

Final Report



# State Road A1A North Bridge over ICWW Bridge

## Draft Design Traffic Technical Memorandum

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## INTRODUCTION

A Project Development and Environment (PD&E) study was performed to develop a preferred alternative for the SR-A1A North Bridge over the Intracoastal Waterway (ICWW) in St. Lucie County, Florida. The project study area (see Figure 1) spans from the intersection of SR-A1A (Roadway ID 94060000) at US-1 (MP 0.000) to 2,000 feet east of the existing bridge approach (MP 0.719), and from the intersection of US-1 (Roadway ID 94010000) at Sunny Lane (MP 14.770) to the intersection of US-1 & Juanita Avenue (MP 15.163). The study area includes the US-1 and CR-605 (Old Dixie Highway) corridors, both north and south of SR-A1A. The study area includes the following intersections:

- US-1 & Juanita Avenue
- US-1 & SR-A1A
- US-1 & Sunny Lane
- SR-A1A & CR-605
- Florida East Coast (FEC) Railroad

The PD&E Study will evaluate alternatives to replace the existing SR-A1A bascule bridge. The analysis included three bridge alternatives as follows: (1) low-level bascule bridge; (2) mid-level moveable bridge; and (3) high-level fixed bridge. Horizontal alignment alternatives include placing the new bridge to the north of, to the south of, and maintaining the same location as the existing bridge. The project also includes the development and evaluation of grade separations over Old Dixie Highway and the FEC Railroad. CR-605 is about 600 feet east of US-1 and the FEC Railroad is approximately 100 feet east of CR-605. Placing SR-A1A over CR-605 and the FEC Railroad requires the elimination of the portion of SR-A1A between US-1 and CR-605/FEC Railroad. To replace this connection, two alternatives were evaluated. Alternative 1 evaluated a new connection between US-1 and CR-605 at the existing intersection of Juanita Avenue and US-1 approximately 1,100 feet north of the intersection. A full median opening can be provided at the US-1 intersection. Alternative 2 evaluated a new connection between US-1 and CR-605 at the existing intersection of Sunny Lane and US-1 about 900 feet south of the existing intersection of

US-1 and SR-A1A. Per FDOT access management criteria, only a directional median opening can be provided.

The traffic analysis was performed for the existing traffic conditions, the anticipated opening year (2020), the mid-year (2030), and the design year (2040).



Figure 1: Location Map



## EXISTING CONDITIONS

The study area is located in the City of Fort Pierce in St. Lucie County, Florida. SR-A1A/North Causeway, from US-1 to east of the SR-A1A bridge, is a two-lane urban minor arterial with a posted speed limit of 40 miles per hour (mph) in both directions. The existing typical section for SR-A1A has one 12 foot lane in each direction, 5-foot wide bicycle lanes, 5-foot wide sidewalks, and no on-street parking or bus stops.

At the intersection of SR-A1A and US-1, the eastbound approach has one exclusive left-turn lane and one shared through/right-turn lane. The westbound approach has two exclusive left-turn lanes, one through lane, and one exclusive right-turn lane. The northbound and southbound approaches each include one exclusive left-turn lane, two through lanes, and one exclusive right-turn lane.

At the intersection of SR-A1A and Old Dixie Highway, the eastbound approach includes one exclusive left-turn lane and one shared through/right-turn lane. The westbound approach includes one exclusive left-turn lane, two through lanes, and one exclusive right-turn lane. The northbound approach includes one exclusive left-turn lane, one through lane, and one exclusive right-turn lane. The southbound approach includes one exclusive left-turn lane and one shared through/right-turn lane.

US-1 is a four-lane divided roadway, two lanes in each direction, with a posted speed limit of 45 mph in both directions. US-1 is characterized by 5-foot wide bicycle lanes, 5-foot wide sidewalks that are separated from the travel way by a buffer that is at minimum 15-feet wide, and no on-street parking or bus stops. The median along US-1 between Sunny Lane and Juanita Avenue varies between 20 feet and 32 feet in width.

At the intersection of US-1 & Juanita Avenue, the eastbound approach includes one exclusive right-turn lane. The southbound approach has one exclusive left-turn lane that only serves u-turn movements, two through lanes, and one exclusive right-turn lane. The northbound approach has one exclusive left-turn lane and two through lanes.

At the intersection of US-1 and Sunny Lane, the eastbound approach includes one exclusive left-turn lane and one exclusive right-turn lane. The southbound approach has one through lane and one shared through/right-turn lane. The northbound approach has one exclusive left-turn lane and two through lanes.

The FEC Railroad lies within the study limits, running parallel to and east of CR-605, also intersecting with SR-A1A. The existing lane geometry for the intersections within the study area is depicted in Figure 2.

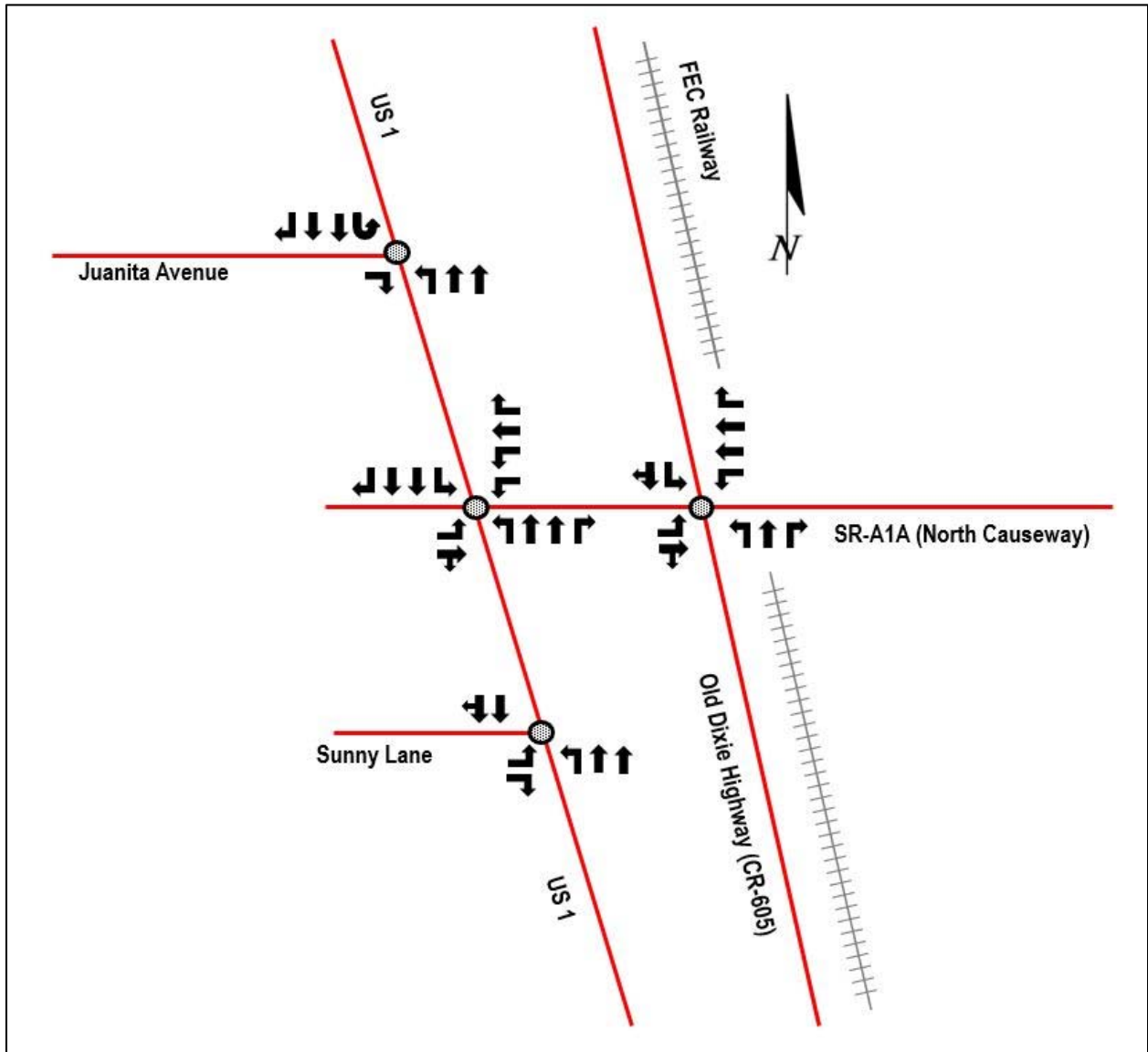


Figure 2: Intersection Lane Geometry

## DATA COLLECTION AND VOLUME DEVELOPMENT

### Data Collection

Traffic data throughout the study area was collected by CTS Engineering, Inc. (CTS) on behalf of the Florida Department of Transportation (FDOT) and provided in a report entitled *SR-A1A Bridge Replacement PD&E Traffic Analysis – SR-A1A from US-1 to Old Dixie Highway* (CTS Report 1).

The following data collection efforts were completed by CTS:

- 6-hour intersection turning movement counts were performed from October 28, 2014 (Tuesday) to October 30, 2014 (Thursday) at the SR-A1A & US-1 intersection and the SR-A1A & CR-605 intersection (7:00 AM to 9:00 AM, 12:00 PM to 2:00 PM, and 4:00 PM to 6:00 PM). The turning movement counts are documented in **Appendix A**.
  - Using the 6-hour intersection turning movement counts, the AM and PM peak hours were determined to be from 7:15 AM to 8:15 AM, and 4:45 PM to 5:45 PM, respectively.
- 72-hour approach/departure machine counts were collected from October 28, 2014 (Tuesday) to October 30, 2014 (Thursday). The approach/departure machine counts are documented in **Appendix A**.

Supplemental data was collected by CTS on behalf of FDOT to provide additional information for the Sunny Lane and Juanita Avenue intersections along US-1 and provided in a report entitled *SR-A1A Bridge Replacement PD&E – Traffic Data Collection and Forecast for Intersections of US-1 at Sunny Lane & US-1 & Juanita Avenue* (CTS Report 2). The following data collection efforts were completed by CTS as a part of the supplemental analysis:

- 6-hour intersection turning movement counts were performed from August 18, 2015 (Tuesday) to August 20, 2015 (Thursday) at the US-1 & Juanita Avenue intersection and US-1 & Sunny Lane intersection (7:00 AM to 9:00 AM, 12:00 PM to 2:00 PM, and 4:00 PM to 6:00 PM). The turning movement counts are documented in **Appendix A**.
  - Using the 6-hour intersection turning movement counts, the AM and PM peak hours were determined to be from 7:30 AM to 8:30 AM, and 4:30 PM to 5:30 PM, respectively.
- 72-hour approach/departure machine counts were collected from August 18, 2015 (Tuesday) to August 20, 2015 (Thursday). The approach/departure machine counts are documented in **Appendix A**.

The collected data was used to develop the design traffic for the SR-A1A, US-1, and CR-605 corridors.

**Volume Development**

Annual Average Daily Traffic (AADT) for each leg of the study intersections was provided in the CTS reports. The AADTs were calculated from the collected three-day average traffic volumes, along with the applicable seasonal and axle correction factors, published in the 2013 and 2014 Florida Traffic Information DVD. For counts taken in 2014, the axle correction factor used was 0.97 and the seasonal factor used was 1.05. For 2015 counts, the axle correction factor used was 0.99 and the seasonal factor used was 1.06. The 2014 and 2015 AADT calculations are documented in Table 1 and Table 2, respectively. The 2014 and 2015 AADT volumes are also represented graphically in Figure 3, on the following page.

**Table 1: 2014 AADT Calculations**

Location	Day 1 Tuesday, October 28 (vehicles)	Day 2 Wednesday, October 29 (vehicles)	Day 3 Thursday, October 30 (vehicles)	3-Day Average (vehicles)	Axle Correction Factor <sup>(1)</sup>	Seasonal Factor <sup>(1)</sup>	AADT <sup>(2)</sup> (vehicles)
US-1 south of SR-A1A	19,029	19,285	19,685	19,333	0.97	1.05	19,700
US-1 north of SR-A1A	19,484	19,836	20,004	19,775			20,100
SR-A1A east of US-1	6,019	6,030	5,983	6,011			6,100
SR-A1A west of US-1	3,609	3,677	3,519	3,602			3,700
CR-605 south of SR-A1A	4,148	4,267	4,325	4,247			4,300
CR-605 north of SR-A1A	1,974	2,040	2,185	2,066			2,100
SR-A1A east of CR-605	7,808	8,028	8,026	7,954			8,100

Source: SR-A1A Bridge Replacement PD&E Traffic Analysis – SR-A1A from US-1 to Old Dixie Highway FDOT report dated November 26, 2014

Notes: (1) 2013 Florida Traffic Information DVD

(2) AADT = (3-Day Average)×(Axle Correction Factor)×(Seasonal Factor), rounded to the nearest hundred

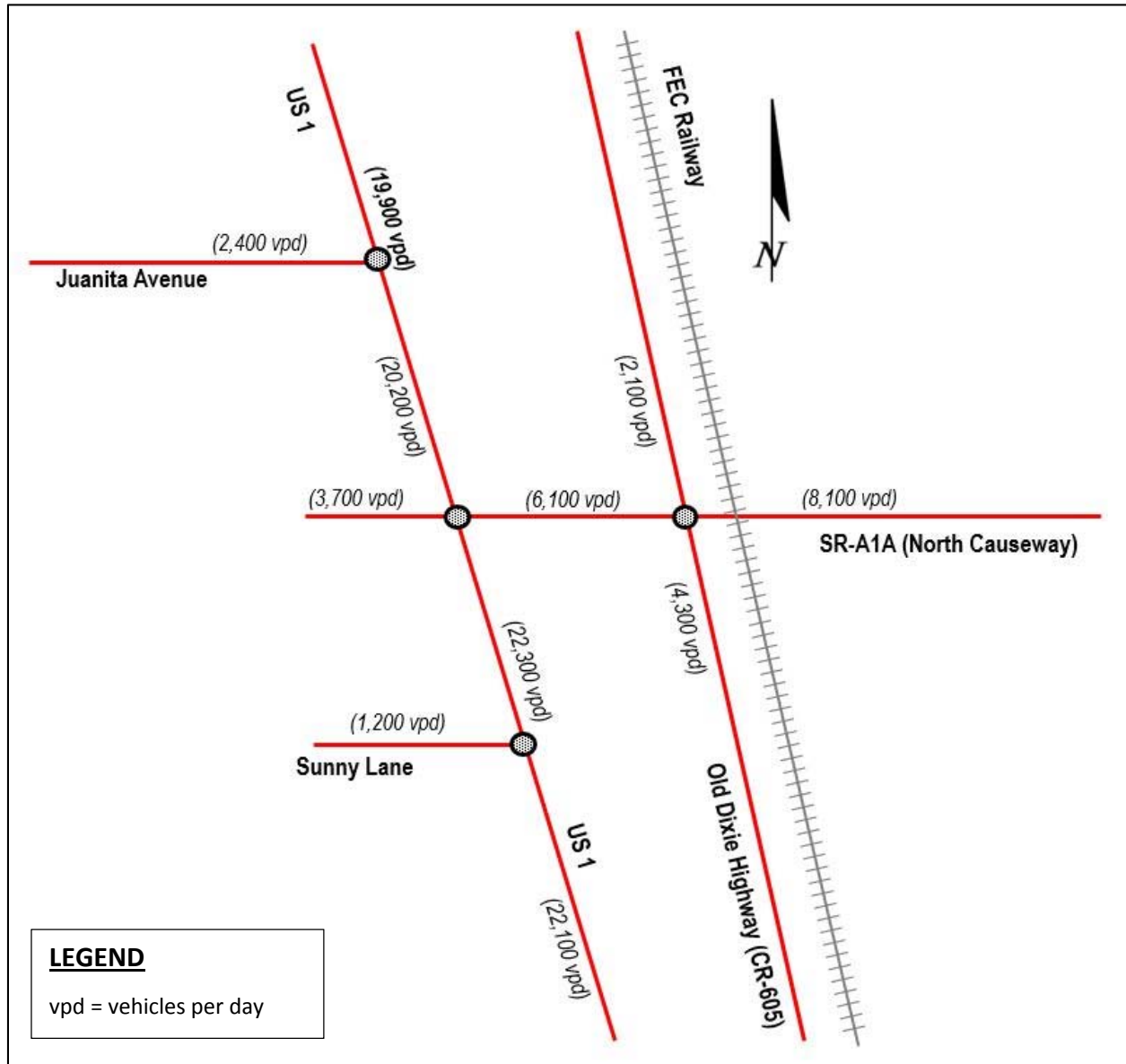
**Table 2: 2015 AADT Calculations**

Location	Day 1 Tuesday, October 28 (vehicles)	Day 2 Wednesday, October 29 (vehicles)	Day 3 Thursday, October 30 (vehicles)	3-Day Average (vehicles)	Axle Correction Factor <sup>(1)</sup>	Seasonal Factor <sup>(1)</sup>	AADT <sup>(2)</sup> (vehicles)
US-1 north of Juanita Avenue	18,954	18,960	18,995	18,970	0.99	1.06	19,900
US-1 south of Juanita Avenue	19,069	19,448	19,365	19,294			20,200
Juanita Avenue west of US-1	2,236	2,231	2,317	2,261			2,400
US-1 north of Sunny Lane	21,088	21,488	21,120	21,219			22,300
US-1 south of Sunny Lane	20,962	21,247	20,945	21,051			22,100
Sunny Lane west of US-1	1,185	1,110	1,179	1,158			1,200

Source: SR-A1A Bridge Replacement PD&E – Traffic Data Collection and Forecast for Intersections of US-1 at Sunny Lane & US-1 & Juanita Avenue FDOT supplemental report dated September 9, 2015

Notes: (1) 2014 Florida Traffic Information DVD

(2) AADT = (3-Day Average)×(Axle Correction Factor)×(Seasonal Factor), rounded to the nearest hundred



**Figure 3: Existing 2014/2015 AADT Volumes**

The intersection turning movement data were adjusted to peak season volumes using the appropriate peak season category factors by CTS in the respective reports. Because the counts were collected at different times, the volumes along US-1 did not balance within an acceptable tolerance. Due to the minimal number of driveways, a balance threshold of 5% was utilized. The US-1 & SR-A1A intersection count was conducted during a typical weekday during the school year, while the US-1 & Juanita Avenue and US-1 & Sunny Lane intersections were collected

during the summer break. Therefore, the US-1 & Juanita Avenue and US-1 & Sunny Lane intersection volumes were manually adjusted to balance with the volumes at the US-1 & SR-A1A intersection. Figure 4 illustrates the adjusted existing AM, Midday, and PM peak turning movement counts.

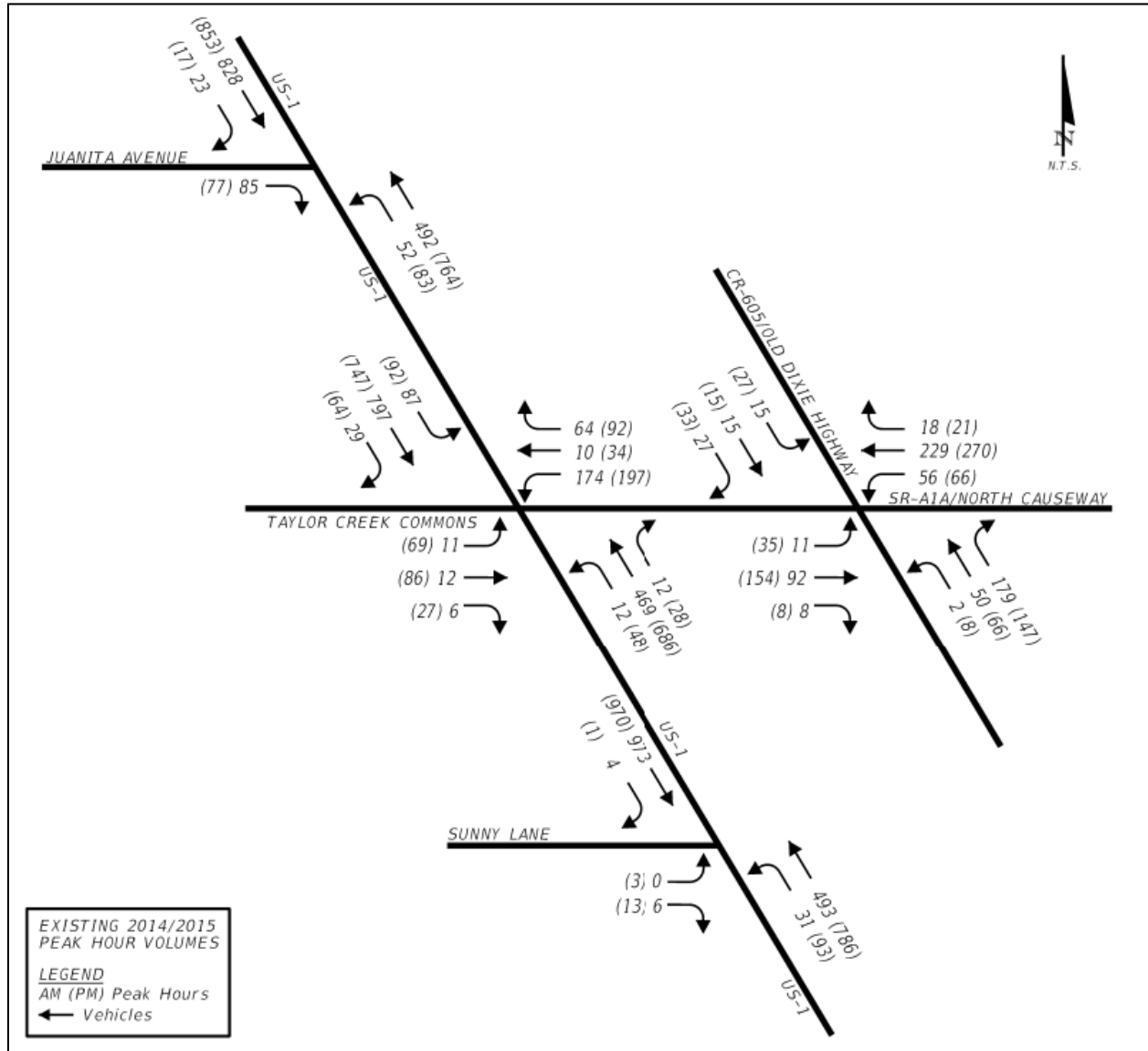


Figure 4: Existing 2014/2015 Peak Hour Volumes

## EXISTING CONDITIONS OPERATIONAL ANALYSIS

The traffic operational analysis was performed at all intersections within the study area for the existing 2014/2015, future 2020, future 2030, and future 2040 no-build traffic conditions. The study intersections were analyzed using Trafficware's *Synchro 9.1* software package, which utilizes methodologies outlined in the *Highway Capacity Manual, 2010 Edition (HCM2010)*. The intersection analyses were conducted for AM and PM peak hours. Intersection level of service (LOS) was used as the performance measure for the intersections. In general, LOS reflects quality of service provided by a roadway facility and it depends on several factors including travel time, delay, speed, freedom to maneuver, traffic interruptions, and comfort. The HCM2010 provides the following definition:

- Intersection LOS is based on average delay per vehicle. Control delay includes initial deceleration delay, queue move up time to first in line at the intersection, stopped delay as first car in queue, and final acceleration delay. Factors such as signal progression, random arrival of vehicles, oversaturation queues, and type of signal control are contributory to control delay.

The existing signal timings were obtained from the St. Lucie County Traffic Division.

### Existing (2014/2015) Conditions AM. Peak Hour Operational Analysis

Table 3 presents AM peak hour LOS for the study intersections. The intersection of SR-A1A & US-1 operates at LOS B with an average delay of 17.8 seconds per vehicle, and the intersection of SR-A1A & CR-605 operates at LOS B with an average delay of 11.0 seconds per vehicle. The approaches and movements at both signalized intersections currently operate at LOS D or better during the AM peak hour.

The existing intersections of US-1 & Sunny Lane and US-1 & Juanita Avenue are three-legged T-intersections with eastbound, northbound, and southbound approaches. At both intersections, the eastbound approach (Sunny Lane and Juanita Avenue) is stop controlled, while US-1 (northbound and southbound approaches) operates under free-flow conditions. Therefore, intersection LOS is not defined for these intersections. The Sunny Lane eastbound approach operates at LOS B with



an average delay of 12.1 seconds per vehicle, and the Juanita Avenue eastbound approach operates at LOS B with an average delay of 12.4 seconds per vehicle.

The detailed existing intersection capacity analyses are included in **Appendix B**.

**Table 3: Existing (2014/2015) AM. Peak Hour Intersection Level of Service**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	41.2 / D	41.4 / D	17.8 / B
		EBT / EBR	41.5 / D		
	WB	WBL	42.2 / D	38.0 / B	
		WBT	27.0 / C		
	NB	WBR	28.3 / C	13.8 / B	
		NBL	12.0 / B		
		NBT	13.9 / B		
	SB	NBR	11.8 / B	13.6 / B	
		SBL	10.8 / B		
		SBT	13.9 / B		
SBR		Free-flow			
SR-A1A & CR-605	EB	EBL	12.5 / B	11.9 / B	11.0 / B
		EBT / EBR	11.8 / B		
	WB	WBL	12.9 / B	11.9 / B	
		WBT	11.8 / B		
	NB	WBR	10.9 / B	10.1 / B	
		NBL	7.9 / A		
		NBT	8.5 / A		
	SB	NBR	10.6 / B	7.7 / A	
		SBL	7.4 / A		
		SBT / SBR	7.8 / A		
US-1 & Sunny Lane	EB	EBL	0.0 / A	12.1 / B	N/A <sup>(3)</sup>
		EBR	12.1 / B		
	NB	NBL	10.6 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
SB	SBT / SBR	Free-flow	N/A		
US-1 & Juanita Avenue	EB	EBR	12.4 / B	12.4 / B	N/A <sup>(3)</sup>
	NB	NBL	10.0 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBL	0.0 / A	N/A <sup>(2)</sup>	
		SBT	Free-flow		
	SBR	Free-flow			

- Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound  
 Movement - L = left-turn; T = through; R = right-turn  
 Note: (1) Delay measured in seconds per vehicle.  
 (2) Approach operates under free-flow conditions. LOS is not defined.  
 (3) Unsignalized intersection LOS is not defined.

**Existing (2014/2015) Conditions PM Peak Hour Operational Analysis**

Table 4 presents PM peak hour LOS for the study intersections. The intersection of SR-A1A & US-1 operates at LOS C with an average delay of 21.1 seconds per vehicle, and the intersection of SR-A1A & CR-605 operates at LOS B with an average delay of 11.6 seconds per vehicle. The

approaches and movements at both signalized intersections currently operate at LOS D or better during the PM peak hour.

The US-1 approaches to Sunny Lane and Juanita Avenue operate under free-flow conditions; therefore, intersection LOS is not defined for these intersections. The eastbound approach at Sunny Lane operates at LOS B with an average delay of 13.1 seconds per vehicle. The eastbound approach at Juanita Avenue operates at LOS B with an average delay of 12.5 seconds per vehicle.

The detailed existing intersection capacity analyses are included in **Appendix B**.

**Table 4: Existing (2014/2015) PM Peak Hour Intersection Level of Service**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	45.3 / D	47.8 / D	21.1 / C
		EBT / EBR	49.3 / D		
	WB	WBL	43.6 / D	38.0 / B	
		WBT	28.1 / C		
	NB	WBR	29.6 / C	15.0 / B	
		NBL	11.7 / B		
		NBT	15.4 / B		
	SB	NBR	12.0 / B	14.3 / B	
		SBL	11.5 / B		
		SBT	14.7 / B		
SBR		Free-flow			
SR-A1A & CR-605	EB	EBL	12.6 / B	11.9 / B	11.6 / B
		EBT / EBR	11.7 / B		
	WB	WBL	13.4 / B	11.6 / B	
		WBT	11.3 / B		
	NB	WBR	10.4 / B	12.1 / B	
		NBL	9.7 / A		
		NBT	10.9 / A		
	SB	NBR	12.7 / B	9.5 / A	
		SBL	9.0 / A		
		SBT / SBR	9.8 / A		
US-1 & Sunny Lane	EB	EBL	16.8 / C	13.1 / B	N/A <sup>(3)</sup>
		EBR	12.2 / B		
	NB	NBL	11.2 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A	
US-1 & Juanita Avenue	EB	EBR	12.5 / B	12.5 / B	N/A <sup>(3)</sup>
	NB	NBL	10.4 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBL	0.0 / A	N/A <sup>(2)</sup>	
		SBT	Free-flow		
		SBR	Free-flow		

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound  
 Movement - L = left-turn; T = through; R = right-turn

Note: (1) Delay measured in seconds per vehicle.  
 (2) Approach operates under free-flow conditions. LOS is not defined.  
 (3) Unsignalized intersection LOS is not defined.

## GROWTH TREND ANALYSIS

The objective of the growth trend analysis is to establish growth rates for forecasting 2020, 2030, and 2040 traffic volumes. Growth rate analysis and growth rates provided in this report were obtained from the CTS Reports. A comparison of the growth rates resulting from each of the three evaluated forecasting methodologies is provided in Table 5. To determine growth rates, the following forecast methodologies were reviewed in the CTS Reports:

- Regression analysis of at least five (5) years of the most recent historical AADTs from FDOT count sites,
- Regression analysis of at least five (5) years of the most recent historical AADTs from FDOT count sites and the St. Lucie County 2035 model volumes from the Greater Treasure Coast Regional Planning Model (GTCRPM), and
- Growth between the base year 2005 and the 2035 GTCRPM roadway volumes.

### FDOT Count Based Growth Rates

A regression analysis was conducted using historical count data for the five (5) most recent years for which data were available at the following count locations:

- 94-0123: US-1 south end of Taylor Creek Bridge,
- 94-0010: US-1 south of St. Lucie Boulevard,
- 94-7017: Juanita Avenue east of 25<sup>th</sup> Street,
- 94-0709: SR-A1A east of US-1,
- 94-0114: SR-A1A east end of ICWW bridge, and
- 94-8521: Old Dixie Highway (CR-605) from Shimonek Lane to Oslo Avenue (HPMS sample).

The historical growth rates provided in Table 5 were calculated using the “Traffic Trends Analysis Tool” spreadsheet. A linear trendline was fit to the data. The historical trendline growth analysis worksheets are included in **Appendix C**.

### GTCRPM Based Growth Rates

The 2035 GTCRPM was used to estimate growth rates for traffic segments as well as for the traffic analysis zone (TAZ) adjacent to where the project lies. Table 5 provides the GTCRPM growth rates for both the traffic segment analysis and the TAZ. The GTCRPM does not include road

segments for Sunny Lane or for SR-A1A west of US-1 (Taylor Creek Commons). The GTCRPM results are also included in **Appendix C**.

**Combination of FDOT Regression Analysis and GTCRPM Growth Rates**

Volumes obtained from the 2035 GTCRPM were included in the regression analysis along with the most recent five (5) years of count data available for each location that were used in the count based growth analysis. The “Traffic Trends Analysis Tool” spreadsheet was used to fit a linear trendline to the data. The combined historical and GTCRPM trendline analysis worksheets are included in **Appendix C**. Growth rates obtained from the combined analysis are provided in Table 5.

**Selected Growth Rates**

The recommended growth rate was determined by evaluating the historical growth rates, historical and model growth rates, the model growth rates, and the TAZ growth rates. The selected growth rates provided in Table 5 were obtained from the CTS Reports.

**Table 5: Growth Rate Comparison**

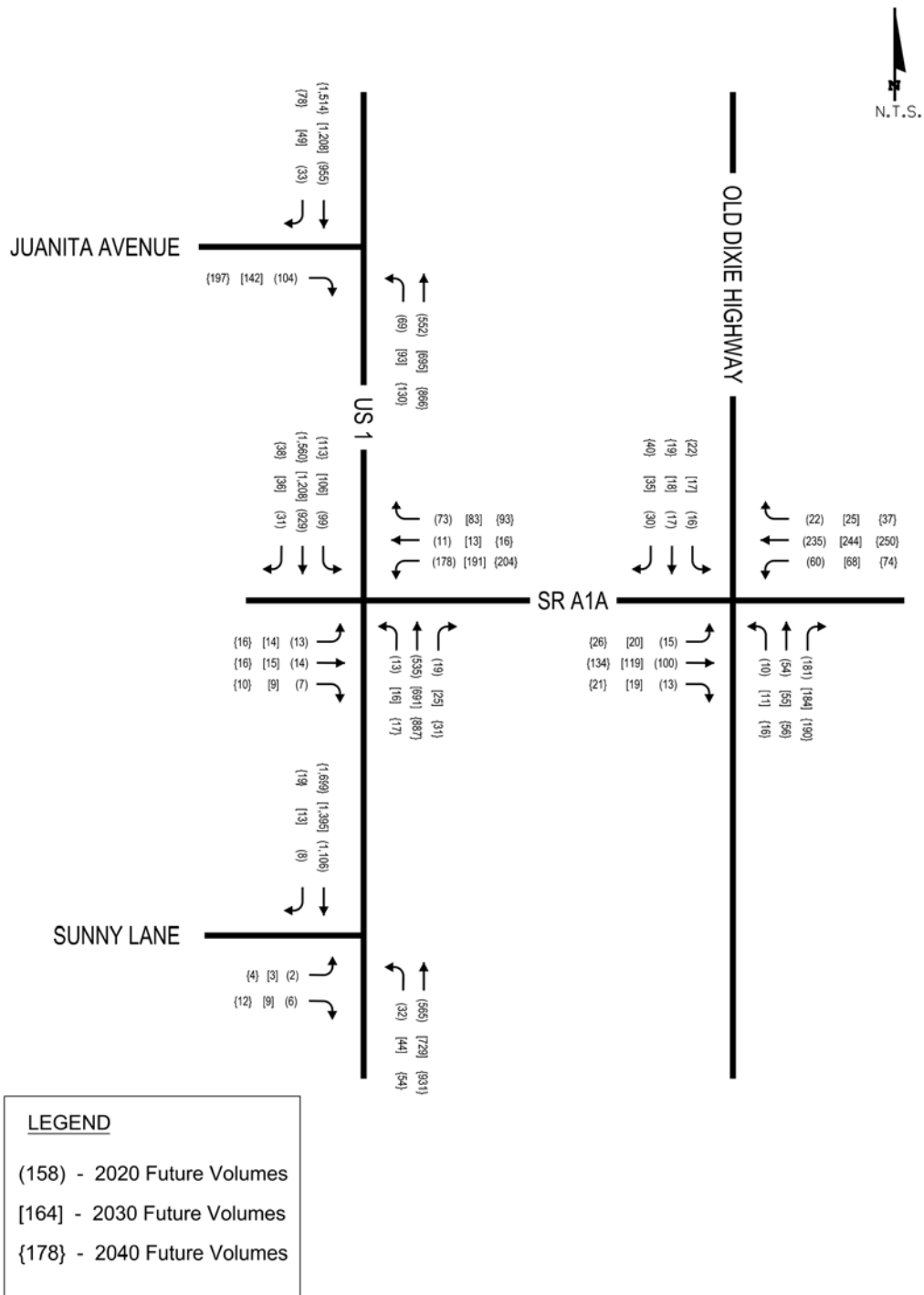
Location Description	Historical Growth Rate	Historical + GTCRPM Growth Rate	GTCRPM Growth Rate	TAZ Growth Rate	Recommended Growth Rate
US-1 north of Juanita Avenue	-3.7%	2.9%	1.5%	2.5%	2.2%
US-1 south of Juanita Avenue			1.4%		
US-1 north of SR-A1A	-2.1%	2.2%	0.9%		
US-1 south of SR-A1A					
US-1 north of Sunny Lane	-0.7%	12.6%	1.4%		
US-1 south of Sunny Lane		2.6%	1.5%		
CR-605 north of SR-A1A	-1.4%	3.1%	0.5%		0.5%
CR-605 south of SR-A1A			N/A		
SR-A1A west of US-1	-2.3%	2.4%	0.6%		
SR-A1A east of US-1	-3.4%	10.5%	3.5%		3.1%
SR-A1A east of CR-605	-	-	-	3.0%	3.0%
Juanita Avenue west of US-1					
Sunny Lane west of US-1					

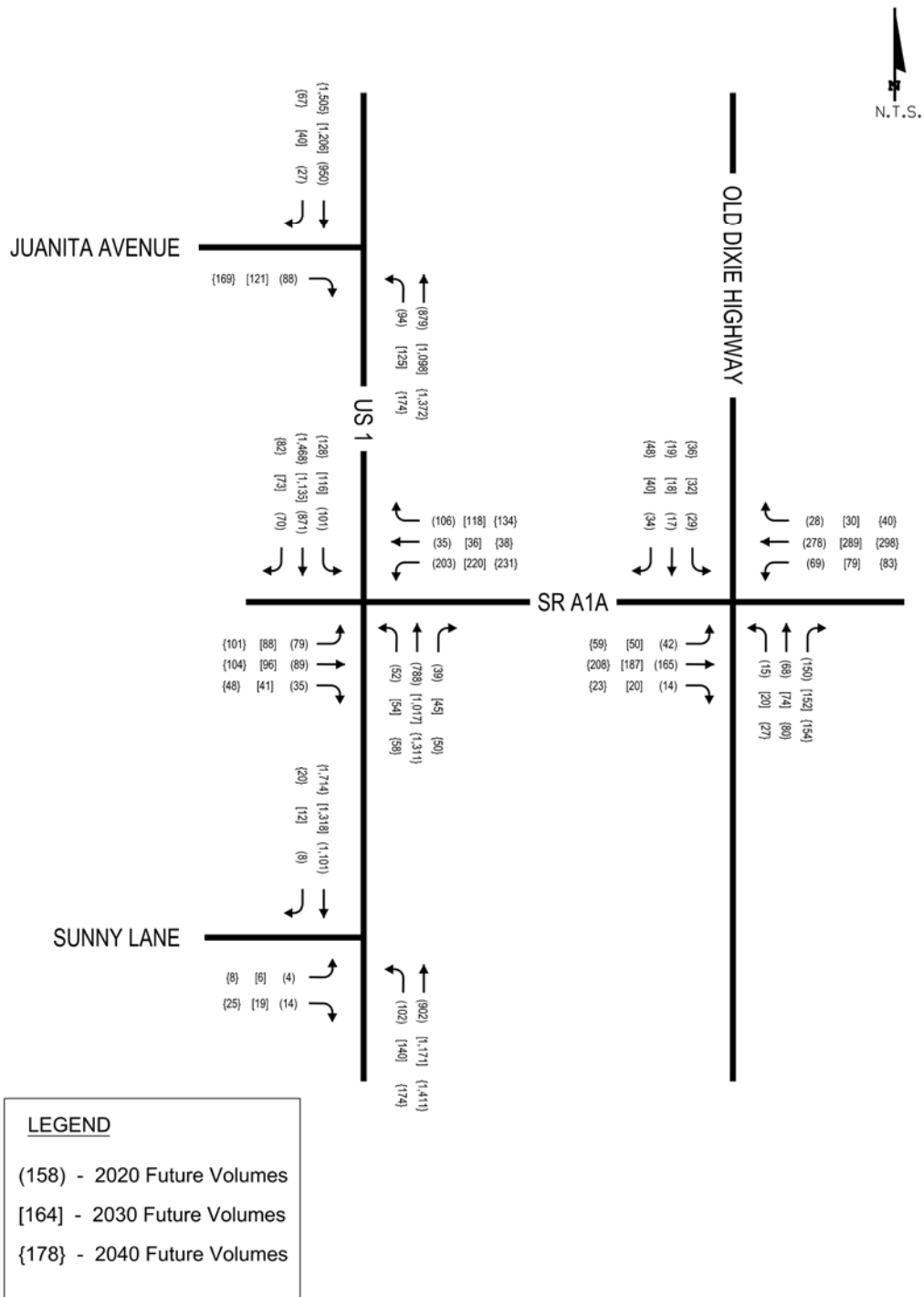
## TURNING MOVEMENT AND AADT DATA FORECAST

FDOT's TMTOOL spreadsheet was used to forecast turning movement volumes for 2020, 2030, and 2040 No-Build and Build conditions. The TMTOOL spreadsheet utilizes background growth rates, base AADT volumes, and existing turning movement counts to calculate the future turning movement volumes. The background growth rates obtained from the CTS Reports were utilized in the analysis. The TMTOOL spreadsheet applies the growth rate to base year volumes in order to forecast future conditions. The build alternatives require trip diversion due to the grade separation of the SR-A1A & CR-605 intersection; therefore the base (2014/2015) AADT volumes were interpolated from the Build Alternative 2035 model volumes using the background growth rates.

The existing turning movement counts from the CTS Reports were utilized, but were modified for each alternative. The existing conditions allow for full movements at the SR-A1A & CR-605 intersection, but each alternative proposes to grade separate the intersection, thus restricting all turning movements. Furthermore, the extensions of Juanita Avenue (Alternative 1) and Sunny Lane (Alternative 2) east to CR-605 will result in the addition of new movements at the newly created roadway segments. Using engineering judgement, the existing turning movement volumes were adjusted for each alternative to re-route traffic where turning movements were eliminated and re-assign the traffic through the new movements at the new intersections (i.e. for Alternative 1, a southbound left-turn movement at the SR-A1A & CR-605 intersection is no longer allowed; therefore, a driver wishing to make this movement will make a southbound right-turn at the CR-605 & Juanita Avenue intersection, a westbound left-turn at the US-1 & Juanita Avenue intersection, and finally a southbound left-turn at the SR-A1A & US-1 intersection.)

Turning movement development spreadsheets summarizing the diversion of traffic for each alternative are included in **Appendix D**. The TMTOOL output worksheets are included in **Appendix E**. Figures summarizing the existing, 2020, 2030, and 2040 turning movement volumes are included in Figure 5 to Figure 10.





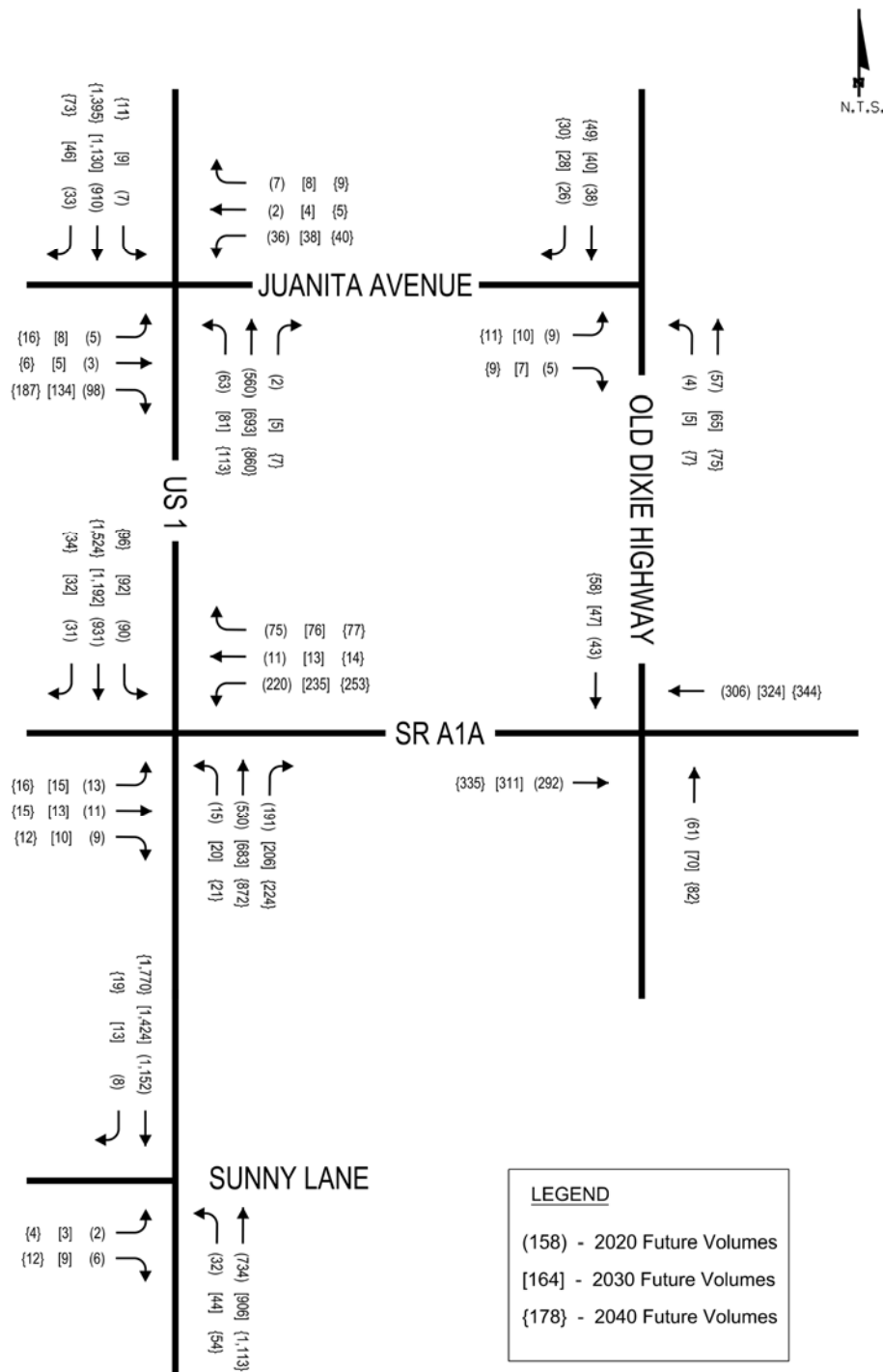


Figure 7: Alternative 1 - AM Peak Hour Volumes



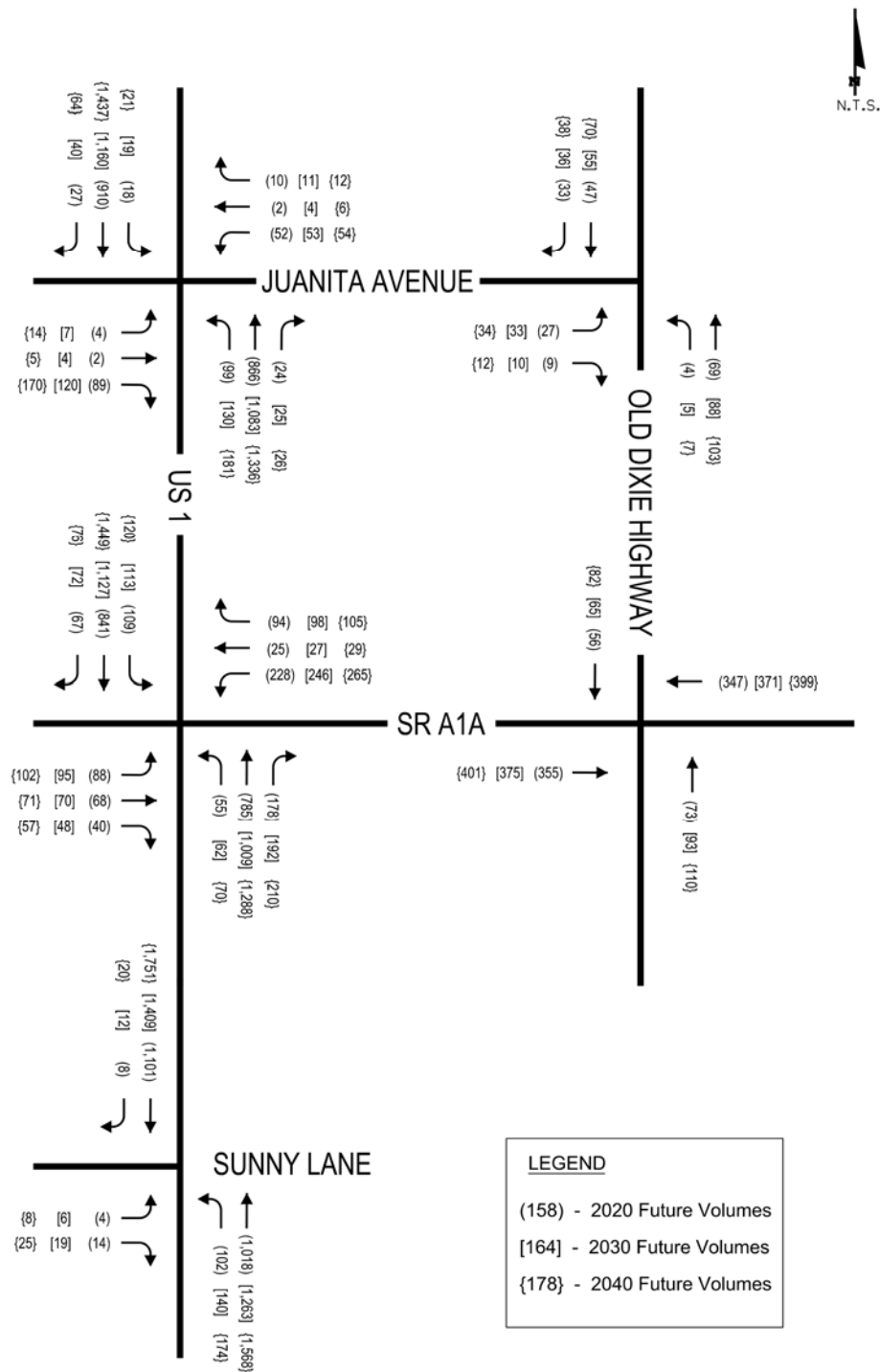


Figure 8: Alternative 1 - PM Peak Hour Volumes

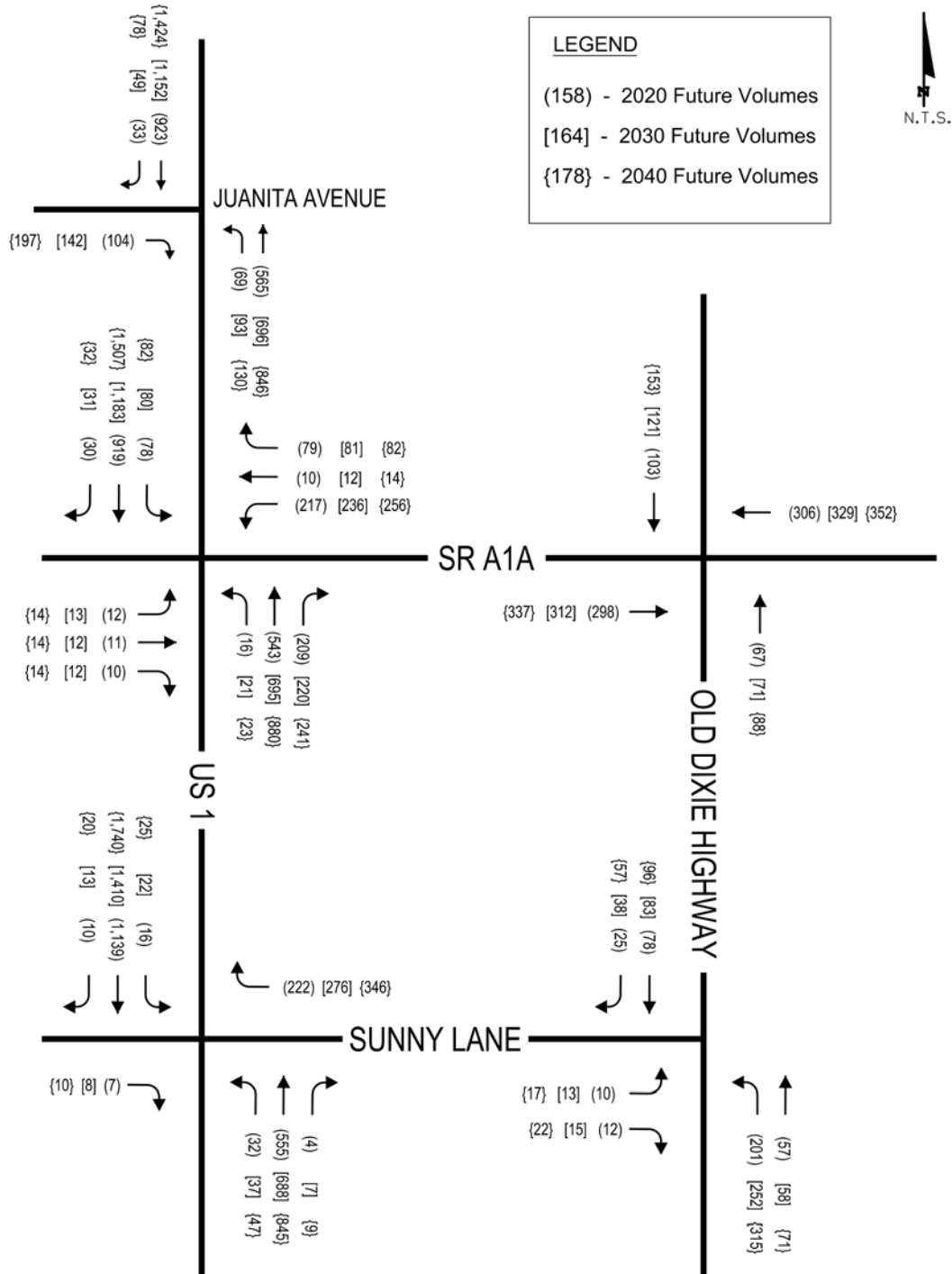


Figure 9: Alternative 2 - AM Peak Hour Volumes

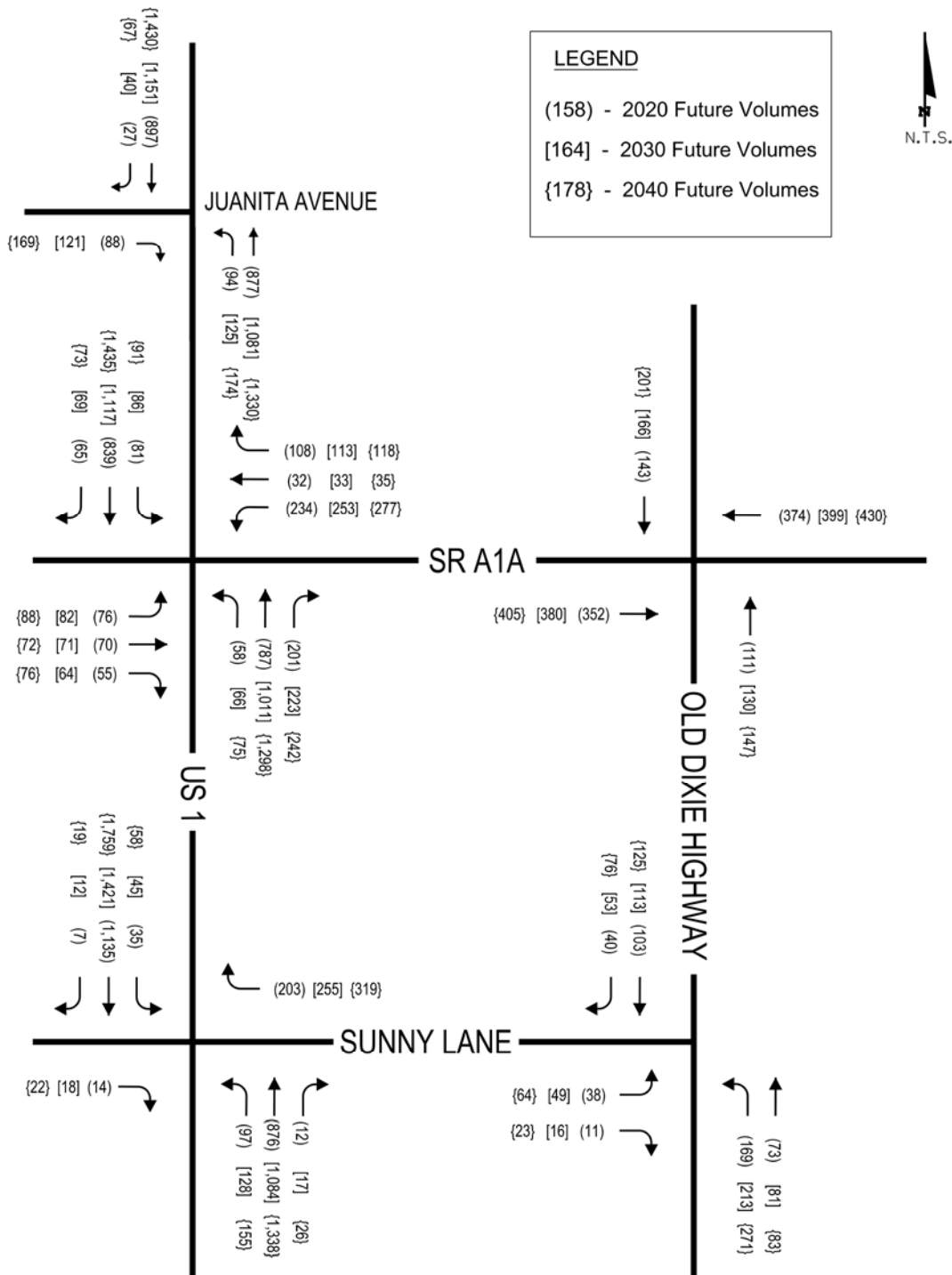


Figure 10: Alternative 2 - PM Peak Hour Volumes

## **FUTURE NO-BUILD CONDITIONS OPERATIONAL ANALYSIS**

The future no-build condition analysis evaluates the impacts of growth in the area if no improvements beyond what is currently planned or programmed occur in the corridor. This section presents intersection analyses for 2020, 2030, and 2040 no-build traffic conditions. In essence, the no-build alternative serves as a benchmark for evaluating other alternatives.

The future no-build analyses were provided in the CTS Reports. Additionally, the Martin-St. Lucie 2035 Regional Long Range Transportation Plan (RLRTP) was reviewed to identify any roadway/intersection capacity improvement projects that may be relevant to this project. No capacity improvements were identified that would impact the study area.

### **Future (2020) No-Build Conditions AM Peak Hour Operational Analysis**

Table 6 presents the future 2020 LOS for the study intersections. The US-1 & SR-A1A intersection is anticipated to operate at LOS B with an average delay of 18.3 seconds per vehicle, and the intersection of CR-605 & SR-A1A is anticipated to operate at LOS B with an average delay of 11.1 seconds per vehicle. The approaches and movements at both signalized intersections are anticipated to operate at LOS D or better during the AM peak hour.

The US-1 (northbound and southbound) approaches to Sunny Lane and Juanita Avenue are anticipated to operate under free-flow conditions. Therefore, intersection LOS is not defined for these intersections. The eastbound approach at Sunny Lane is anticipated to operate at LOS B with an average delay of 13.9 seconds per vehicle. The eastbound approach at Juanita Avenue is anticipated to operate at LOS B with an average delay of 13.8 seconds per vehicle.

The detailed future 2020 no-build intersection capacity analyses are included in **Appendix F**.

**Table 6: Future (2020) AM Peak Hour Intersection No-Build Level of Service**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	41.3 / D	41.4 / D	18.3 / B
		EBT / EBR	41.6 / D		
	WB	WBL	42.4 / D	37.9 / D	
		WBT	27.0 / C		
		WBR	28.5 / C		
	NB	NBL	12.6 / B	14.5 / B	
		NBT	14.6 / B		
		NBR	12.1 / B		
	SB	SBL	11.1 / B	14.6 / C	
		SBT	15.0 / B		
SBR		Free-flow			
SR-A1A & CR-605	EB	EBL	12.4 / B	11.8 / B	11.1 / B
		EBT / EBR	11.8 / B		
	WB	WBL	13.0 / B	11.8 / B	
		WBT	11.5 / B		
		WBR	10.7 / B		
	NB	NBL	8.0 / A	10.6 / B	
		NBT	9.0 / A		
		NBR	11.2 / B		
	SB	SBL	7.8 / A	8.5 / A	
		SBT / SBR	8.7 / A		
US-1 & Sunny Lane	EB	EBL	16.5 / C	13.9 / B	N/A <sup>(3)</sup>
		EBR	13.0 / B		
	NB	NBL	11.5 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A	
US-1 & Juanita Avenue	EB	EBR	13.8 / B	13.8 / B	N/A <sup>(3)</sup>
		NBL	10.9 / B		
	NB	NBT	Free-flow	N/A <sup>(2)</sup>	
		SBL	0.0 / A		
	SB	SBT	Free-flow	N/A <sup>(2)</sup>	
		SBR	Free-flow		

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound  
 Movement - L = left-turn; T = through; R = right-turn

Note: (1) Delay measured in seconds per vehicle.  
 (2) Approach operates under free-flow conditions. LOS is not defined.  
 (3) Unsignalized intersection LOS is not defined.

**Future (2020) No-Build Conditions PM Peak Hour Operational Analysis**

Table 7 presents the future 2020 LOS for the study intersections. The US-1 & SR-A1A intersection is anticipated to operate at LOS C with an average delay of 21.9 seconds per vehicle, and the intersection of CR-605 & SR-A1A is anticipated to operate at LOS B with an average delay of 11.8 seconds per vehicle. The approaches and movements at both signalized intersections are anticipated to operate at LOS D or better during the PM peak hour.

The US-1 (northbound and southbound) approaches to Sunny Lane and Juanita Avenue are anticipated to operate under free-flow conditions. Therefore, intersection LOS is not defined for

these intersections. The eastbound approach at Sunny Lane is anticipated to operate at LOS B with an average delay of 14.4 seconds per vehicle. The eastbound approach at Juanita Avenue is anticipated to operate at LOS B with an average delay of 13.4 seconds per vehicle.

The detailed future 2020 no-build intersection capacity analyses are included in **Appendix F**.

**Table 7: Future (2020) PM Peak Hour Intersection No-Build Level of Service**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	45.7 / D	48.3 / D	21.9 / C
		EBT / EBR	49.9 / D		
	WB	WBL	44.3 / D	38.2 / D	
		WBT	28.0 / C		
		WBR	29.8 / C		
	NB	NBL	12.6 / B	16.3 / B	
		NBT	16.7 / B		
		NBR	12.6 / B		
	SB	SBL	12.4 / B	15.7 / B	
		SBT	16.0 / B		
SBR		Free-flow			
SR-A1A & CR-605	EB	EBL	12.6 / B	11.8 / B	11.8 / B
		EBT / EBR	11.7 / B		
	WB	WBL	13.5 / B	11.5 / B	
		WBT	11.1 / B		
		WBR	10.2 / B		
	NB	NBL	10.0 / B	12.8 / B	
		NBT	11.7 / B		
		NBR	13.7 / B		
	SB	SBL	9.5 / A	10.4 / B	
		SBT / SBR	10.9 / B		
US-1 & Sunny Lane	EB	EBL	19.1 / C	14.4 / B	N/A <sup>(3)</sup>
		EBR	13.1 / B		
	NB	NBL	12.4 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A	
US-1 & Juanita Avenue	EB	EBR	13.4 / B	13.4 / B	N/A <sup>(3)</sup>
		NBL	11.1 / B		
	NB	NBT	Free-flow	N/A <sup>(2)</sup>	
		SBL	0.0 / A		
		SBT	Free-flow		
		SBR	Free-flow		

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound

Movement - L = left-turn; T = through; R = right-turn

- Note: (1) Delay measured in seconds per vehicle.  
 (2) Approach operates under free-flow conditions. LOS is not defined.  
 (3) Unsignalized intersection LOS is not defined.

**Future (2030) No-Build Conditions AM Peak Hour Operational Analysis**

Table 8 presents the future 2030 LOS for the study intersections. The US-1 & SR-A1A intersection is anticipated to operate at LOS B with an average delay of 19.7 seconds per vehicle, and the intersection of CR-605 & SR-A1A is anticipated to operate at LOS B with an average delay of 11.4 seconds per vehicle. The approaches and movements at both signalized intersections are anticipated to operate at LOS D or better during the AM peak hour.

The US-1 (northbound and southbound) approaches to Sunny Lane and Juanita Avenue are anticipated to operate under free-flow conditions. Therefore, intersection LOS is not defined for these intersections. The eastbound approach at Sunny Lane is anticipated to operate at LOS C with an average delay of 16.7 seconds per vehicle. The eastbound approach at Juanita Avenue is anticipated to operate at LOS C with an average delay of 18.0 seconds per vehicle.

The detailed future 2030 no-build intersection capacity analyses are included in **Appendix G**.

**Table 8: Future (2030) AM Peak Hour Intersection No-Build Level of Service**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	41.4 / D	41.6 / D	19.7 / B
		EBT / EBR	41.7 / D		
	WB	WBL	43.0 / D	38.1 / D	
		WBT	27.1 / C		
		WBR	28.8 / C		
	NB	NBL	14.3 / B	15.7 / B	
		NBT	15.9 / B		
		NBR	12.4 / B		
	SB	SBL	11.8 / B	17.3 / B	
		SBT	17.8 / D		
SBR		Free-flow			
SR-A1A & CR-605	EB	EBL	12.1 / B	11.7 / B	11.4 / B
		EBT / EBR	11.6 / B		
	WB	WBL	13.1 / B	11.5 / B	
		WBT	11.2 / B		
		WBR	10.4 / B		
	NB	NBL	8.7 / A	11.6 / B	
		NBT	9.8 / A		
		NBR	12.3 / B		
	SB	SBL	8.5 / A	9.3 / A	
		SBT / SBR	9.6 / A		
US-1 & Sunny Lane	EB	EBL	21.3 / C	16.7 / C	N/A <sup>(3)</sup>
		EBR	15.2 / C		
	NB	NBL	13.9 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A	
US-1 & Juanita Avenue	EB	EBR	18.0 / C	18.0 / C	N/A <sup>(3)</sup>
	NB	NBL	13.1 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBL	0.0 / A	N/A <sup>(2)</sup>	
		SBT	Free-flow		
		SBR	Free-flow		

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound  
 Movement - L = left-turn; T = through; R = right-turn  
 Note: (1) Delay measured in seconds per vehicle.  
 (2) Approach operates under free-flow conditions. LOS is not defined.  
 (3) Unsignalized intersection LOS is not defined.

**Future (2030) No-Build Conditions PM Peak Hour Operational Analysis**

Table 9 presents the future 2030 LOS for the study intersections. The US-1 & SR-A1A intersection is anticipated to operate at LOS C with an average delay of 23.8 seconds per vehicle, and the intersection of CR-605 & SR-A1A is anticipated to operate at LOS B with an average delay of 12.1 second per vehicle. The approaches and movements at both signalized intersections are anticipated to operate at LOS D or better during the PM peak hour.

The US-1 (northbound and southbound) approaches to Sunny Lane and Juanita Avenue are anticipated to operate under free-flow conditions. Therefore, intersection LOS is not defined for



these intersections. The eastbound approach at Sunny Lane is anticipated to operate at LOS C with an average delay of 17.5 seconds per vehicle. The eastbound approach at Juanita Avenue is anticipated to operate at LOS C with an average delay of 17.0 seconds per vehicle.

The detailed future 2030 no-build intersection capacity analyses are included in **Appendix G**.

**Table 9: Future (2030) PM Peak Hour Intersection No-Build Level of Service**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	45.9 / D	48.3 / D	23.8 / C
		EBT / EBR	49.9 / D		
	WB	WBL	45.4 / D	38.8 / D	
		WBT	27.8 / C		
		WBR	29.8 / C		
	NB	NBL	15.1 / B	19.4 / B	
		NBT	19.9 / B		
		NBR	13.3 / B		
	SB	SBL	15.1 / B	18.8 / B	
		SBT	19.1 / B		
SBR		Free-flow			
SR-A1A & CR-605	EB	EBL	12.4 / B	11.7 / B	12.1 / B
		EBT / EBR	11.6 / B		
	WB	WBL	13.8 / B	11.3 / B	
		WBT	10.8 / B		
		WBR	10.0 / A		
	NB	NBL	10.8 / B	14.1 / B	
		NBT	12.9 / B		
		NBR	15.1 / B		
	SB	SBL	10.4 / B	11.5 / B	
		SBT / SBR	12.2 / B		
US-1 & Sunny Lane	EB	EBL	26.0 / D	17.5 / C	N/A <sup>(3)</sup>
		EBR	14.8 / B		
	NB	NBL	15.7 / C	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A	
US-1 & Juanita Avenue	EB	EBR	17.0 / C	17.0 / C	N/A <sup>(3)</sup>
	NB	NBL	13.7 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBL	0.0 / A	N/A <sup>(2)</sup>	
		SBT	Free-flow		
		SBR	Free-flow		

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound  
 Movement - L = left-turn; T = through; R = right-turn

Note: (1) Delay measured in seconds per vehicle.  
 (2) Approach operates under free-flow conditions. LOS is not defined.  
 (3) Unsignalized intersection LOS is not defined.

**Future (2040) No-Build Conditions AM Peak Hour Operational Analysis**

Table 10 presents the future 2040 LOS for the study intersections. The US-1 & SR-A1A intersection is anticipated to operate at LOS C with an average delay of 23.4 seconds per vehicle, and the intersection of CR-605 & SR-A1A is anticipated to operate at LOS B with an average delay of 11.7 seconds per vehicle. The approaches and movements at both signalized intersections are anticipated to operate at LOS D or better during the AM peak hour.

The US-1 (northbound and southbound) approaches to Sunny Lane and Juanita Avenue are anticipated to operate under free-flow conditions. Therefore, intersection LOS is not defined for these intersections. The eastbound approach at Sunny Lane is anticipated to operate at LOS C with an average delay of 21.0 seconds per vehicle. The eastbound approach at Juanita Avenue is anticipated to operate at LOS D with an average delay of 31.9 seconds per vehicle.

The detailed future 2040 no-build intersection capacity analyses are included in **Appendix H**.

**Table 10: Future (2040) AM Peak Hour Intersection No-Build Level of Service**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	41.5 / D	41.7 / D	23.4 / C
		EBT / EBR	41.9 / D		
	WB	WBL	43.5 / D	38.4 / D	
		WBT	27.1 / C		
		WBR	29.1 / C		
	NB	NBL	18.9 / B	17.6 / B	
		NBT	17.7 / B		
		NBR	12.6 / B		
	SB	SBL	13.1 / B	23.4 / C	
		SBT	24.1 / C		
SBR		Free-flow			
SR-A1A & CR-605	EB	EBL	12.1 / B	11.7 / B	11.7 / B
		EBT / EBR	11.6 / B		
	WB	WBL	13.3 / B	11.5 / B	
		WBT	11.1 / B		
		WBR	10.4 / B		
	NB	NBL	9.1 / A	12.6 / B	
		NBT	10.5 / B		
		NBR	13.5 / B		
	SB	SBL	8.9 / A	10.0 / A	
		SBT / SBR	10.4 / B		
US-1 & Sunny Lane	EB	EBL	28.9 / D	21.0 / C	N/A <sup>(3)</sup>
		EBR	18.3 / C		
	NB	NBL	17.9 / C	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A	
US-1 & Juanita Avenue	EB	EBR	31.9 / D	31.9 / D	N/A <sup>(3)</sup>
	NB	NBL	18.3 / C	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBL	0.0 / A	N/A <sup>(2)</sup>	
		SBT	Free-flow		
		SBR	Free-flow		

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound  
 Movement - L = left-turn; T = through; R = right-turn  
 Note: (1) Delay measured in seconds per vehicle.  
 (2) Approach operates under free-flow conditions. LOS is not defined.  
 (3) Unsignalized intersection LOS is not defined.

**Future (2040) No-Build Conditions PM Peak Hour Operational Analysis**

Table 11 presents the future 2040 LOS for the study intersections. The US-1 & SR-A1A intersection is anticipated to operate at LOS C with an average delay of 28.6 seconds per vehicle, and the intersection of CR-605 & SR-A1A is anticipated to operate at LOS B with an average delay of 12.4 seconds per vehicle. The approaches and movements at both signalized intersections are anticipated to operate at LOS D or better during the PM peak hour.

The US-1 (northbound and southbound) approaches to Sunny Lane and Juanita Avenue are anticipated to operate under free-flow conditions. Therefore, intersection LOS is not defined for

these intersections. The eastbound approach at Sunny Lane is anticipated to operate at LOS D with an average delay of 25.9 seconds per vehicle. The eastbound approach at Juanita Avenue is anticipated to operate at LOS D with an average delay of 27.2 seconds per vehicle.

The detailed future 2040 no-build intersection capacity analyses are included in **Appendix H**.

**Table 11: Future (2040) PM Peak Hour Intersection No-Build Level of Service**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	46.2 / D	48.5 / D	28.6 / C
		EBT / EBR	50.0 / D		
	WB	WBL	46.4 / D	39.1 / D	
		WBT	27.5 / C		
		WBR	29.9 / C		
	NB	NBL	21.4 / C	25.3 / C	
		NBT	25.9 / C		
		NBR	14.2 / B		
	SB	SBL	22.9 / C	25.7 / C	
		SBT	25.9 / C		
SBR		Free-flow			
SR-A1A & CR-605	EB	EBL	12.4 / B	11.7 / B	12.4 / B
		EBT / EBR	11.5 / B		
	WB	WBL	14.1 / B	11.2 / B	
		WBT	10.6 / B		
		WBR	9.8 / A		
	NB	NBL	11.4 / B	15.1 / B	
		NBT	14.0 / B		
		NBR	16.4 / B		
	SB	SBL	11.1 / B	12.7 / B	
		SBT / SBR	13.6 / B		
US-1 & Sunny Lane	EB	EBL	47.0 / E	25.9 / D	N/A <sup>(3)</sup>
		EBR	19.2 / C		
	NB	NBL	28.6 / D	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A <sup>(2)</sup>	
US-1 & Juanita Avenue	EB	EBR	27.2 / D	27.2 / D	N/A <sup>(3)</sup>
	NB	NBL	20.6 / C	N/A <sup>(2)</sup>	
		NBT	Free-flow		
		SBL	0.0 / A		
	SB	SBT	Free-flow	N/A <sup>(2)</sup>	
		SBR	Free-flow		

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound

Movement - L = left-turn; T = through; R = right-turn

- Note: (1) Delay measured in seconds per vehicle.  
 (2) Approach operates under free-flow conditions. LOS is not defined.  
 (3) Unsignalized intersection LOS is not defined.

## **FUTURE BUILD CONDITIONS CAPACITY ANALYSIS**

All bridge alternatives will grade separate the CR-605 & SR-A1A intersection, with SR-A1A being constructed over CR-605, thus eliminating the ability to access CR-605 from SR-A1A. Due to the proximity of the FEC Railroad to CR-605, SR-A1A will also be grade separated above the FEC Railroad, eliminating the conflict between vehicles and trains. In order to maintain access to CR-605 in the vicinity of the bridge, two (2) build alternatives were identified to provide a new connection between US-1 and CR-605 parallel to SR-A1A. A summary of these alternatives is presented below.

### **Alternative 1 – Juanita Avenue Extension**

This alternative extends Juanita Avenue as a two-lane street east from its existing terminus at US-1 to provide a new connection from US-1 to CR-605, approximately 1,100 feet north of SR-A1A. At the intersection of US-1 & Juanita Avenue, this build alternative would provide:

- A shared eastbound through/left-turn lane;
- A raised island between the eastbound through lane and the existing right-turn lane;
- An exclusive westbound left-turn lane;
- A westbound through lane;
- An exclusive westbound right-turn lane;
- A pork-chop island to channelize the exclusive southbound right-turn lane; and
- An exclusive northbound right-turn lane.

At the intersection of CR-605 & Juanita Avenue, this build alternative would include:

- An exclusive eastbound left-turn lane;
- An exclusive eastbound right-turn lane;
- Converting the southbound through lane to a shared through/right-turn lane; and
- Adding an exclusive northbound left-turn lane.

### **Future (2020) Conditions AM Peak Hour Operational Analysis – Alternative 1**

Table 12 presents the future 2020 LOS for the intersections under the Build Alternative 1 scenario. The intersection of US-1 & SR-A1A is anticipated to operate at LOS B with an average delay of

18.6 seconds per vehicle, and all approaches and movements are anticipated to operate at LOS D or better during the AM peak hour.

The northbound and southbound approaches to the intersections of US-1 & Juanita Avenue, US-1 & Sunny Lane, and CR-605 & Juanita Avenue will operate under free-flow conditions. Therefore, intersection LOS is not defined for these intersections. The eastbound approach at the intersection of US-1 & Sunny Lane is anticipated to operate at LOS B with an average delay of 14.6 seconds per vehicle. The eastbound and westbound approaches at the intersection of US-1 & Juanita Avenue are both anticipated to operate at LOS B with an average delay of 13.5 seconds per vehicle and 13.9 seconds per vehicle, respectively. The eastbound approach to the intersection of CR-605 & Juanita Avenue is anticipated to operate at LOS A with an average delay of 8.5 seconds per vehicle. All movements at these intersections are anticipated to operate at LOS C or better.

The detailed future 2020 build intersection capacity analyses for Alternative 1 are included in **Appendix I**.

**Table 12: Future (2020) AM Peak Hour Intersection LOS – Alternative 1**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	41.3 / D	41.5 / D	18.6 / B
		EBT / EBR	41.6 / D		
	WB	WBL	43.9 / D	39.5 / D	
		WBT	27.0 / C		
		WBR	28.6 / C		
	NB	NBL	12.5 / B	14.3 / B	
		NBT	14.4 / B		
		NBR	14.2 / B		
	SB	SBL	11.1 / B	14.7 / B	
		SBT	15.1 / B		
SBR		Free-flow			
US-1 & Sunny Lane	EB	EBL	17.7 / C	14.6 / B	N/A <sup>(3)</sup>
		EBR	13.5 / B		
	NB	NBL	11.9 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A <sup>(2)</sup>	
US-1 & Juanita Avenue	EB	EBL / EBT	14.8 / B	13.5 / B	N/A <sup>(3)</sup>
		EBR	13.4 / B		
	WB	WBL	14.5 / B	13.9 / B	
		WBT	15.8 / C		
		WBR	10.2 / B		
	NB	NBL	10.6 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
		NBR	Free-flow		
	SB	SBL	8.7 / A	N/A <sup>(2)</sup>	
		SBT	Free-flow		
		SBR	Free-flow		
	CR-605 & Juanita Avenue	EB	EBL	8.5 / A	
EBR			8.6 / A		
NB		NBL	7.4 / A	N/A <sup>(2)</sup>	
		NBT	Free-flow		
SB		SBT / SBR	Free-flow	N/A <sup>(2)</sup>	

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound  
 Movement - L = left-turn; T = through; R = right-turn  
 Note: (1) Delay measured in seconds per vehicle.  
 (2) Approach operates under free-flow conditions. LOS is not defined.  
 (3) Unsignalized intersection LOS is not defined.

**Future (2020) Conditions PM Peak Hour Operational Analysis – Alternative 1**

Table 13 presents the future 2020 LOS for the intersections under the Build Alternative 1 scenario. The intersection of US-1 & SR-A1A is anticipated to operate at LOS C with an average delay of 21.5 seconds per vehicle, and all approaches and movements are anticipated to operate at LOS D or better during the PM peak hour.

The northbound and southbound approaches to the intersections of US-1 & Juanita Avenue, US-1 & Sunny Lane, and CR-605 & Juanita Avenue will operate under free-flow conditions. Therefore, intersection LOS is not defined for these intersections. The eastbound approach at the intersection

of US-1 & Sunny Lane is anticipated to operate at LOS B with an average delay of 13.6 seconds per vehicle. The eastbound approach at the intersection of US-1 & Juanita Avenue is anticipated to operate at LOS B with an average delay of 13.5 seconds per vehicle, while the westbound approach is anticipated to operate at LOS C with an average delay of 18.9 seconds per vehicle. The eastbound approach to the intersection of CR-605 & Juanita Avenue is anticipated to operate at LOS A with an average delay of 8.7 seconds per vehicle. All movements at these intersections are anticipated to operate at LOS C or better.

The detailed future 2020 build intersection capacity analyses for Alternative 1 are included in **Appendix I**.



**Table 13: Future (2020) PM Peak Hour Intersection LOS – Alternative 1**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	46.4 / D	47.4 / D	21.5 / C
		EBT / EBR	48.2 / D		
	WB	WBL	45.0 / D	39.6 / D	
		WBT	27.9 / C		
		WBR	29.5 / C		
	NB	NBL	12.5 / B	16.2 / B	
		NBT	16.8 / B		
		NBR	14.6 / B		
	SB	SBL	12.6 / B	15.3 / B	
		SBT	15.7 / B		
SBR		Free-flow			
US-1 & Sunny Lane	EB	EBL	14.8 / B	13.6 / B	N/A <sup>(3)</sup>
		EBR	13.2 / B		
	NB	NBL	12.4 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A <sup>(2)</sup>	
US-1 & Juanita Avenue	EB	EBL / EBT	17.3 / C	13.5 / B	N/A <sup>(3)</sup>
		EBR	13.2 / B		
	WB	WBL	29.3 / C	18.9 / C	
		WBT	19.8 / C		
		WBR	11.7 / B		
	NB	NBL	10.9 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
		NBR	Free-flow		
	SB	SBL	10.0 / A	N/A <sup>(2)</sup>	
		SBT	Free-flow		
		SBR	Free-flow		
CR-605 & Juanita Avenue	EB	EBL	8.7 / A	8.7 / A	N/A <sup>(3)</sup>
		EBR	8.7 / A		
	NB	NBL	7.4 / A	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A <sup>(2)</sup>	

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound  
 Movement - L = left-turn; T = through; R = right-turn

Note: (1) Delay measured in seconds per vehicle.  
 (2) Approach operates under free-flow conditions. LOS is not defined.  
 (3) Unsignalized intersection LOS is not defined.

**Future (2030) Conditions AM Peak Hour Operational Analysis – Alternative 1**

Table 14 presents the future 2030 LOS for the intersections under the Build Alternative 1 scenario. The intersection of US-1 & SR-A1A is anticipated to operate at LOS C with an average delay of 19.8 seconds per vehicle, and all approaches and movements are anticipated to operate at LOS D or better during the AM peak hour.

The northbound and southbound approaches to the intersections of US-1 & Juanita Avenue, US-1 & Sunny Lane, and CR-605 & Juanita Avenue will operate under free-flow conditions. Therefore,

intersection LOS is not defined for these intersections. The eastbound approach at the intersection of US-1 & Sunny Lane is anticipated to operate at LOS C with an average delay of 16.1 seconds per vehicle. The eastbound and westbound approaches at the intersection of US-1 & Juanita Avenue are both anticipated to operate at LOS C with an average delay of 16.9 seconds per vehicle and 18.3 seconds per vehicle, respectively. The eastbound approach to the intersection of CR-605 & Juanita Avenue is anticipated to operate at LOS A with an average delay of 8.5 seconds per vehicle. All movements at these intersections are anticipated to operate at LOS C or better.

The detailed future 2030 build intersection capacity analyses for Alternative 1 are included in **Appendix J**.

**Table 14: Future (2030) AM Peak Hour Intersection LOS – Alternative 1**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	41.5 / D	41.8 / D	19.8 / C
		EBT / EBR	41.9 / D		
	WB	WBL	44.7 / D	40.2 / D	
		WBT	27.2 / C		
		WBR	28.7 / C		
	NB	NBL	14.1 / B	15.2 / B	
		NBT	15.5 / B		
		NBR	14.5 / B		
	SB	SBL	11.7 / B	17.3 / B	
		SBT	17.7 / B		
SBR		Free-flow			
US-1 & Sunny Lane	EB	EBL	18.5 / C	16.1 / C	N/A <sup>(3)</sup>
		EBR	15.3 / C		
	NB	NBL	13.9 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A <sup>(2)</sup>	
US-1 & Juanita Avenue	EB	EBL / EBT	18.7 / C	16.9 / C	N/A <sup>(3)</sup>
		EBR	16.7 / C		
	WB	WBL	19.6 / C	18.3 / C	
		WBT	20.7 / C		
		WBR	10.8 / B		
	NB	NBL	12.2 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
		NBR	Free-flow		
	SB	SBL	9.2 / A	N/A <sup>(2)</sup>	
		SBT	Free-flow		
SBR		Free-flow			
CR-605 & Juanita Avenue	EB	EBL	8.5 / A	8.5 / A	N/A <sup>(3)</sup>
		EBR	8.6 / A		
	NB	NBL	7.4 / A	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A <sup>(2)</sup>	

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound

Movement - L = left-turn; T = through; R = right-turn

Note: (1) Delay measured in seconds per vehicle.

(2) Approach operates under free-flow conditions. LOS is not defined.

(3) Unsignalized intersection LOS is not defined.

**Future (2030) Conditions PM Peak Hour Operational Analysis – Alternative 1**

Table 15 presents the future 2030 LOS for the intersections under the Build Alternative 1 scenario. The intersection of US-1 & SR-A1A is anticipated to operate at LOS C with an average delay of 23.2 seconds per vehicle, and all approaches and movements are anticipated to operate at LOS D or better during the PM peak hour.

The northbound and southbound approaches to the intersections of US-1 & Juanita Avenue, US-1 & Sunny Lane, and CR-605 & Juanita Avenue will operate under free-flow conditions. Therefore, intersection LOS is not defined for these intersections. The eastbound approach at the intersection of US-1 & Sunny Lane is anticipated to operate at LOS C with an average delay of 17.5 seconds per vehicle. The eastbound approach at the intersection of US-1 & Juanita Avenue is anticipated to operate at LOS C with an average delay of 17.3 seconds per vehicle, while the westbound approach is anticipated to operate at LOS D with an average delay of 30.3 seconds per vehicle. The eastbound approach to the intersection of CR-605 & Juanita Avenue is anticipated to operate at LOS A with an average delay of 8.8 seconds per vehicle. All movements at these intersections are anticipated to operate at LOS D or better.

The detailed future 2030 build intersection capacity analyses for Alternative 1 are included in **Appendix J**.

**Table 15: Future (2030) PM Peak Hour Intersection LOS – Alternative 1**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	46.4 / D	47.5 / D	23.2 / C
		EBT / EBR	48.4 / D		
	WB	WBL	46.1 / D	40.4 / D	
		WBT	27.7 / C		
		WBR	29.4 / C		
	NB	NBL	15.0 / B	18.6 / B	
		NBT	19.5 / B		
		NBR	15.2 / B		
	SB	SBL	15.0 / B	18.5 / B	
		SBT	18.8 / B		
SBR		Free-flow			
US-1 & Sunny Lane	EB	EBL	26.0 / D	17.5 / C	N/A <sup>(3)</sup>
		EBR	14.8 / B		
	NB	NBL	15.7 / C	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A <sup>(2)</sup>	
US-1 & Juanita Avenue	EB	EBL / EBT	24.6 / C	17.3 / C	N/A <sup>(3)</sup>
		EBR	16.6 / C		
	WB	WBL	34.0 / D	30.3 / D	
		WBT	30.8 / D		
		WBR	12.9 / B		
	NB	NBL	13.4 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
		NBR	Free-flow		
	SB	SBL	11.1 / B	N/A <sup>(2)</sup>	
		SBT	Free-flow		
		SBR	Free-flow		
CR-605 & Juanita Avenue	EB	EBL	8.8 / A	8.8 / A	N/A <sup>(3)</sup>
		EBR	8.7 / A		
	NB	NBL	7.5 / A	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A <sup>(2)</sup>	

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound  
 Movement - L = left-turn; T = through; R = right-turn  
 Note: (1) Delay measured in seconds per vehicle.  
 (2) Approach operates under free-flow conditions. LOS is not defined.  
 (3) Unsignalized intersection LOS is not defined.

**Future (2040) Conditions AM Peak Hour Operational Analysis – Alternative 1**

Table 16 presents the future 2040 LOS for the intersections under the Build Alternative 1 scenario. The intersection of US-1 & SR-A1A is anticipated to operate at LOS C with an average delay of 22.8 seconds per vehicle, and all approaches and movements are anticipated to operate at LOS D or better during the AM peak hour.

The northbound and southbound approaches to the intersections of US-1 & Juanita Avenue, US-1 & Sunny Lane, and CR-605 & Juanita Avenue will operate under free-flow conditions. Therefore, intersection LOS is not defined for these intersections. The eastbound approach at the intersection

of US-1 & Sunny Lane is anticipated to operate at LOS C with an average delay of 20.0 seconds per vehicle. The eastbound approach at the intersection of US-1 & Juanita Avenue is anticipated to operate at LOS D with an average delay of 26.3 seconds per vehicle, while the westbound approach is anticipated to operate at LOS E with an average delay of 43.7 seconds per vehicle. The eastbound approach to the intersection of CR-605 & Juanita Avenue is anticipated to operate at LOS A with an average delay of 8.6 seconds per vehicle. All movements in the 2040 AM peak hour Build Alternative 1 scenario are anticipated to operate at LOS D or better except the westbound left-turn movement at the intersection of US-1 & Juanita Avenue, which is anticipated to operate at LOS F.

The detailed future 2040 build intersection capacity analyses for Alternative 1 are included in **Appendix K**.

**Table 16: Future (2040) AM Peak Hour Intersection LOS – Alternative 1**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	41.6 / D	41.9 / D	22.8 / C
		EBT / EBR	42.1 / D		
	WB	WBL	45.7 / D	41.1 / D	
		WBT	27.2 / C		
		WBR	28.8 / C		
	NB	NBL	18.3 / B	16.7 / B	
		NBT	17.1 / B		
		NBR	14.9 / B		
	SB	SBL	12.8 / B	22.7 / C	
		SBT	23.3 / C		
SBR		Free-flow			
US-1 & Sunny Lane	EB	EBL	24.3 / C	20.0 / C	N/A <sup>(3)</sup>
		EBR	18.5 / C		
	NB	NBL	17.9 / C	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A <sup>(2)</sup>	
US-1 & Juanita Avenue	EB	EBL / EBT	27.9 / D	26.3 / D	N/A <sup>(3)</sup>
		EBR	26.1 / D		
	WB	WBL	<b>52.1 / F</b>	43.7 / E	
		WBT	34.8 / D		
		WBR	11.6 / B		
	NB	NBL	15.7 / C	N/A <sup>(2)</sup>	
		NBT	Free-flow		
		NBR	Free-flow		
	SB	SBL	9.9 / A	N/A <sup>(2)</sup>	
		SBT	Free-flow		
SBR		Free-flow			
CR-605 & Juanita Avenue	EB	EBL	8.6 / A	8.6 / A	N/A <sup>(3)</sup>
		EBR	8.7 / A		
	NB	NBL	7.4 / A	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A <sup>(2)</sup>	

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound  
 Movement - L = left-turn; T = through; R = right-turn  
 Note: (1) Delay measured in seconds per vehicle.  
 (2) Approach operates under free-flow conditions. LOS is not defined.  
 (3) Unsignalized intersection LOS is not defined.

**Future (2040) Conditions PM Peak Hour Operational Analysis – Alternative 1**

Table 17 presents the future 2040 LOS for the intersections under the Build Alternative 1 scenario. The intersection of US-1 & SR-A1A is anticipated to operate at LOS C with an average delay of 27.1 seconds per vehicle, and all approaches and movements are anticipated to operate at LOS D or better during the PM peak hour.

The northbound and southbound approaches to the intersections of US-1 & Juanita Avenue, US-1 & Sunny Lane, and CR-605 & Juanita Avenue will operate under free-flow conditions. Therefore, intersection LOS is not defined for these intersections. The eastbound approach at the intersection

of US-1 & Sunny Lane is anticipated to operate at LOS D with an average delay of 26.6 seconds per vehicle. The eastbound approach at the intersection of US-1 & Juanita Avenue is anticipated to operate at LOS D with an average delay of 27.9 seconds per vehicle, while the westbound approach is anticipated to operate at LOS F with an average delay of 238.4 seconds per vehicle. The eastbound approach to the intersection of CR-605 & Juanita Avenue is anticipated to operate at LOS A with an average delay of 9.0 seconds per vehicle. The westbound left-turn movement and westbound-through movement at US-1 & Juanita Avenue are anticipated to operate at LOS F with average delays of 302.2 seconds per vehicle and 111.2 seconds per vehicle, respectively.

The detailed future 2040 build intersection capacity analyses for Alternative 1 are included in **Appendix K**.



**Table 17: Future (2040) PM Peak Hour Intersection LOS – Alternative 1**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	46.5 / D	47.6 / D	27.1 / C
		EBT / EBR	48.5 / D		
	WB	WBL	47.5 / D	41.3 / D	
		WBT	27.5 / C		
		WBR	29.4 / C		
	NB	NBL	21.3 / C	23.2 / C	
		NBT	24.4 / C		
		NBR	16.0 / B		
	SB	SBL	21.7 / C	24.5 / C	
		SBT	24.7 / C		
SBR		Free-flow			
US-1 & Sunny Lane	EB	EBL	49.1 / E	26.6 / D	N/A <sup>(3)</sup>
		EBR	19.4 / C		
	NB	NBL	28.6 / C	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A <sup>(2)</sup>	
US-1 & Juanita Avenue	EB	EBL / EBT	49.8 / E	27.9 / D	N/A <sup>(3)</sup>
		EBR	25.5 / D		
	WB	WBL	<b>302.2 / F</b>	<b>238.4 / F</b>	
		WBT	<b>111.2 / F</b>		
		WBR	14.8 / B		
	NB	NBL	12.8 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
		NBR	Free-flow		
	SB	SBL	13.4 / B	N/A <sup>(2)</sup>	
		SBT	Free-flow		
SBR		Free-flow			
CR-605 & Juanita Avenue	EB	EBL	9.0 / A	9.0 / A	N/A <sup>(3)</sup>
		EBR	8.9 / A		
	NB	NBL	7.5 / A	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBT / SBR	Free-flow	N/A <sup>(2)</sup>	

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound  
 Movement - L = left-turn; T = through; R = right-turn  
 Note: (1) Delay measured in seconds per vehicle.  
 (2) Approach operates under free-flow conditions. LOS is not defined.  
 (3) Unsignalized intersection LOS is not defined.

## **Alternative 2 – Sunny Lane**

This alternative extends Sunny Lane east from its existing terminus at US-1 to provide a new two-lane connection from US-1 to CR-605, approximately 900 feet south of SR-A1A. At the intersection of US-1 & Sunny Lane, eastbound and westbound movements will be restricted to right-turn only. This build alternative would include:

- Eliminating the existing exclusive eastbound left-turn lane;
- Maintaining the existing exclusive eastbound right-turn lane;
- An exclusive westbound right-turn lane;
- A median island on US-1 to restrict eastbound and westbound left-turn and through movements;
- An exclusive southbound left-turn lane;
- An exclusive southbound right-turn lane;
- An exclusive northbound left-turn lane; and
- An exclusive northbound right-turn lane.

At the intersection of CR-605 and Sunny Lane, this build alternative would include:

- A shared eastbound left-turn/right-turn lane;
- Converting the southbound through lane to a shared through/right-turn lane; and
- Converting the northbound through lane to a shared through/left-turn lane.

## **Future (2020) Conditions AM Peak Hour Operational Analysis – Alternative 2**

Table 18 presents the future 2020 LOS for the intersections under the Build Alternative 2 scenario. The intersection of US-1 & SR-A1A is anticipated to operate at LOS B with an average delay of 18.5 seconds per vehicle, and all approaches and movements are anticipated to operate at LOS D or better during the AM peak hour.

The northbound and southbound approaches to the intersections of US-1 & Juanita Avenue, US-1 & Sunny Lane, and CR-605 & Sunny Lane will operate under free-flow conditions. Therefore, intersection LOS is not defined for these intersections. The eastbound and westbound approaches at the intersection of US-1 & Sunny Lane are both anticipated to operate at LOS B with an average delay of 13.2 seconds per vehicle and 12.8 seconds per vehicle, respectively. The eastbound approach to the intersection of CR-605 & Sunny Lane is anticipated to operate at LOS B with an average delay of 10.3 seconds per vehicle. The eastbound approach at the intersection of US-1 &

Juanita Avenue is anticipated to operate at LOS B with an average delay of 13.9 seconds per vehicle. All movements at these intersections are anticipated to operate at LOS B or better.

The detailed future 2020 build intersection capacity analyses for Alternative 2 are included in **Appendix L**.

**Table 18: Future (2020) AM Peak Hour Intersection LOS – Alternative 2**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	41.3 / D	41.6 / D	18.5 / B
		EBT / EBR	41.7 / D		
	WB	WBL	43.8 / D	39.3 / D	
		WBT	27.0 / C		
		WBR	28.7 / C		
	NB	NBL	12.3 / B	14.2 / B	
		NBT	14.2 / B		
		NBR	14.2 / B		
	SB	SBL	11.0 / B	14.7 / B	
		SBT	15.0 / B		
SBR		Free-flow			
US-1 & Sunny Lane	EB	EBR	13.2 / B	13.2 / B	N/A <sup>(3)</sup>
	WB	WBR	12.8 / B	12.8 / B	
	NB	NBL	11.6 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
		NBR	Free-flow		
	SB	SBL	8.7 / A	N/A <sup>(2)</sup>	
		SBT	Free-flow		
		SBR	Free-flow		
CR-605 & Sunny Lane	EB	EBL / EBR	10.3 / B	10.3 / B	N/A <sup>(3)</sup>
	NB	NBL / NBT	7.8 / A	N/A <sup>(2)</sup>	
	SB	SBT / SBR	Free-flow		
US-1 & Juanita Avenue	EB	EBR	13.9 / B	13.9 / B	N/A <sup>(3)</sup>
	NB	NBL	10.9 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBL	0.0 / A	N/A <sup>(2)</sup>	
		SBT	Free-flow		
		SBR	Free-flow		

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound  
 Movement - L = left-turn; T = through; R = right-turn

Note: (1) Delay measured in seconds per vehicle.  
 (2) Approach operates under free-flow conditions. LOS is not defined.  
 (3) Unsignalized intersection LOS is not defined.

**Future (2020) Conditions PM Peak Hour Operational Analysis – Alternative 2**

Table 19 presents the future 2020 LOS for the intersections under the Build Alternative 2 scenario. The intersection of US-1 & SR-A1A is anticipated to operate at LOS C with an average delay of 22.1 seconds per vehicle, and all approaches and movements are anticipated to operate at LOS D or better during the PM peak hour.

The northbound and southbound approaches to the intersections of US-1 & Juanita Avenue, US-1 & Sunny Lane, and CR-605 & Sunny Lane will operate under free-flow conditions. Therefore, intersection LOS is not defined for these intersections. The eastbound approach at the intersection of US-1 & Sunny Lane is anticipated to operate at LOS B with an average delay of 13.4 seconds per vehicle, while the westbound approach is anticipated to operate at LOS C with an average delay of 16.1 seconds per vehicle. The eastbound approach to the intersection of CR-605 & Sunny Lane is anticipated to operate at LOS B with an average delay of 11.0 seconds per vehicle. The eastbound approach at the intersection of US-1 & Juanita Avenue is anticipated to operate at LOS B with an average delay of 13.5 seconds per vehicle. All movements at these intersections are anticipated to operate at LOS B or better.

The detailed future 2020 build intersection capacity analyses for Alternative 2 are included in **Appendix L**.

**Table 19: Future (2020) PM Peak Hour Intersection LOS – Alternative 2**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	45.3 / D	48.6 / D	22.1 / C
		EBT / EBR	50.6 / D		
	WB	WBL	46.7 / D	40.2 / D	
		WBT	27.8 / C		
		WBR	29.8 / C		
	NB	NBL	12.6 / B	16.0 / B	
		NBT	16.6 / B		
		NBR	14.7 / B		
	SB	SBL	12.5 / B	15.8 / B	
SBT		16.1 / B			
SBR		Free-flow			
US-1 & Sunny Lane	EB	EBR	13.4 / B	13.4 / B	N/A <sup>(3)</sup>
	WB	WBR	16.1 / C	16.1 / C	
		NBL	12.5 / B	N/A <sup>(2)</sup>	
	NB	NBT	Free-flow		
		NBR	Free-flow		
	SB	SBL	10.1 / B	N/A <sup>(2)</sup>	
		SBT	Free-flow		
		SBR	Free-flow		
CR-605 & Sunny Lane	EB	EBL / EBR	13.3 / B	13.3 / B	N/A <sup>(3)</sup>
	NB	NBL / NBT	7.9 / A	N/A <sup>(2)</sup>	
		SB	SBT / SBR		
US-1 & Juanita Avenue	EB	EBR	13.5 / B	13.5 / B	N/A <sup>(3)</sup>
	NB	NBL	11.1 / B	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBL	0.0 / A	N/A <sup>(2)</sup>	
		SBT	Free-flow		
		SBR	Free-flow		

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound

Movement - L = left-turn; T = through; R = right-turn

Note: (1) Delay measured in seconds per vehicle.

(2) Approach operates under free-flow conditions. LOS is not defined.

(3) Unsignalized intersection LOS is not defined

**Future (2030) Conditions AM Peak Hour Operational Analysis – Alternative 2**

Table 20 presents the future 2030 LOS for the intersections under the Build Alternative 2 scenario. The intersection of US-1 & SR-A1A is anticipated to operate at LOS B with an average delay of 19.8 seconds per vehicle, and all approaches and movements are anticipated to operate at LOS D or better during the AM peak hour.

The northbound and southbound approaches to the intersections of US-1 & Juanita Avenue, US-1 & Sunny Lane, and CR-605 & Sunny Lane will operate under free-flow conditions. Therefore, intersection LOS is not defined for these intersections. The eastbound and westbound approaches at the intersection of US-1 & Sunny Lane are both anticipated to operate at LOS C with an average

delay of 15.3 seconds per vehicle and 15.9 seconds per vehicle, respectively. The eastbound approach to the intersection of CR-605 & Sunny Lane is anticipated to operate at LOS B with an average delay of 11.0 seconds per vehicle. The eastbound approach at the intersection of US-1 & Juanita Avenue is anticipated to operate at LOS C with an average delay of 18.2 seconds per vehicle. All movements at these intersections are anticipated to operate at LOS C or better.

The detailed future 2030 build intersection capacity analyses for Alternative 2 are included in **Appendix M**.

**Table 20: Future (2030) AM Peak Hour Intersection LOS – Alternative 2**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	41.5 / D	41.8 / D	19.8 / B
		EBT / EBR	42.0 / D		
	WB	WBL	44.8 / D	40.2 / D	
		WBT	27.2 / C		
		WBR	28.9 / C		
	NB	NBL	13.9 / B	15.0 / B	
		NBT	15.3 / B		
		NBR	14.4 / B		
	SB	SBL	11.5 / B	17.3 / B	
		SBT	17.6 / B		
SBR		Free-flow			
US-1 & Sunny Lane	EB	EBR	15.3 / C	15.3 / C	N/A <sup>(3)</sup>
	WB	WBR	15.9 / C	15.9 / C	
		NBL	13.8 / B	N/A <sup>(2)</sup>	
	NB	NBT	Free-flow		
		NBR	Free-flow		
	SB	SBL	9.2 / A	N/A <sup>(2)</sup>	
		SBT	Free-flow		
		SBR	Free-flow		
CR-605 & Sunny Lane	EB	EBL / EBR	11.0 / B	11.0 / B	N/A <sup>(3)</sup>
	NB	NBL / NBT	8.0 / A	N/A <sup>(2)</sup>	
	SB	SBT / SBR	Free-flow		
US-1 & Juanita Avenue	EB	EBR	18.2 / C	18.2 / C	N/A <sup>(3)</sup>
	NB	NBL	13.1 / C	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBL	0.0 / A	N/A <sup>(2)</sup>	
		SBT	Free-flow		
		SBR	Free-flow		

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound

Movement - L = left-turn; T = through; R = right-turn

Note: (1) Delay measured in seconds per vehicle.

(2) Approach operates under free-flow conditions. LOS is not defined.

(3) Unsignalized intersection LOS is not defined.

**Future (2030) Conditions PM Peak Hour Operational Analysis – Alternative 2**

Table 21 presents the future 2030 LOS for the intersections under the Build Alternative 2 scenario. The intersection of US-1 & SR-A1A is anticipated to operate at LOS C with an average delay of 23.6 seconds per vehicle, and all approaches and movements are anticipated to operate at LOS D or better during the PM peak hour.

The northbound and southbound approaches to the intersections of US-1 & Juanita Avenue, US-1 & Sunny Lane, and CR-605 & Sunny Lane will operate under free-flow conditions. Therefore, intersection LOS is not defined for these intersections. The eastbound and westbound approaches at the intersection of US-1 & Sunny Lane are both anticipated to operate at LOS C with an average delay of 15.7 seconds per vehicle and 24.4 seconds per vehicle, respectively. The eastbound approach to the intersection of CR-605 & Sunny Lane is anticipated to operate at LOS B with an average delay of 12.2 seconds per vehicle. The eastbound approach at the intersection of US-1 & Juanita Avenue is anticipated to operate at LOS C with an average delay of 17.2 seconds per vehicle. All movements at these intersections are anticipated to operate at LOS C or better.

The detailed future 2030 build intersection capacity analyses for Alternative 2 are included in **Appendix M**.

**Table 21: Future (2030) PM Peak Hour Intersection LOS – Alternative 2**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service			
			Movement	Approach	Intersection	
SR-A1A & US-1	EB	EBL	45.3 / D	48.7 / D	23.6 / C	
		EBT / EBR	50.7 / D			
	WB	WBL	48.3 / D	41.3 / D		
		WBT	27.6 / C			
		WBR	29.8 / C			
	NB	NBL	15.2 / B	18.4 / B		
		NBT	19.3 / B			
		NBR	15.6 / B			
	SB	SBL	14.7 / B	18.9 / B		
		SBT	19.2 / B			
SBR		Free-flow				
US-1 & Sunny Lane	EB	EBR	15.7 / C	15.7 / C	N/A <sup>(3)</sup>	
	WB	WBR	24.4 / C	24.4 / C		
		NB	NBL	16.6 / C		N/A <sup>(2)</sup>
			NBT	Free-flow		
	SB	NBR	Free-flow	N/A <sup>(2)</sup>		
		SBL	11.4 / B			
		SBT	Free-flow			
	SBR	Free-flow				
CR-605 & Sunny Lane		EB	EBL / EBR	12.2 / B	N/A <sup>(3)</sup>	
		NB	NBL / NBT	8.1 / A		
	SB	SBT / SBR	Free-flow			
US-1 & Juanita Avenue	EB	EBR	17.2 / C	17.2 / C	N/A <sup>(3)</sup>	
	NB	NBL	13.7 / B	N/A <sup>(2)</sup>		
		NBT	Free-flow			
	SB	SBL	0.0 / A	N/A <sup>(2)</sup>		
		SBT	Free-flow			
		SBR	Free-flow			

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound

Movement - L = left-turn; T = through; R = right-turn

- Note: (1) Delay measured in seconds per vehicle.  
 (2) Approach operates under free-flow conditions. LOS is not defined.  
 (3) Unsignalized intersection LOS is not defined.

**Future (2040) Conditions AM Peak Hour Operational Analysis – Alternative 2**

Table 22 presents the future 2040 LOS for the intersections under the Build Alternative 2 scenario. The intersection of US-1 & SR-A1A is anticipated to operate at LOS C with an average delay of 22.6 seconds per vehicle, and all approaches and movements are anticipated to operate at LOS D or better during the AM peak hour.

The northbound and southbound approaches to the intersections of US-1 & Juanita Avenue, US-1 & Sunny Lane, and CR-605 at Sunny Lane will operate under free-flow conditions. Therefore, intersection LOS is not defined for these intersections. The eastbound approach at the intersection



of US-1 & Sunny Lane is anticipated to operate at LOS C with an average delay of 18.7 seconds per vehicle, while the westbound approach is anticipated to operate at LOS D with an average delay of 25.3 seconds per vehicle. The eastbound approach to the intersection of CR-605 & Sunny Lane is anticipated to operate at LOS B with an average delay of 12.6 seconds per vehicle. The eastbound approach at the intersection of US-1 & Juanita Avenue is anticipated to operate at LOS D with an average delay of 32.9 seconds per vehicle. All movements at these intersections are anticipated to operate at LOS D or better.

The detailed future 2040 build intersection capacity analyses for Alternative 2 are included in **Appendix N**.

**Table 22: Future (2040) AM Peak Hour Intersection LOS – Alternative 2**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	41.5 / D	42.0 / D	22.6 / C
		EBT / EBR	42.2 / D		
	WB	WBL	45.9 / D	41.2 / D	
		WBT	27.2 / C		
		WBR	28.9 / C		
	NB	NBL	18.1 / B	16.4 / B	
		NBT	16.8 / B		
		NBR	14.8 / B		
	SB	SBL	12.6 / B	22.4 / C	
		SBT	23.0 / C		
SBR		Free-flow			
US-1 & Sunny Lane	EB	EBR	18.7 / C	18.7 / C	N/A <sup>(3)</sup>
	WB	WBR	25.3 / D	25.3 / D	
		NBL	17.9 / C	N/A <sup>(2)</sup>	
	NB	NBT	Free-flow		
		NBR	Free-flow		
	SB	SBL	9.9 / A	N/A <sup>(2)</sup>	
		SBT	Free-flow		
		SBR	Free-flow		
CR-605 & Sunny Lane	EB	EBL / EBR	12.6 / B	12.6 / B	N/A <sup>(3)</sup>
	NB	NBL / NBT	8.3 / A	N/A <sup>(2)</sup>	
	SB	SBT / SBR	Free-flow		
US-1 & Juanita Avenue	EB	EBR	32.9 / D	32.9 / D	N/A <sup>(3)</sup>
	NB	NBL	18.3 / C	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBL	0.0 / A	N/A <sup>(2)</sup>	
		SBT	Free-flow		
		SBR	Free-flow		

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound

Movement - L = left-turn; T = through; R = right-turn

Note: (1) Delay measured in seconds per vehicle.

(2) Approach operates under free-flow conditions. LOS is not defined.

(3) Unsignalized intersection LOS is not defined.

**Future (2040) Conditions PM Peak Hour Operational Analysis – Alternative 2**

Table 23 presents the future 2040 LOS for the intersections under the Build Alternative 2 scenario. The intersection of US-1 & SR-A1A is anticipated to operate at LOS C with an average delay of 28.5 seconds per vehicle, and all approaches and movements are anticipated to operate at LOS D or better during the PM peak hour.

The northbound and southbound approaches to the intersections of US-1 & Juanita Avenue, US-1 & Sunny Lane, and CR-605 & Sunny Lane will operate under free-flow conditions. Therefore, intersection LOS is not defined for these intersections. The eastbound approach at the intersection of US-1 & Sunny Lane is anticipated to operate at LOS C with an average delay of 19.6 seconds per vehicle, while the westbound approach is anticipated to operate at LOS F with an average delay of 71.0 seconds per vehicle. The eastbound approach to the intersection of CR-605 & Sunny Lane is anticipated to operate at LOS B with an average delay of 14.4 seconds per vehicle. The eastbound approach at the intersection of US-1 & Juanita Avenue is anticipated to operate at LOS D with an average delay of 27.7 seconds per vehicle. All movements at these intersections are anticipated to operate at LOS D or better except the westbound right-turn movement at the intersection of US-1 & Juanita Avenue, which is anticipated to operate at LOS F.

The detailed future 2040 build intersection capacity analyses for Alternative 2 are included in **Appendix N**.

**Table 23: Future (2040) AM Peak Hour Intersection LOS – Alternative 2**

Intersection	Approach	Movement	Delay <sup>(1)</sup> and Level of Service		
			Movement	Approach	Intersection
SR-A1A & US-1	EB	EBL	45.7 / D	49.5 / D	28.5 / C
		EBT / EBR	51.8 / D		
	WB	WBL	49.2 / D	41.9 / D	
		WBT	27.1 / C		
		WBR	29.3 / C		
	NB	NBL	23.0 / C	24.0 / C	
		NBT	25.3 / C		
		NBR	17.1 / B		
	SB	SBL	21.4 / C	26.1 / C	
		SBT	26.4 / C		
SBR		Free-flow			
US-1 & Sunny Lane	EB	EBR	19.6 / C	19.6 / C	N/A <sup>(3)</sup>
	WB	WBR	<b>71.0 / F</b>	<b>71.0 / F</b>	
		NBL	27.0 / D	N/A <sup>(2)</sup>	
	NB	NBT	Free-flow		
		NBR	Free-flow		
	SB	SBL	13.6 / B	N/A <sup>(2)</sup>	
		SBT	Free-flow		
		SBR	Free-flow		
CR-605 & Sunny Lane	EB	EBL / EBR	14.4 / B	14.4 / B	N/A <sup>(3)</sup>
	NB	NBL / NBT	8.4 / A	N/A <sup>(2)</sup>	
	SB	SBT / SBR	Free-flow		
US-1 & Juanita Avenue	EB	EBR	27.7 / D	27.7 / D	N/A <sup>(3)</sup>
	NB	NBL	20.6 / C	N/A <sup>(2)</sup>	
		NBT	Free-flow		
	SB	SBL	0.0 / A	N/A <sup>(2)</sup>	
		SBT	Free-flow		
		SBR	Free-flow		

Legend: Approach - EB = eastbound; WB = westbound; NB = northbound; SB = southbound  
 Movement - L = left-turn; T = through; R = right-turn

Note: (1) Delay measured in seconds per vehicle.  
 (2) Approach operates under free-flow conditions. LOS is not defined.  
 (3) Unsignalized intersection LOS is not defined.

## BRIDGE ALTERNATIVE ANALYSIS

As part of this project, three bridge alternatives are being considered for the SR-A1A bridge over the ICWW: (1) a low-level movable bridge, such as the bridge that currently exists today, (2) a mid-level movable bridge that would provide a 60-foot vertical clearance when in the down position, and (3) a high-level fixed bridge.

The existing low-level movable bridge opens approximately three (3) times per hour during both the AM and PM peak hours. During the AM peak hour, bridge openings average approximately six (6) minutes in length, while the average opening during the PM peak hour lasts approximately four and a half (4.5) minutes.

Based on the bridge tender log, it was assumed that a mid-level (60-foot vertical clearance) bridge would reduce the frequency of openings by approximately 33 percent (33%). A high-level fixed bridge will not interrupt traffic flow. Table 24 provides the 95<sup>th</sup> percentile queueing analysis for both the low-level and mid-level movable bridge options. Since a high-level bridge will not interrupt traffic flow, there is no queue associated with this alternative. As shown in Table 24, queue length decreases slightly with the mid-level bridge. It should be noted that the duration of the bridge openings was not reduced, only the frequency of openings was changed. Along with the increase in vertical clearance, the horizontal clearance is also planned to be increased which will allow larger boats to cross in opposing directions at the same time, reducing the time needed to keep the bridge open. However, in order to provide a conservative analysis the duration of the bridge opening was left unchanged. Therefore, although queue length is not significantly reduced, queueing occurrences are reduced from approximately three (3) times per hour to approximately two (2) times per hour. Under these assumptions, the maximum eastbound queue length will not exceed 1,500 feet, therefore, the queue will not impact the intersection of SR-A1A & US-1, which is located approximately 2,600 feet west of the ICWW bridge stop bar.

**Table 24: 95th Percentile Bridge Queuing Analysis**

Conditions	AM Peak Hour		PM Peak Hour	
	Eastbound Queue Length (feet)	Westbound Queue Length (feet)	Eastbound Queue Length (feet)	Westbound Queue Length (feet)
<i>Low Level Bridge (Mid-Level Bridge)</i>				
Existing	944 (N/A)	1,010 (N/A)	826 (N/A)	914 (N/A)
2020	987 (1,250)	1,062 (1,323)	873 (1,177)	971 (1,142)
2030	1,073 (1,342)	1,142 (1,412)	956 (1,256)	1,039 (1,240)
2040	1,173 (1,468)	1,236 (1,509)	1,039 (1,363)	1,116 (1,354)

The queuing analysis and signal timing sheets from Trafficware’s *Synchro 9.1* are provided in **Appendix O**.

## CONCLUSIONS

A Project Development and Environment (PD&E) study is being performed to develop a preferred alternative for a new SR-A1A bridge over the ICWW. Three (3) bridge alternatives are being considered, all of which will grade separate SR-A1A from CR-605 and the FEC Railroad. Additionally, two (2) alternatives are being considered to maintain access to CR-605 in the vicinity of the ICWW bridge via new connector roads from US-1 to CR-605: (1) Build Alternative 1 will provide a connection to the north of SR-A1A by extending Juanita Avenue from US-1 to CR-605, and (2) Build Alternative 2 will provide a connection to the south of SR-A1A by extending Sunny Lane from US-1 to CR-605.

Both alternatives are anticipated to allow the study intersections, including all approaches, to mostly operate at LOS D or better. However, for the 2040 analysis year some minor street movements and approaches are anticipated to operate at LOS F. For Build Alternative 1, the westbound approach to the US-1 & Juanita Avenue intersection is anticipated to operate at LOS F in the 2040 PM peak hour. For Build Alternative 2, the westbound approach to the US-1 & Sunny Lane intersection is anticipated to operate at LOS F in the 2040 PM peak hour.

Overall, Build Alternative 2 is anticipated to provide lower vehicle delay; however, Build Alternative 2 restricts eastbound and westbound movements at US-1 from Sunny Lane to right-turns only. The minor street left-turn movements typically have higher delays as turning drivers must find longer gaps in traffic in both directions. It is anticipated that if a similar restriction is implemented for Juanita Avenue, Build Alternative 1 would have reduced delay. Furthermore, a signal warrant analysis should be conducted to evaluate the need for a signal at the intersection of US-1 & Juanita Avenue (for Build Alternative 1). Implementation of a signal may further reduce delay for these minor streets.