

Chapter 3. ALTERNATIVE ANALYSIS

This chapter outlines the results of the network analysis for the Build conditions, including the proposed interchange modifications and an additional lane on I-10. The following subsections summarize the Tier I and Tier II/III analyses including the alternative comparative evaluation, and an overview of the study area network. The overview includes a general description of the network and the proposed changes within the study area to address issues identified in Chapter 2.

Summary of Tier I Analysis

A high-level interchange analysis (Tier I) was completed during the Stage 0 Study which determined feasible interchange alternatives. The Tier I analysis recommended two alternatives for the Washington/Dalrymple interchange for continued analysis: a Terrace Street left exit on I-110 and a consolidated interchange with Washington Street and Dalrymple Drive on I-10. The Terrace Street left exit was analyzed under the I-110 to Terrace Avenue IMR (Terrace IMR) project (S.P. H.012422). Details of the Tier I analysis are in **Appendix A-1**.

Summary of Tier II/III Analysis

The purpose of the Tier II/III analysis was to further refine the alternative selected in the Tier I. The analysis included the technical analysis of the alternative interchanges, critical geometry, striping, and safety comparison. The geometric layout was refined through an iterative process between the geometric design team and the traffic analysis team to determine the lane configurations based on the environmental constraints and operations.

Proposed Consolidated Interchange Build Layout

A consolidated interchange is proposed with the following features:

- Westbound
 - New- Combined I-10 off-ramp to Washington/Dalrymple
 - Existing- I-10 on-ramp from Dalrymple Drive
 - Existing- I-10 on-ramp from Washington Street
 - New- Frontage Road connecting Dalrymple Drive and Washington Street
- Eastbound
 - New- Combined I-10 off-ramp to Washington/Dalrymple. This ramp will only be accessible from I-10 prior to the merge with I-110. Traffic from I-110 will access Washington/Dalrymple via the Terrace St Left Exit.
 - New- Combined I-10 on-ramp from Washington/Dalrymple
 - New- Frontage Road connection Dalrymple Drive and Washington Street
 - New- WB to EB U-turn connecting the Frontage Roads

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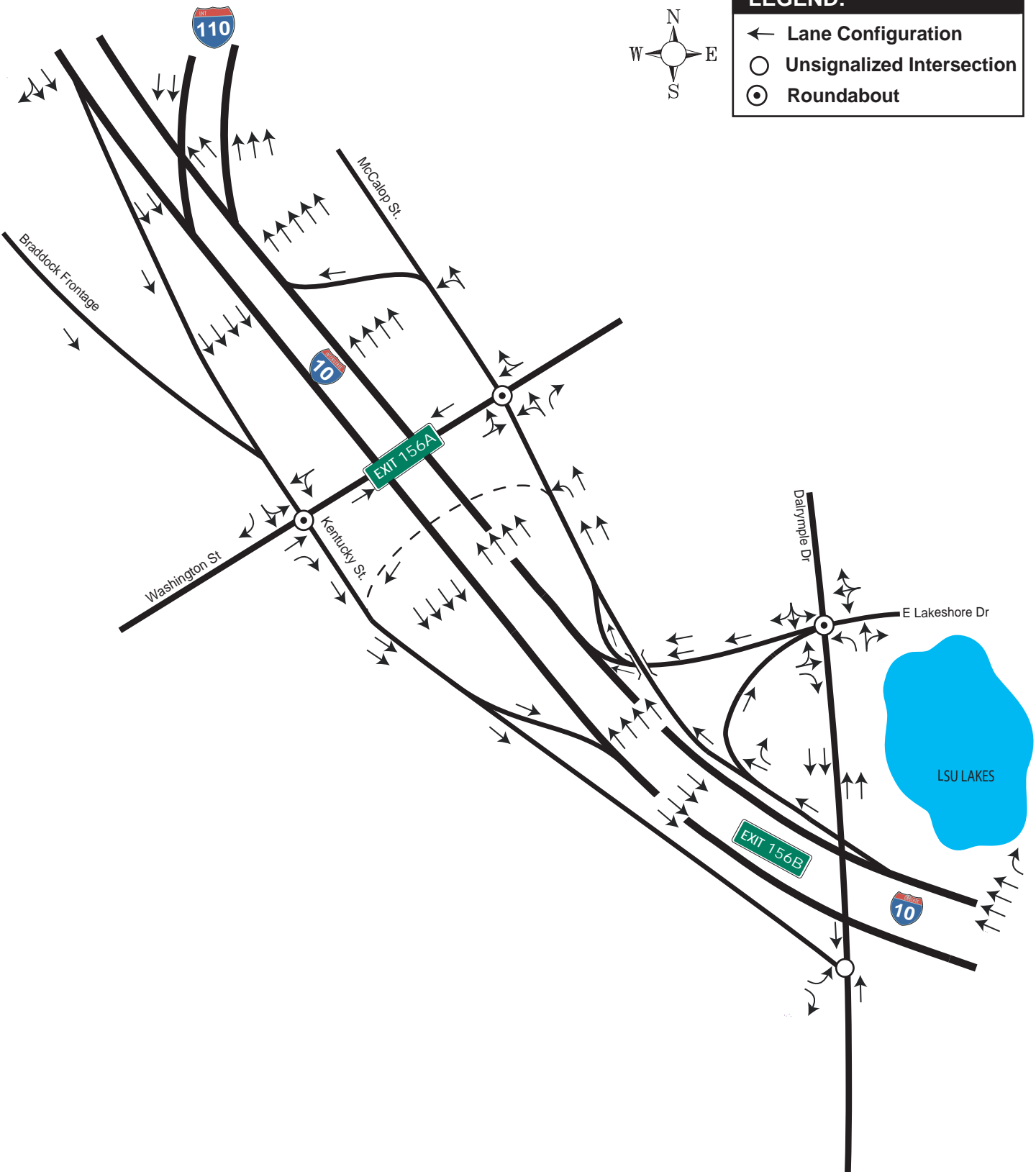
Traffic signals and roundabouts were considered at:

- I-10 EB Service Road at Washington Street
- I-10 WB Service Road at Washington Street
- I-10 WB off-ramp at Dalrymple

Based on environmental constraints and operation, roundabouts were identified as the preferred alternative.

The I-10 EB Service Road at Dalrymple Drive intersection was analyzed as stop control on the Service Road approach.

Figure 3.1 presents the proposed configuration of the consolidated interchange with roundabouts. The proposed interchange geometry is presented in **Appendix D**.



LEGEND:

- ← Lane Configuration
- Unsignalized Intersection
- ⊙ Roundabout



Figure 3.1

2040 Build Lane Configuration
Washington/Dalrymple IMR

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Critical Geometry

The proposed geometric improvements were designed, with exceptions, to meet the LADOTD Minimum Design Guidelines and are in accordance with “A Policy on Geometric Design of Highways and Streets 2018”. The LADOTD Road Design Manuals and applicable memoranda were also utilized.

The proposed critical geometry criteria and design exceptions are presented in **Appendix D**.

Alternative Analysis

The merge/diverge ramp junctions, surface street intersections, and frontage roads were analyzed for the AM and PM peaks with the Build conditions and compared to the No Build conditions summarized in Chapter 2. The analysis files and input parameters are included in **Appendix D**. The 2040 Build volumes are presented in **Appendix C** on pages **C-28** and **C-29**.

Merge/Diverge

Highway Capacity Software (HCS) version 7.5 was used for the merge/diverge ramp junction analysis. The Build conditions analysis included an additional lane on mainline I-10 in both directions and the consolidated Washington/Dalrymple interchange. In this program, adjacent ramps are not considered in merge and diverge analysis when there are more than three (3) freeway lanes. The Build condition includes four (4) or more I-10 freeway lanes in each direction and therefore adjacent ramp information was not utilized.

Table 3.1 presents the results of the Build analysis for the merge and diverge locations.

**Table 3.1
Scenario Comparison
HCS Merge/Diverge**

Location		AM		PM	
		No Build	Build	No Build	Build
Existing	Proposed	Density (pc/mi/ln)	Density (pc/mi/ln)	Density (pc/mi/ln)	Density (pc/mi/ln)
<i>I-10 EB Diverge to Washington Street</i>	<i>I-10 EB Diverge to Washington/Dalrymple</i>	--	34.3	35.8	41.0
<i>I-10 EB Merge from Braddock Street</i>	<i>I-10 EB Merge from Washington/Dalrymple</i>	--	--	45.3	31.0
<i>I-10 EB Diverge to Dalrymple Drive</i>	N/A	41.1	N/A	--	N/A
<i>I-10 WB Diverge to Dalrymple Drive</i>	<i>I-10 WB Diverge to Washington/Dalrymple</i>	--	35.3	--	37.7
<i>I-10 WB Merge from Dalrymple Drive</i>		--	32.9	--	35.1
<i>I-10 WB Merge from Washington Street</i>		--	35.9	--	40.3
<i>I-10 WB Diverge to Louise Street</i>	N/A	--	N/A	--	N/A

--When v/c (volume to capacity) is greater than 1 the HCS software does not report density.

pc/ln/mi represents passenger car per lane per mile.

N/A – Location does not exist in *Proposed*

A review of **Table 3.1** indicates that the density is expected to improve at most of the ramp junctions with the proposed improvements. The I-10 EB diverge to Washington/Dalrymple density is expected to increase slightly in the PM peak, however, this single ramp in the Build scenario services traffic from two existing ramps in the No Build. The analysis files and input parameters are included in **Appendix D**.

Surface Street Intersections

Trafficware Synchro 8 was used to analyze the signalized intersections on the surface streets. 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.

Tables 3.2 and **3.3** present the results of the AM and PM Build Synchro analysis results compared to the No Build analysis, respectively. The highest v/c ratio and 95th percentile queue for each approach is presented.

**Table 3.2
AM No Build vs Build Comparison Intersections
Synchro Analysis**

Location	AM					
	No Build			Build		
	Delay (sec)	V/C Ratio	95 th % Queues	Delay (sec)	V/C Ratio	95 th % Queues
I-10 WB ramps at Dalrymple Drive	6.9	-	-	14.4	-	-
<i>I-10 off-ramp Eastbound</i>	27.3	0.24	40	27.8	0.41	73
<i>E Lakeshore Drive Westbound</i>	27.4	0.26	43	26.3	0.20	33
<i>Dalrymple Drive Northbound</i>	2.7	0.27	55	14.4	0.79	190
<i>Dalrymple Drive Southbound</i>	6.0	0.15	60	11.7	0.41	175
I-10 EB off-ramp at Dalrymple Drive***	7.4	-	-	-	-	-
<i>I-10 off-ramp Eastbound</i>	26.9	0.81	155	86.5	0.75	70
<i>Dalrymple Drive Northbound</i>	3.8	0.20	68	0.0	0.00	0
<i>Dalrymple Drive Southbound</i>	4.4	0.32	123	0.0	0.00	0
I-10 WB on-ramp at Washington Street**	-	-	-	23.8	-	-
<i>Washington Street Eastbound</i>	5.0	0.32	35	23.1	0.78	235
<i>Washington Street Westbound</i>	N/A			17.9	0.33	17.9
<i>Frontage Road Northbound</i>				26.6	0.67	26.6
I-10 EB off-ramp at Washington Street	13.0	-	-	14.0	-	-
<i>Washington Street Eastbound</i>	15.7	0.61	230	15.6	0.71	338
<i>Washington Street Westbound</i>	11.3	0.29	70	8.9	0.30	115
<i>Kentucky Street Northbound</i>	11.2	0.28	75	*	*	*
<i>I-10 off-ramp/Braddock Street Southbound</i>	10.7	0.22	68	17.1	0.28	95
Frontage Road Eastbound U-Turn^	N/A			-	-	-
<i>U-Turn from Westbound to Eastbound</i>				10.9	0.11	9

- Output not reported

*Approach does not exist in this alternative

**No Build condition is unsignalized

***Build condition is unsignalized

^Build condition analyzed using HCM 2000

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**Table 3.3
PM No Build vs Build Comparison Intersections
Synchro Analysis**

Location	PM					
	No Build			Build		
	Delay (sec)	V/C Ratio	95 th % Queues	Delay (sec)	V/C Ratio	95 th % Queues
I-10 WB ramps at Dalrymple Drive	5.9	-	-	16.9	-	-
<i>I-10 off-ramp Eastbound</i>	27.7	0.27	45	27.1	0.41	80
<i>E Lakeshore Drive Westbound</i>	27.0	0.17	28	26.4	0.33	60
<i>Dalrymple Drive Northbound</i>	2.6	0.28	55	17.3	0.85	230
<i>Dalrymple Drive Southbound</i>	6.0	0.18	68	12.8	0.40	160
I-10 EB off-ramp at Dalrymple Drive***	4.0	-	-	-	-	-
<i>I-10 off-ramp Eastbound</i>	32.7	0.79	68	44.7	0.37	40
<i>Dalrymple Drive Northbound</i>	2.2	0.25	73	0.0	0.00	0
<i>Dalrymple Drive Southbound</i>	2.1	0.23	65	0.0	0.00	0
I-10 WB on-ramp at Washington Street**	-	-	-	18.8	-	-
<i>Washington Street Eastbound</i>	5.6	0.33	35	16.1	0.64	253
<i>Washington Street Westbound</i>	N/A			29.5	0.54	29.5
<i>Frontage Road Northbound</i>	N/A			20.7	0.5	20.7
I-10 EB off-ramp at Washington Street	13.6	-	-	15.6	-	-
<i>Washington Street Eastbound</i>	16.1	0.63	248	17.7	0.79	408
<i>Washington Street Westbound</i>	11.1	0.26	63	9.7	0.28	110
<i>Kentucky Street Northbound</i>	10.7	0.23	65	*	*	*
<i>I-10 off-ramp/Braddock Street Southbound</i>	9.2	0.03	8	16.9	0.26	93
Frontage Road Eastbound U-Turn^	N/A			-	-	-
<i>U-Turn from Westbound to Eastbound</i>	N/A			12.9	0.18	16

- Output not reported

*Approach does not exist in this alternative

**No Build condition is unsignalized

***Build condition is unsignalized

^Build condition analyzed using HCM 2000

A review of **Tables 3.2** and **3.3** indicate that the overall intersection delay and v/c ratios are expected to increase in both the AM and PM peaks. Under signal control, Washington Street eastbound would need two through lanes at the I-10 EB off-ramp. To accommodate the 400+ foot queues on this approach, Washington Street eastbound would need to be widened to two lanes from I-10 EB to the intersection at Thomas Delpit Dr. The widening of Washington Street would

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impact the Dr. Leo S. Butler Community Center and is therefore not a feasible option. Additional details are provided in **Appendix D**.

To improve efficiency and eliminate the impacts to the Dr. Leo S. Butler Community Center, roundabouts were considered at the following intersections:

- Washington Street at I-10 EB off-ramp
- Washington Street at I-10 WB on-ramp
- Dalrymple Drive at I-10 WB off-ramp

Roundabout analysis was performed using SIDRA software Version 7.0. **Table 3.4** presents the result of the roundabout Build analysis for the subject intersections.

Table 3.4
Roundabout Analysis
SIDRA Analysis

Location	Roundabout					
	AM			PM		
	Delay (sec)	V/C Ratio	95 th % Queues	Delay (sec)	V/C Ratio	95 th % Queues
I-10 WB ramps at Dalrymple Drive	4.3	0.82	-	4.7	0.82	-
<i>I-10 off-ramp Eastbound</i>	0.4	0.40	21	0.5	0.36	22
<i>E Lakeshore Drive Westbound</i>	3.4	0.11	11	4	0.2	21
<i>Dalrymple Drive Northbound</i>	0.8	0.40	74	1	0.45	88
<i>Dalrymple Drive Southbound</i>	13.8	0.82	336	16.9	0.82	324
I-10 WB on-ramp at Washington Street	12.1	0.82	-	17	0.89	-
<i>Washington Street Eastbound</i>	0.0	0.68	0	0.0	0.77	0
<i>Washington Street Westbound</i>	50.4	0.82	277	82.1	0.89	352
<i>Frontage Road Northbound</i>	11.0	0.64	182	18.5	0.7	239
I-10 EB off-ramp at Washington Street	3.5	0.81	-	2.6	0.67	-
<i>Washington Street Eastbound</i>	5.0	0.81	332	3.3	0.67	194
<i>Washington Street Westbound</i>	0.0	0.47	0	0.0	0.48	0
<i>I-10 off-ramp/Braddock Southbound</i>	3.2	0.29	44	3.6	0.34	54

- Output not reported

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A review of **Table 3.4** indicated that, in general, the delays and queues improve with conversion to roundabouts and the widening of Washington Street is not required.

Frontage Roads

Roadway analysis was conducted on both the EB and WB frontage roads to confirm that the proposed number of lanes would be sufficient for the traffic volumes. The proposed volumes and geometry were input into HCS version 7.5 software. The two-lane EB and WB frontage roads were analyzed separately as multi-lane roads with 100 percent (%) of the volume in the analysis direction to allow it to include different input parameters for each. **Table 3.5** presents the results for the roadway analysis for the AM and PM peaks.

Table 3.5
AM and PM Frontage Road
Roadway Analysis

Location	AM	PM
	v/c Ratio	v/c Ratio
<i>Multi-lane WB Frontage Road</i>	0.18	0.27
<i>Multi-lane EB Frontage Road</i>	0.15	0.16

Based on **Table 3.5**, the resulting volume to capacity ratios were less than one indicating sufficient number of lanes on the services roads.

Safety Analysis

The number and type of conflict points were determined for the proposed conditions for comparison to the existing conditions. The conflict point diagrams for the proposed configuration are presented in **Appendix D**. **Table 3.6** presents the comparison of Existing versus Build conflict points.

Table 3.6
Existing vs Build
Conflict Point Comparison

Conflict Type	Existing	Build (Roundabouts)
Diverging Conflict	26	26
Merging Conflict	28	25
Crossing Conflict	37	3
TOTAL Conflicts	91	54

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Striping and Signage layouts

The purpose of developing conceptual striping and signage layouts as part of an IMR is to ensure the alternative design could be adequately signed and striped with the proposed modifications. Striping and signage layouts are presented in **Appendix D**.

Study Area Network Overview

The main safety concern in the study area noted in Chapter 2 was the outside lane of I-10 EB dropping as an exit only lane to Washington Street requiring through traffic to merge left resulting in one (1) lane for the I-10 mainline. The proposed consolidated interchange eliminates this condition and maintains two (2) lanes for the I-10 mainline.

An additional contributing factor to crashes identified in Chapter 2 was congestion. The capacity analyses results indicated that the consolidation of ramps will reduce friction on the mainline and improve congestion.

In the AM peak period, an issue identified was that I-10 traffic is heavy in the westbound direction. In the PM peak period, an issue identified was congestion on I-10 in both eastbound and westbound directions; particularly in the eastbound direction which services the evening commuter traffic. The analyses indicated the operations will improve during both the AM and PM peaks with the widening and interchange modifications.

The interchange modifications will also provide much needed access to I-10 eastbound from Dalrymple Drive and the LSU campus.

In general, the conversion of the following surface street intersections to roundabouts improves operation and reduces conflict points:

- Washington Street at I-10 EB off-ramp
- Washington Street at I-10 WB on-ramp
- Dalrymple Drive at I-10 WB off-ramp