## **Chapter 2. EXISTING AND NO BUILD ANALYSIS**

This chapter outlines the results of the network analysis of the existing conditions. The information documents baseline operating conditions for use in comparing to future conditions. The following subsections summarize the existing road network characteristics, land use and demographics, operational conditions, and safety concerns within the study area.

#### Existing Roadway Network

Roadway characteristic data was collected for each of the major road segments. **Figure 2.1** illustrates the LADOTD Functional Classification Map of the roadways in the vicinity of the study area.



Figure 2.1 LADOTD Functional Classification Map Source: LADOTD Website

**Table 2.1** summarizes the number of lanes, functional classification, and posted speed limit of each major roadway within the study area that may be affected by modifications to the existing network. **Table 2.2** summarizes the Average Daily Traffic (ADT) data for the study area.

Route	Number of Lanes (Bi-directional)	Functional Classification	Posted Speed Limit (mph)
I-10	6-8	Interstate, Urban	60
Acadian Thruway	4	Principal Arterial, Urban	40
Perkins Road	2-4	Minor Arterial, Urban	35

Table 2.1Roadway Design Designations

Table 2.2Bi-Directional Average Daily Traffic (ADT)

Route/Location	ADT (veh/day)	Year	Source
I-10 Between Dalrymple and Perkins	152,840	2014	LADOTD Count Station 206331
I-10 Between Perkins and Acadian	153,470	2014	LADOTD Count Station 206251
I-10 Between Acadian and College	170,912	2014	LADOTD Count Station 206231
Acadian Between Perkins and I-10	27,639	2014	LADOTD Count Station 206691
Acadian Between I-10 and Bawell	22,153	2014	LADOTD Count Station 206681
Perkins Between I-10 Ramps and Acadian	24,441	2014	LADOTD Count Station 206241

**Figure 2.2** presents aerial images of the road network in the vicinity of the Perkins and Acadian interchanges.



Figure 2.2 Acadian Perkins Interchange Source: Google Earth

# **Existing Land Use and Demographics**

Land use in the study area consists mainly of residential (yellow and beige); however, the land use directly adjacent the study are roadways is also commercial (red), industrial (purple) and mixed use (turquoise) as shown in **Figure 2.3**.



Figure 2.3 Land Use

Source: http://ebrgis.maps.arcgis.com/apps/webappviewer/index.html?id=71eea5e62ce84b1d94be194ad8f2ac2e

The demographics of the community surrounding the study area are included in EBR Tracts 23, 26.01 and 27 as presented in **Figure 2.4**.



**Figure 2.4 Cencus Tracts** 

Source: https://www2.census.gov/geo/maps/dc10map/tract/st22\_la/c22033\_east\_baton\_rouge/DC10CT\_C22033\_001.pdf

The population by race obtained for these tracts was sourced from the USCB, 2010 Census Summary File 1 (DP-1) 100-Percent Data. Tract 23 was approximately 3% African American, 94% Caucasian and 3% other races/two or more races. Tract 26.01 was approximately 4% African American, 92% Caucasian and 4% other races/two or more races. Tract 27 was approximately 66% African American, 32% Caucasian and 2% other races/two or more races.

# **Existing Operational Conditions**

The following describes a typical weekday without incidents or inclement weather.

#### Interstate 10

#### AM Peak

Interstate 10 is heavily congested in the westbound direction with commuter traffic. Traffic typically slows or becomes stop-and-go approaching Acadian and remains slow-moving through the study area. The I-10 westbound at Acadian on ramp queues due to the congestion and queuing on I-10 mainline. The eastbound direction is less congested as this is not the main commuter route. The eastbound flows are typically faster with less congestion.

# PM Peak

Interstate 10 is congested in both eastbound and westbound directions; particularly in the eastbound direction which services the evening commuter traffic. The eastbound flows slow approaching Perkins and remain congested through the study area.

### <u>Acadian Thruway</u>

### AM Peak

At the I-10 interchanges, southbound queues on Acadian extend through the Bawell intersection at times. This is due in part to queuing on the westbound on-ramp and queuing on the eastbound on ramp due to the southbound left movement. Queues typically clear in one cycle. Queues also form on all approaches at the Perkins intersection and typically clear in one cycle.

#### PM Peak

In the PM peak, congestion is heavier than the AM peak for both northbound and southbound directions. Queues extend in all directions of Acadian at Perkins and most did not completely clear each cycle. The southbound queue extends to Acadian Centre at times. The northbound queue often originates from the heavy right turn movement onto I-10 eastbound that yields during the southbound left turn phase.

#### **Existing Network Analysis**

#### Purpose and Goals

The purpose of the existing conditions analysis is to develop baseline data that will be compared to future conditions both with and without the proposed interchange modification. The existing peak hour volumes were presented in **DCR Figure 2**.

#### <u>Methodology</u>

Capacity analysis was performed to determine operational conditions in the AM and PM peaks. This type of analysis is the industry standard and the methods are the widely accepted practice of evaluating impacts on traffic operations. The capacity analysis was performed using procedures developed by the Transportation Research Board and contained in the Hwy Capacity Manual Special Report 209. The Hwy Capacity Manual (HCM) procedures have been adapted to computer-based analysis packages. The input parameters for the existing conditions capacity analysis and the TSIs used for the intersections are included in **Appendix B**.

Capacity analysis was conducted using HCS version 7.5 for the freeway analyses. The Measures of Effectiveness (MOE) was density in passenger cars per mile per lane (pc/mi/ln). A limitation of

the HCS software is that density is not reported when thresholds are exceeded, such as volume to capacity ratio greater than one.

I-10 eastbound between Acadian and College is a weave. A volume sensitivity weave analysis was conducted. The following three (3) volume scenarios were considered for the weave maneuvers (freeway to freeway, freeway to ramp, ramp to freeway, and ramp to ramp):

- Volume Scenario 1: 100% of vehicles exiting at College originate from Acadian
- Volume Scenario 2: 100% of vehicles exiting at College originate from I-10 eastbound
- Volume Scenario 3: 50% of vehicles exiting at College originate from Acadian and I-10 eastbound

The details are in the Appendix B.

Trafficware Synchro 8 was used to analyze the signalized intersection. For signalized intersections MOEs include delay in seconds, volume to capacity ratio (v/c) and 95<sup>th</sup>% queues. When the v/c is greater than 1.0, it is considered to be saturated conditions/demand exceeds available capacity. The 95<sup>th</sup>% queue is essentially the maximum queue that may be experienced. If this exceeds available storage spillback will occur into other lanes and/or through the upstream intersection. The highest v/c ratio and 95th percentile queue for each approach were reported. The queue results were reported in number of vehicles but then converted to feet by multiplying 25 feet/vehicle.

A summary of the existing analysis results for merge and diverge segment locations is presented in **Table 2.3**.

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	<mark>AM</mark>	<mark>PM</mark>	
<b>Location</b>	<b>Density</b>	<b>Density</b>	
	<mark>(pc/ln/mi)</mark>	<mark>(pc/ln/mi)</mark>	
I-10 Eastbound Freeway west of Perkins Road	<mark>39.8</mark>	<mark>34.0</mark>	
I-10 Eastbound Diverge at Perkins Road	<mark>39.0</mark>	<mark>34.4</mark>	
<mark>I-10 Eastbound Freeway between Perkins Road and</mark> Acadian Thruway	<mark>37.4</mark>	<mark>34.1</mark>	
I-10 Eastbound Diverge at Acadian Thruway	<mark>36.3</mark>	<mark>33.2</mark>	
I-10 Eastbound Weave between Acadian Thruway and College Drive – Case #1	<mark>38.5</mark>	<mark>38.5</mark>	
I-10 Eastbound Weave between Acadian Thruway and College Drive – Case #2			
I-10 Eastbound Weave between Acadian Thruway and College Drive – Case #3	<mark>42.6</mark>	<mark>41.3</mark>	
I-10 Westbound Merge at College Drive	<b>33.3</b>	<mark>28.9</mark>	
I-10 Westbound Freeway between Acadian Thruway and College Drive	<mark>32.6</mark>	<mark>28.8</mark>	
I-10 Westbound Merge at Acadian Thruway	<mark>37.8</mark>	<mark>32.6</mark>	
I-10 Westbound Merge at Perkins Road	<mark>44.9</mark>	37.3	
I-10 Westbound Freeway west of Perkins Road		<mark>35.3</mark>	
Density not reported.			

# Table 2.3Existing Conditions Freeway, Merge and Diverge AnalysisHCS Freeway/Merge/Diverge/Weave Segments

A summary of the existing analysis results for the subject intersections is presented in Table 2.4.

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		<mark>AM</mark>		<b>PM</b>			
<b>Location</b>	<mark>Delay</mark> (sec)	<mark>V/C</mark> Ratio	95 <sup>th</sup> % Queues (ft)	<mark>Delay</mark> (sec)	<mark>V/C</mark> Ratio	95 <sup>th</sup> % Queues (ft)	
Acadian Thruway at I-10 Westbound Ramps	<mark>21.3</mark>			<mark>20.3</mark>			
<mark>Acadian Thruway</mark> <mark>Northbound</mark>	<mark>11.5</mark>	<mark>0.74</mark>	<mark>138</mark>	<mark>11.9</mark>	<mark>0.78</mark>	<mark>123</mark>	
<mark>Acadian Thruway</mark> Southbound	<mark>14.3</mark>	<mark>0.54</mark>	<mark>370</mark>	<mark>14.2</mark>	<mark>0.59</mark>	<mark>418</mark>	
I-10 Off Ramp Westbound	<mark>42.0</mark>	<mark>0.82</mark>	<mark>350</mark>	<mark>42.4</mark>	<mark>0.81</mark>	<mark>313</mark>	
<mark>Acadian Thruway</mark> <mark>at I-10 Eastbound Ramps</mark>	<mark>16.7</mark>			<mark>15.1</mark>			
<mark>Acadian Thruway</mark> <mark>Northbound</mark>	<mark>50.1</mark>	<mark>0.82</mark>	300	<mark>38.9</mark>	<mark>0.67</mark>	<mark>303</mark>	
<mark>Acadian Thruway</mark> <mark>Southbound</mark>	<mark>5.7</mark>	<mark>0.54</mark>	<mark>368</mark>	<mark>6.6</mark>	<mark>0.60</mark>	<mark>418</mark>	
I-10 Off Ramp Eastbound	<mark>61.8</mark>	<mark>0.73</mark>	<mark>95</mark>	<mark>65.8</mark>	<mark>0.64</mark>	<mark>50</mark>	
<mark>Acadian Thruway</mark> at Acadian Centre	<mark>8.5</mark>			<mark>8.4</mark>			
<mark>Acadian Thruway</mark> <mark>Northbound</mark>	<mark>8.4</mark>	<mark>0.50</mark>	<mark>320</mark>	<mark>8.7</mark>	<mark>0.54</mark>	<mark>373</mark>	
Acadian Thruway Southbound	<mark>5.1</mark>	<mark>0.42</mark>	<mark>253</mark>	<mark>4.7</mark>	<mark>0.42</mark>	<mark>240</mark>	
Richland Plantation Eastbound	<mark>84.4</mark>	<mark>0.41</mark>	<mark>5</mark>	<mark>51.8</mark>	<mark>0.29</mark>	<mark>18</mark>	
Acadian Centre Westbound	<mark>46.0</mark>	<mark>0.59</mark>	<mark>140</mark>	<mark>47.7</mark>	<mark>0.51</mark>	<mark>78</mark>	
Acadian Thruway at Perkins Road	<mark>44.0</mark>			<mark>53.2</mark>			
Stanford Avenue Northbound	<mark>44.2</mark>	<mark>0.90</mark>	<mark>375</mark>	<mark>65.0</mark>	<mark>0.89</mark>	<mark>598</mark>	
Acadian Thruway Southbound	<mark>47.9</mark>	<mark>0.80</mark>	<mark>425</mark>	<mark>62.5</mark>	<mark>0.90</mark>	<mark>348</mark>	
Perkins Road Eastbound	<mark>42.3</mark>	<mark>0.80</mark>	<mark>363</mark>	<mark>47.4</mark>	<mark>0.85</mark>	<mark>575</mark>	
Perkins Road Westbound	<mark>42.0</mark>	<mark>0.81</mark>	<mark>530</mark>	<mark>42.0</mark>	<mark>0.77</mark>	<mark>550</mark>	

Table 2.4Existing Conditions IntersectionsSynchro Analysis

Synchro Analysis								
	AM			<mark>PM</mark>				
<b>Location</b>	<mark>Delay</mark> (sec)	<mark>V/C</mark> Ratio	95 <sup>th</sup> % Queues (ft)	<mark>Delay</mark> (sec)	<mark>V/C</mark> Ratio	95 <sup>th</sup> % Queues (ft)		
<mark>Perkins Road</mark> at I-10 Ramps	<mark>18.0</mark>			<mark>9.5</mark>				
I-10 Eastbound off ramp Southbound	<mark>54.5</mark>	<mark>0.91</mark>	<mark>398</mark>	<mark>55.2</mark>	<mark>0.66</mark>	<mark>213</mark>		
Perkins Road Eastbound	<mark>6.1</mark>	<mark>0.24</mark>	<mark>158</mark>	<mark>4.2</mark>	<mark>0.38</mark>	<mark>233</mark>		
<mark>Perkins Road</mark> Westbound	<mark>11.5</mark>	<mark>0.41</mark>	<mark>318</mark>	<mark>8.7</mark>	<mark>0.49</mark>	<mark>390</mark>		

### Table 2.4 (continued) Existing Conditions Intersections Synchro Analysis

The documentation of the existing analysis is included in Appendix B.

# Design Year 2040 No Build Analysis

## Purpose and Goals

The purpose of the No Build analysis is to provide data for comparison to existing conditions and to future conditions with the proposed interchange modifications. The existing lane configurations at the time of this report were used for the No Build scenario analysis.

# <u>Methodology</u>

No Build analysis was also conducted with only changes to volume inputs to provide a comparison of the existing network to the projected conditions. The No Build volumes are presented in **Figure 2.5**. The methodology for the No Build analysis was the same as for the existing conditions. The input parameters for the No Build capacity analysis, including the weave sensitivity volumes, are included in **Appendix C**.

Table 2.5 presents the results of the No Build analysis for the merge and diverge locations.



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Location	<mark>AM</mark> Density (pc/ln/mi)	PM Density (pc/ln/mi)
I-10 Eastbound Freeway west of Perkins Road	<mark></mark>	<mark></mark>
I-10 Eastbound Diverge at Perkins Road	<mark></mark>	<mark></mark>
I-10 Eastbound Freeway between Perkins Road and Acadian Thruway		
I-10 Eastbound Diverge at Acadian Thruway		
I-10 Eastbound Weave between Acadian Thruway and College Drive – Case #1		
I-10 Eastbound Weave between Acadian Thruway and College Drive – Case #2		
I-10 Eastbound Weave between Acadian Thruway and College Drive – Case #3	-	
I-10 Westbound Merge at College Drive	<mark>42.9</mark>	<mark>36.6</mark>
I-10 Westbound Freeway between Acadian Thruway and College Drive	<mark>44.1</mark>	<mark>36.2</mark>
I-10 Westbound Merge at Acadian Thruway	_	<mark>43.8</mark>
I-10 Westbound Merge at Perkins Road	-	
I-10 Westbound Freeway west of Perkins Road		
Density not reported.		

# Table 2.5No Build Conditions Freeway, Merge and Diverge AnalysisHCS Freeway/Merge/Diverge Segments

Table 2.6 presents the results of the No Build analysis for the study area intersections.

		<mark>AM</mark>		<b>PM</b>		
Location	<mark>Delay</mark> (sec)	<mark>V/C</mark> Ratio	95 <sup>th</sup> % Queues (ft)	<mark>Delay</mark> (sec)	<mark>V/C</mark> Ratio	95 <sup>th</sup> % Queues (ft)
Acadian Thruway at I-10 Westbound Ramps	<mark>21.8</mark>			<mark>20.8</mark>		
Acadian Thruway Northbound	<mark>11.8</mark>	<mark>0.75</mark>	<mark>143</mark>	<mark>12.1</mark>	<mark>0.78</mark>	<mark>130</mark>
Acadian Thruway Southbound	<mark>15.2</mark>	<mark>0.57</mark>	<mark>393</mark>	<mark>15.2</mark>	<mark>0.62</mark>	<mark>448</mark>
I-10 Off Ramp Westbound	<mark>42.1</mark>	<mark>0.83</mark>	<mark>363</mark>	<mark>42.4</mark>	<mark>0.81</mark>	<mark>325</mark>
Acadian Thruway at I-10 Eastbound Ramps	<mark>17.2</mark>			<mark>15.4</mark>		
Acadian Thruway Northbound	<mark>51.9</mark>	<mark>0.83</mark>	<mark>315</mark>	<mark>38.5</mark>	<mark>0.68</mark>	<mark>313</mark>
Acadian Thruway Southbound	<mark>6.0</mark>	<mark>0.57</mark>	<mark>390</mark>	<mark>7.1</mark>	<mark>0.63</mark>	<mark>450</mark>
I-10 Off Ramp Eastbound	<mark>61.2</mark>	<mark>0.73</mark>	<mark>98</mark>	<mark>66.0</mark>	<mark>0.65</mark>	<mark>53</mark>
<mark>Acadian Thruway</mark> at Acadian Centre	<mark>8.8</mark>			<mark>8.6</mark>		
Acadian Thruway Northbound	<mark>8.9</mark>	<mark>0.53</mark>	<mark>343</mark>	<mark>9.1</mark>	<mark>0.57</mark>	<mark>393</mark>
Acadian Thruway Southbound	<mark>5.4</mark>	0.44	<mark>265</mark>	<mark>4.9</mark>	<mark>0.43</mark>	<mark>255</mark>
<b>Richland Plantation Eastbound</b>	<mark>84.4</mark>	<mark>0.41</mark>	<mark>5</mark>	<mark>51.8</mark>	<mark>0.29</mark>	<mark>18</mark>
Acadian Centre Westbound	<mark>46.1</mark>	<mark>0.60</mark>	<mark>145</mark>	<mark>47.5</mark>	<mark>0.52</mark>	<mark>80</mark>

# Table 2.6No Build Conditions IntersectionsSynchro Analysis

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		<mark>AM</mark>		PM PM		
Location	<mark>Delay</mark> (sec)	<mark>V/C</mark> Ratio	95 <sup>th</sup> % Queues (ft)	<mark>Delay</mark> (sec)	<mark>V/C</mark> Ratio	95 <sup>th</sup> % Queues (ft)
<mark>Acadian Thruway</mark> at Perkins Road	<mark>47.5</mark>			<mark>55.7</mark>		
Stanford Avenue Northbound	<mark>44.6</mark>	<mark>0.91</mark>	<mark>390</mark>	<mark>67.3</mark>	<mark>0.91</mark>	<mark>630</mark>
Acadian Thruway Southbound	<mark>48.7</mark>	<mark>0.81</mark>	<mark>448</mark>	<mark>63.0</mark>	<mark>0.90</mark>	<mark>363</mark>
Perkins Road Eastbound	<mark>45.2</mark>	<mark>0.82</mark>	<mark>410</mark>	<mark>51.4</mark>	<mark>0.87</mark>	<mark>668</mark>
Perkins Road Westbound	<mark>50.2</mark>	<mark>0.93</mark>	<mark>643</mark>	<mark>45.7</mark>	<mark>0.78</mark>	<mark>638</mark>
Perkins Rd <mark>at I-10 Ramps</mark>	<mark>18.9</mark>			<mark>10.1</mark>		
I-10 Eastbound off ramp Southbound	<mark>53.2</mark>	<mark>0.91</mark>	<mark>435</mark>	<mark>56.5</mark>	<mark>0.73</mark>	<mark>233</mark>
Perkins Road Eastbound	<mark>7.1</mark>	0.27	<mark>193</mark>	<mark>4.5</mark>	<mark>0.42</mark>	<mark>265</mark>
Perkins Road Westbound	<mark>13.5</mark>	<mark>0.47</mark>	<mark>375</mark>	<mark>9.5</mark>	0.55	<mark>448</mark>

# Table 2.6 (continued)No Build Conditions IntersectionsSynchro Analysis

The documentation of the No Build analysis and a comparison to the existing network analysis in tabular format is included in **Appendix C**.

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## Safety Concerns

The safety concerns in the study area were identified in a detailed evaluation of the existing safety data that was presented in **Chapter 1**. The main factor identified as contributing to crashes was congestion. Also noted as a potential safety concern was the close proximity of the Acadian and Perkins ramps.