

## *College Drive Interchange Modification Report*

### Chapter 3. ALTERNATIVE ANALYSIS

The results of the network analysis for the Build conditions, including the proposed College Drive interchange modifications and an additional lane on I-10, are presented in this chapter. The following subsections contain summaries of the Tier I and Tier II/ III analyses 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 to determine feasible interchange alternatives. The only alternative moving forward from the Tier 1 for further analysis was the directional ramp from I-10 WB and I-12 WB to the exit at College Drive. In this alternative, there are ramps from I-10 WB and from I-12 WB to exit for College Drive east of the I-10/I-12 merge. With this alternative, the current I-10 weave issue is eliminated. Details of the Tier I analysis are in **Appendix A**.

#### Summary of Tier II/ III Analysis

The purpose of the Tier II/ III analysis was to further refine the alternative selected in Tier I. The Tier II/ III analysis included the technical critical geometry, alternative analysis, striping and conflict point comparison.

#### Proposed Build Layout

The proposed Build layout includes with the following features:

- Westbound
  - New - Single drop lane exit ramp from I-10 to College Drive east of the merge with I-12.
  - New - Single drop lane exit ramp from I-12 to College Drive east of the merge with I-10.
  - The new College Drive exit ramps from I-10 and I-12 will join, creating a two-lane ramp north of I-10 mainline. There are two (2) options for the tie in of the directional ramp to College Drive:
    - Option 1 includes a single lane exit ramp to Trust Drive, a new designated right turn only lane at the signalized intersection of College Drive at the I-10 WB ramp and the removal of the WB right turn slip lane.
    - Option 2 includes a right turn slip lane for vehicles exiting at College Drive destined for Corporate Boulevard and a new designated right turn only lane at the signalized intersection of College Drive at the I-10 WB ramp.
  - I-10 just west of the I-10/I-12 merge will be a four-lane section.
  - I-10 will be a four-lane section including an auxiliary lane between the Essen Lane on ramp and the I-12 off ramp.

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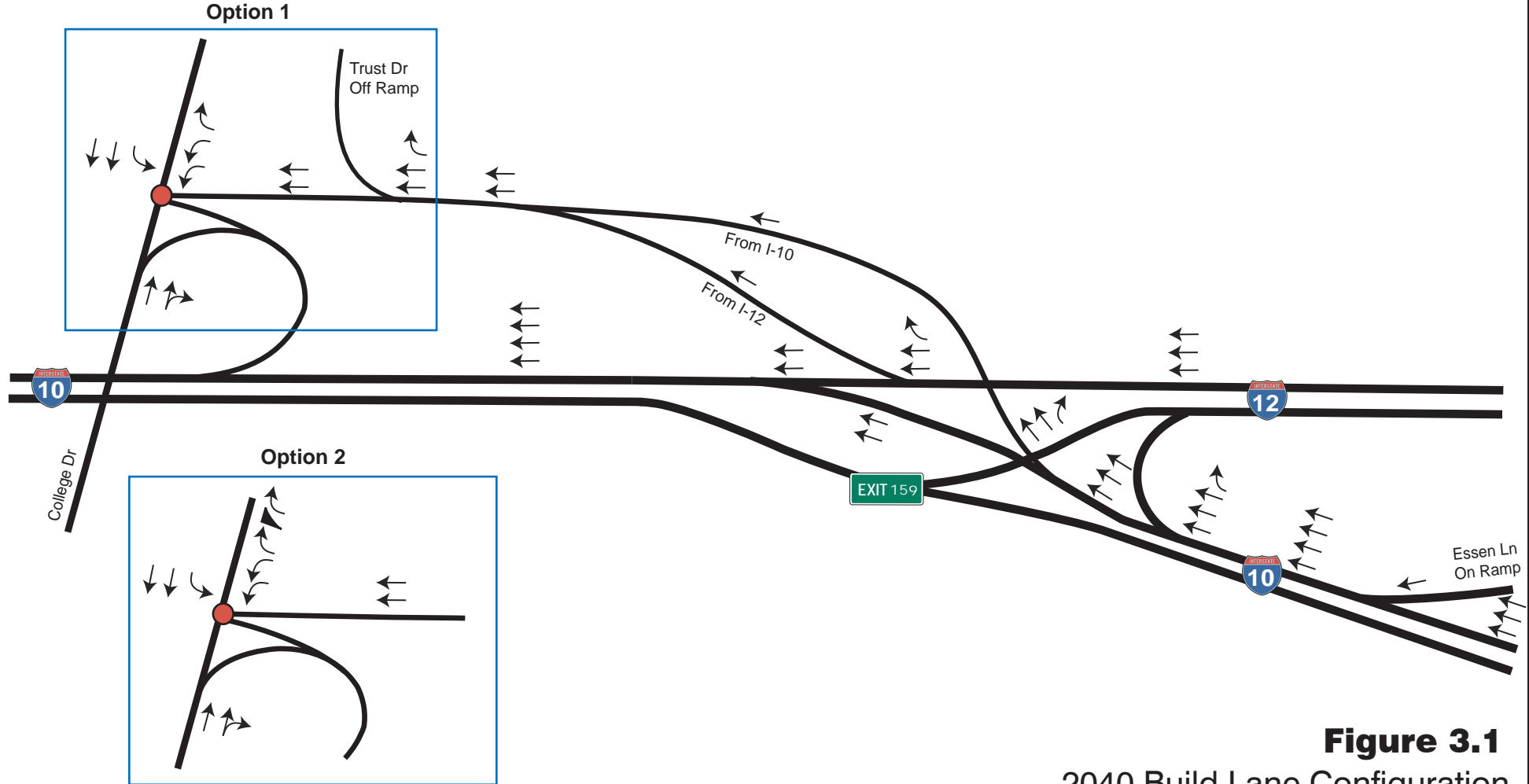
**Figure 3.1** presents the proposed lane configurations. The proposed Line and Grade geometry is in **Appendix D**.

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**LEGEND:**

- ← Lane Configuration
- ▴ Median for Channelization
- Signalized Intersection



**Figure 3.1**  
 2040 Build Lane Configuration

**IMR Data Collection**  
 Directional Ramp from I-10 WB to College Drive  
 East Baton Rouge Parish, LA

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### ***Critical Geometry***

The proposed geometric modifications to I-10, I-12 and to the College Drive exit ramps were designed to meet the LADOTD Minimum Design Criteria 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 interchange configuration does not require any design exceptions.

The proposed critical geometry criteria for the College Drive interchange is presented in **Appendix D**.

### ***Alternative Analysis***

The diverge ramp junction, surface street intersection, freeway segments and weave were analyzed for the AM and PM peaks for the 2040 Build conditions and compared to the No Build analysis summarized in **Chapter 2**. Due to the geometry changes in the Build condition, not all analysis results were comparable between the No Build and Build conditions. Figures were prepared to illustrate the geometric differences and present the analysis type performed for each location.

The measure of effectiveness was density, which is the number of vehicles occupying a given length of a lane or roadway at an instant, in passenger cars per lane per mile (pc/mi/ln). A limitation of the HCS software is that density is not reported when thresholds are exceeded, such as a volume to capacity ratio greater than one.

The Build analysis files and input parameters are included in **Appendix D**. The 2040 Build volumes are presented in **Appendix C**.

### ***Freeway/Diverge***

HCS version 7.5 was used for the diverge ramp junction and freeway analysis. The Build conditions analysis included the I-10 WB mainline, directional exit ramps from I-10 WB and I-12 WB to College Drive and the Trust Drive off ramp in Option 1.

### ***Weave Sensitivity Analysis***

The proposed configuration of I-10 WB between the Essen Lane on ramp and the I-12 EB off ramp would create a weave in the Build condition. As there was insufficient data to determine which vehicles entering I-10 WB from the Essen Lane on ramp remain on I-10 WB or exit to I-12 EB, a volume sensitivity weave analysis was conducted. The following three (3) volume scenarios were considered:

- Volume Scenario 1: 100% of vehicles entering I-10 WB from Essen Lane exits to I-12 EB
- Volume Scenario 2: 100% of vehicles entering I-10 WB from Essen Lane remains on I-10 WB
- Volume Scenario 3: 50% of vehicles entering I-10 WB from Essen Lane exits to I-12 EB and 50% remains on I-10 WB

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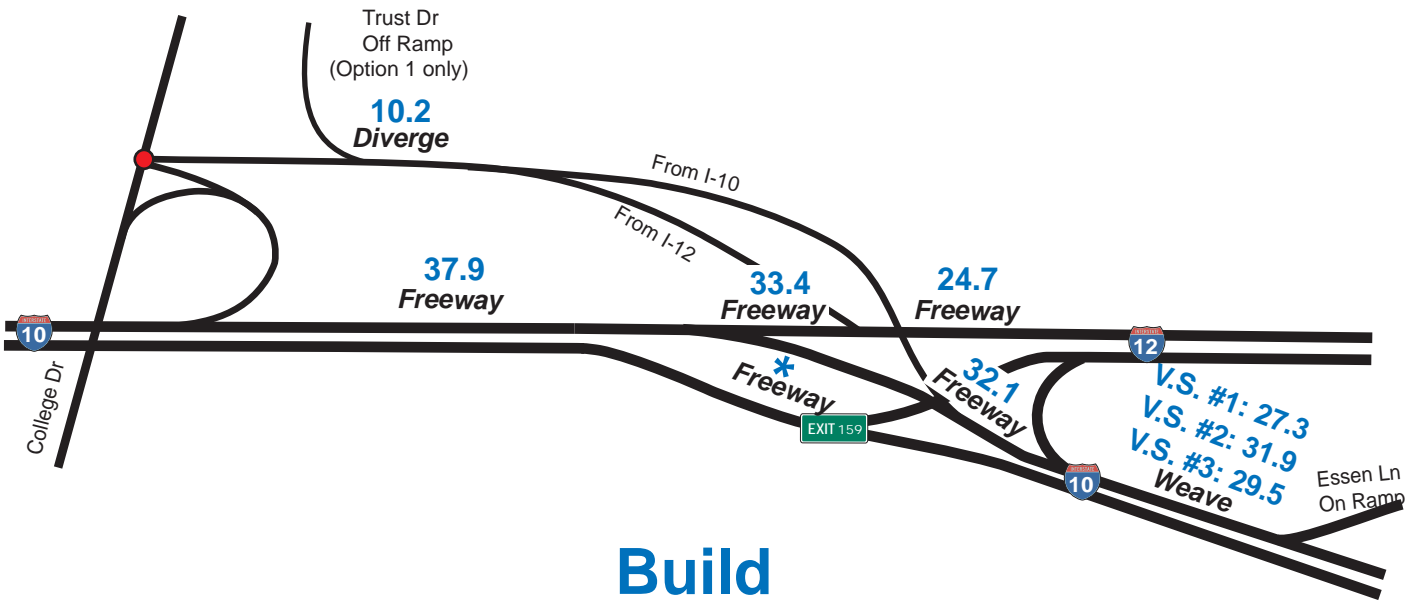
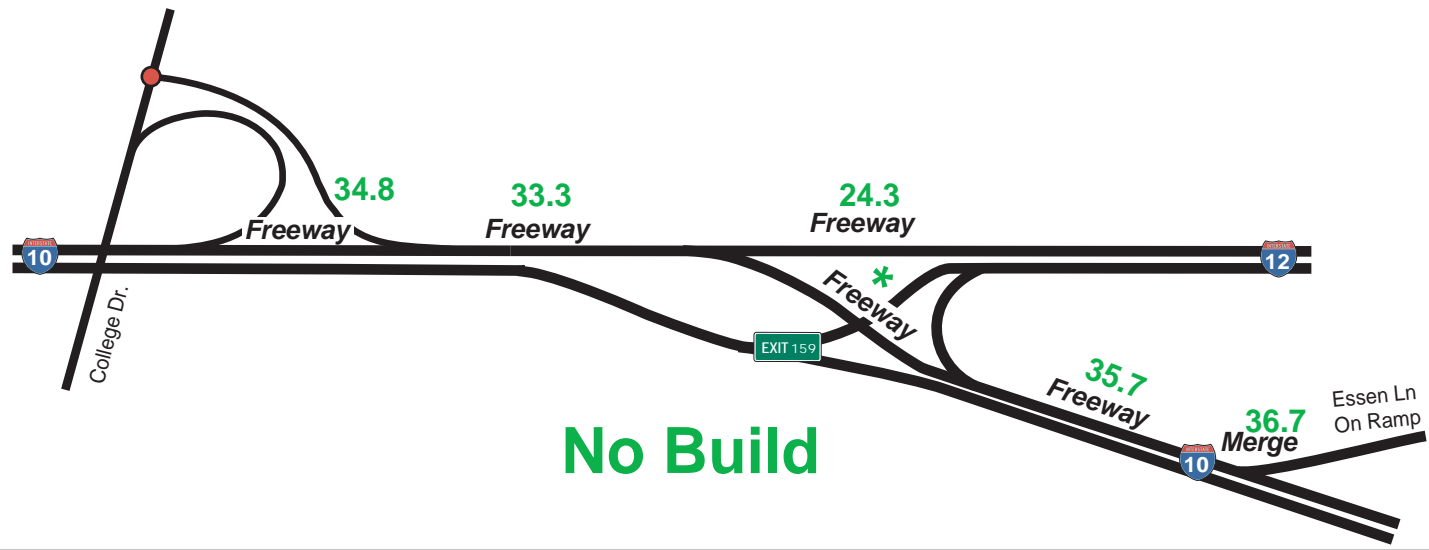
The input parameters and volume scenarios used in the weave analysis are presented in **Appendix D**. HCS version 7.5 was used for the Build volume sensitivity weave analysis.

**Figures 3.2** and **3.3** present the No Build and Build results of the freeway, diverge and weave analysis for the AM and PM peaks, respectively.



**LEGEND:**

- X AM No Build Reported Density (pc/mi/ln)
- X AM Build Reported Density (pc/mi/ln)
- X Freeway Analysis Type
- \* V/C ratio > 1; HCS software does not report density V.S. Volume Scenario



**Figure 3.2**  
AM 2040 No Build vs. Build MOE Results

IMR Data Collection  
Directional Ramp from I-10 WB to College Drive  
East Baton Rouge Parish, LA

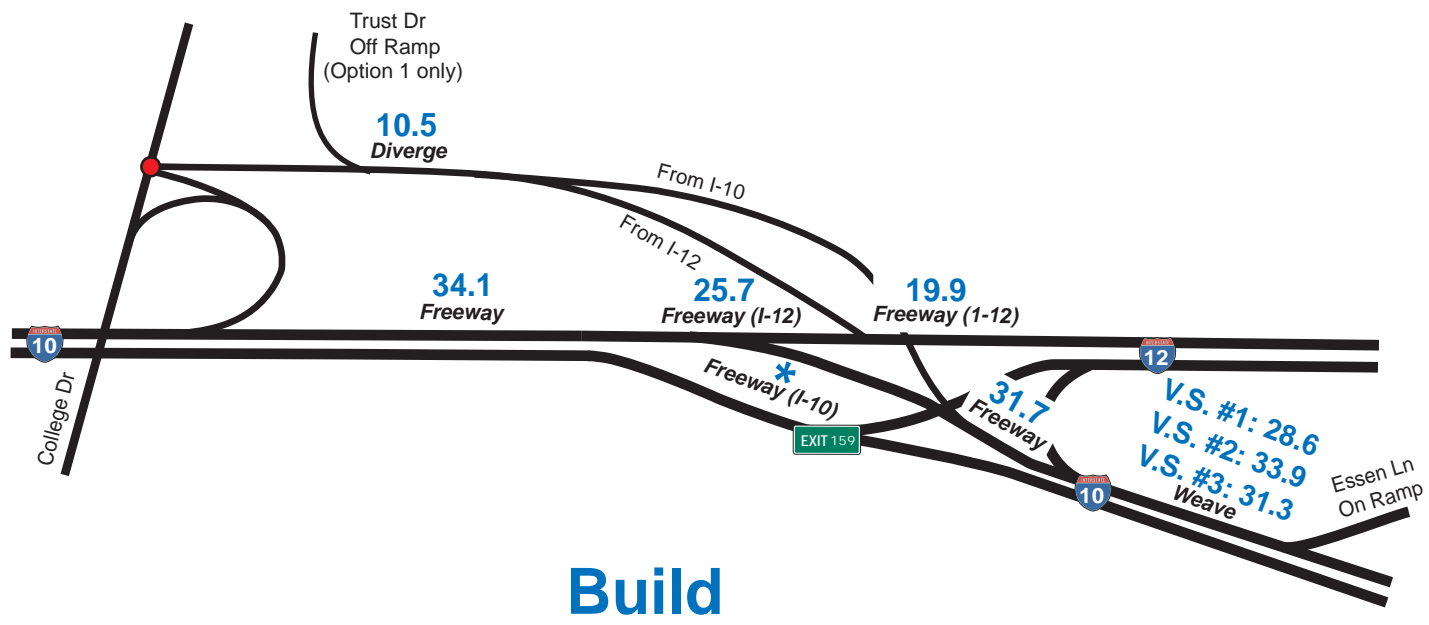
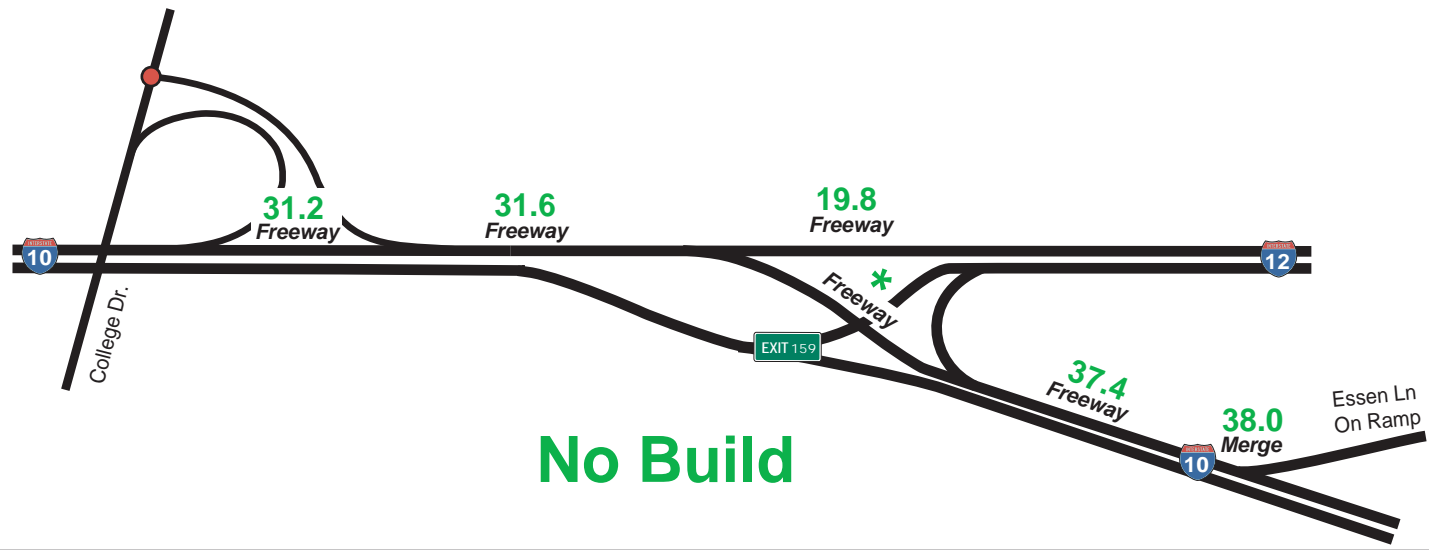
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**LEGEND:**

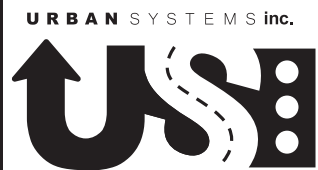
- X AM No Build Reported Density (pc/mi/ln)
- X AM Build Reported Density (pc/mi/ln)
- X Freeway Analysis Type
- \* V/C ratio > 1; HCS software does not report density V.S. Volume Scenario



**Figure 3.3**  
PM 2040 No Build and Build MOE Results

IMR Data Collection  
Directional Ramp from I-10 WB to College Drive  
East Baton Rouge Parish, LA

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A review of **Figures 3.2** and **3.3** indicate the following:

- The College Drive off ramp diverge to Trust Drive, Option 1, is expected to have acceptable density in both peaks.
- I-10 WB after the merge with I-12 is expected have similar capacity in the No Build and Build conditions.
- I-12 WB is expected to have similar capacity in the No Build and Build conditions.
- The two (2) lane segment of I-10 WB between the proposed exit ramp to College Drive and the I-12 WB merge is expected to be over capacity in the Build condition in both peaks.
- The three (3) lane segment of I-10 WB between the I-12 EB exit ramp and the proposed exit ramp to College Drive is expected to have adequate capacity in the Build condition.
- Weave analysis indicated densities were less than 35 pc/mi/ln for all three (3) volume scenarios in both peaks.

### *Surface Street Intersection*

Trafficware Synchro 8 was used to analyze the signalized intersection at the ramp terminal intersection with College Drive with the proposed Build condition geometry. Options 1 and 2 were modeled the same in Synchro due to the similarity in volumes and lane configuration. The volume using the off ramp to Trust Drive in Option 1 is the same volume using the slip lane in Option 2. The lane configuration at the signalized intersection is the same for Options 1 and 2 as the slip lane is not included in the analysis.

Signal timing parameters in the Build conditions analysis were developed to accommodate concurrent vehicle and pedestrian movements for proposed crosswalks, as presented in the Line and Grade in **Appendix D**. The minimum green plus the yellow time was adjusted to accommodate the calculated pedestrian clearance for the concurrent signal phase accommodating the pedestrian crossing.

The minimum pedestrian times were calculated as:

$$\text{Minimum Pedestrian Times (sec)} = \text{Walk Distance (ft)} \times 3.5 \text{ ft/sec} + 7 \text{ sec walk}$$

The crosswalk measurements and pedestrian timing calculations for Options 1 and 2 are presented in **Appendix D**.

**Tables 3.1** and **3.2** present the results of the AM and PM Build analysis for the subject intersection, respectively. 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.

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**Table 3.1**  
**AM 2040 No Build vs Build Intersection Comparison**  
**Synchro Analysis**

Location	AM					
	No Build			Build (Options 1 and 2)		
	Delay (sec)	v/c Ratio	95 <sup>th</sup> % Queues	Delay (sec)	v/c Ratio	95 <sup>th</sup> % Queues
<b>I-10 WB ramp at College Dr</b>	<b>32.6</b>			<b>39.4</b>		
<i>I-10 ramp Westbound</i>	56.0	0.88	413	51.9	0.87	618
<i>College Dr Northbound</i>	35.3	0.81	630	49.6	0.96	843
<i>College Dr Southbound</i>	20.3	0.89	483	24.8	0.94	575

**Table 3.2**  
**PM 2040 No Build vs Build Intersection Comparison**  
**Synchro Analysis**

Location	PM					
	No Build			Build (Options 1 and 2)		
	Delay (sec)	v/c Ratio	95 <sup>th</sup> % Queues	Delay (sec)	v/c Ratio	95 <sup>th</sup> % Queues
<b>I-10 WB ramp at College Dr</b>	<b>36.6</b>			<b>36.9</b>		
<i>I-10 ramp Westbound</i>	99.8	1.02	798	72.9	0.94	823
<i>College Dr Northbound</i>	28.0	0.71	738	36.3	0.85	953
<i>College Dr Southbound</i>	18.6	0.85	668	23.3	0.94	608

The results in **Tables 3.1** and **3.2** indicate that the overall intersection delay is expected to slightly increase in both peaks. The delay and the v/c ratio are expected to be lower in the Build condition for the I-10 WB off ramp.

The reported 95% queues on the I-10 WB off ramp were compared to the proposed storage length in the Line and Grade. The comparison indicated that the queues would not extend onto the mainline on to the Trust Drive diverge.

**Safety Analysis**

The number and type of conflict points were determined for the Build condition and compared to the existing condition. The conflict points for the I-10 WB mainline and College Drive at I-10 WB terminal, for Options 1 and 2, are presented in **Appendix D. Tables 3.3** and **3.4** present the comparison of existing vs Build conflict points for the I-10 WB mainline and the College Drive at I-10 WB terminal, respectively.

**Table 3.3  
Existing vs Build Conflict Point Comparison  
I-10 WB Mainline**

<b>Conflict Type</b>	<b>Existing</b>	<b>Build</b>
<b>I-10 WB Mainline</b>		
Diverging Conflict	8	10
Merging Conflict	9	10
<b>TOTAL</b>	<b>17</b>	<b>20</b>

**Table 3.4  
Existing vs Build Conflict Point Comparison  
College Dr at I-10 WB Terminal**

<b>Conflict Type</b>	<b>Existing</b>	<b>Build</b>
<b>Option 1 College Dr at I-10 WB Terminal (Includes Trust Dr Diverge)</b>		
Diverging Conflict	8	8
Merging Conflict	5	5
Crossing Conflict	9	9
<b>TOTAL</b>	<b>22</b>	<b>22</b>
<b>Option 2 College Dr at I-10 WB Terminal</b>		
Diverging Conflict	8	7
Merging Conflict	5	5
Crossing Conflict	9	9
<b>TOTAL</b>	<b>22</b>	<b>21</b>

A review of **Table 3.3** indicates that the total number of conflict points on the I-10 WB mainline will increase due to the addition of the I-10 and I-12 ramps to College Drive.

A review of **Table 3.4** indicates the total number of conflict points is the same with Option 1 compared to the No Build condition. The number of conflict points for the College Drive at I-10 WB terminal would decrease by one (1) with Option 2.

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### *Striping and Signage Layouts*

The purpose of conceptual striping and signage layouts are to ensure the alternative design could be adequately signed and striped in the Build condition. Striping and signing layouts are presented in **Appendix D**.

### *Study Area Network Overview*

The main safety concern in the study area noted in **Chapter 2** was the weaving movements on I-10 WB between the I-10/I-12 merge and the College Drive off ramp. The purpose and need of the proposed interchange modification is to reduce conflict points on I-10 WB from the I-10/I-12 merge to College Drive. The weaving movements between the I-10/I-12 merge and College Drive are eliminated in Options 1 and 2 of the Build conditions.

The number of conflict points on the I-10 WB mainline will increase by three (3) in the Build condition. In Option 1, for College Drive at I-10 WB, the number of conflict points is unchanged from the existing condition. In Option 2, there is one (1) less conflict point than the existing condition.

In the Build condition, I-10 WB is expected to have acceptable operating conditions except for the freeway segment between the proposed exit ramp to College Drive and the merge with I-12.

Option 1 which includes the Trust Drive diverge, eliminates the weave maneuver on College Drive NB between the I-10 WB off ramp and Corporate Boulevard. This weave maneuver is still present in Option 2; however, the addition of the right turn only lane for motorists not destined for Corporate Boulevard would lessen the number of weaving vehicles. At the intersection of I-10 WB at College Drive, the off ramp would include enough storage for queued vehicles.