

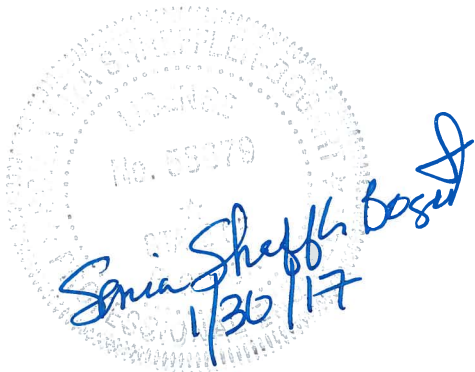


Final Design Traffic Technical Memorandum

CR-510 from CR-512 to 58th Avenue
Project Development and Environment (PD&E) Study
Indian River County, Florida

Financial Management Number: 405606-2-22-02
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Florida Department of Transportation
District Four



January 2017



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Final Design Traffic Technical Memorandum

FDOT Office
Environmental Management
District Four

Author
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EXECUTIVE SUMMARY

The subject project is located adjacent to the western and southern limits of Sebastian Florida, in Indian River County. The project entails the investigation of widening a segment of County Road CR-510 from two to four lanes. The study segment extends from the CR-510/CR-512 (Sebastian Boulevard) intersection to just east of 58th Avenue for a total distance of 4.3 miles±. CR-510 links the local community of Wabasso to CR-512 (Sebastian Boulevard), the main east-west arterial serving Sebastian. The project corridor is generally rural in nature and includes a mixture of agricultural, educational, commercial, industrial and residential facilities.



The objective of this document is to examine the existing and forecasted traffic conditions under the No-Build Alternative and the potential Build Alternative for the CR-510 PD&E Study. Even though the scope of this document is limited to an operational evaluation of all competing project alternatives, it is inherently clear that issues such as construction costs, socioeconomic and environmental impacts, along with many other engineering considerations (e.g., constructability, multimodal implications, compatibility with transportation plans, etc.) are also an integral part of the final determination of the recommended alternative.

The objective of the CR-510 study is to develop a proposed improvement strategy that is technically sound, environmentally sensitive and publicly acceptable while meeting the needs of the corridor. As with every PD&E Study, emphasis has been placed on the

development, evaluation and documentation of detailed engineering and environmental studies including data collection, conceptual design, environmental analyses, project documentation and the preparation of a Preliminary Engineering Report.

CR-510 Traffic Volume Information from ETDM

Segment	2014 ¹		2035 ²		Adopted LOS Standard
	AADT	Truck Volume	AADT	Truck Volume	
From CR-512/ to 58 th Avenue	9,800	520 (5.3%)	20,000	1,060 (5.3%)	D

¹ 2014 FDOT Florida Traffic Online; ² 2035 Greater Treasure Coast Regional Planning Model

Based on the evaluation of the projected traffic volumes for the CR 510 PD&E Study the proposed widening to four lanes will provide the required capacity for future traffic needs and is therefore recommended. Future projections also indicate the potential need to signalize the proposed intersection at 82nd Avenue; the project is included in the latest Indian River County MPO Transportation Improvement Program. It should be noted that the new signal would meet the FDOT’s access management spacing criteria as per Access Management Rule 14-97. The queue length analysis revealed that at 66th Street the northbound left turn may benefit from dual left turn lanes and that this recommendation should be further investigated during concept design of Build scenario. A list of recommended improvements is provided below:

Build Conditions: Recommended Geometric and Signal Phasing Improvements

Intersection	Geometry	Signal Timing	
		Cycle Length	Phasing
CR-512	Additional Exclusive EBR Lane	--	Optimized
Mako Way & Hammerhead Way	--	Maintained	One controller for two Int. maintained Adjustment of timing splits
87 th Street	--	--	Optimized
Treasure Coast Elementary School	--	AM: 125 sec PM: 70 sec	Optimized
Powerline Rd	Signalized - Actd-Uncrd	100 sec	EBT: Phase 2 (LT Permissive) WBT: Phase 6 (LT Permissive) SBLR: Phase 8
66 th Ave	Additional Exclusive NBL lane	AM: 150 sec PM: 150 sec	Eliminate SBL Permissive Phase due to opposing dual NBL lanes
58 th Ave	--	--	Optimized
82 nd Avenue	New intersection -Signalized - Semi Act-Uncrd	100 sec	EBL: Phases 5/2 (Protected/Permissive) EBT: Phase 2 WBT: Phase 6 (LT Permissive) NBT: Phase 4 (LT Permissive) SBL: Phases 3/8 (Protected/Permissive) SBT Phase 8

Recommended Turn Bay Storage Length

Number	Intersection	Movement	Recommended Storage length (ft) ¹
1	CR-512	EBL	375
		EBR	350
		WBL	325
		NBL	450
2	Mako Way ³	NBL	275
		SBR	350
3	Hammerhead Way ³	NBL	200
		SBR	225
4	87th Street	NBL	200
		SBR	475
5	Treasure Coast Elementary School	EBR	400
		WBL	250
		NBR	450
6	Powerline Rd	EBL	325
		SBL	225
7	66 th Ave	EBL	475
		EBR	475
		WBL	175
		NBL	375
		SBL	375
8	58th Ave	EBL	25
		WBL	350
		NBL	325
9	82nd Ave	EBL	375
		WBL	25
		NBL	175
		SBL	200

¹based on 25ft/veh;

²storage length does not include deceleration + taper lengths;

³based on synchro queuing reports

Thru queue not used due to low demand for turn movement

In closing, even though the Build Alternative performs better than the other competing option, other considerations need to be taken into account and evaluated as part of the overall PD&E effort (e.g. potential negative environmental, social and economic impacts, right-of-way acquisitions, construction costs, etc.) that will largely determine which Alternative and improvements are ultimately recommended for implementation. The preparation of this DTTM exclusively deals with the traffic impact of the Alternatives and as such is only a component of the final preferred Alternative determination.

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1 INTRODUCTION

1.1 Project Background/Description

The subject project is located adjacent to the western and southern limits of Sebastian Florida, in Indian River County. This area is within the northern part of Florida’s Treasure Coast, so named after the discovery of treasure from the 1715 Spanish Treasure Fleet, lost in a hurricane near the Sebastian Inlet.

The project entails the investigation of widening a segment of County Road CR-510 from two to four lanes. The study segment extends from the CR-510/CR-512 (Sebastian Boulevard) intersection to just east of 58th Avenue for a total distance of 4.3 miles± (**Figure 1-1**). CR-510 links the local community of Wabasso to CR-512 (Sebastian Boulevard), the main east-west arterial serving Sebastian. The project corridor is generally rural in nature and includes a mixture of agricultural, educational, commercial, industrial and residential facilities.



Project Location Map

Figure 1-1

The existing right-of-way along the corridor varies from approximately 80 to 160 feet wide. CR-510 is owned and maintained by Indian River County and is functionally classified as an urban principal arterial. The proposed project will provide additional capacity to meet the future traffic needs resulting from projected population and employment growth within the projected area, expected as a result of various proposed residential developments.

1.2 Methodology

The objective of this document is to examine the existing and forecasted traffic conditions under the No-Build Alternative and the potential Build Alternative for the CR-510 PD&E Study. The No-Build Alternative is used as a base to compare the traffic patterns along with the operational and capacity improvements associated with the potential Build Alternative. The analysis periods will include existing conditions (year 2015); the proposed project opening year (2020); the interim year (2030) and the design year (2040). Even though the scope of this document is limited to an operational evaluation of all competing project alternatives, it is inherently clear that issues such as construction costs, socioeconomic and environmental impacts, along with many other engineering considerations (e.g., constructability, multimodal implications, compatibility with transportation plans, etc.) are also an integral part of the final determination of the recommended alternative.

The methodology used for the development of this Design Traffic Technical Memorandum is consistent with the Design Traffic Procedure (Topic No. 525-030-120-g) published by the Florida Department of Transportation (FDOT). The methodology covers the following tasks:

- Collect all available traffic count information, previous studies, traffic characteristics and other data.
- Develop Design Hour Volumes (Standard K), Design Hour Directional Volumes (D_{30}) and percentage of trucks for both the design hour and daily demand (T_{peak} , T_{daily}) based on the Department's Roadway Characteristics Inventory (RCI) and historical traffic data.
- Estimate the existing AADT and DDHV for roadway segments and cross streets.
- Develop future year traffic volume forecasts for the No-Build and Build conditions for the subject corridor based on trends analysis of historical traffic counts and the Treasure Coast Regional Planning Model (TCRMP 4.0). Develop Design Hour turning movements for the intersections along the corridor, based on the data collection and the recommended design characteristics.
- Evaluate capacity for the existing and future traffic volumes to determine whether the corridor operates under constrained or unconstrained capacity conditions.

- Perform Level of Service analysis for the corridor and intersections under existing and future (No-Build and Build) conditions. Using an adopted Level of Service D.
- Based on the Level of Service analysis, provide recommendations for improvements to accommodate the anticipated travel demand within the corridor.

2 EXISTING CONDITIONS

2.1 Data Collection

The Florida Department of Transportation has provided the *Traffic Data Collection and Traffic Projections, February 2016 (Pre-PD&E Study)* as a basis for the existing conditions analysis. Documentation and data for the study area and analysis locations have been incorporated into this section of the report to facilitate continuity. The complete referenced document is provided in **Appendix A**. The data collection effort included turning movement counts, approach/departure counts and the vehicle classification counts. Data collection locations are illustrated in **Figure 2-1**.



Three-day intersection data collection (3-hour AM Peak turning movement counts from 6:00 AM to 9:00 AM, 3-hour PM Peak turning movement counts from 4:00 PM to 7:00 PM, and 24-hour approach/departure counts), were collected at the following intersections:

1. CR-510 at CR-512 (signalized)
2. CR-510 at Mako Way (signalized)
3. CR-510 at Hammerhead Way (signalized)
4. CR-510 at 87th Street (signalized)
5. CR-510 at Treasure Coast Elementary School (signalized)
6. CR-510 at Powerline Road/70th Avenue (un-signalized)
7. CR-510 at 66th Avenue (signalized)
8. CR-510 at 58th Avenue (signalized)

The intersection data collection included passenger car, pedestrian, bicyclist and truck counts. Vehicle classification counts were collected on CR-510 east of Powerline Road and west of Treasure Coast Elementary School. The traffic counts were collected from December 1st thru 3rd, 2015. The turning movement counts and approach/departure counts are documented within the *Pre-PD&E Study* provided in **Appendix A**.

2.2 Traffic Factors

Design Traffic Factors were obtained from the 2014 Florida Traffic Information DVD (2014 FTI), published by the FDOT. The factors were used to adjust the raw field count data.

Seasonal Factors (SF) were applied to daily and peak hour volumes used in the operational analysis of existing conditions.

Axle factors were applied to the traffic count data as appropriate.

Directional Distribution Factors (D-factor) were determined for each location using the traffic count data in combination with thresholds established in the FDOT Project Traffic Forecasting Handbook, 2014. When the resultant D-factor based on actual counts is not within the FDOT acceptable range for this facility 50.8 to 67.1, the recommended factor is used. The north/south segment from CR 512 to north of 87th Street the AM peak direction is southbound with corresponding PM peak direction northbound. The east/west segment from south of 87th Street to east of 58th Street, the AM peak direction is eastbound with corresponding PM peak westbound. The D-factors were set at the maximum acceptable value of 67.1 The recommended D-factors for CR 510 are summarized in **Table 2-1**. Additional information, including values for cross-streets are provided in **Appendix A**.

Table 2-1 CR 510 Recommended D-factors

Roadway	Segment		D-factor (direction)	
	From	To	AM	PM
CR 510	CR 512	Mako Way	62.0 (SB)	54.6 (NB)
	Mako Way	Hammerhead Way	62.0 (SB)	53.7 (NB)
	Hammerhead Way	87 th Street	54.0 (SB)	56.6 (NB)
	87 th Street	Treasure Coast Elementary	65.9 (EB)	67.1(WB)
	Treasure Coast Elementary	58 th Avenue	67.1 (EB)	67.1 (WB)

Design Hour Factors (K-factor) were determined using the Standard K Factors established by FDOT. However, several locations do not generate typical peak hour distribution of traffic due to land uses such as schools (existing K-factors are approximately 0.20) or volumes are very low; therefore, the few vehicles during peak hour result in a higher K-factor. For these instances the existing calculated K-factor was used for the design factor. The recommended non-standard K-factors are summarized in **Table 2-2**.

Table 2-2 Recommended Non-Standard K-factors

Location	K-Factor	
	AM	PM
CR 510 North of CR 512	20.7	29.3
Hammerhead Way West of CR 510	27.5	11.3
Treasure Coast Elementary School South of CR 510	32.5	9.0

Truck Factors (T) Daily (T_{24}) and Peak Hour (T_{peak}) truck factors were determined based on 2015 classification counts and 5-year FTI data. A T_{24} of 5.4% and T_{peak} of 2.7% were established for the project area. Truck volume data is provided in **Appendix A**.

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2.3 Existing Traffic Volumes

2.3.1 Average Annual Daily Traffic

The raw 72-hour approach counts are summarized in **Table 2-3** along with corresponding traffic factors used to determine the AADT.

Table 2-3 Existing (2015) Average Annual Daily Traffic

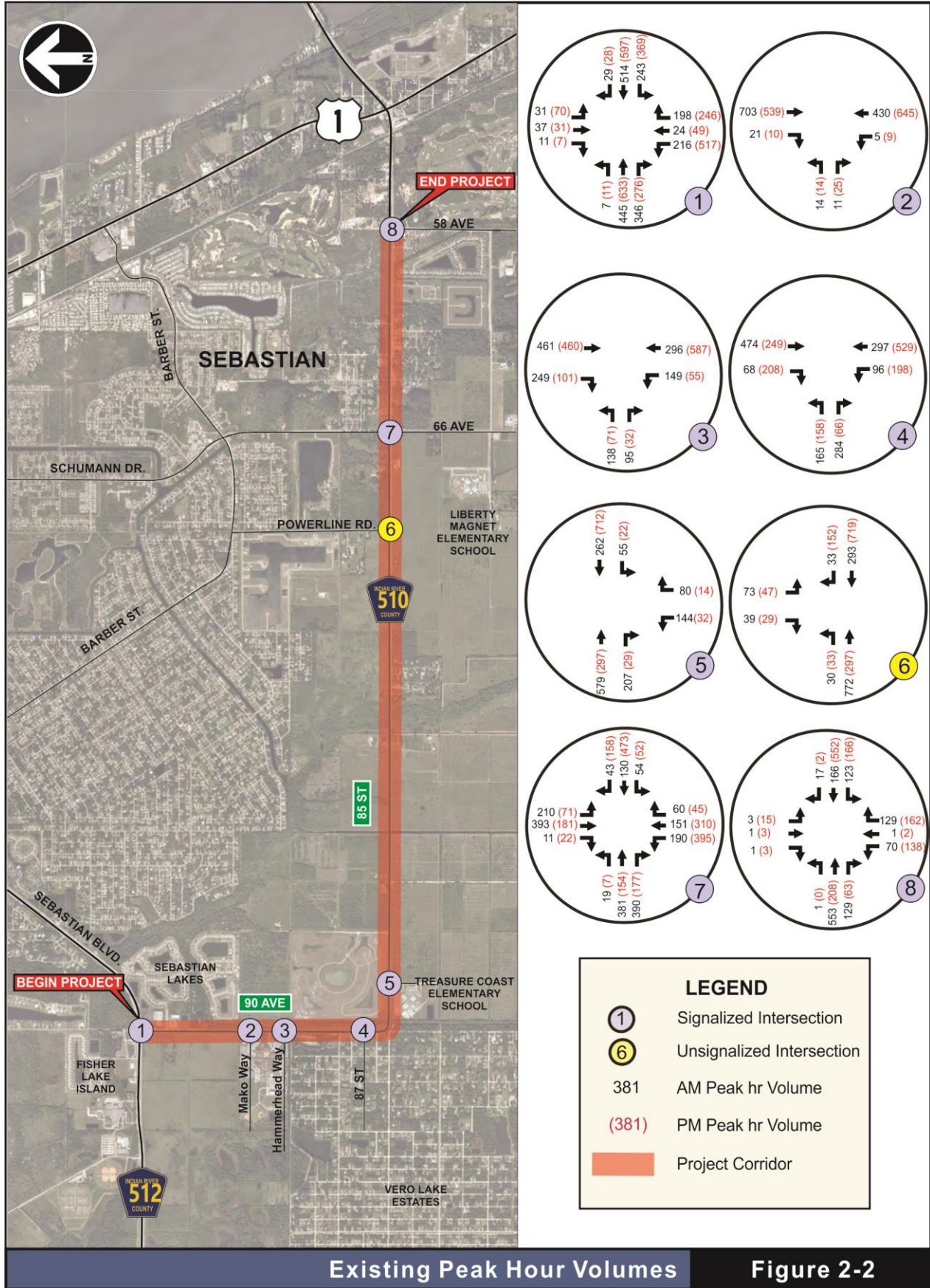
Number	Intersection	Location	Count				Axle Correction Factor	Seasonal Factor	2015 AADT
			Day 1	Day 2	Day 3	Average			
1	<i>CR-512</i>	CR 510 North of CR 512	717	654	691	687	0.98	1.0	670
		CR 510 South of CR 512	13,725	13,426	13,549	13,567	0.98	1.0	13,000
		CR 512 East of CR 510	17,536	17,204	17,407	17,382	0.98	1.0	17,000
		CR 512 West of CR 510	18,921	17,728	18,284	18,311	0.98	1.0	18,000
2	<i>Mako Way</i>	CR 510 North of Mako Way	13,669	13,457	13,586	13,571	0.98	1.0	13,000
		CR 510 South of Mako Way	13,999	13,693	13,847	13,846	0.98	1.0	14,000
		Mako Way West of CR 510	1,005	1,182	1,094	1,094	0.98	1.0	1,100
3	<i>Hammerhead Way</i>	CR 510 North of Hammerhead Way	13,841	13,532	13,519	13,631	0.98	1.0	13,000
		CR 510 South of Hammerhead Way	12,956	12,692	12,873	12,840	0.98	1.0	13,000
		Hammerhead Way West of CR 510	2,574	2,172	2,272	2,339	0.98	1.0	2,300
4	<i>87th Street</i>	CR 510 North of 87th Street	13,275	13,133	13,241	13,216	0.98	1.0	13,000
		CR 510 South of 87th Street	11,617	11,331	11,272	11,407	0.98	1.0	11,000
		87th Street West of CR 510	7,156	6,973	7,049	7,059	0.98	1.0	6,900
5	<i>Treasure Coast Elementary</i>	CR 510 East of Treasure Coast Elementary School	13,867	14,010	12,731	13,536	0.98	1.0	13,000
		CR 510 West of Treasure Coast Elementary School	12,208	11,907	12,208	12,108	0.98	1.0	12,000
		Treasure Coast Elementary School South of CR 510	1,452	1,522	1,492	1,489	0.98	1.0	1,500
6	<i>Power line Road</i>	CR 510 East of Powerline Road	14,147	13,922	14,096	14,055	0.98	1.0	14,000
		CR 510 West of Powerline Road	12,098	11,903	11,816	11,939	0.98	1.0	12,000
		Powerline Road North of CR 510	2,652	2,980	2,631	2,754	0.98	1.0	2,700
7	<i>66th Avenue</i>	66th Avenue North of CR 510	7,787	7,732	7,721	7,747	0.98	1.0	7,600
		66th Avenue South of CR 510	12,313	12,774	12,589	12,559	0.98	1.0	12,000
		CR 510 East of 66th Avenue	10,822	10,911	10,520	10,751	0.98	1.0	11,000
		CR 510 West of 66th Avenue	13,777	13,615	13,382	13,591	0.98	1.0	13,000
8	<i>58th Avenue</i>	58th Avenue North of CR 510	478	517	417	471	0.98	1.0	460
		58th Avenue South of CR 510	6,763	7,208	6,583	6,851	0.98	1.0	6,700
		CR 510 East of 58th Avenue	13,637	13,442	12,999	13,359	0.98	1.0	13,000
		CR 510 West of 58th Avenue	11,562	11,780	11,389	11,577	0.98	1.0	11,000

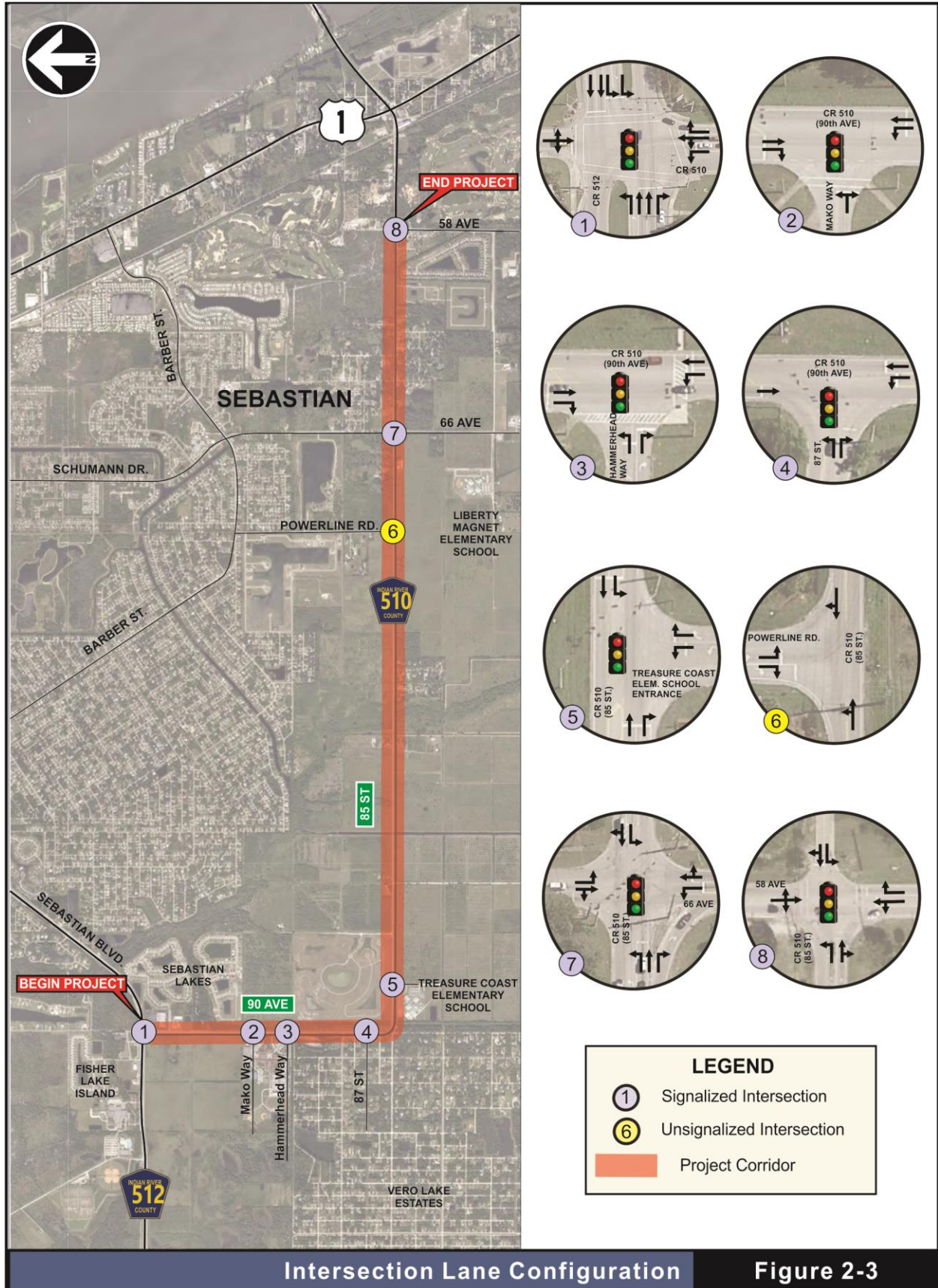
Source: Traffic Data Collection and Traffic Projections CR-510 from CR-512 to 58th Avenue, February 2016

2.3.2 Peak Hour Intersection Volumes

Based on the Pre-PD&E Study, three-day TMCs were collected from 12/1/2015 to 12/3/2015. In order to conduct a conservative intersection analysis, a left turn volume assessment was conducted for each intersection in the study area. The highest left turn volumes occurred on 12/1/2015; therefore, corresponding intersection volumes were selected for the analysis. The intersection volumes used in the analysis are provided in **Figure 2-2** and intersection lane geometry is provided in **Figure 2-3**.

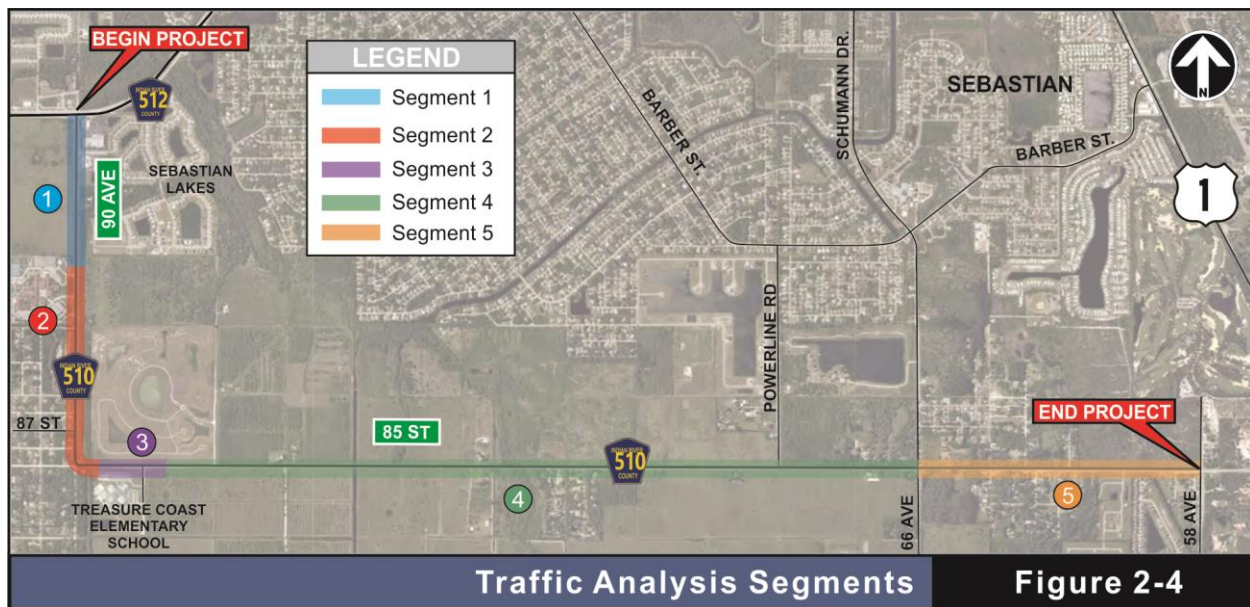
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2.4 Existing Conditions Segment Analysis

CR-510, within the study area is predominantly a two-lane undivided roadway from CR-512 to 58th Avenue; functionally classified as a principal arterial by Indian River County. The study area was broken down into five segments based on changes in operational characteristics such as number of lanes, posted speed limit or presence of exclusive turn lanes. The segment limits are shown in **Figure 2-4**.



The LOS Standard was established using the FDOT Level of Service Standards for the State Highway System (Procedure No.: 525-000-006). The adopted Standard for CR-510 from CR-512 to 58th Avenue is LOS D. The FDOT Generalized Service Volume Tables were used to establish the LOS threshold for each segment by applying the non-state roadway and appropriate characteristic adjustment factors. **Table 2-4** summarizes the existing CR-510 segmental data, corresponding LOS D service volume, AADT and resultant volume to capacity ratio. Volume to capacity ratios greater than 1.0 are considered failing.

Table 2-4 Existing Volume to Capacity Ratios (AADT)

SEGMENT	Limits		# of Lanes (speed limit)	LOS D SV	AADT EXISTING	
	From	To			2015	V/C
1	CR 512	Mako Way	3LD (>40 MPH)	26,280	13,000	0.49
2	Mako Way	800' West Of Treasure Coast Elementary	2LD (>40 MPH) with LT lanes	16,730	12,800	0.77
3	800' West Of Treasure Coast Elementary	500' East Of Treasure Coast Elementary	2LU (<35 MPH) with LT lanes	13,320	12,000	0.90
4	500' East Of Treasure Coast Elementary	66 Avenue	2LU (>40 MPH)	12,740	13,000	1.02
5	66 Avenue	58 Avenue	2LU (<35 MPH) with LT lanes	13,320	11,000	0.83

Results show that Segment 4 (from 500' east of the Treasure Coast Elementary school to 66th Avenue) does not meet the adopted LOS. The Directional Design Hour Volumes were also evaluated and have been summarized in **Table 2-5**. Results show that Segment 3 (from 800' west to 500' east of the Treasure Coast Elementary school) and Segment 4 (from 500' east of the Treasure Coast Elementary school to 66th Avenue) do not meet the adopted LOS.

Table 2-5 Existing Volume to Capacity Ratios (DDHV)

Roadway	Limits		# of Lanes (speed limit)	LOS D SV	DDHV EXISTING	
	From	To			2015	V/C
1	CR 512	Mako Way	3LD (>40 MPH)	830	690	0.83
2	Mako Way	800' West of Treasure Coast Elementary	2LD (>40 MPH) with LT lanes	830	680	0.82
3	800' West of Treasure Coast Elementary	500' East of Treasure Coast Elementary	2LU (<35 MPH) with LT lanes	680	725	1.07
4	500' East of Treasure Coast Elementary	66 Avenue	2LU (>40 MPH)	630	785	1.25
5	66 Avenue	58 Avenue	2LU (<35 MPH) with LT lanes	680	664	0.98

2.4.1 Existing Intersection Analysis

Existing signal timing for each signalized intersection within the study limit was provided by Indian River County Traffic Engineering Division, they are included in **Appendix B**. Existing operations were analyzed to serve as the base for future condition analyses. **Table 2-6** presents the existing intersection LOS results for both AM and PM peak hours. Results show that the overall LOS at all intersections meet or exceed the adopted LOS except for the intersections of CR-510 at Mako Way and at 66th Avenue. Although LOS for the remaining intersections meet the adopted standard, there are several approaches below the standard in both AM and PM peak hours. Detailed analysis results are provided in **Appendix C**.

Table 2-6 Existing Intersection LOS

Number	Intersection	MVT	2015							
			AM PK				PM PK			
			Approach		Intersection		Approach		Intersection	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	CR-512	EB	33.7	C	53.9	D	41.4	D	47.7	D
		WB	70.2	E			42.5	D		
		NB	51.1	D			58.5	E		
		SB	59.9	E			71.4	E		
2	Mako Way**	EB	48.9	D	53.5	D	50.9	D	77.7	E
		NB	79.8	E			126.1	F		
		SB	40.6	D			22.5	C		
3	Hammerhead Way**	EB	132.9	F	53.0	D	63.3	E	22.9	C
		NB	13.6	B			13.4	B		
		SB	45.6	D			23.0	C		
4	87th Street	EB	35.3	D	23.3	C	25.4	C	13.0	B
		NB	10.4	B			7.3	A		
		SB	23.2	C			14.9	B		
5	Treasure Coast Elementary	EB	18.5	B	20.0	C	5.4	A	5.3	A
		WB	7.5	A			4.3	A		
		NB	37.4	D			15.6	B		
6	*Powerline Road	SB	31.7	D	3.9	A	25.4	D	2.2	A
		EB	0.3	A			1.2	A		
		WB	0.0	A			0.0	A		
7	66th Avenue	EB	39.8	D	52.1	D	25.7	C	105.2	F
		WB	30.0	C			48.5	D		
		NB	55.8	E			181.5	F		
		SB	66.8	E			78.4	E		
8	58th Avenue	EB	28.3	C	28.1	C	14.2	B	28.3	C
		WB	15.3	B			10.8	B		
		NB	47.8	D			72.9	E		
		SB	63.6	E			91.3	F		

*Stop controlled intersection; **Based on HCM2000 Synchro Reports (HCM2010 does not support 1 controller for 2 intersections); **XX LOS does not meet adopted standard LOS D**

3 FUTURE CONDITIONS

Future traffic projections for the analysis locations within the study area for both the No Build and Build scenarios were provided by the Department. The development of traffic projections requires the examination of historical growth, proposed development levels within the corridor vicinity, and a basic understanding of local traffic circulation patterns and travel characteristics of the study area. Excerpts of the documentation and analysis from the aforementioned study have also been included in this section to facilitate continuity of the report. As mentioned in the previous section, the Pre-PD&E Study is included in **Appendix A**.

3.1 Scenarios

For the No Build alternative, CR-510 from CR-512 to 58th Avenue was coded as a two-lane road. For the Build alternative, CR-510 from CR-512 to 58th Avenue was coded as a four-lane road. There are two proposed projects within the study segment; the extension of 82nd Avenue from 69th Street (just south of the project) to CR-510, which creates a new intersection on CR-510 at 82nd Avenue and the widening of 66th Avenue from 2-lanes to 4-lanes. These projects are reflected in the No-Build condition.

3.2 Development of Future Traffic Projections

3.2.1 Design Period

Through coordination with the Department, the future analysis years of the project were established as:

- Opening Year 2020
- Interim Year 2030
- Design Year 2040

3.2.2 Future Travel Demand

Various traffic forecasting methodologies were evaluated and summarized as part of this work. The purpose was to identify the most reasonable forecasting method which can be used to estimate the growth rates for all the study intersection link approaches. The following forecasting methodologies were reviewed:

- Regression analysis of the last 7 years (2008-2014) of AADTs from FDOT count sites using FDOT Trend analysis spreadsheet.
- Socioeconomic growth for TAZs within 2-mile buffer of the study corridor between the base year 2010 and future year 2040.
- Average growth rates from the model based on the 2010 and 2040 TCRPM 4.0 volumes. Three different model runs were performed – 2010 base year, 2040 full Build scenario where CR-510 has 4 lanes in the study corridor, and 2040 No-Build scenario where the number of lanes on CR-510 in the 2040 cost-feasible highway networks was reduced back to 2 lanes (existing conditions) in the study corridor. This resulted in two different growth rates – one for the No-Build scenario and the other for the Build scenario.

The growth rates of historical counts, TCRPM socioeconomic growth, and the model to model projections methodology was summarized and compared with each other. Based on the comparison and discussions with FDOT Traffic Modeling Coordinator, growth rates obtained from the model to model projections methodology was used to develop the future year AADTs. The 2015 AADT obtained from field counts for each approach, was grown based on the corresponding growth rates to obtain the 2040 No-Build and Build forecasted AADT. Then the 2020 and 2030 AADT was estimated by interpolating the 2015 AADT and the 2040 forecasted AADT.

In cases where the model didn't have a specific approach at a study intersection link (due to the coarse nature of the TAZ structure and highway network delineation in a regional travel demand model), a growth rate for that specific approach was assigned by looking at the turning movement counts at that intersection. For example, the north leg of the CR-510/CR-512 intersection was not coded in the regional model. To obtain the growth rate for this leg, the turning movement counts from the north leg were analyzed, and the movement (through, right turn or left-turn) with the maximum number of vehicles was identified. In this case, the left-turn movement was dominant, and hence the growth rate from the east leg of the intersection was applied to this north leg.

The recommended growth rates obtained from the Pre-PD&E Study are summarized in **Table 3-1**.

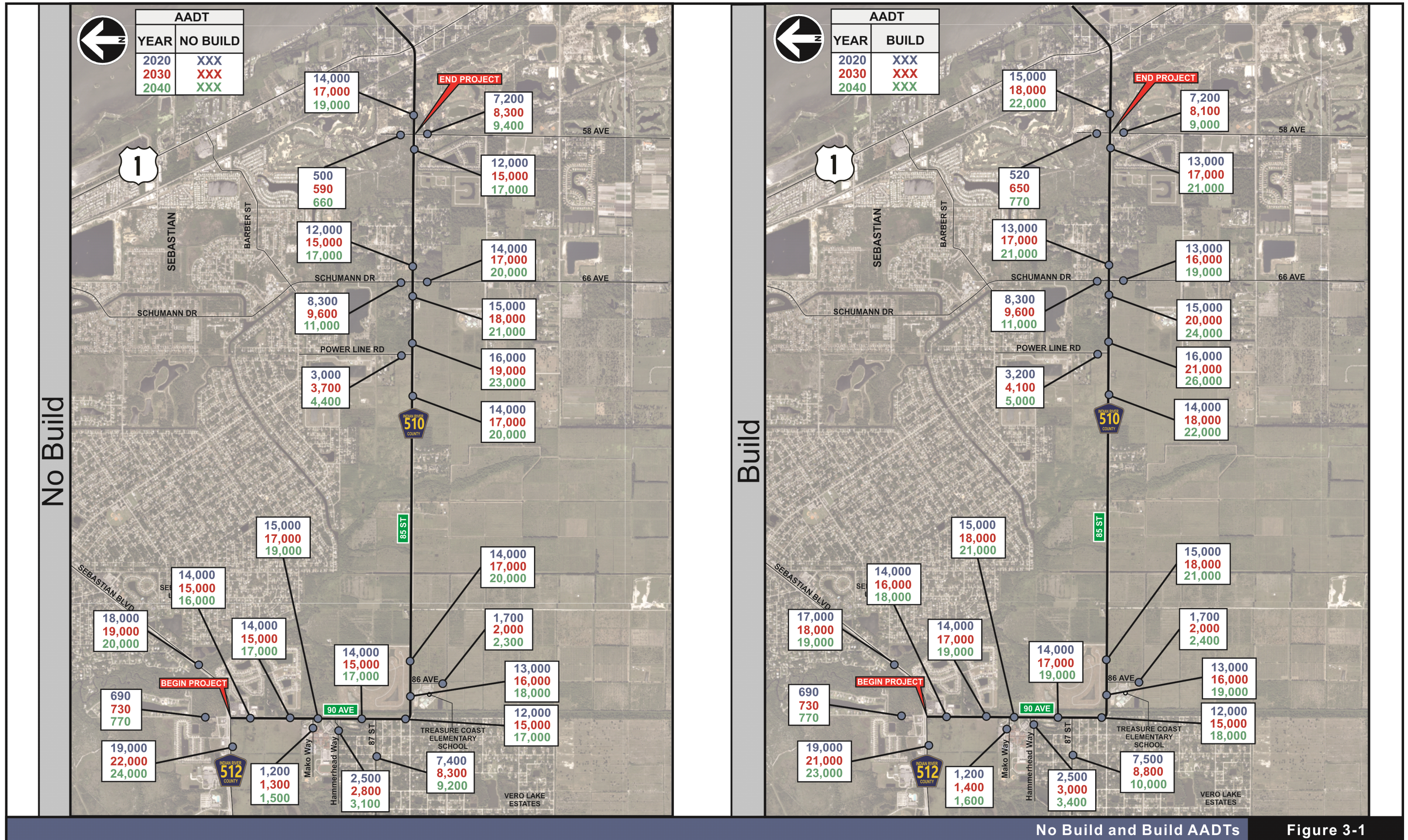
Table 3-1 No-Build and Build Growth Rates

Number	Intersection	Location	No Build (2-Lane)	Build (4-Lane)
1	CR 512	CR 510 North of CR 512	0.56%	0.54%
		CR 510 South of CR 512	0.89%	1.32%
		CR 512 East of CR 510	0.56%	0.54%
		CR 512 West of CR 510	1.04%	1.14%
2	Mako Way	CR 510 North of Mako Way	1.15%	1.60%
		CR 510 South of Mako Way	1.15%	1.60%
		Mako Way West of CR 510	1.15%	1.60%
3	Hammerhead Way	CR 510 North of Hammerhead Way	1.15%	1.60%
		CR 510 South of Hammerhead Way	1.15%	1.60%
		Hammerhead Way West of CR 510	1.15%	1.60%
4	87th Street	CR 510 North of 87th Street	1.15%	1.60%
		CR 510 South of 87th Street	1.64%	1.94%
		87th Street West of CR 510	1.15%	1.60%
5	Treasure Coast Elementary School	CR 510 East of Treasure Coast Elementary School	1.64%	1.94%
		CR 510 West of Treasure Coast Elementary School	1.64%	1.94%
		Treasure Coast Elementary School South of CR 510	1.64%	1.94%
6	Powerline Road	CR 510 East of Powerline Road	1.99%	2.49%
		CR 510 West of Powerline Road	1.99%	2.49%
		Powerline Road North of CR 510	1.99%	2.49%
7	66th Avenue	66th Avenue North of CR 510	1.34%	1.44%
		66th Avenue South of CR 510	1.99%	1.87%
		CR 510 East of 66th Avenue	1.75%	2.59%
		CR 510 West of 66th Avenue	1.99%	2.49%
8	58th Avenue	58th Avenue North of CR 510	1.59%	2.07%
		58th Avenue South of CR 510	1.34%	1.20%
		CR 510 East of 58th Avenue	1.59%	2.07%
		CR 510 West of 58th Avenue	1.76%	2.58%

Source: Traffic Data Collection and Traffic Projections CR-510 from CR-512 to 58th Avenue, February 2016

Future AADTs obtained from the Pre-PD&E Study for both No-Build and Build scenarios are provided in **Figure 3-1**.

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No Build and Build AADTs **Figure 3-1**

3.2.2.1 No-Build Directional Design Hour and Intersection Volumes

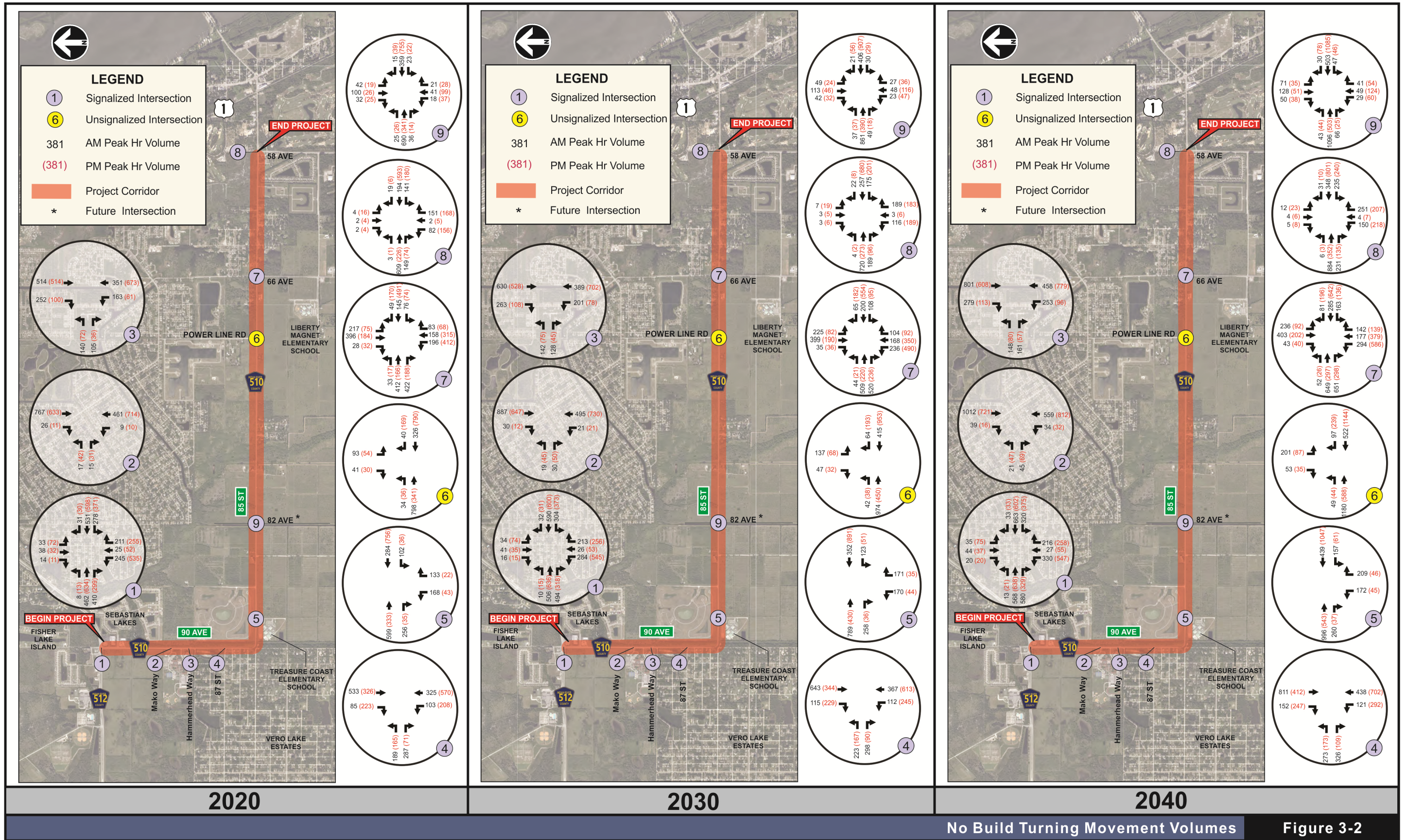
The AADTs for No-Build conditions established in the Pre-PD&E Study were used to determine the Directional Design Hour Volumes (DDHV). DDHVs were obtained by applying the Standard K and D- factors to the AADTs. The future intersection volumes were developed using TMT00L, a tool which establishes turning movements using the existing AADTs, existing turning percentages and the established growth factors, to project the future traffic demand for the 2020 (opening), 2030 (interim), and 2040 (design) years. As discussed in a previous section, K-factors for future traffic follow the established FDOT Standard K values. However, several locations do not generate typical peak hour distribution of traffic due to land uses such as schools (existing K-factors are approximately 0.20) or volumes are very low; therefore, the few vehicles during peak hour result in a higher K-factor. For these instances the existing calculated K-factor was recommended.

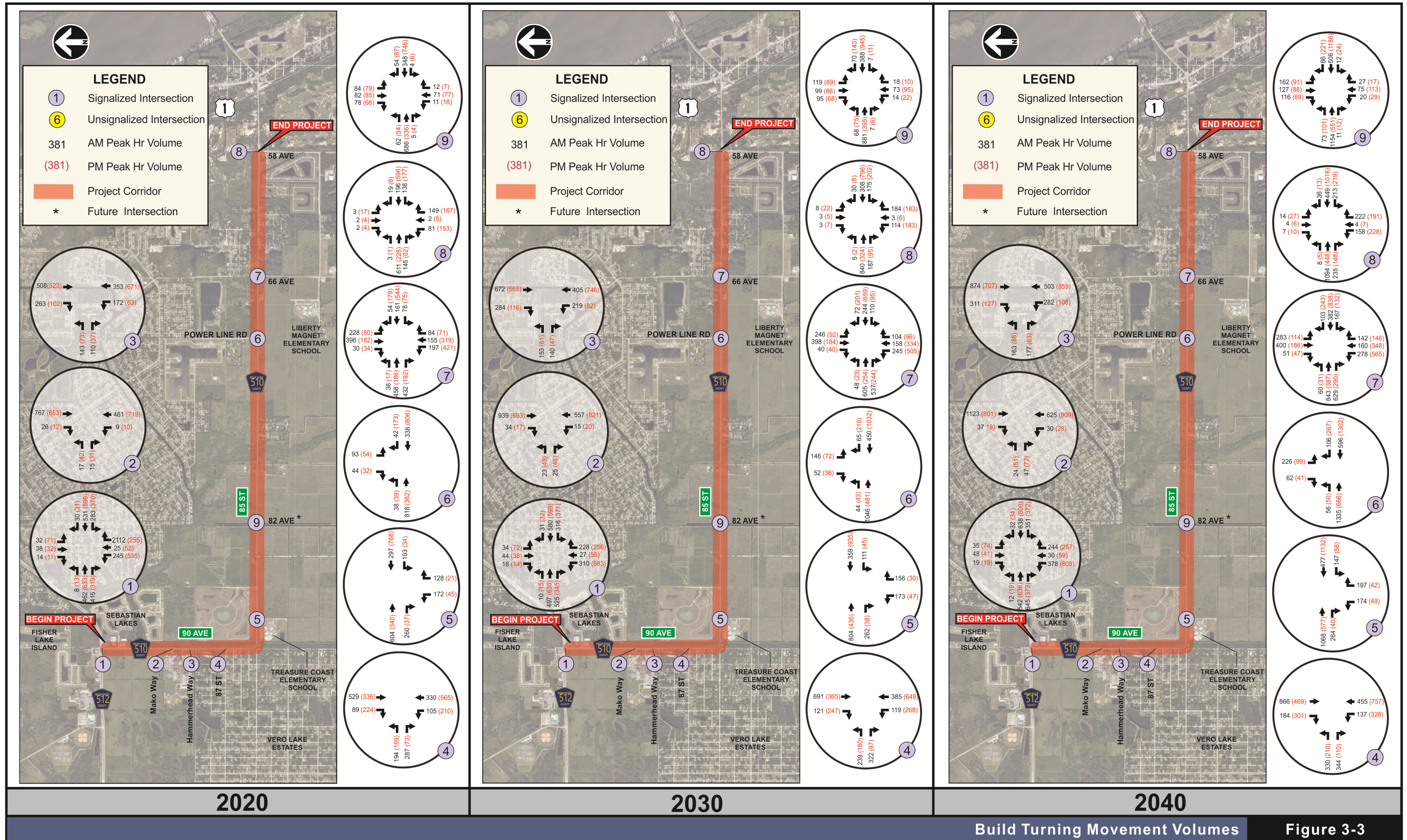
The TMT00L worksheets are provided in **Appendix D**. It should be noted that volumes for the future CR-510 intersection with 82nd Avenue were forecasted using the AADTs from the east leg of Powerline Road and the west leg of 88th Avenue/Treasure Coast Elementary School. Since the previously established 2020 and 2030 AADT were estimated by interpolating the 2015 AADT and the 2040 forecasted AADT, distinction for opening year for the 82nd Avenue project is not specified. The No-Build AM and PM peak hour intersection volumes are provided in **Figure 3-2**.

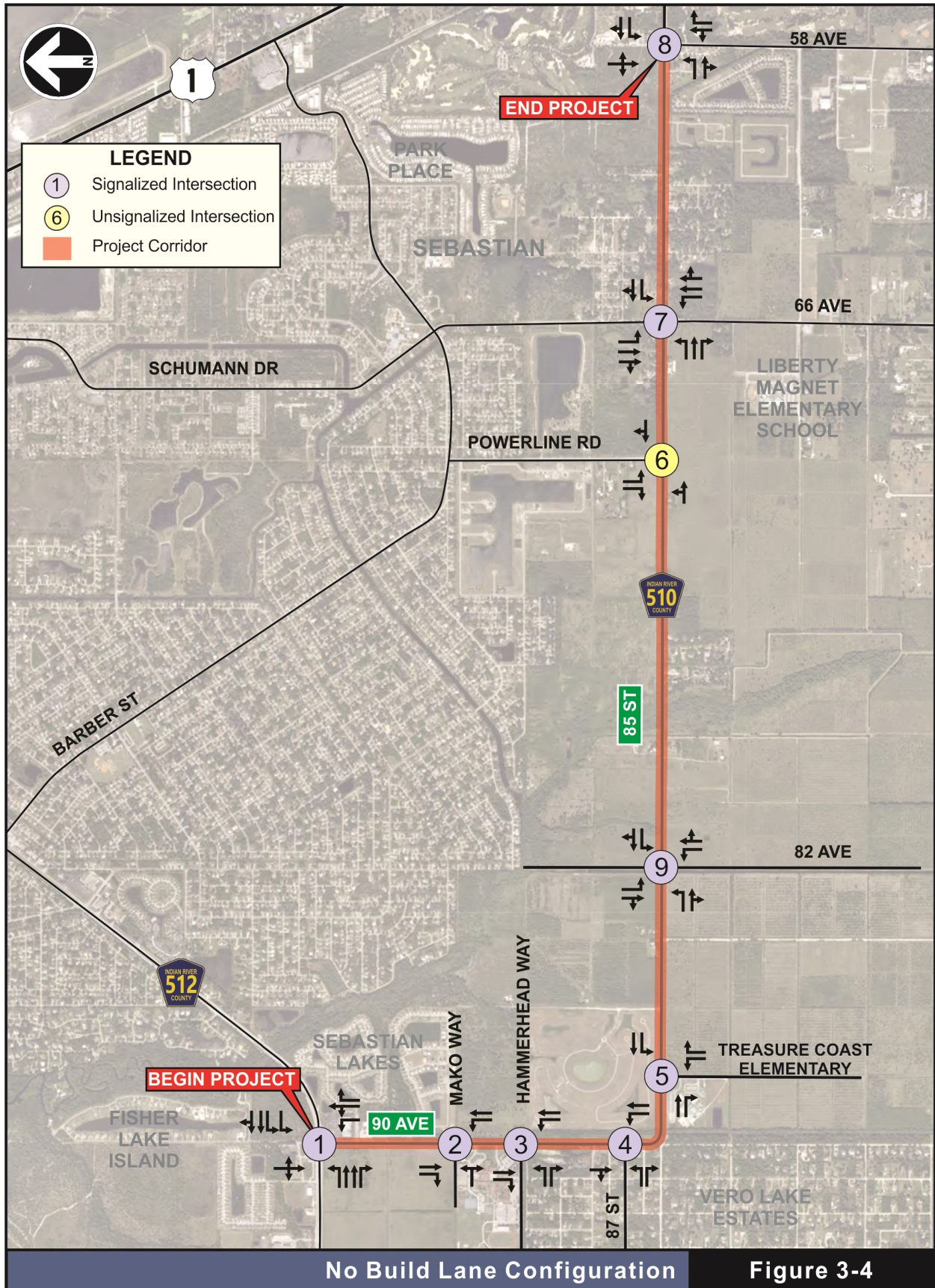
3.2.2.2 Build Directional Design Hour and Intersection Volumes

Following the same methodology used in the No-Build scenario, the future Build traffic demand for the 2020 (opening), 2030 (interim), and 2040 (design) years were determined. Per the 2040 TCRPM, volumes on the south leg of 82nd Avenue decrease under Build conditions. With the additional capacity on CR 510 the model shows traffic from 82nd Avenue is diverted; thus, reflecting lower volumes when compared to No Build conditions. As expected with the additional capacity on CR 510, corresponding AADTs will increase. The Build AM and PM peak hour intersection volumes are provided in **Figure 3-3**.

No Build and Build intersection lane assignments are provided in **Figures 3-4** and **3-5**.







No Build Lane Configuration **Figure 3-4**



3.3 Future Traffic Operational Analysis

3.3.1 No Build Analysis

3.3.1.1 No Build Roadway Segment Analysis

The five segments established in the previous section are also used for future conditions. For No-Build, CR-510 maintains existing condition characteristics. Therefore, the existing LOS D thresholds still apply. Based on the No-Build AADTs and the corresponding DDHVs, Segment 4 has a volume to capacity (v/c) ratio greater than 1.0 and therefore exceeds the LOS D threshold by 2020; in 2030 Segment 3 and Segment 5 will exceed LOS D, as well as Segment 2 by 2040. **Table 3-2** summarizes the resultant v/c ratios for all analysis years for No-Build AADTs. The No-Build DDHV results are summarized in **Table 3-3**. Segments 3,4 and 5 fail in 2020; all segments fail by 2040.

Table 3-2 No Build Volume to Capacity Ratios (AADT)

SEGMENT	Limits		# of Lanes (speed limit)	LOS D SV	AADT NO BUILD					
	From	To			2020	V/C	2030	V/C	2040	V/C
1	CR 512	Mako Way	3LD (>40 MPH)	26,280	14,000	0.53	15,000	0.57	16,500	0.63
2	Mako Way	800' West Of Treasure Coast Elementary	2LD (>40 MPH) with LT lanes	16,730	13,800	0.82	15,200	0.91	17,400	1.04
3	800' West Of Treasure Coast Elementary	500' East Of Treasure Coast Elementary	2LU (<35 MPH) with LT lanes	13,320	13,000	0.98	15,000	1.13	18,000	1.35
4	500' East Of Treasure Coast Elementary	66 Avenue	2LU (>40 MPH)	12,740	14,000	1.10	17,250	1.35	21,000	1.65
5	66 Avenue	58 Avenue	2LU (<35 MPH) with LT lanes	13,320	12,000	0.90	14,000	1.05	17,000	1.28

Table 3-3 No Build Volume to Capacity Ratios (DDHV)

SEGMENT	Limits		# of Lanes (speed limit)	LOS D SV	DDHV NO BUILD					
	From	To			2020	V/C	2030	V/C	2040	V/C
1	CR 512	Mako Way	3LD (>40 MPH)	830	743	0.90	797	0.96	876	1.06
2	Mako Way	800' West of Treasure Coast Elementary	2LD (>40 MPH) with LT lanes	830	733	0.88	807	0.97	924	1.11
3	800' West of Treasure Coast Elementary	500' East of Treasure Coast Elementary	2LU (<35 MPH) with LT lanes	680	785	1.15	906	1.33	1,087	1.60
4	500' East of Treasure Coast Elementary	66 Avenue	2LU (>40 MPH)	630	845	1.34	1,042	1.65	1,268	2.01
5	66 Avenue	58 Avenue	2LU (<35 MPH) with LT	680	725	1.07	845	1.24	1,027	1.51

3.3.1.2 No Build Intersection Analysis

The traffic operational analysis included the following intersections within the study corridor. It should be noted that the future signalized intersection at 82nd Avenue has also been included.

1. CR-510 at CR-512 (signalized)
2. CR-510 at Mako Way (signalized)
3. CR-510 at Hammerhead Way (signalized)
4. CR-510 at 87th Street (signalized)
5. CR-510 at Treasure Coast Elementary School (signalized)
6. CR-510 at Powerline Road/70th Avenue (un-signalized)
7. CR-510 at 66th Avenue (signalized)
8. CR-510 at 58th Avenue (signalized)
9. CR-510 at 82nd Avenue (future signalized intersection).

The study intersections were analyzed, as for existing conditions, using Synchro 8 and the Highway Capacity Manual 2010 Methodology. Existing truck percentages were maintained thru all analysis years. The analysis was performed to evaluate traffic operational conditions for the opening year 2020, interim year 2030, and design year 2040. **Tables 3-4** and **3-5** indicate the operating LOS for the study intersections.

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Table 3-4 No-Build Intersection LOS (AM Peak Hour)

No.	Intersection	MVT	2020				2030				2040			
			Approach		Intersection		Approach		Intersection		Approach		Intersection	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	CR-512	EB	23.6	C	31.6	C	29.0	C	33.8	C	42.1	D	39.3	D
		WB	26.3	C			27.2	C			27.9	C		
		NB	50.0	D			49.6	D			49.8	D		
		SB	61.6	E			62.9	E			64.6	E		
2	Mako Way¹	EB	46.5	D	44.8	D	47.7	D	62.9	E	48.4	D	104.8	F
		NB	71.4	E			90.2	F			118.6	F		
		SB	28.9	C			48.3	D			100.5	F		
3	Hammerhead Way¹	EB	70.7	E	27.0	C	79.8	E	32.0	C	88.5	F	38.0	D
		NB	12.5	B			14.7	B			24.6	C		
		SB	22.8	C			29.0	C			32.5	C		
4	87th Street	EB	36.7	D	21.2	C	53.0	D	27.9	C	108.0	F	50.1	D
		NB	8.8	A			9.8	A			12.4	B		
		SB	18.0	B			21.9	C			35.9	D		
5	Treasure Coast Elementary	EB	15.0	B	15.5	B	16.1	B	18.6	B	24.6	C	30.4	C
		WB	6.2	A			7.3	A			12.4	B		
		NB	28.9	C			42.2	D			77.8	E		
6	Powerline Road²	SB	37.9	E	4.0	A	207.0	F	22.9	C	1062.2	F	128.6	F
		EB	0.3	A			0.4	A			0.4	A		
		WB	0.0	A			0.0	A			0.0	A		
7	66th Avenue	EB	24.9	C	27.6	C	29.0	C	34.0	C	40.6	D	47.0	D
		WB	17.8	B			19.8	B			25.8	C		
		NB	29.8	C			37.4	D			52.3	D		
		SB	32.2	C			43.5	D			65.1	E		
8	58th Avenue	EB	19.7	B	21.9	C	30.2	C	35.2	D	92.7	F	100.0	F
		WB	10.6	B			18.0	B			54.6	D		
		NB	45.0	D			73.7	E			189.9	F		
		SB	60.3	E			74.3	E			84.7	F		
9	82nd Avenue	EB	8.8	A	13.1	B	13.2	B	15.9	B	37.5	D	30.5	C
		WB	5.7	A			6.9	A			11.2	B		
		NB	42.7	D			43.0	D			43.6	D		
		SB	35.3	D			35.3	D			35.0	C		

¹Based on HCM2000 Synchro Reports (HCM2010 does not support 1 controller for 2 intersections); ²Stop controlled intersection; **XX LOS does not meet adopted standard LOS D**

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Table 3-5 No-Build Intersection LOS (PM Peak Hour)

No.	Intersection	MVT	2020				2030				2040			
			Approach		Intersection		Approach		Intersection		Approach		Intersection	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	CR-512	EB	31.1	C	40.4	D	32.5	C	41.1	D	33.4	C	41.8	D
		WB	35.8	D			36.3	D			36.9	D		
		NB	52.1	D			51.9	D			52.0	D		
		SB	72.7	E			74.6	E			76.3	E		
2	Mako Way ¹	EB	64.6	E	50.0	D	67.6	E	49.3	D	94.8	F	55.9	E
		NB	84.5	F			82.4	F			92.2	F		
		SB	9.5	A			9.1	A			8.2	A		
3	Hammerhead Way ¹	EB	32.8	C	39.3	D	32.0	C	43.4	D	30.4	C	64.5	E
		NB	44.3	D			50.7	D			81.2	F		
		SB	34.4	C			36.5	D			50.7	D		
4	87th Street	EB	27.5	C	12.3	B	29.3	C	13.0	B	34.3	C	15.1	B
		NB	6.5	A			7.0	A			8.5	A		
		SB	14.0	B			14.7	B			17.0	B		
5	Treasure Coast Elementary	EB	7.9	A	7.8	A	9.6	A	9.2	A	11.4	B	10.4	B
		WB	6.0	A			7.4	A			8.5	A		
		NB	29.2	C			28.7	C			28.5	C		
6	Powerline Road ²	SB	32.8	D	2.2	A	80.8	F	4.9	A	278.2	F	21.9	C
		EB	1.0	A			0.9	A			0.0	A		
		WB	0.0	A			0.0	A			0.9	A		
7	66th Avenue	EB	25.1	C	39.2	D	30.5	C	53.4	D	34.2	C	77.8	E
		WB	38.9	D			59.4	E			97.1	F		
		NB	37.7	D			49.0	D			74.3	E		
		SB	53.1	D			68.0	E			75.3	E		
8	58th Avenue	EB	20.0	C	18.4	B	21.7	C	20.9	C	25.4	C	25.5	C
		WB	12.6	B			14.2	B			17.5	B		
		NB	29.0	C			33.9	C			42.6	D		
		SB	38.8	D			44.2	D			55.7	E		
9	82nd Avenue	EB	7.0	A	13.9	B	9.2	A	18.3	B	14.8	B	37.6	D
		WB	9.6	A			15.9	B			46.8	D		
		NB	43.6	D			44.0	D			48.1	D		
		SB	32.5	C			32.3	C			31.9	C		

¹Based on HCM2000 Synchro Reports (HCM2010 does not support 1 controller for 2 intersections); ²Stop controlled intersection; **XX LOS does not meet adopted standard LOS D**

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As indicated in **Tables 3-4** and **3-5** for opening year 2020, overall intersection LOS operate within threshold at all locations during AM and PM peaks. However, several approaches do not operate within threshold in the interim and design years. The following intersections operate beyond the adopted LOS E standard in either the AM or PM peak hours:

Intersections beyond the acceptable threshold LOS by 2030

- Mako Way

Additional intersections beyond the acceptable threshold LOS by Year 2040

- Hammerhead Way
- Powerline Road
- 66th Avenue
- 58th Avenue

Based on the operational analysis it is anticipated that the intersection of CR 510 at Powerline Road/70th Avenue may require signalization. A preliminary signal warrant evaluation was performed using existing volumes; results show that Warrant 1 Eight-Hour Vehicular Volume and Warrant 2 Four-Hour Vehicular Volume meet the required thresholds. Worksheets are provided in **Appendix E**. The remaining locations meet the adopted standard.

3.3.2 Build Analysis

3.3.2.1 Build Roadway Segment Analysis

For the Build condition CR-510 is widened from two-lanes to four-lanes, from CR-512 to east of 58th Avenue. Following the same methodology as Existing and No Build the v/c ratio was determined for each of the five study segments. Segment 4 which exceeded the LOS D standard under the No-Build, now has a v/c ratio less than 1.0. Therefore, all segments will operate within the LOS standard, having adequate capacity thru design year (2040). **Tables 3-6** and **3-7** summarize the resultant v/c ratios for all analysis years for AADT and DDHV, respectively.

Table 3-6 Build Volume to Capacity Ratios (AADT)

SEGMENT	Limits		# of Lanes (speed limit)	LOS D SV	AADT BUILD					
	From	To			2020	V/C	2030	V/C	2040	V/C
1	CR 512	Mako Way	4LD (>40 MPH)	35,820	14,000	0.39	16,000	0.45	18,500	0.52
2	Mako Way	800' West Of Treasure Coast Elementary	4LD (>40 MPH)	35,820	13,800	0.39	16,200	0.45	19,200	0.54
3	800' West Of Treasure Coast Elementary	500' East Of Treasure Coast Elementary	4LD (<35 MPH)	29,160	13,000	0.45	16,000	0.55	19,000	0.65
4	500' East Of Treasure Coast Elementary	66 Avenue	4LD (>40 MPH)	35,820	14,750	0.41	18,250	0.51	23,250	0.65
5	66 Avenue	58 Avenue	4LD (<35 MPH)	29,160	12,500	0.43	16,000	0.55	21,000	0.72

Table 3-7 Build Volume to Capacity Ratios (DDHV)

SEGMENT	Limits		# of Lanes (speed limit)	LOS D SV	DDHV BUILD					
	From	To			2020	V/C	2030	V/C	2040	V/C
1	CR 512	Mako Way	4LD (>40 MPH)	1,800	743	0.41	850	0.47	982	0.55
2	Mako Way	800' West of Treasure Coast Elementary	4LD (>40 MPH)	1,800	733	0.41	860	0.48	1,020	0.57
3	800' West of Treasure Coast Elementary	500' East of Treasure Coast Elementary	4LD (>35 MPH)	1,470	785	0.53	966	0.66	1,147	0.78
4	500' East of Treasure Coast Elementary	66 Avenue	4LD (>40 MPH)	1,800	891	0.49	1,102	0.61	1,404	0.78
5	66 Avenue	4LD (>40 MPH)	4LD (>35 MPH)	1,470	755	0.51	966	0.66	1,268	0.86

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3.3.2.2 Build Intersection Analysis

Tables 3-8 and 3-9 summarize the delay and corresponding LOS at the study intersections for AM and PM peak hours under Build condition. The three-step roundabout evaluation will be provided as part of the preliminary engineering report. This analysis reveals that low volume, minor approaches at intersections with CR-512, Mako Way and 58th Street are projected to operate at LOS E. For CR 510 at Powerline Road/70th Avenue, the intersection is signalized under the build condition since the preliminary signal warrant evaluation shows the required volume thresholds are met under existing conditions. However, all intersections operate within the adopted LOS D standard thru design year (2040).

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Table 3-8 - Build Intersection LOS (AM Peak Hour)

No.	Intersection	MVM T	2020				2030				2040			
			Approach		Intersection		Approach		Intersection		Approach		Intersection	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	CR-512	EB	21.9	C	30.0	C	25.2	C	32.0	C	29.7	C	34.6	C
		WB	26.7	C			28.6	C			30.3	C		
		NB	45.7	D			45.6	D			46.1	D		
		SB	60.4	E			60.5	E			62.1	E		
2	Mako Way ¹	EB	51.7	D	18.1	A	53.2	D	21.0	C	53.7	D	23.3	C
		NB	31.3	C			35.9	D			39.7	D		
		SB	8.9	A			10.6	B			12.2	B		
3	Hammerhead Way ¹	EB	52.5	D	27.1	C	55.2	E	24.9	C	57.2	E	26.1	C
		NB	11.1	B			13.8	B			19.8	B		
		SB	29.6	C			22.9	C			21.3	C		
4	87th Street	EB	22.5	C	16.0	B	26.8	C	18.5	B	34.7	C	23.4	C
		NB	8.1	A			9.2	A			10.6	B		
		SB	16.5	B			18.5	B			23.3	C		
5	Treasure Coast Elementary	EB	12.6	B	15.0	B	12.6	B	16.0	B	14.8	B	17.9	B
		WB	5.2	A			5.2	A			6.8	A		
		NB	34.9	C			42.3	D			48.0	D		
6	Powerline Road	EB	6.4	A	7.3	A	7.1	A	8.3	A	9.0	A	10.8	B
		WB	5.4	A			5.7	A			6.8	A		
		SB	18.4	B			22.0	C			29.5	C		
7	66th Avenue	EB	25.9	C	29.9	C	27.6	C	33.3	C	34.7	C	39.0	D
		WB	21.7	C			22.2	C			25.1	C		
		NB	35.6	D			42.1	D			51.5	D		
		SB	32.7	C			39.2	D			46.7	D		
8	58th Avenue	EB	17.9	B	17.7	B	20.5	C	21.3	D	29.7	C	30.1	C
		WB	9.0	A			10.7	B			17.0	B		
		NB	30.3	C			40.3	D			53.0	D		
		SB	47.0	D			54.5	D			68.3	E		
9	82nd Avenue	EB	11.3	B	13.6	B	12.8	B	14.9	B	14.8	B	17.4	B
		WB	15.2	B			15.9	B			16.7	B		
		NB	22.1	C			25.0	C			32.3	C		
		SB	14.8	B			16.6	B			21.9	C		

¹Based on HCM2000 Synchro Reports (HCM2010 does not support 1 controller for 2 intersections); **XX LOS does not meet adopted standard LOS D**

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Table 3-9 - Build Intersection LOS (PM Peak Hour)

No.	Intersection	MVT	2020				2030				2040			
			Approach		Intersection		Approach		Intersection		Approach		Intersection	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	CR-512	EB	30.6	C	40.4	D	32.8	C	41.5	D	34.4	C	42.5	D
		WB	37.1	D			38.3	D			39.2	D		
		NB	51.0	D			50.0	D			49.7	D		
		SB	75.6	E			77.8	E			79.8	E		
2	Mako Way	EB	53.1	D	27.6	C	54.7	D	30.4	C	56.6	E	32.4	C
		NB	41.5	D			44.9	D			48.3	D		
		SB	9.6	A			10.0	A			10.7	B		
3	Hammerhead Way	EB	51.3	D	18.4	B	52.6	D	18.7	B	54.5	D	19.0	B
		NB	11.3	B			11.8	B			12.4	B		
		SB	20.9	C			20.9	C			20.1	C		
4	87th Street	EB	24.6	C	11.4	B	26.6	C	12.3	B	30.4	C	14.5	B
		NB	5.9	A			6.4	A			7.7	A		
		SB	13.4	B			14.7	B			17.3	B		
5	Treasure Coast Elementary	EB	9.0	A	7.2	A	10.0	A	7.9	A	11.3	B	8.9	A
		WB	4.9	A			5.5	A			6.3	A		
		NB	25.3	C			25.5	C			25.8	C		
6	Powerline Road	EB	4.7	A	6.4	A	4.3	A	6.6	A	4.5	A	7.6	A
		WB	5.8	A			5.7	A			6.3	A		
		SB	21.3	C			28.2	C			38.1	D		
7	66th Avenue	EB	22.3	C	30.1	C	23.8	C	33.8	C	26.1	C	39.0	D
		WB	25.5	C			27.9	C			33.8	C		
		NB	33.4	C			38.5	D			45.2	D		
		SB	38.8	D			46.1	D			54.3	D		
8	58th Avenue	EB	18.4	B	16.4	B	19.2	B	18.2	B	20.5	C	21.4	C
		WB	10.6	B			11.3	B			12.6	B		
		NB	27.1	C			33.5	C			45.3	D		
		SB	35.6	D			42.0	D			55.2	E		
9	82nd Avenue	EB	9.0	A	15.3	B	9.1	A	17.2	B	9.8	A	21.1	C
		WB	16.1	B			17.5	B			22.4	C		
		NB	26.5	C			33.3	C			41.5	D		
		SB	18.6	B			23.6	C			30.6	C		

¹Based on HCM2000 Synchro Reports (HCM2010 does not support 1 controller for 2 intersections); **XX LOS does not meet adopted standard LOS D**

3.4 Turn Lane Storage Length Requirements

Turn lane storage length requirements were developed for the Build Alternative based on the 95th percentile queue lengths (obtained from the HCM 2010 reports). **Tables 3-10 and 3-11** summarize the existing turn bay length, 95th percentile queue lengths and recommended storage length for all study intersections in the CR-510 corridor. The recommended storage lengths do not include the taper or deceleration distance (refer to FDOT Design Standard Index #301 for taper and deceleration distances). During the design phase, the recommended storage lengths along with taper and deceleration

distances shall determine the required turn bay length. **Tables 3-12** and **3-13** summarize the minimum required turn bay lengths in order to avoid blockage by queued vehicles in the thru lanes (based on the 95th percentile).

Table 3-10 Recommended Turn Bay Storage Length (AM Peak Hour)

No.	Intersection	MVT	Turn Bay Length (ft.) (from analysis)	Number of Vehicles (from analysis)			Turn Lane Queue Length (ft.) ¹			Recommended Storage Length (ft.) ²
				2020	2030	2040	2020	2030	2040	
1	CR-512	EBL	255	0.2	0.3	0.4	5	8	10	25
		EBR	255	8.4	10.4	13.5	210	260	338	350
		WBL	325	7.6	8.5	9.3	190	213	233	250
		NBL/T	170	6.4	7.9	9.3	160	198	233	250
		NBR ⁴	--	11.4	12.3	13.2	285	308	330	350
2	Mako Way ³	NBL	190	-	-	-	10	14	28	50
		SBR	100	-	-	-	12	16	18	25
3	Hammerhead Way ³	EBL ⁴	--	-	-	-	214	227	241	250
		EBR ⁴	--	-	-	-	58	64	70	75
		NBL	510	-	-	-	69	88	116	125
		SBR	100	-	-	-	153	101	74	75
4	87th Street	EBL	175	5.2	7.7	12.1	130	193	303	325
		EBR ⁴	--	8.6	10.9	13.9	215	273	348	350
		NBL	215	1.9	2.4	3.2	48	60	80	100
5	Treasure coast Elementary	EBR	250	6.7	7.0	7.8	168	175	195	200
		WBL	490	1.7	1.9	3.0	43	48	75	75
		NBL ⁴	--	7.1	8.1	8.8	178	203	220	225
		NBR	275	9.2	12.3	17.1	230	308	428	450
6	Powerline Rd.	EBL	150	0.4	0.6	1.1	10	15	28	50
		SBL	300	2.0	3.8	8.1	50	95	203	225
		SBR ⁴	--	0.9	1.2	1.9	23	30	48	50
7	66th Ave	EBL	290	1.1	1.6	2.3	28	40	58	75
		EBR ³	300	-	-	-	80	94	180	200
		WBL	225	2.4	3.7	6.5	60	93	163	175
		NBL	250	4.4	6.3	8.1	110	158	203	225
		SBL	200	9.9	11.7	14.9	248	293	373	375
8	58th Ave	EBL	200	0.1	0.1	0.2	3	3	5	25
		WBL	190	2.8	4.3	8.0	70	108	200	200
		NBT/L	240	2.7	5.2	9.0	68	130	225	225
		NBR ⁴	--	5.5	8.8	12.9	138	220	323	325
9	82nd Ave	EBL	300	1.1	1.3	1.6	28	33	40	50
		WBL	300	0.1	0.2	0.4	3	5	10	25
		NBL	300	0.3	0.4	0.7	8	10	18	25
		SBL	300	1.8	2.9	5.1	45	73	128	150

¹based on 25ft/veh; ²storage length does not include deceleration + taper lengths; ³Based on Synchro Queuing Reports; ⁴ Auxiliary/drop lane;

95th percentile volume exceeds capacity; queue may be longer; m queue metered by upstream signal

Table 3-11 Recommended Turn Bay Storage Length (PM Peak Hour)

No.	Intersection	MVT	Turn Bay Length (ft.) (from analysis)	Number of Vehicles (from analysis)			Turn Lane Queue Length (ft.) ¹			Recommended Storage Length (ft.) ²
				2020	2030	2040	2020	2030	2040	
1	CR-512	EBL	255	0.5	0.6	0.8	13	15	20	25
		EBR	255	7.5	8.2	9.0	188	205	225	225
		WBL	325	11.5	11.5	11.6	288	288	290	300
		NBL	170	15.1	16.4	17.1	378	410	428	450
		NBR ⁴	--	14.3	13.9	13.8	358	348	345	350
2	Mako Way ³	NBL	190	-	-	-	12	18	23	25
		SBR	100	-	-	-	8	9	10	25
3	Hammerhead Way ³	EBL ⁴	--	-	-	-	119	129	140	150
		EBR ⁴	--	-	-	-	35	39	45	50
		NBL	510	-	-	-	29	36	46	50
		SBR	100	-	-	-	35	38	33	50
4	87th Street	EBL	175	5.0	5.8	7.8	125	145	195	200
		EBR ⁴	--	2.0	2.9	3.7	50	73	93	100
		NBL	215	3.1	4.4	6.3	78	110	158	175
5	Treasure Coast Elementary	EBR	250	0.6	0.7	0.8	15	18	20	25
		WBL	490	0.5	0.6	0.8	13	15	20	25
		NBL ⁴	--	1.4	1.5	1.6	35	38	40	50
		NBR	275	1.3	1.9	2.7	33	48	68	75
6	Powerline Rd.	EBL	150	0.6	0.8	1.3	15	20	33	50
		SBL	300	1.3	2.3	4.2	33	58	105	125
		SBR ⁴	--	0.8	1.1	1.6	20	28	40	50
7	66th Ave	EBL	290	0.5	0.8	1.2	13	20	30	50
		EBR ³	300	-	-	-	55	61	70	0
		WBL	225	2.3	3.2	4.8	58	80	120	125
		NBL	250	9.2	12.0	14.4	230	300	360	375
		SBL	200	4.2	5.5	7.5	105	138	188	200
8	58th Ave	EBL	200	0.0	0.1	0.1	0	3	3	25
		WBL	190	3.8	4.8	5.9	95	120	148	150
		NBT/L	240	5.0	7.4	11.3	125	185	283	300
		NBR ⁴	--	5.6	7.4	9.3	140	185	233	250
9	82nd Ave	EBL	300	1.0	1.5	2.6	25	38	65	75
		WBL	300	0.1	0.2	0.5	3	5	13	25
		NBL	300	0.5	0.8	1.3	13	20	33	50
		SBL	300	2.1	2.9	3.7	53	73	93	100

¹based on 25ft/veh; ²storage length does not include deceleration + taper lengths; ³Based on Synchro Queuing Reports; ⁴ Auxiliary/drop lane;
 # 95th percentile volume exceeds capacity; queue may be longer; m queue metered by upstream signal

**Table 3-12 Minimum Required Storage Length
No Thru Queue Blockage (AM Peak Hour)**

No.	Intersection	Movement	Number of Vehicles			Thru Lane Queue Length (ft.) ¹			Minimum Required Storage Length (ft.) ²
			2020	2030	2040	2020	2030	2040	
1	CR-512	EBT	8.4	9.3	10.4	210	233	260	275
		WBT	8.7	9.8	11.0	218	245	275	275
		NBT ⁴	0.0	0.0	0.0	0	0	0	0
		SBT/L	0.0	0.0	0.0	0	0	0	0
2	Mako Way ³	NBT	-	-	-	124	101	182	200
		SBT	-	-	-	200	216	330	350
3	Hammerhead Way ³	NBT	-	-	-	65	75	94	100
		SBT	-	-	-	132	155	191	200
4	87th Street	NBT	2.6	3.6	4.8	65	90	120	125
		SBT	7.7	11.0	16.7	193	275	418	425
5	Treasure Coast Elementary	EBT	7.5	10.4	15.7	188	260	393	400
		WBT	2.1	2.7	4.5	53	68	113	125
6	Powerline Rd.	EBT	5.0	8.2	13.0	125	205	325	325
		WBT	2.0	3.3	6.0	50	83	150	150
7	66th Ave	EBT	8.4	11.6	18.4	210	290	460	475
		WBT	3.5	5.7	9.6	88	143	240	250
		NBT	4.8	6.4	8.7	120	160	218	225
		SBT	8.1	9.5	11.3	203	238	283	300
8	58th Ave	EBT	10.0	16.3	27.5	250	408	688	700
		WBT	1.8	3.4	6.4	45	85	160	175
9	82nd Ave	EBT	6.6	9.3	14.2	165	233	355	375
		WBT	4.3	5.4	8.1	108	135	203	225
		NBT	2.2	2.7	3.8	55	68	95	100
		SBT	3.3	4.5	7.5	83	113	188	200

¹based on 25ft/veh; ²Turn Bay Length = Storage + Deceleration + Taper Lengths; ³Based on queuing reports;

⁴Shared thru-left lane

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**Table 3-13 Minimum Required Storage Length
No Thru Queue Blockage (PM Peak Hour)**

No.	Intersection	Movement	Number of Vehicles			Thru Lane Queue Length (ft.) ¹			Minimum Required Storage Length (ft.) ²
			2020	2030	2040	2020	2030	2040	
1	CR-512	EBT	13.9	14.3	14.6	348	358	365	375
		WBT	11.6	12.0	12.4	290	300	310	325
		NBT ⁴	0.0	0.0	0.0	0	0	0	0
		SBT ⁴	0.0	0.0	0.0	0	0	0	0
2	Mako Way ³	NBT	-	-	-	203	235	270	275
		SBT	-	-	-	165	177	211	225
3	Hammerhead Way ³	NBT	-	-	-	129	146	174	200
		SBT	-	-	-	156	166	208	225
4	87th Street	NBT	3.6	4.5	6.1	90	113	153	175
		SBT	6.3	7.6	10.6	158	190	265	275
5	Treasure coast Elementary	EBT	3.1	4.4	6.3	78	110	158	175
		WBT	5.4	7.4	9.4	135	185	235	250
6	Powerline Rd.	EBT	1.8	2.7	4.6	45	68	115	125
		WBT	6.4	9.0	13.7	160	225	343	350
7	66th Ave	EBT	3.2	4.9	8.2	80	123	205	225
		WBT	12.9	16.7	23.9	323	418	598	600
		NBT	7.6	9.4	12.4	190	235	310	325
		SBT	4.6	5.6	6.9	115	140	173	175
8	58th Ave	EBT	4.1	6.3	10.2	103	158	255	275
		WBT	5.9	8.9	13.1	148	223	328	350
9	82nd Ave	EBT	2.8	3.8	8.3	70	95	208	225
		WBT	9.9	14.3	22.1	248	358	553	575
		NBT	2.6	4.0	6.2	65	100	155	175
		SBT	3.7	4.8	6.2	93	120	155	175

¹based on 25ft/veh; ²Turn Bay Length = Storage + Deceleration + Taper Lengths; ³Based on queuing reports;

⁴Shared thru-left lane

4 CONCLUSIONS AND RECOMMENDATIONS

The proposed CR-510 from CR-512 to 58th Avenue project will provide additional capacity to meet the expected future traffic needs, resulting from projected population and employment growth within the project area. The need for improvements along CR-510 is based on the anticipated substandard traffic operations along the project corridor.

4.1 Alternatives Summary

4.1.1 Roadway Segments

The analysis results indicate that under the No Build Scenario, Segment 4 of the project corridor will fall below the LOS threshold in opening year (2020). Further analysis shows that Segments 3 and Segment 5 also fall below the LOS in the interim year (2030) and that Segment 2 falls below the LOS threshold in the design year (2040); under build conditions all segments operate at or above the LOS threshold. For comparison of alternatives, **Table 4-1** provides a summary of the expected LOS in each segment of the corridor under the No Build and Build scenarios based on AADT and DDHV values.

Table 4-1 Future Segment LOS (AADT)

SEGMENTS	Limits		NO BUILD			BUILD		
	From	To	2020	2030	2040	2020	2030	2040
1	CR 512	Mako Way	C	C	C	C	C	C
2	Mako Way	800' West Of Treasure Coast Elementary	C	C	F	C	C	C
3	800' West Of Treasure Coast Elementary	500' East Of Treasure Coast Elementary	D	F	F	C	D	D
4	500' East Of Treasure Coast Elementary	66 Avenue	F	F	F	C	C	C
5	66 Avenue	58 Avenue	D	F	F	C	D	D

Table 4-2 Future Segment LOS (DDHV)

SEGMENTS	Limits		NO BUILD			BUILD		
	From	To	2020	2030	2040	2020	2030	2040
1	CR 512	Mako Way	C	C	C	C	C	C
2	Mako Way	800' West Of Treasure Coast Elementary	C	C	F	C	C	C
3	800' West Of Treasure Coast Elementary	500' East Of Treasure Coast Elementary	D	F	F	C	D	D
4	500' East Of Treasure Coast Elementary	66 Avenue	F	F	F	C	C	C
5	66 Avenue	58 Avenue	D	F	F	C	D	D

4.1.2 Intersections

In general terms, the intersection LOS results presented in **Tables 4-3** and **4-4** reveal that several intersections and a substantial number of the approaches are anticipated to operate below the adopted level of service by the design year (2040) under the No Build scenario. For the Build scenario, low volume, minor approaches at intersections with CR-512, Mako Way and 58th Street are projected to operate at LOS E . However, all intersections operate within the adopted level of service. In addition to the additional capacity with the widening of CR 510, traffic signal phasing and timing modifications were implemented where appropriate. **Tables 4-5** and **4-6** summarize the intersection LOS for the Build scenarios.

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Table 4-3 No Build Intersection LOS (AM PK)

No.	Intersection	MVT	2020				2030				2040			
			Approach		Intersection		Approach		Intersection		Approach		Intersection	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	CR-512	EB	23.6	C	31.6	C	29.0	C	33.8	C	42.1	D	39.3	D
		WB	26.3	C			27.2	C			27.9	C		
		NB	50.0	D			49.6	D			49.8	D		
		SB	61.6	E			62.9	E			64.6	E		
2	Mako Way ¹	EB	46.5	D	44.8	D	47.7	D	62.9	E	48.4	D	104.8	F
		NB	71.4	E			90.2	F			118.6	F		
		SB	28.9	C			48.3	D			100.5	F		
3	Hammerhead Way ¹	EB	70.7	E	27.0	C	79.8	E	32.0	C	88.5	F	38.0	D
		NB	12.5	B			14.7	B			24.6	C		
		SB	22.8	C			29.0	C			32.5	C		
4	87th Street	EB	36.7	D	21.2	C	53.0	D	27.9	C	108.0	F	50.1	D
		NB	8.8	A			9.8	A			12.4	B		
		SB	18.0	B			21.9	C			35.9	D		
5	Treasure Coast Elementary	EB	15.0	B	15.5	B	16.1	B	18.6	B	24.6	C	30.4	C
		WB	6.2	A			7.3	A			12.4	B		
		NB	28.9	C			42.2	D			77.8	E		
6	Powerline Road ²	SB	37.9	E	4.0	A	207.0	F	22.9	C	1062.2	F	128.6	F
		EB	0.3	A			0.4	A			0.4	A		
		WB	0.0	A			0.0	A			0.0	A		
7	66th Avenue	EB	24.9	C	27.6	C	29.0	C	34.0	C	40.6	D	47.0	D
		WB	17.8	B			19.8	B			25.8	C		
		NB	29.8	C			37.4	D			52.3	D		
		SB	32.2	C			43.5	D			65.1	E		
8	58th Avenue	EB	19.7	B	21.9	C	30.2	C	35.2	D	92.7	F	100.0	F
		WB	10.6	B			18.0	B			54.6	D		
		NB	45.0	D			73.7	E			189.9	F		
		SB	60.3	E			74.3	E			84.7	F		
9	82nd Avenue	EB	8.8	A	13.1	B	13.2	B	15.9	B	37.5	D	30.5	C
		WB	5.7	A			6.9	A			11.2	B		
		NB	42.7	D			43.0	D			43.6	D		
		SB	35.3	D			35.3	D			35.0	C		

¹Due to clustered intersection HCS 2000 LOS/Delay reported

²Unsignalized; **XX LOS does not meet adopted standard LOS D**

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Table 4-4 No Build Intersection LOS (PM PK)

No.	Intersection	MVMT	2020				2030				2040			
			Approach		Intersection		Approach		Intersection		Approach		Intersection	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	CR-512	EB	31.1	C	40.4	D	32.5	C	41.1	D	33.4	C	41.8	D
		WB	35.8	D			36.3	D			36.9	D		
		NB	52.1	D			51.9	D			52.0	D		
		SB	72.7	E			74.6	E			76.3	E		
2	Mako Way	EB	64.6	E	50.0	D	67.6	E	49.3	D	94.8	F	55.9	E
		NB	84.5	F			82.4	F			92.2	F		
		SB	9.5	A			9.1	A			8.2	A		
3	Hammerhead Way	EB	32.8	C	39.3	D	32.0	C	43.4	D	30.4	C	64.5	E
		NB	44.3	D			50.7	D			81.2	F		
		SB	34.4	C			36.5	D			50.7	D		
4	87th Street	EB	27.5	C	12.3	B	29.3	C	13.0	B	34.3	C	15.1	B
		NB	6.5	A			7.0	A			8.5	A		
		SB	14.0	B			14.7	B			17.0	B		
5	Treasure Coast Elementary	EB	7.9	A	7.8	A	9.6	A	9.2	A	11.4	B	10.4	B
		WB	6.0	A			7.4	A			8.5	A		
		NB	29.2	C			28.7	C			28.5	C		
6	Powerline Road*	SB	32.8	D	2.2	A	80.8	F	4.9	A	278.2	F	21.9	C
		EB	1.0	A			0.9	A			0.0	A		
		WB	0.0	A			0.0	A			0.9	A		
7	66th Avenue	EB	25.1	C	39.2	D	30.5	C	53.4	D	34.2	C	77.8	E
		WB	38.9	D			59.4	E			97.1	F		
		NB	37.7	D			49.0	D			74.3	E		
		SB	53.1	D			68.0	E			75.3	E		
8	58th Avenue	EB	20.0	C	18.4	B	21.7	C	20.9	C	25.4	C	25.5	C
		WB	12.6	B			14.2	B			17.5	B		
		NB	29.0	C			33.9	C			42.6	D		
		SB	38.8	D			44.2	D			55.7	E		
9	82nd Avenue	EB	7.0	A	13.9	B	9.2	A	18.3	B	14.8	B	37.6	D
		WB	9.6	A			15.9	B			46.8	D		
		NB	43.6	D			44.0	D			48.1	D		
		SB	32.5	C			32.3	C			31.9	C		

¹Due to clustered intersection HCS 2000 LOS/Delay reported

²Unsignalized; **XX LOS does not meet adopted standard LOS D**

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Table 4-5 Build Intersection LOS (AM PK)

No.	Intersection	MVT	2020				2030				2040			
			Approach		Intersection		Approach		Intersection		Approach		Intersection	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	CR-512	EB	21.9	C	30.0	C	25.2	C	32.0	C	29.7	C	34.6	C
		WB	26.7	C			28.6	C			30.3	C		
		NB	45.7	D			45.6	D			46.1	D		
		SB	60.4	E			60.5	E			62.1	E		
2	Mako Way ¹	EB	51.7	D	18.1	A	53.2	D	21.0	C	53.7	D	23.3	C
		NB	31.3	C			35.9	D			39.7	D		
		SB	8.9	A			10.6	B			12.2	B		
3	Hammerhead Way ¹	EB	52.5	D	27.1	C	55.2	E	24.9	C	57.2	E	26.1	C
		NB	11.1	B			13.8	B			19.8	B		
		SB	29.6	C			22.9	C			21.3	C		
4	87th Street	EB	22.5	C	16.0	B	26.8	C	18.5	B	34.7	C	23.4	C
		NB	8.1	A			9.2	A			10.6	B		
		SB	16.5	B			18.5	B			23.3	C		
5	Treasure Coast Elementary	EB	12.6	B	15.0	B	12.6	B	16.0	B	14.8	B	17.9	B
		WB	5.2	A			5.2	A			6.8	A		
		NB	34.9	C			42.3	D			48.0	D		
6	Powerline Road	EB	6.4	A	7.3	A	7.1	A	8.3	A	9.0	A	10.8	B
		WB	5.4	A			5.7	A			6.8	A		
		SB	18.4	B			22.0	C			29.5	C		
7	66th Avenue	EB	25.9	C	29.9	C	27.6	C	33.3	C	34.7	C	39.0	D
		WB	21.7	C			22.2	C			25.1	C		
		NB	35.6	D			42.1	D			51.5	D		
		SB	32.7	C			39.2	D			46.7	D		
8	58th Avenue	EB	17.9	B	17.7	B	20.5	C	21.3	D	29.7	C	30.1	C
		WB	9.0	A			10.7	B			17.0	B		
		NB	30.3	C			40.3	D			53.0	D		
		SB	47.0	D			54.5	D			68.3	E		
9	82nd Avenue	EB	11.3	B	13.6	B	12.8	B	14.9	B	14.8	B	17.4	B
		WB	15.2	B			15.9	B			16.7	B		
		NB	22.1	C			25.0	C			32.3	C		
		SB	14.8	B			16.6	B			21.9	C		

¹Based on HCM2000 Synchro Reports (HCM2010 does not support 1 controller for 2 intersections); **XX LOS does not meet adopted standard LOS D**

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Table 4-6 Build Intersection LOS (PM PK)

No.	Intersection	MVT	2020				2030				2040			
			Approach		Intersection		Approach		Intersection		Approach		Intersection	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	CR-512	EB	30.6	C	40.4	D	32.8	C	41.5	D	34.4	C	42.5	D
		WB	37.1	D			38.3	D			39.2	D		
		NB	51.0	D			50.0	D			49.7	D		
		SB	75.6	E			77.8	E			79.8	E		
2	Mako Way	EB	53.1	D	27.6	C	54.7	D	30.4	C	56.6	E	32.4	C
		NB	41.5	D			44.9	D			48.3	D		
		SB	9.6	A			10.0	A			10.7	B		
3	Hammerhead Way	EB	51.3	D	18.4	B	52.6	D	18.7	B	54.5	D	19.0	B
		NB	11.3	B			11.8	B			12.4	B		
		SB	20.9	C			20.9	C			20.1	C		
4	87th Street	EB	24.6	C	11.4	B	26.6	C	12.3	B	30.4	C	14.5	B
		NB	5.9	A			6.4	A			7.7	A		
		SB	13.4	B			14.7	B			17.3	B		
5	Treasure Coast Elementary	EB	9.0	A	7.2	A	10.0	A	7.9	A	11.3	B	8.9	A
		WB	4.9	A			5.5	A			6.3	A		
		NB	25.3	C			25.5	C			25.8	C		
6	Powerline Road	EB	4.7	A	6.4	A	4.3	A	6.6	A	4.5	A	7.6	A
		WB	5.8	A			5.7	A			6.3	A		
		SB	21.3	C			28.2	C			38.1	D		
7	66th Avenue	EB	22.3	C	30.1	C	23.8	C	33.8	C	26.1	C	39.0	D
		WB	25.5	C			27.9	C			33.8	C		
		NB	33.4	C			38.5	D			45.2	D		
		SB	38.8	D			46.1	D			54.3	D		
8	58th Avenue	EB	18.4	B	16.4	B	19.2	B	18.2	B	20.5	C	21.4	C
		WB	10.6	B			11.3	B			12.6	B		
		NB	27.1	C			33.5	C			45.3	D		
		SB	35.6	D			42.0	D			55.2	E		
9	82nd Avenue	EB	9.0	A	15.3	B	9.1	A	17.2	B	9.8	A	21.1	C
		WB	16.1	B			17.5	B			22.4	C		
		NB	26.5	C			33.3	C			41.5	D		
		SB	18.6	B			23.6	C			30.6	C		

¹Based on HCM2000 Synchro Reports (HCM2010 does not support 1 controller for 2 intersections); **XX LOS does not meet adopted standard LOS D**

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4.2 Turn Lane Storage Length Requirements

Turn lane storage length requirements were developed for the Build Alternative based on the 95th percentile queue lengths. A storage length for each study intersection was recommended; the lengths do not include the taper or deceleration distance (refer to FDOT Design Standard Index #301 for taper and deceleration distances). Specifically, the analysis was done for vehicle thru, exclusive left and exclusive right turn lanes based on the 95th percentile queues in 2020, 2030 and 2040 for both AM and PM peak hours. The queues were evaluated for exclusive left and exclusive right turn movements. The queues for thru movements were also assessed to determine if queues will impede entrance to the exclusive turn lanes. Thus, requiring additional storage in order to provide sufficient length to prevent blockage. From this analysis, the maximum storage length for each movement was derived. **Table 4-7** summarizes the recommended storage length for each location.

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Table 4-7 Recommended Turn Bay Storage Length

Number	Intersection	Movement	Recommended Storage length (ft) ¹
1	CR-512	EBL	375
		EBR	350
		WBL	325
		NBL	450
2	Mako Way ³	NBL	275
		SBR	350
3	Hammerhead Way ³	NBL	200
		SBR	225
4	87th Street	NBL	200
		SBR	425
5	Treasure Coast Elementary School	EBR	400
		WBL	250
		NBR	450
6	Powerline Rd	EBL	325
		SBL	225
7	66 th Ave	EBL	475
		EBR	475
		WBL	175
		NBL	375
		SBL	375
8	58th Ave	EBL	25
		WBL	350
		NBL	325
9	82nd Ave	EBL	375
		WBL	25
		NBL	175
		SBL	200

¹based on 25ft/veh;

²storage length does not include deceleration + taper lengths;

³based on synchro queuing reports

Thru queue not used due to low demand for turn movement

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4.3 Recommendations

Based on the evaluation of the projected traffic volumes for the CR 510 PD&E Study, the proposed widening to four lanes will provide the required capacity for future traffic needs and is therefore recommended. Future projections also indicate the potential need to signalize the proposed intersection at 82nd Avenue; the project is included in the latest Indian River County MPO Transportation Improvement Program. It should be noted that the new signal would meet the FDOT’s access management spacing criteria as per Access Management Rule 14-97. The queue length analysis revealed that at 66th Street the northbound left turn may benefit from dual left turn lanes and that this recommendation should be further investigated during concept design of Build scenario. A list of recommended improvements is summarized in **Table 4-8**.

In closing, even though the Build Alternative performs better than the other competing option, other considerations need to be taken into account and evaluated as part of the overall PD&E effort (e.g. potential negative environmental, social and economic impacts, right-of-way acquisitions, construction costs, etc.) that will largely determine which Alternative and improvements are ultimately recommended for implementation. The preparation of this DTTM exclusively deals with the traffic impact of the Alternatives and as such is only a component of the final preferred Alternative determination.

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Table 4-8
Build Conditions: Recommended Geometric and Signal Phasing Improvements

Intersection	Geometry	Signal Timing	
		Cycle Length	Phasing
CR-512	Additional Exclusive EBR Lane	--	Optimized
Mako Way & Hammerhead Way	--	Maintained	One controller for two Int. maintained Adjustment of timing splits
87 th Street	--	--	Optimized
Treasure Coast Elementary School	--	AM: 125 sec PM: 70 sec	Optimized
Powerline Rd	Signalized - Actd-Unchr	100 sec	EBT: Phase 2 (LT Permissive) WBT: Phase 6 (LT Permissive) SBLR: Phase 8
66 th Ave	Additional Exclusive NBL lane	AM: 150 sec PM: 150 sec	Eliminate SBL Permissive Phase due to opposing dual NBL lanes
58 th Ave	--	--	Optimized
82 nd Avenue	New intersection -Signalized - Semi Act-Unchr	100 sec	EBL: Phases 5/2 (Protected/Permissive) EBT: Phase 2 WBT: Phase 6 (LT Permissive) NBT: Phase 4 (LT Permissive) SBL: Phases 3/8 (Protected/Permissive) SBT Phase 8

No Build: optimization of timing splits. All cycle lengths and phasing maintained. NW 82 Ave int. signal timing cycle and phasing same as Build scenario