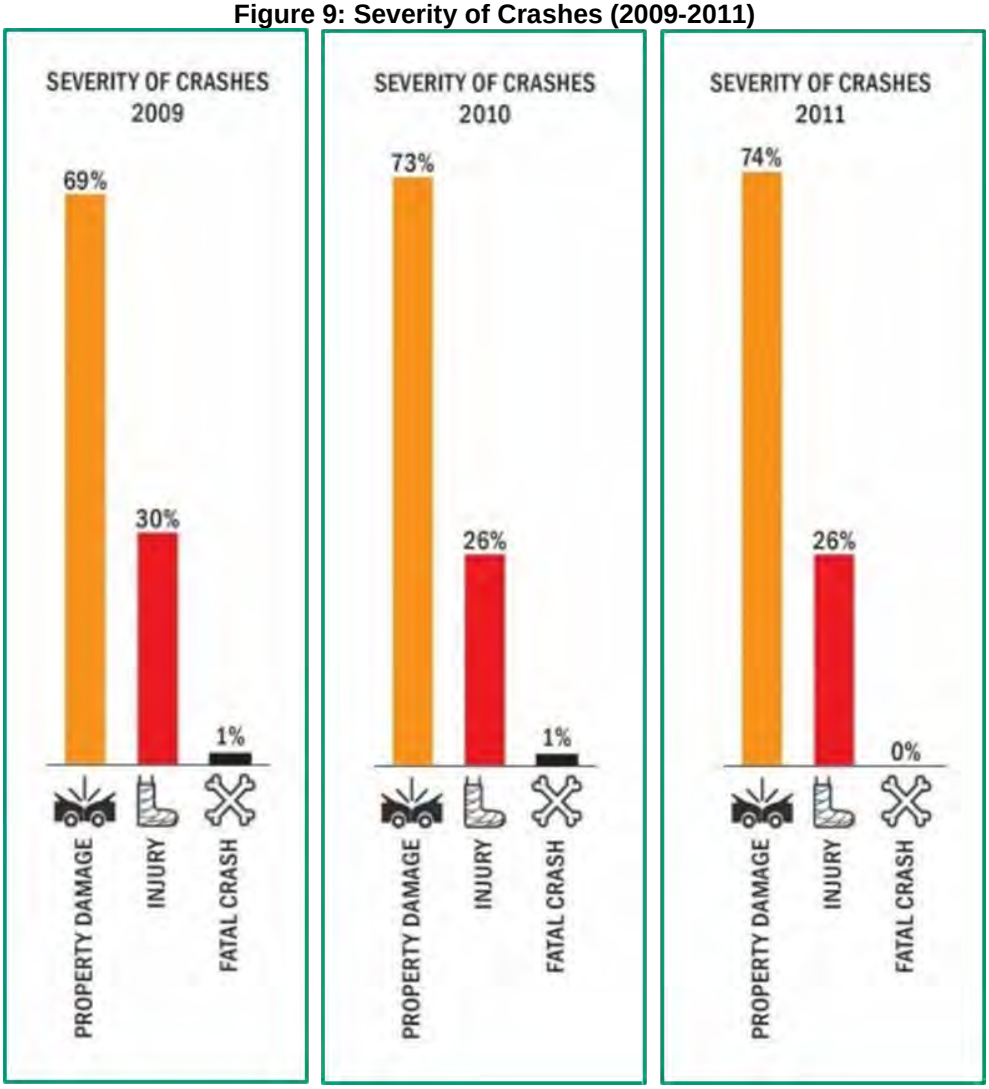
[10] A portal is the space between the batter braces (the inclined end post of a truss) at the end of a bridge.

Crash data from year 2009 to 2011 provided by DOTD showed a total of 1,240 crashes over the three-year period along I-10 in the study area[11], with 446 reported in 2009, 379 in 2010, and 415 in 2011. The severity of crashes for each year showed the following distributions (**Figure 9**):

- In 2009, 69% (307) involved property damage, 30% (134) involved injuries, and 1% (5) involved fatalities.
- In 2010, 73% (277) involved property damage, 26% involved injuries (98), and 1% (4) involved fatalities.
- In 2011, 74% (309) involved property damage, 26% (106) involved injuries, and there were no fatalities.

Comparatively, Louisiana statewide average severities showed, in general, slight differences in crash severity, with 64% property damage crashes (less than the study area) and 34% injury crashes and 2% fatality crashes (more than the study area).

Figure 9: Severity of Crashes (2009-2011)

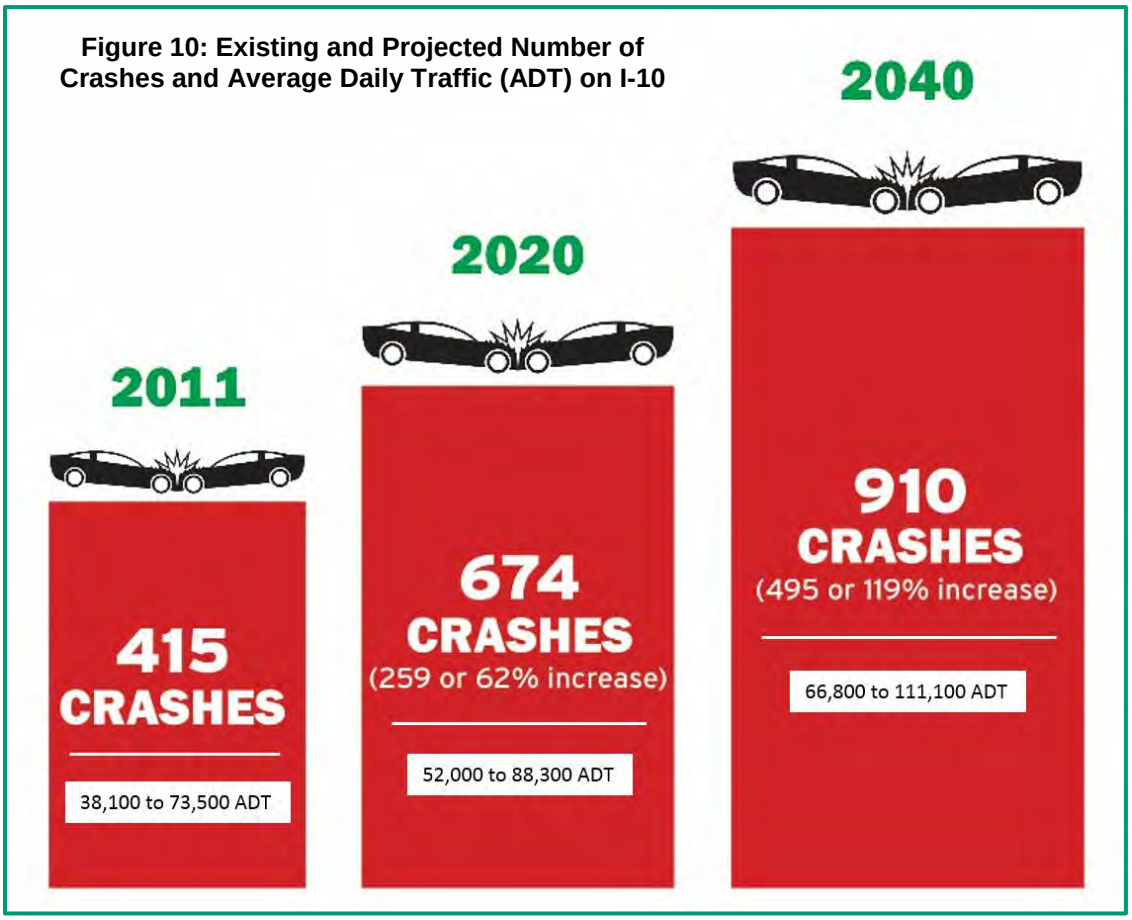


[11] *Traffic and safety analysis study area extends slightly farther west (approximately 3 miles) from the Project study area (**Figure 2**).*

During the same three-year period discussed above (2009-2011), the highest number of accidents were reported along I-10 between Miller Ave. and Ryan St., which includes the Calcasieu River Bridge. This span experienced a total of 189 crashes of which 128 were property damage only crashes, 61 crashes involved injuries and one crash resulted in a fatality.

The average Louisiana statewide crash rate for a rural interstate is 0.58 crashes per million vehicle miles. Crash rates between Miller Ave. and Ryan St., including the Calcasieu River Bridge, averaged 0.31 crashes per million vehicle miles from 2009-2011. While less than the 0.58 state average, safety remains a concern along I-10 and the Calcasieu River Bridge as the number of crashes under No-Build conditions[12] are anticipated to increase in future conditions (**Figure 10** and discussion below).

Figure 10: Existing and Projected Number of Crashes and Average Daily Traffic (ADT) on I-10



The FHWA spreadsheet based Enhanced Interchange Safety Analysis Tool (ISATe) was used to forecast crashes for I-10 under No-Build conditions[13]. In 2011, the average daily traffic (ADT) on I-10 in the study area ranged from 38,100 to 73,500 vehicles, with 415 crashes reported that same year. The forecast shows that as ADT increases, so do the number of anticipated crashes. In 2020, the ADT on I-10 in the study area is expected to increase to 52,000 to 88,300 vehicles, with the number of crashes also increasing to 674.

[12] *No-Build conditions are based on existing conditions and includes committed projects.*

Likewise, ADT in 2040 is anticipated to increase to 66,800 to 111,100 vehicles, with the number of crashes increasing to 910.

The analysis demonstrates a marked increase in the number of anticipated crashes in the future as the number of vehicles traveling on I-10 in the study area increases under No-Build conditions – a 62% increase by 2020 and a 119% increase by 2040.

In addition to the above, specific safety hazards along the project corridor were highlighted by DOTD Lake Charles District - Traffic Division. These safety issues are identified in **Attachment B**. As the environmental process proceeds forward, agency and public input obtained on the purpose and need of the Project will be incorporated, as applicable, into the Purpose and Need Technical Report.

3.0 PROJECT PURPOSE AND OBJECTIVES

3.1 Purpose

The purpose of the proposed project is to address the transportation needs identified in **Section 2.0** by:

- Improving system connectivity/continuity;
- Relieving traffic congestion;
- Addressing structural and functional deficiencies of the existing facility; and
- Enhancing roadway safety.

3.2 Project Objectives

In addition to the purpose and need, other project elements were established to balance transportation and environmental objectives. As previously mentioned, these objectives provide guidance for the alternatives development process in that they sharpen the decision framework when two or more alternatives meet the purpose and need and other criteria need to be employed to further screen and evaluate alternatives. Objectives of the proposed Project are listed below.

- **Minimize Right-of-Way (ROW) Impacts** – To minimize the amount of new ROW required for project implementation.
- **Avoid/Minimize Impacts to Existing Infrastructure** – To avoid/minimize impacts to utilities and railroad crossings.
- **Minimize Roadway Disruptions during Construction** - To minimize inconvenience to motorists during periods of construction.
- **Support Economic Development** – To provide a supportive climate for existing and potential economic development along I-10
- **Maximize Safety** - To reduce the number of conflict points to provide a safer route on I-10 and arterial network. *Note: Reduction of conflict points used in the high/planning level analysis of the Preliminary Alternatives. A more detailed safety analysis, including crash rates, to be conducted once the Reasonable Alternatives are identified.*

- **Optimize Cost** – To provide an improved safe and efficient facility while optimizing construction, right-of-way, and operations and maintenance costs
- **Minimize Construction Risk in EDC Contamination Area** - To minimize potential risks associated with construction techniques in the known ethylene dichloride (EDC) contamination area near Sampson St. and I-10.
- **Avoid/Minimize Impacts to the Community** - To avoid/minimize displacements of residences and businesses; and impacts to minority and low-income (Environmental Justice) populations, limited English proficiency populations, and park land.
- **Avoid/Minimize Impacts to Cultural Resources** - To avoid/minimize impacts to archaeological sites and historic resources.
- **Avoid/Minimize Impacts to Natural Resources** - To avoid/minimize impacts to surface water crossings and wetlands, wildlife habitat, and essential fish habitat.
- **Avoid/Minimize Impacts to Other Resources** - To avoid/minimize impacts from hazardous materials and traffic noise; and to Section 4(f) and 6(f) resources and private industry vessel crafts utilizing the Calcasieu River as a navigable waterway.
- **Sustain Public and Agency Support** - To ensure the project addresses the vision the public and agencies have for the study area.

Attachment A

I-10 Calcasieu River Bridge
Timeline of Events

Timeline	Action
1950's	■ The I-10 Calcasieu River Bridge is originally constructed as a part of US 90.
1960's	■ The I-10 Calcasieu River Bridge is integrated as part of I-10.
1970's	■ Due to numerous accidents on the bridge, the DOTD investigates skid resistance and an epoxy overlay for the bridge. Bridge inspections identify areas of concern.
1980's	■ Consideration of an epoxy overlay is abandoned in favor of a bridge replacement feasibility study.
2000's	■ The DOTD initiates an engineering and environmental feasibility study for an area of I-10 extending from PPG Drive to US 90. ■ The feasibility study examines numerous project alternatives for replacement of the existing high-level bridge (135-foot vertical clearance for ship traffic) with different bridge profiles and heights, as well as replacing the existing Sampson Street interchange (including geometric improvements to current standards and a grade separation with the adjacent Union Pacific mainline railroad). ■ The first public meeting is held.
2001	■ A Marine Use Study determines that mid-level (73-foot) and high-level (118 – 125-foot) vertical clearance bridges are feasible.
2002	■ Six technical memoranda and a Comprehensive Preliminary Alternatives Report are prepared and conclude that replacement of the existing bridge on a new parallel alignment with a lower level bridge (73-foot vertical clearance) is the best solution, is feasible and should be advanced. ■ The second public meeting is held to present the findings.
2003	■ In accordance with NEPA, the I-10 Calcasieu River Bridge and Approaches EA is initiated.
2004	■ The first public meeting is held for the I-10 Calcasieu River Bridge and Approaches EA. ■ The DOTD begins a re-evaluation of the navigational clearance based on the concern of a local organization. ■ As to not delay improvements to the Sampson Street interchange during the bridge height resolution process, the DOTD separates the Calcasieu River Bridge component and the Sampson Street interchange component of the overall I-10 corridor into two separate EAs.
2005	■ The I-10 Sampson Street Interchange EA is initiated and the public meeting is held.
2006	■ A Lake Charles Port Planning Study is prepared and determines that the mid-level bridge (73-foot vertical clearance) would be sufficient for all reasonable shipping interests. ■ The I-10 Sampson Street Interchange EA is suspended pending resolution of a hazardous material contamination matter near the existing interchange.
2007	■ Based on public comments, a Bridge Height Special Study is prepared with the purpose of examining an "In-Between" bridge profile (approximately 90-100-foot vertical clearance) to replace the I-10 Calcasieu River Bridge instead of the previously studied mid-level (73-foot) and high-level (118-125-foot) bridge profiles.
2008	■ The Lake Charles MPO (IMCAL) votes to adopt the mid-level bridge (73-foot vertical clearance) as its preferred alternative and requests the DOTD proceed with development of that proposal.
2010	■ FHWA approves to restart the NEPA process as an EIS rather than an EA due to the discovery of hazardous contamination. *Note: An EIS is prepared for major federal actions that significantly affect the environment.*
2012	■ The DOTD completes a maintenance and repair project. Includes main truss connection repairs, pin plate connection repairs on approach spans, cleaning and spot painting local areas, bridge railing repairs, and resealing bridge joints.
2013	■ The DOTD and the FHWA publish a NOI to prepare an EIS for capacity improvements to I-10 between the I-210 interchanges, which includes the Calcasieu River Bridge and Sampson Street interchange. ■ The first agency and public scoping meeting is held for the EIS. ■ The USCG requests an updated bridge height/navigation study (last study conducted in 2007). ■ The EIS is put on hold pending completion of new navigation study.
2014	■ The DOTD completes a new bridge height/navigation study per USCG directive.
2015	■ Based on the 2014 bridge height/navigation study findings, the DOTD identifies 73-feet as the bridge height to be analyzed in EIS.
2016	■ Due to the hazardous material contamination at the Sampson St. interchange, DOTD begins investigation of additional alternatives to avoid and/or minimize contact with contamination. Additional alternatives to be evaluated as part of the EIS.
2017	■ The DOTD re-initiates work on the EIS.

Glossary of Terms

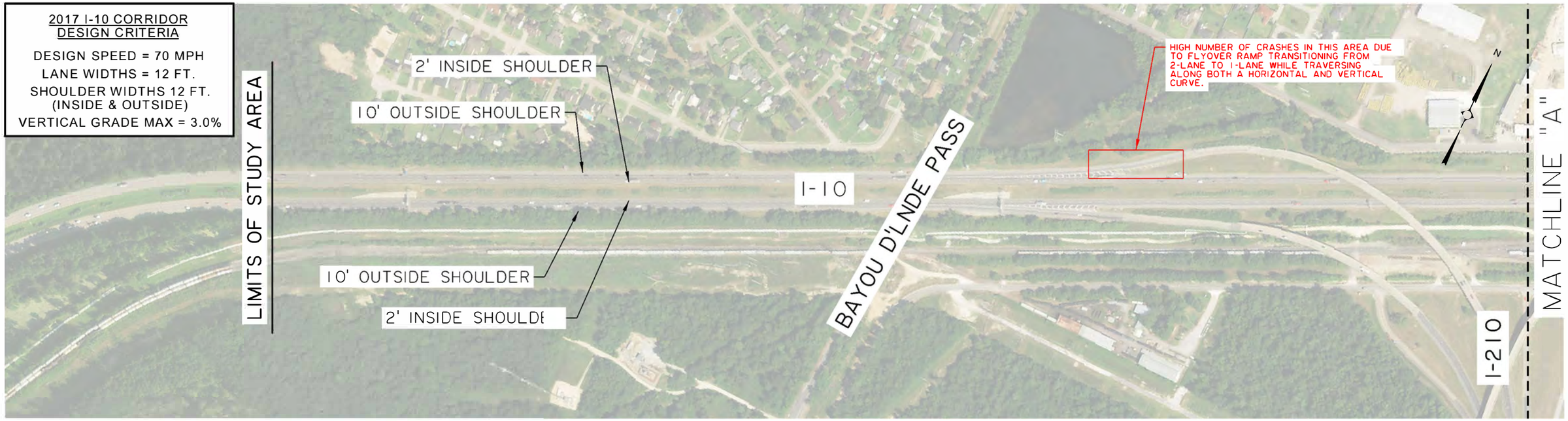
DOTD = Louisiana Department of Transportation and Development
EA = Environmental Assessment
EIS = Environmental Impact Statement
IMCAL = Imperial Calcasieu Regional Planning and Development Commission
MPO = Metropolitan Planning Organization
NEPA = National Environmental Policy Act of 1969
NOI = Notice of Intent
USCG = United States Coast Guard

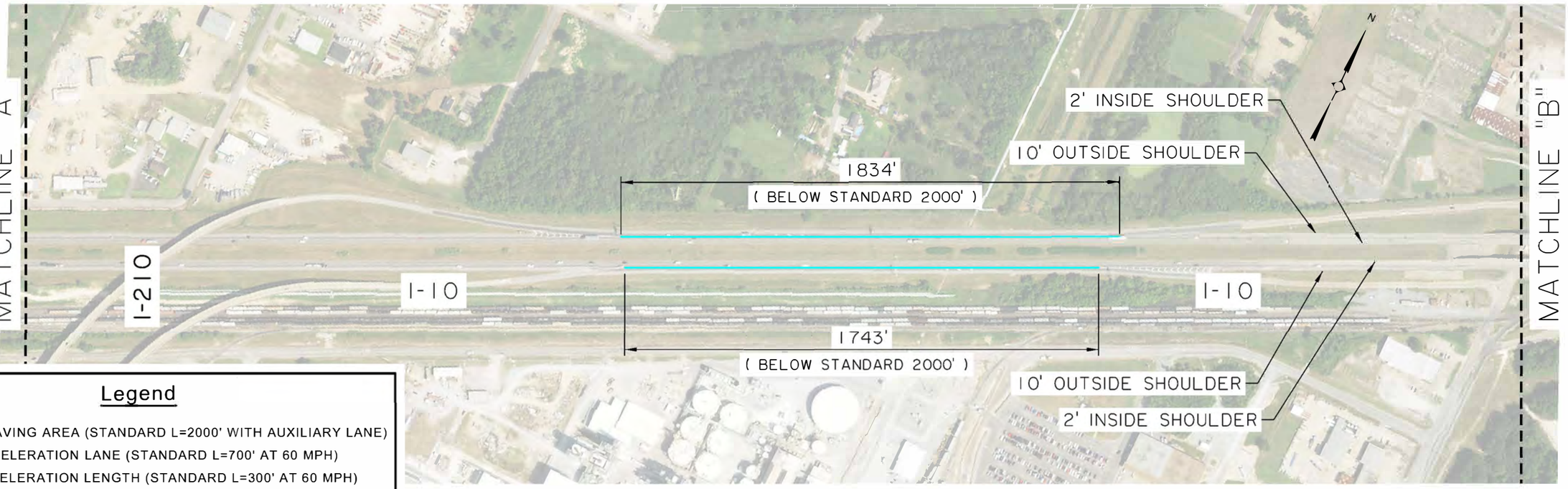
Attachment B

Existing I-10 Functional Deficiencies and Safety Hazards in the Study Area

2017 I-10 CORRIDOR DESIGN CRITERIA

DESIGN SPEED = 70 MPH
LANE WIDTHS = 12 FT.
SHOULDER WIDTHS 12 FT. (INSIDE & OUTSIDE)
VERTICAL GRADE MAX = 3.0%





Legend

- WEAVING AREA (STANDARD L=2000' WITH AUXILIARY LANE)
- ACCELERATION LANE (STANDARD L=700' AT 60 MPH)
- DECELERATION LENGTH (STANDARD L=300' AT 60 MPH)
- BRIDGE EXISTING VERTICAL CLEARANCE HEIGHT LESS THAN 16'-6"
- RED CALLOUTS INCLUDE INPUT ON SAFETY HAZARDS AS PROVIDED BY THE LADOTD LAKE CHARLES DISTRICT ENGINEER IN APRIL 2017

SCALE IN FEET
400 0 200 400

EXISTING I-10 FUNCTIONAL DEFICIENCIES AND SAFETY HAZARDS IN THE STUDY AREA

I-10 CALCASIEU RIVER BRIDGE (I-10/I-210 WEST END TO I-10/I-210 EAST END)

ATTACHMENT B
SHEET No.
1 OF 6

2017 I-10 CORRIDOR DESIGN CRITERIA

DESIGN SPEED = 70 MPH
LANE WIDTHS = 12 FT.
SHOULDER WIDTHS 12 FT. (INSIDE & OUTSIDE)
VERTICAL GRADE MAX = 3.0%

MEDIAN WIDTH VARIES
W=(40' TO 60')
STANDARD W=(64')

2' INSIDE SHOULDER

10' OUTSIDE SHOULDER

US-90

I-10

211'

SHORT ACCELERATION LANE DISTANCE

111'

SHORT ACCELERATION LANE DISTANCE

10' OUTSIDE SHOULDER

2' INSIDE SHOULDER

PPG DR.

MATCHLINE "B"

I-10

MATCHLINE "C"

N

Legend

- WEAVING AREA (STANDARD L=2000' WITH AUXILIARY LANE)
- ACCELERATION LANE (STANDARD L=700' AT 60 MPH)
- DECELERATION LENGTH (STANDARD L=300' AT 60 MPH)
- BRIDGE EXISTING VERTICAL CLEARANCE HEIGHT LESS THAN 16'-6"
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SCALE IN FEET
400 0 200 400

EXISTING I-10 FUNCTIONAL DEFICIENCIES AND SAFETY HAZARDS IN THE STUDY AREA

I-10 CALCASIEU RIVER BRIDGE
(I-10/I-210 WEST END TO I-10/I-210 EAST END)

ATTACHMENT B
SHEET No.
2 OF 6

2017 I-10 CORRIDOR DESIGN CRITERIA

DESIGN SPEED = 70 MPH
LANE WIDTHS = 12 FT.
SHOULDER WIDTHS 12 FT. (INSIDE & OUTSIDE)
VERTICAL GRADE MAX = 3.0%

N

MATCHLINE "C"

MATCHLINE "D"

LA-379
SULPUR AVE.

LA-378

SAMPSON ST.

WHEN TRAINS INTERRUPT SAMPSON STREET (LA 378) TRAFFIC, THERE IS A POTENTIAL FOR THE WB EXIT RAMP TO QUEUE ONTO THE MAINLINE. WHEN THIS OCCURS, THERE IS NOTHING TO WARN MOTORISTS OF QUEUED CONDITION AHEAD AS THEY ARE TRAVELLING ACROSS THE I-10 CALCASIEU RIVER BRIDGE.

THE SPEED ON THE I-10 MAINLINE IS 60 MPH. VEHICLES EXITING EB AT THIS LOCATION HAVE A 20 MPH ADVISORY SPEED DUE TO THE SHARP CURVE AT THE I-10 FRONTAGE ROAD. CRASHES IN THIS AREA CAUSED BY EXCESSIVE SPEED WOULD BE REDUCED IF THE I-10 ALIGNMENT CHANGE WAS NOT SO ABRUBT.

10' OUTSIDE SHOULDER

2' INSIDE SHOULDER

I-10

I-10 SERVICE RD.

I-10

394'

2' INSIDE SHOULDER

10' OUTSIDE SHOULDER

I-10 SERVICE RD.

EXISTING CALCASIEU RIVER BRIDGE
VERTICAL GRADE (5.0%)
NO SHOULDERS
STANDARD GRADE =(3.0%)

HIGH NUMBER OF CRASHES IN THIS AREA DUE TO MAINLINE TRAFFIC HAVING TO SLOW FOR EB RAMP VEHICLES ATTEMPTING TO MERGE WITHOUT ADEQUATE DISTANCE TO ACCELERATE.

SHORT ACCELERATION LANE DISTANCE

Legend

- WEAVING AREA (STANDARD L=2000' WITH AUXILIARY LANE)
- ACCELERATION LANE (STANDARD L=700' AT 60 MPH)
- DECELERATION LENGTH (STANDARD L=300' AT 60 MPH)
- BRIDGE EXISTING VERTICAL CLEARANCE HEIGHT LESS THAN 16'-6"
- RED CALLOUTS INCLUDE INPUT ON SAFETY HAZARDS AS PROVIDED BY THE LADOTD LAKE CHARLES DISTRICT ENGINEER IN APRIL 2017

SCALE IN FEET
400 0 200 400

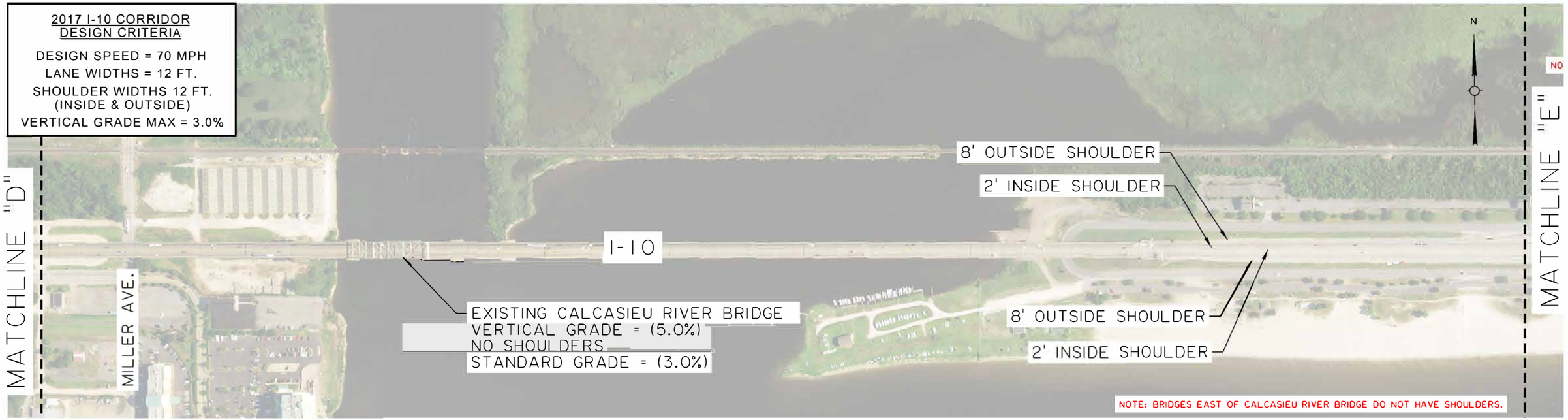
EXISTING I-10 FUNCTIONAL DEFICIENCIES AND SAFETY HAZARDS IN THE STUDY AREA

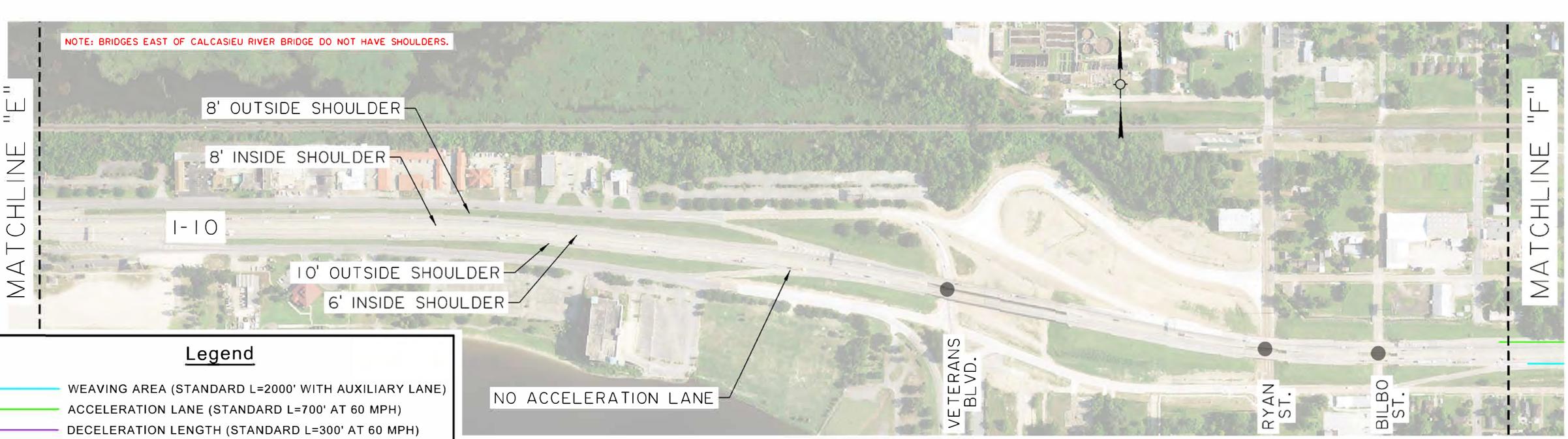
I-10 CALCASIEU RIVER BRIDGE
(I-10/I-210 WEST END TO I-10/I-210 EAST END)

ATTACHMENT B
SHEET No.
3 OF 6

2017 I-10 CORRIDOR DESIGN CRITERIA

DESIGN SPEED = 70 MPH
LANE WIDTHS = 12 FT.
SHOULDER WIDTHS 12 FT. (INSIDE & OUTSIDE)
VERTICAL GRADE MAX = 3.0%





Legend

- WEAVING AREA (STANDARD L=2000' WITH AUXILIARY LANE)
- ACCELERATION LANE (STANDARD L=700' AT 60 MPH)
- DECELERATION LENGTH (STANDARD L=300' AT 60 MPH)
- BRIDGE EXISTING VERTICAL CLEARANCE HEIGHT LESS THAN 16'-6"
- RED CALLOUTS INCLUDE INPUT ON SAFETY HAZARDS AS PROVIDED BY THE LADOTD LAKE CHARLES DISTRICT ENGINEER IN APRIL 2017

SCALE IN FEET
400 0 200 400

EXISTING I-10 FUNCTIONAL DEFICIENCIES AND SAFETY HAZARDS IN THE STUDY AREA

I-10 CALCASIEU RIVER BRIDGE (I-10/I-210 WEST END TO I-10/I-210 EAST END)

ATTACHMENT B
SHEET No.
4 OF 6

2017 I-10 CORRIDOR DESIGN CRITERIA

DESIGN SPEED = 70 MPH
LANE WIDTHS = 12 FT.
SHOULDER WIDTHS 12 FT. (INSIDE & OUTSIDE)
VERTICAL GRADE MAX = 3.0%

NOTE: BRIDGES EAST OF CALCASIEU RIVER BRIDGE DO NOT HAVE SHOULDERS.

MATCHLINE "F"

438'

SHORT ACCELERATION LANE

296'

1733'
(BELOW STANDARD 2000')

8' OUTSIDE SHOULDER

8' INSIDE SHOULDER

I-10

10' OUTSIDE SHOULDER

8' INSIDE SHOULDER

KIRKMAN ST.

ENTERPRISE BLVD.

THE SHORT DISTANCE BETWEEN THE EB ENTRANCE RAMP AT ENTERPRISE BLVD AND THE NEXT ADJACENT EXIT RAMP CREATES A CONFLICT POINT AS MOTORISTS MERGING ONTO I-10 MUST WEAVE BETWEEN MOTORISTS EXITING I-10.

1282'
(BELOW STANDARD 2000')

1282'
(BELOW STANDARD 2000')

S. SHATTUCK ST.

MATCHLINE "G"

N

NOTE: BRIDGES EAST OF CALCASIEU RIVER BRIDGE DO NOT HAVE SHOULDERS.

MATCHLINE "G"

UNION PACIFIC RAILROAD

OPELOUSAS ST.

HIGH NUMBER OF 18-WHEELER ROLLOVER CRASHES DUE TO THE DEGREE OF ROADWAY CURVATURE AND EXCESSIVE SPEED.

NO DECELERATION LANE

1636'
(BELOW STANDARD 2000')

US-90

NO ACCELERATION LANE

NO ACCELERATION LANE

10' OUTSIDE SHOULDER

10' INSIDE SHOULDER

571'
(BELOW STANDARD 2000')

TRAFFIC IS EXITING THE MAINLINE AT HIGH RATE OF SPEED WHILE VEHICLES ENTERING I-10 FROM US 171 ARE ATTEMPTING TO GAIN SPEED TO MERGE.

I-10

NO DECELERATION LANE

10' OUTSIDE SHOULDER

10' INSIDE SHOULDER

HIGH NUMBER OF 18-WHEELER ROLLOVER CRASHES DUE TO THE DEGREE OF ROADWAY CURVATURE AND EXCESSIVE SPEED.

US-171

MATCHLINE "H"

N

Legend

- WEAVING AREA (STANDARD L=2000' WITH AUXILIARY LANE)
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- DECELERATION LENGTH (STANDARD L=300' AT 60 MPH)
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SCALE IN FEET
400 0 200 400

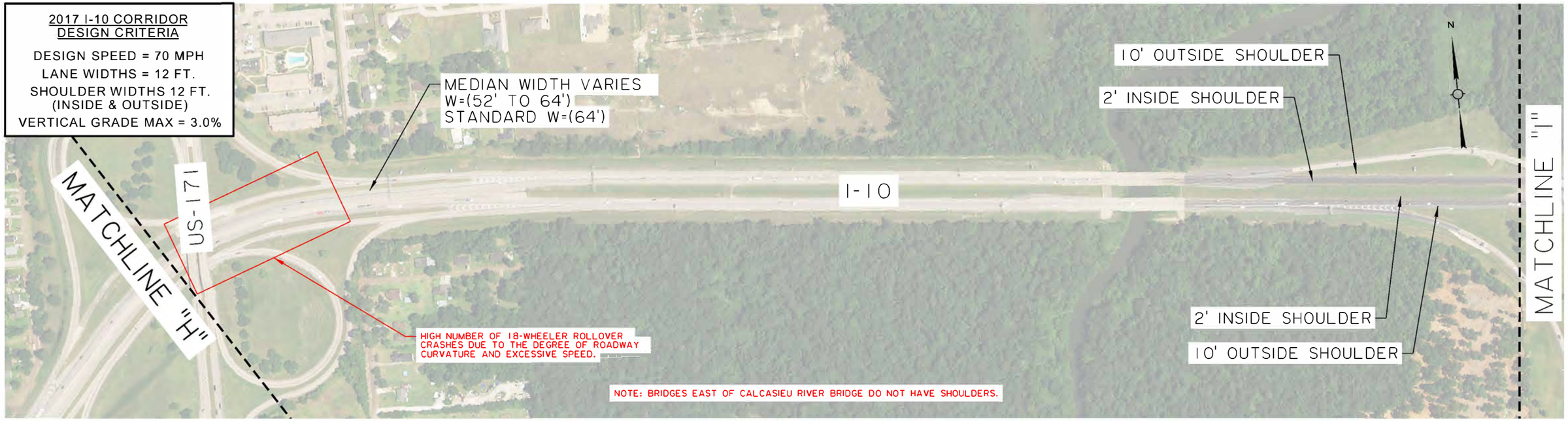
EXISTING I-10 FUNCTIONAL DEFICIENCIES AND SAFETY HAZARDS IN THE STUDY AREA

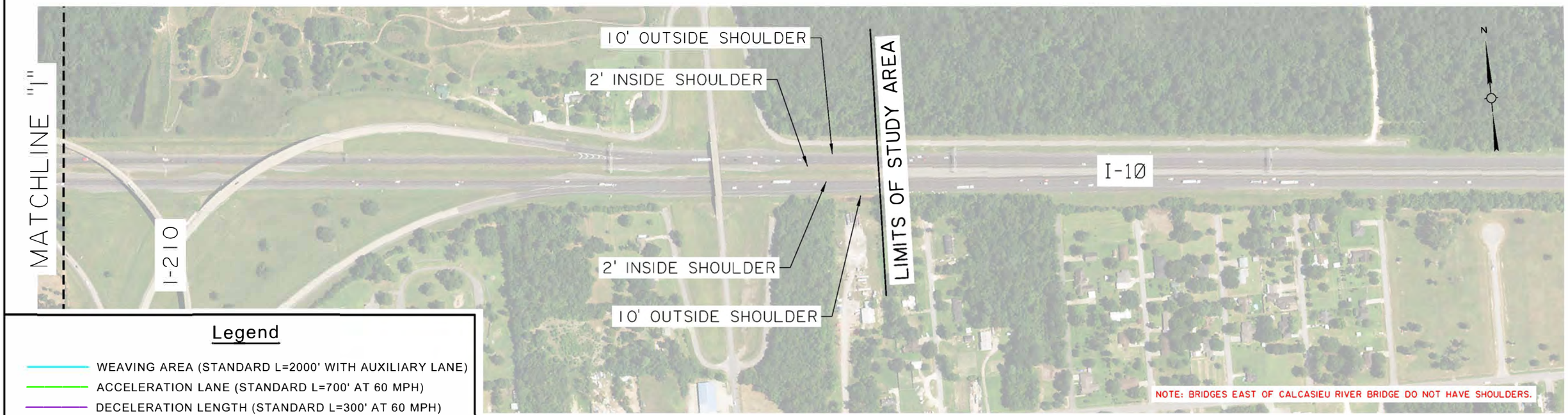
I-10 CALCASIEU RIVER BRIDGE (I-10/I-210 WEST END TO I-10/I-210 EAST END)

ATTACHMENT B
SHEET No.
5 OF 6

2017 I-10 CORRIDOR DESIGN CRITERIA

DESIGN SPEED = 70 MPH
LANE WIDTHS = 12 FT.
SHOULDER WIDTHS 12 FT. (INSIDE & OUTSIDE)
VERTICAL GRADE MAX = 3.0%





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SCALE IN FEET
400 0 200 400

EXISTING I-10 FUNCTIONAL DEFICIENCIES AND SAFETY HAZARDS IN THE STUDY AREA

I-10 CALCASIEU RIVER BRIDGE (I-10/I-210 WEST END TO I-10/I-210 EAST END)

ATTACHMENT B
SHEET No.
6 OF 6