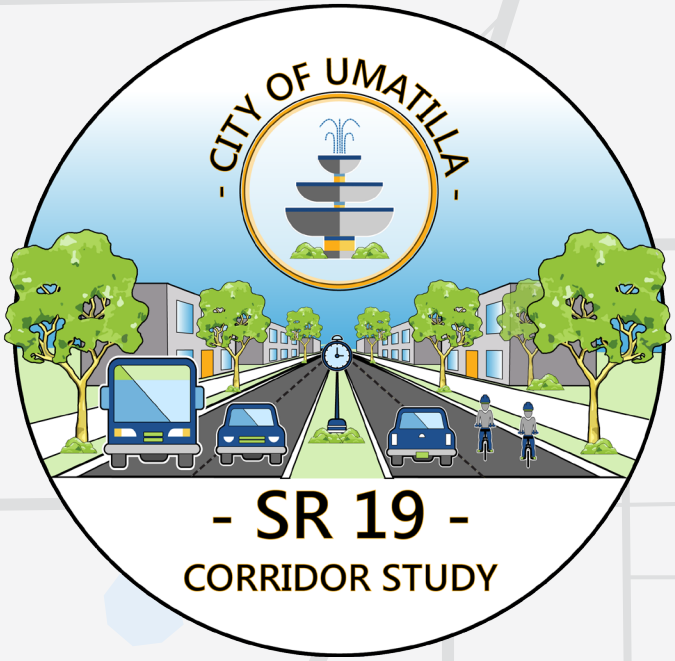

Florida Department of Transportation District Five

Central Avenue (SR 19) Corridor Planning

Future Conditions Report

April 2017

Financial No: 439756-1

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Appendices

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Chapter One: Introduction

1.1 Report Purpose

In September 2016, the Florida Department of Transportation (FDOT) engaged the services of VHB to perform a Corridor Planning Study on State Road (SR) 19/Central Avenue from County Road (CR) 450A to Bulldog Way. As part of this effort, FDOT also requested VHB examine a secondary corridor, Umatilla Boulevard, from its southern terminus (intersection of SR 19 and Ocala Street) to its northern terminus (intersection of SR 19, just south of Lake Street). Collectively, these two streets constitute the efforts of the "SR 19 Corridor Planning Study".

A Corridor Planning Study is a high-level evaluation of safety, environmental and geometric concerns along a transportation corridor where needs, possible improvement options, and planning level cost estimates are identified. The purpose of the study is to develop a multi-modal, design-driven vision, rather than a model-driven vision, to determine how best to meet the needs of the current and future end users of the corridor, and to establish a long-term plan to guide evolution of the corridor. Multi-modal corridor projects are seen as essential to network efficiency, safety, and livability within the context of future transportation needs.

This *Future Conditions Report* serves two main purposes.

First, it summarizes key components of the *Existing Conditions Report*, which includes planned roadway and multi-modal improvements, existing (year 2016) traffic conditions, and Levels of Service (LOS) along the corridor. The existing traffic conditions provides a baseline for comparison with projected future conditions. More detailed information on the existing conditions of the corridor can be found in the *Existing Conditions Report*.

Second, it presents the analysis of future traffic conditions in both the short-term (year 2021) and long-term (year 2040). Using this data, this report identifies any deficiencies or needs for the corridor in both the short-term and long-term conditions. In turn, these deficiencies and needs will be used to develop potential improvement alternatives.

1.2 Project Background and Purpose

This project has been requested by the City of Umatilla and the Lake-Sumter Metropolitan Planning Organization (MPO) to coordinate the development of a future vision for the SR 19 corridor, which will assess the feasibility of improving multimodal safety and mobility using a "complete streets" approach. This study will involve a community-based evaluation to determine how best to meet the needs of current and future users, and to establish a long-term plan to guide evolution of the corridor, which appropriately correlates the balance between land use and transportation planning. This project will be coordinated with local and regional agency partners, such as the Lake-Sumter MPO, the City of Umatilla, and LakeXpress, in order to develop potential solutions which establish a more multimodal urban environment utilizing a context-sensitive approach.

This corridor study will also integrate the Healthy Community Design approach into the corridor study process. Healthy Community Design (HCD) is a planning approach which integrates public health, transportation, and community planning to recognize how the built environment affects the physical, social, and mental health of communities. Transportation is an important part of the built environment and significantly influences physical activity and well-being, safety, and the ability of community members to access destinations essential to a healthy lifestyle. By integrating this approach into the standard corridor study, the Project Team can identify physical improvements and policies, resulting in better health outcomes for the communities served by state roads.

Figure 1 illustrates the Study Area.

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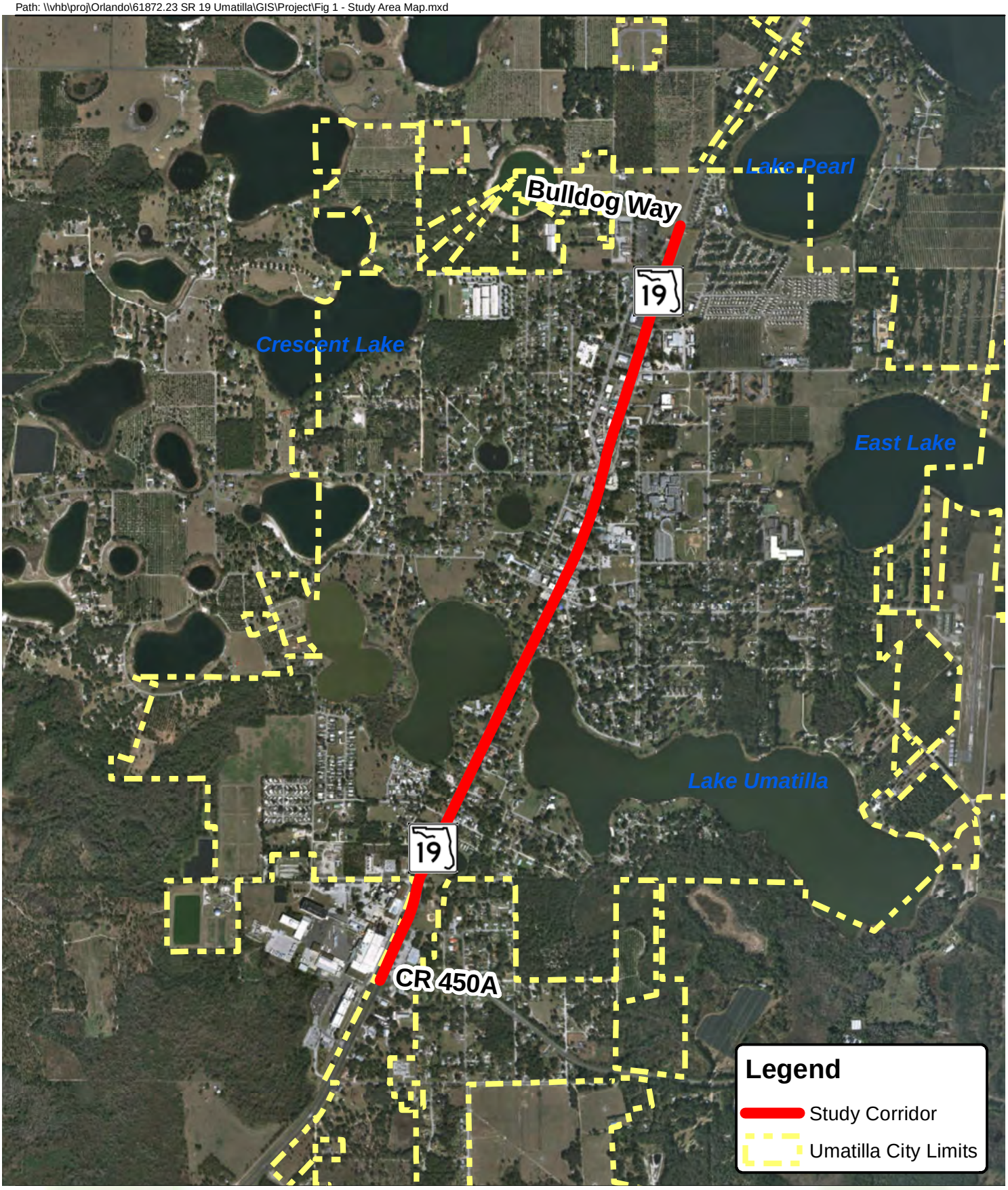

Figure 1
Study Area Map

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Chapter Two: Summary of Existing Conditions

2.1 Introduction

Before presenting the Future Conditions Analysis, it is important to summarize the existing conditions of the corridor. This chapter highlights key sections of the *Existing Conditions Report.* This information serves as a baseline for comparison against short-term (year 2021) and long-term (year 2040) future conditions. For more information, please refer to the *Existing Conditions Report*.

2.2 Roadway and Intersection Characteristics

The SR 19 Corridor Study consists of a 2.0-mile section of SR 19 (Central Avenue) beginning at County Road 450A to the south and ending at Bulldog Way to the north. This corridor study also includes the 0.5-mile-long Umatilla Boulevard, from its southern terminus (intersection of SR 19 and Ocala Street) to its northern terminus (intersection of SR 19, just south of Lake Street).

The SR 19 Study Corridor is separated into three (3) section types:

- SR 19 from CR 450A to Golden Gem Drive is a four (4) lane divided arterial with a median and rural cross-section (no curb and gutter).
- From north of Golden Gem Drive to Bulldog Lane/W. Ocala Street, SR 19 is a four (4) lane arterial with a curbed median with well-maintained landscaping and a closed drainage system with curb and gutter.
- North of W. Ocala Street, SR 19 is a three (3) lane arterial with a bi-directional center turn lane. In this segment, drainage is typically a closed system with grate/drainage pan and no curb and gutter.

The posted speed limit is 45 miles-per-hour (mph) along the southern portion of SR 19. South of Golden Gem Drive, the posted speed limit is reduced to 40 mph for a small section, until it reduces again to 35 mph south of Guerrant Street/Cassady Street.

The majority of SR 19 and Umatilla Boulevard has sidewalks present on both sides of the road with occasional gaps along the corridor. Most side streets do not have any type of sidewalk

connection to SR 19. There are no designated bicycle lanes along SR 19 or Umatilla Boulevard, except a 150-foot bicycle lane on SR 19 northbound south of the intersection of SR 19 and E Collins Street (CR 450), and a 150-foot bicycle lane on SR 19 northbound starting south of the intersection of SR 19 and Palmetto Street.

Figure 2 depicts the existing intersection geometry for the Study Area Intersections.

2.3 Existing Volumes

Weekday daily and hourly traffic volumes along the Study Area roadway segments and intersections were collected from the FDOT Florida Transportation Information (FTI) database. These counts were also supplemented by 24-hour tube counts and 7-hour (7:00 – 9:00 AM, 1:00 – 4:00 PM, and 4:00 – 6:00 PM) manual turning movement counts conducted along the Study Area roadway segments and intersections in September and November 2016. Figure 3 presents the existing turning movement volumes.

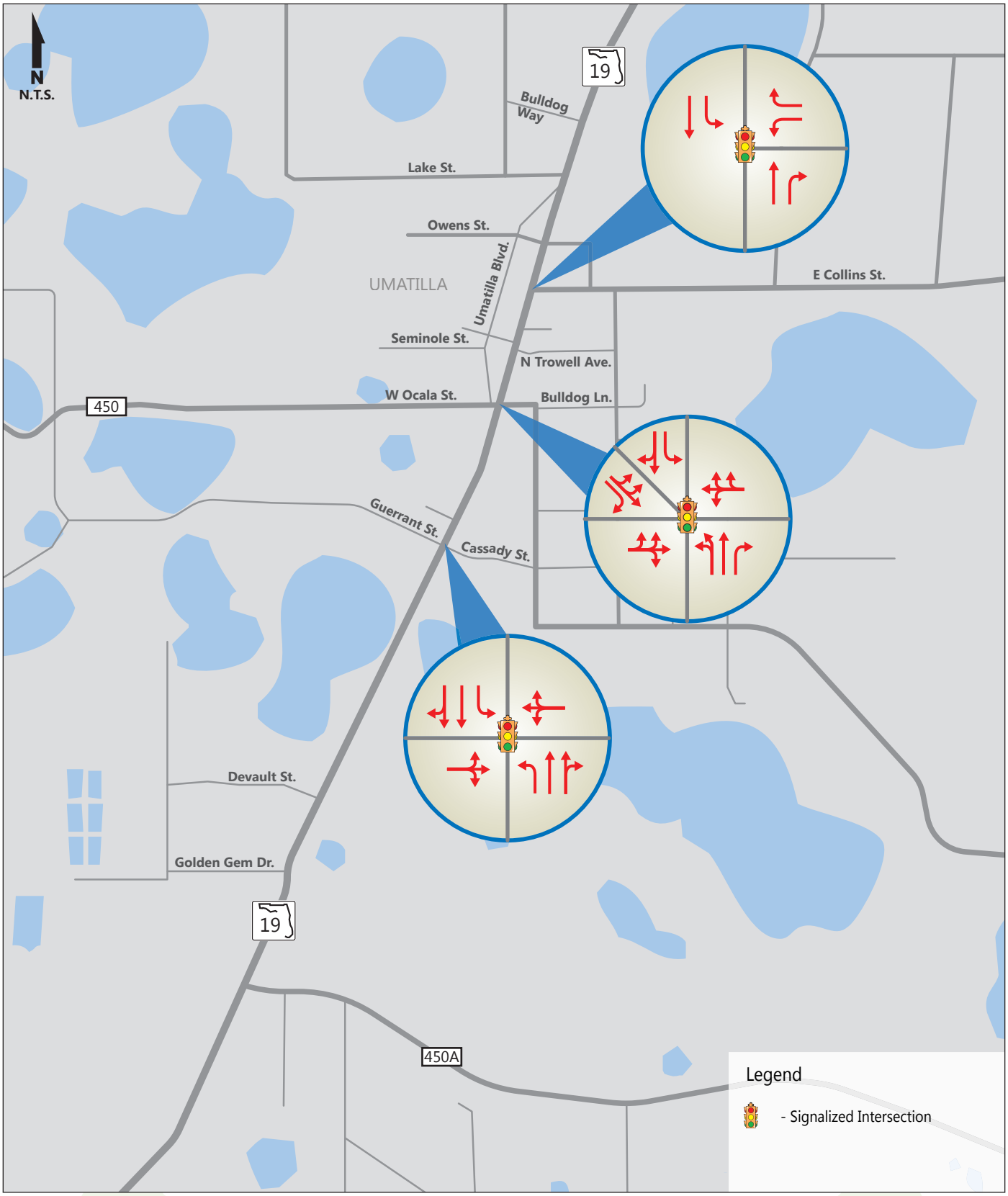

Figure 2
Existing Intersection Geometry

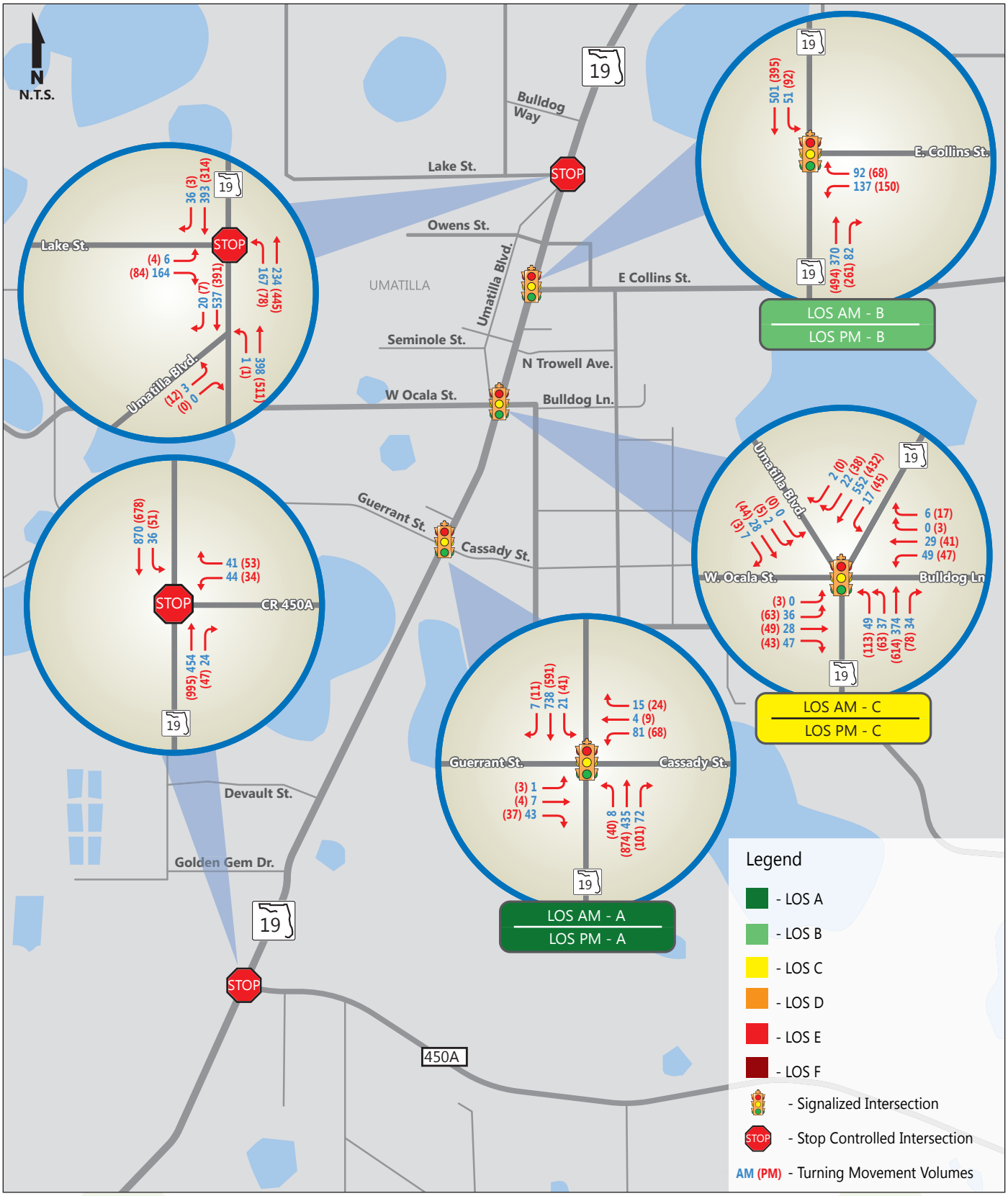

Figure 3
Existing Turning Movement Volumes and Level of Service

2.4 Existing Operational Analysis

An analysis of operations along the corridor was conducted using existing 2016 traffic volumes. The following subsections provide a summary of the key findings for each mode. The complete, detailed analysis is included in the *Existing Conditions Report*.

2.4.1 Existing Roadway Operations

Policy VII-1.1.2 of the Lake County Comprehensive Plan Transportation Element adopts FDOT's LOS Standard of D on state roads within the urban area boundary, which includes SR 19.

All the roadway segments within the Study Area currently operate within acceptable LOS standards (LOS D or better). Table 1 in Appendix A details the individual roadway segments, their volume, and the existing roadway segment LOS analysis.

2.4.2 Existing Intersection Operations

An analysis of both signalized and unsignalized intersections was performed.

The overall intersection summary LOS analysis for the signalized study intersections is shown in Figure 3 and included in Table 2 in Appendix A. All the signalized study intersections operate at an overall intersection LOS C or better; however, many of the side street movements operate at LOS D or E. These movements experience long delays and/or queues due to the long cycle lengths along the SR 19 corridor. Although these movements operate at LOS D or E, the volume-to-capacity (v/c) ratios are all below 1.0. The Synchro reports are included in Appendix B.

Unsignalized study intersections were also analyzed with all movements currently operating at LOS D or better. The summary table is included as Table 3 in Appendix A. The Synchro reports are included in Appendix B.

2.4.3 Existing Bicycle Operations

In addition to the LOS for the general motorists, the LOS for bicyclists was also evaluated. The LOS for the bicycle mode is based on the number of vehicles traveling on the roadway and the coverage of available bicycle lanes or paved shoulders provided along the corridor. As depicted in Table 4 in Appendix A, bicyclists along SR 19 are experiencing LOS E on most of the segments; however, some of the segments, depending on the time period being considered, are operating at LOS D. Along Umatilla Boulevard, bicyclists experience LOS C during all time periods.

2.4.4 Existing Pedestrian Operations

The LOS for pedestrians was evaluated in addition to the vehicle and bicycle modes. The pedestrian LOS is based on the number of vehicles traveling on the roadway and the coverage

of available sidewalks provided along the corridor. As depicted in Table 5 in Appendix A, pedestrians traveling along the corridor are experiencing LOS D or better between CR 450A and E Collins Street (CR 450). Pedestrians are experiencing poor LOS (LOS E or LOS F) south of CR 450A and north of E Collins Street (CR 450) where the sidewalk coverage is sparse. Pedestrians are experiencing LOS D or better along Umatilla Boulevard depending on the time period being considered.

2.4.5 Existing Transit Operations

Transit LOS was also examined. Presently, Route 4 provides service along the corridor every two hours. Based on the 2012 FDOT Quality/Level of Service Handbook, this equates to LOS F.

2.5 Safety and Crash Analysis

A multi-modal safety analysis was completed for the SR 19 Study Area roadways and intersections to determine if the traffic demands combined with geometric conditions pose potential safety concerns. Crash data from the Signal Four Analytics database for the previous five years (October 01, 2012 to September 30, 2016) was analyzed to identify crash patterns along the corridor. Tables 6 through 9 in Appendix A summarize the results of this analysis.

Two of the five Study Area intersections (SR 19 at Guerrant Street/ Cassady Street; and SR 19 at E Collins Street (CR 450) experience an average crash rate higher than the average crash rate for similar facilities, according to the statewide average. This indicates the need for further study and evaluation for safety improvements.

3

Chapter Three: Future Conditions

3.1 Introduction

An essential component of this study involves forecasting travel demands and identifying land use changes. This analysis was performed for short-term (year 2021) and long-term (year 2040) conditions in order to anticipate future needs and recommend corresponding transportation infrastructure investments.

The 2021 short-term analysis was conducted in order to provide a 5-year horizon to evaluate the effect of transportation system improvements/enhancements, which do not require substantial permitting, right of way acquisitions, or lengthy environmental impact review. This scenario includes background growth which will occur by the year 2021 and planned transportation improvements identified in the Lake-Sumter MPO Transportation Improvement Plan (TIP). This scenario also evaluates alternative signal timings (optimized timings) which may better serve future traffic volumes, as it reflects change in travel patterns.

The 2040 long-term analysis was conducted in order to provide a longer-term horizon to evaluate the effect of transportation improvements/recommendations, which will likely take more time to design, permit, and fund. The year 2040 is consistent with the Central Florida Regional Planning Model future year. This scenario includes background growth probable to occur by the year 2040, and planned transportation improvements identified in the Lake-Sumter MPO Long Range Transportation Plan (LRTP).

3.2 Items Considered in Analysis

As part of the future conditions analysis, future land use, planned improvements, and growth projections were considered as part of the short-term and long-term conditions assessment. This section summarizes these three components.

3.2.1 Future Land Use

As noted previously, existing and planned future land use patterns along the SR 19 corridor are important factors to consider during the investigation of multi-modal transportation

system improvements. As the population increases and the land uses evolve along the corridor, the demand for additional access and transportation infrastructure grows.

The most prevalent existing land uses within the Study Area are public/institutional and residential. Public/Institutional uses include Federal, State or City-owned land, as well as schools, hospitals, and places of worship.

The Future Land Uses (FLUs) adopted by the City of Umatilla and Lake County within the Study Area are shown in Figure 4. Residential FLUs are the primary future land use type within one-half mile of the SR 19 corridor, accounting for 42% of the land. The majority of the residential land uses are low density.

Mixed Use/Urban is the second most common FLU category; however, it is important to note the anticipated use is primarily residential. The Lake County Comprehensive Plan describes the "Urban" FLU categories are intended to provide "for a range of residential uses" and allow "for the conversion of existing residential units to residential professional office uses". The Plan continues to describe the land "should be located on or in proximity to collector or arterial roadways to minimize traffic on local streets and provide convenient access to transit facilities" and so "this land use can serve effectively as a transitional use between more intense urban development and Low Density Residential uses." The two "Urban" FLUs account for almost 27% of the total land in the Study Area and the City's Downtown Mixed Use District accounts for 1.7% and is located along SR 19, generally between Cassady Street and E Collins Street (CR 450).

Within the general area surrounding the corridor, typically the further away from the SR 19 corridor a property is located, the less intense the designated FLU will be.

Table 1 summarizes the future land uses within one-half mile of the SR 19 corridor within the Study Area.

Table 1: Future Land Use – City and County Specific

Jurisdiction	Future Land Use	Percent (1/2-Mile Buffer)
City of Umatilla	Agriculture	0.4%
	Commercial General	8.8%
	Commercial Tourist	0.8%
	Commercial Wholesale	0.3%
	Downtown Mixed Use	1.7%
	Industrial	3.7%
	Institutional	5.3%
	Lake	3.8%
	Recreation	2.2%
	Mobile Home HD	2.7%
	Residential Multi-Family Low Rise	5.9%
	Residential Single Family Low Density	8.4%
	Residential Single Family Medium Density	25.0%
	Transportation	0.5%
	Utility	1.0%
Lake County	Industrial	2.4%
	Rural Transition	0.3%
	Urban Low	14.2%
	Urban Medium	12.6%

Source: City of Umatilla and Lake County GIS data

Path: \\vhb\proj\Orlando\61872.23 SR 19 Umatilla\GIS\Project\Fig 3 - FLU Map.mxd

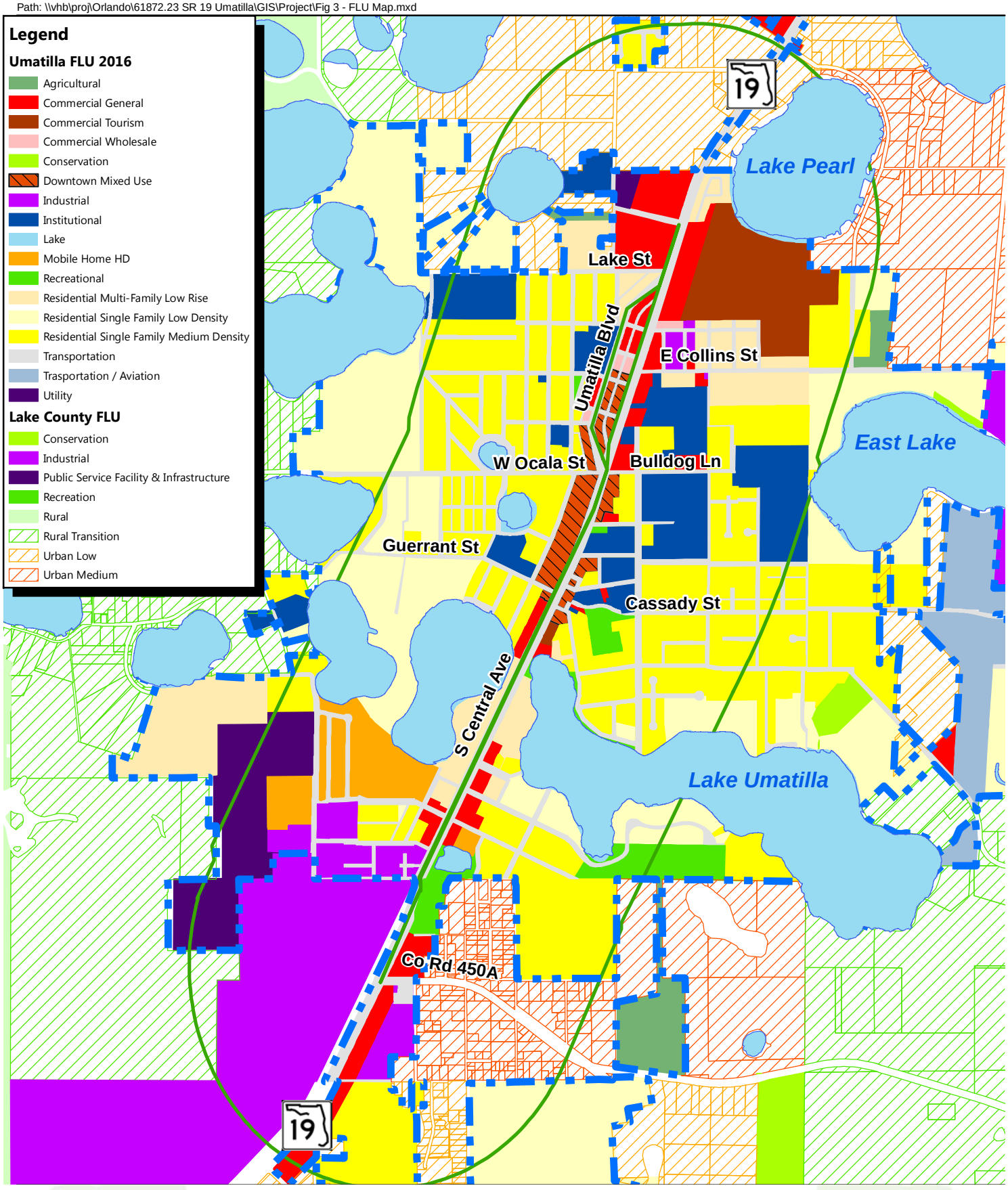

Figure 4
Future Land Use Map

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Source: 2010 US Census

3.2.2 Planned Improvements

Planned improvements identified by various transportation agencies were also considered as part of the future conditions analysis. These improvements are broken down by mode.

One important item to note is the improvements contained in the FDOT Resurfacing, Restoration, and Rehabilitation (3R) scope are preliminary in nature and subject to change because the 3R scope will be finalized after this corridor study is completed. The 3R improvements have been included as background improvements in the baseline 2021 and 2040 future conditions evaluation presented in this chapter.

Roadway Improvements

The Lake-Sumter MPO 2040 LRTP identifies SR 19 (from CR 450A to Bulldog Way) as a constrained corridor with a maximum of 4-lanes.

Preliminarily, the FDOT 3R scope identifies resurfacing along SR 19 from Golden Gem Drive to 75 feet south of Palmetto Street, but no operational/geometric improvements were identified.

Bicycle and Pedestrian Improvements

The Lake County Trails Master Plan identifies a proposed trail running through the Study Area: the North Lake Trail-Phase 2. This trail is expected to begin north of Ferran Park in Eustis and terminate at Bulldog Way in Umatilla. While the plan indicates there is a desire to place the trail on the east side of SR 19, no planning has been completed to determine a final alignment for this trail, and no funding has been designated for design or construction. Conversations with Mr. Gallus Quigley, Recreation Coordinator for Trails in Lake County, indicated the extents and final location of the trail are flexible and can be modified to ensure future construction projects can complete portions of the planned trail.

Preliminarily, the FDOT 3R scope has identified bicycle and pedestrian improvements from Golden Gem Drive to 75 feet south of Palmetto Street. The bicycle improvements include new bike facilities throughout the length of the project with the introduction of buffered bike lanes, sharrows, and 4-foot bike lanes. Pedestrian improvements primarily include rebuilding curb ramps not satisfying Americans with Disabilities Act (ADA) code, and minor improvements to widen or construct new sidewalk where existing facilities are too narrow.

Transit Improvements

The LakeXpress Transit Development Plan (TDP) identified one improvement to the route running through the Study Area (Route 4):

- **Year 2020:** Increased frequency (2 hours to 1 hour)

Preliminarily, the FDOT 3R scope identified the construction of new landing pads for existing bus stops from Golden Gem Drive to 75 feet south of Palmetto Street.

3.2.3 Growth Projections and Assumptions

In order to determine an acceptable growth rate for the SR 19 Study Area, traffic projections from various available sources were considered. This included the latest year Central Florida Regional Planning Model, Version 6.1 (CFRPM 6.1), FDOT historical Average Annual Daily Traffic (AADT) growth trends, and Lake County population projections from the Bureau of Economic and Business Research (BEBR). Table 2 below presents the comparison of the resulting growth rates.

Table 2: Annual Growth Rate Comparison

Growth Method	2040 Growth Rate
Historic Trends Analysis	-0.80%
Model Growth Analysis	-0.17%
BEBR Growth Analysis (Lake County – Medium)	2.23%
Average Growth Rate	0.42%
Growth Rate Used in Study	**0.50%**

The historic vehicular volumes obtained from the two FDOT count stations used to compute the -0.80% growth rate are shown in Figure 5 and Figure 6.

Figure 5: FDOT Count Station Data on SR 19 from CR 450A to W Ocala St (CR 450)/Bulldog Ln

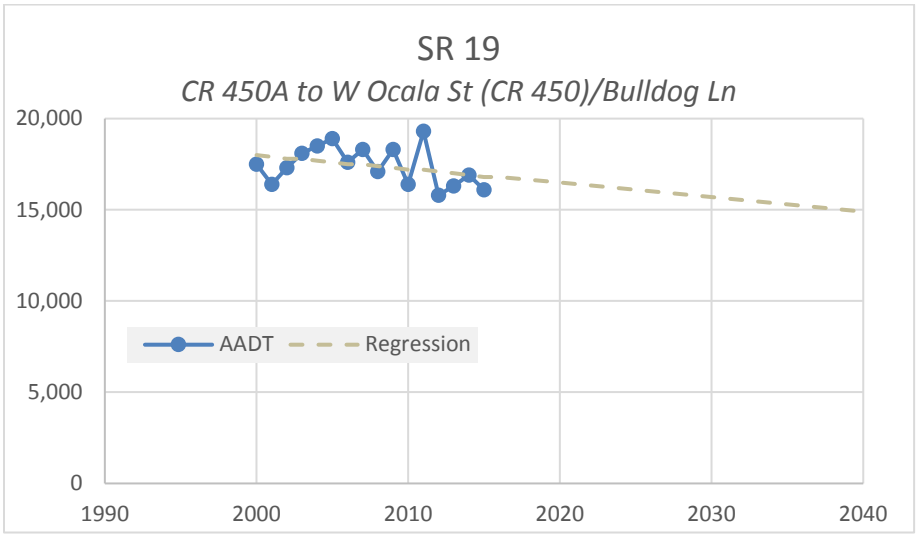
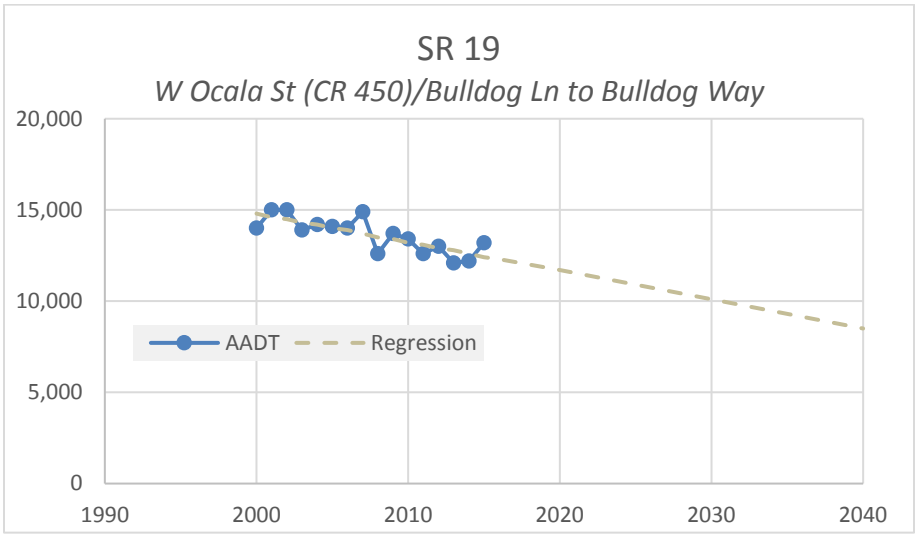


Figure 6: FDOT Count Station Data on SR 19 from W Ocala St (CR 450)/Bulldog Ln to Bulldog Way



The historic growth trends were not applied because of the negative value as illustrated in Table 2 and illustrated in the two previous figures. The model growth analysis also identified a negative growth rate between 2016 and 2040. The BEBR growth analysis projects the growth for Lake County to be 2.23% between 2015 and 2040. The average of these three growth projections was found to be 0.42%. This average was rounded up to 0.50% to provide a conservative estimate to develop the 2021 and 2040 future traffic volumes. There are no major proposed developments along the Study Area expected to impact the characteristics of the corridor; therefore, the background growth will be due to small scale developments and potential redevelopment along the corridor.

The 0.5% annual growth rate was presented to the Project Vision Team during a meeting on March 9, 2017, where it received concurrence.

3.3 Health Trends

Health trends offer a general indication of how health issues change over time. Data obtained from the Department of Health from 2002, 2007, 2010, and 2013 were used to extrapolate the trends for the short-term scenario (year 2021). Table 3 presents the 2021 estimates regarding health, specifically chronic diseases, facing Lake County and Florida. This projection does not consider any improvements, changing demographics, or other factors which may impact the trend; it simply projects the past trend will continue.

The chronic diseases described in this section were selected based on the 2016 Community Health Needs Assessment (CHNA) completed by Florida Waterman Hospital. Per the 2016 CHNA, heart diseases, cerebrovascular diseases (e.g., strokes), and diabetes are in the County's top causes of death. Hypertension was identified as the second most prevalent secondary diagnosis for both inpatient and out-patients for the hospital. The 2016 CHNA further identified asthma, diabetes, obesity, and heart disease in the list of "ten most pressing

and feasible issues" to focus on improving in collaboration with Lake County. These four health issues are listed in Table 3 below.

The percent of the adult population who have had heart or cerebrovascular diseases is not included in the data; however, data was available for certain risk factors for these diseases. Per the American Heart Association, American Stroke Association, and Center for Disease Control, diabetes, hypertension, and obesity are all risk factors for both heart disease and cerebrovascular diseases.

The trend data used to develop these estimates is presented in Figure 7 through Figure 11.

Table 3: Health Trends in Lake County – 2021 Estimates

Health Indicator (Percent of Adult Population Affected)	Florida (2013)	Lake County (2021 Estimates)	Florida (2013)	Florida (2021 Estimates)
Asthma	8.7%	9.4%	8.3%	9.9%
Diabetes	15.2%	19.7%	11.2%	14.1%
Hypertension	39.0%	44.4%	34.6%	41.9%
Obese	27.5%	30.4%	26.4%	30.6%
Overweight or Obese	65.5%	69.9%	62.8%	65.5%

Figure 7: Percent of Adult Population with Asthma

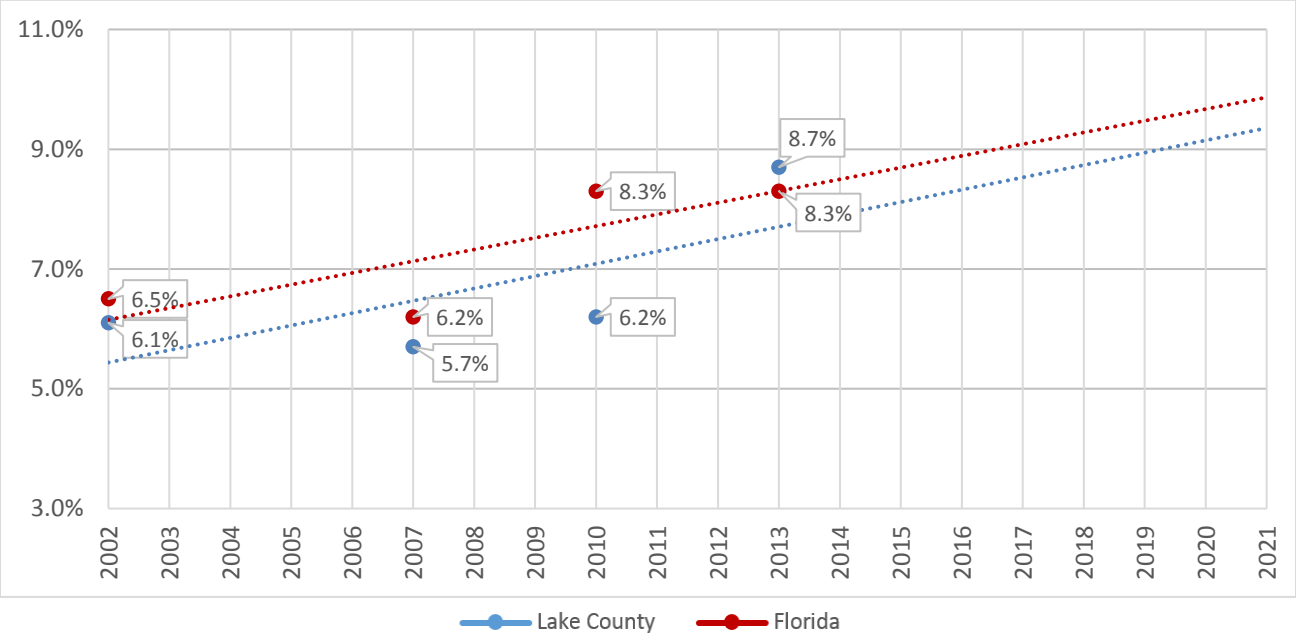


Figure 8: Percent of Adult Population with Diabetes

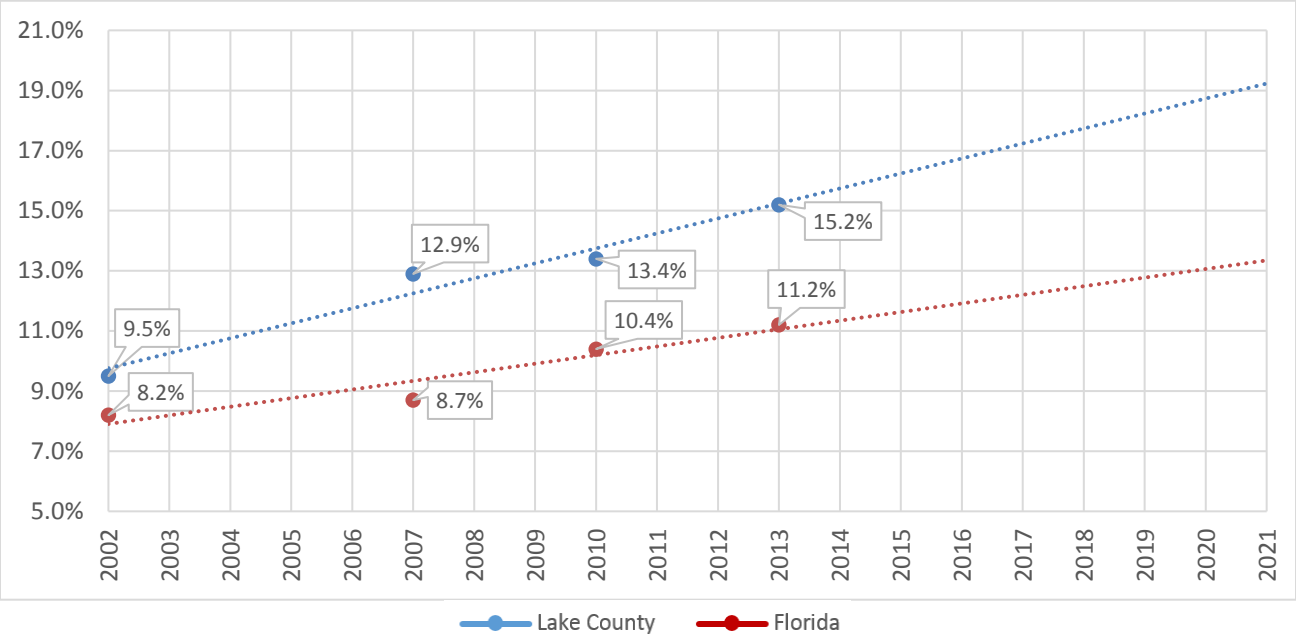


Figure 9: Percent of Adult Population with Hypertension

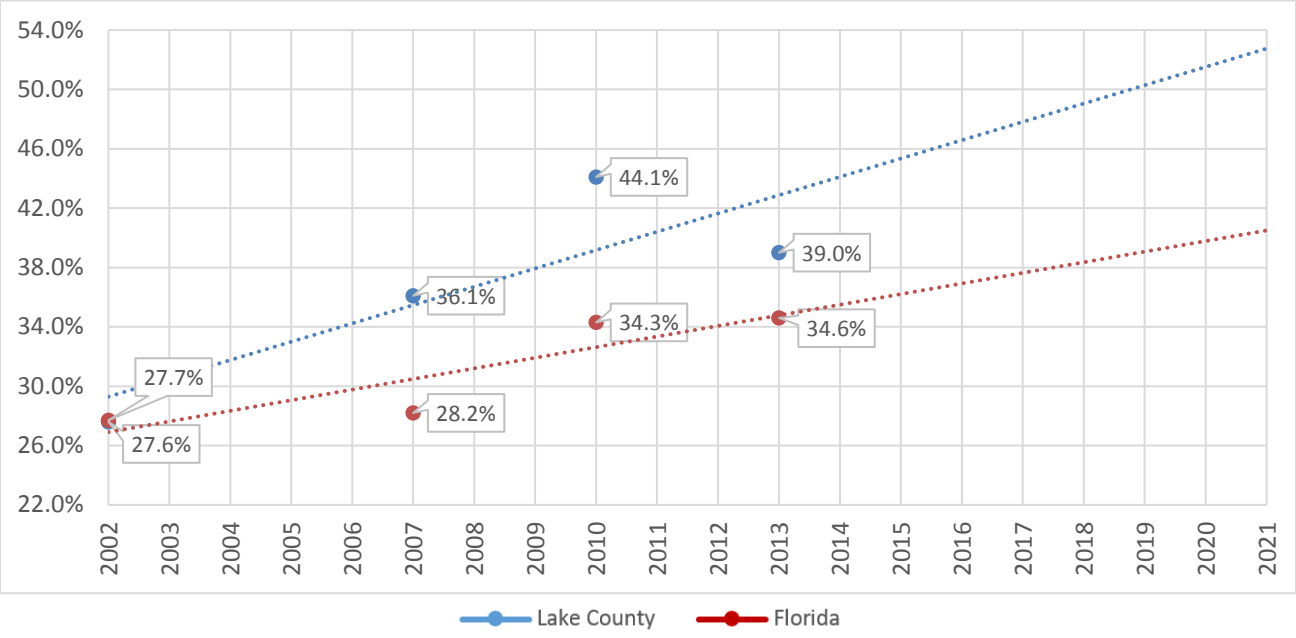


Figure 10: Percent of Adult Population who are Obese

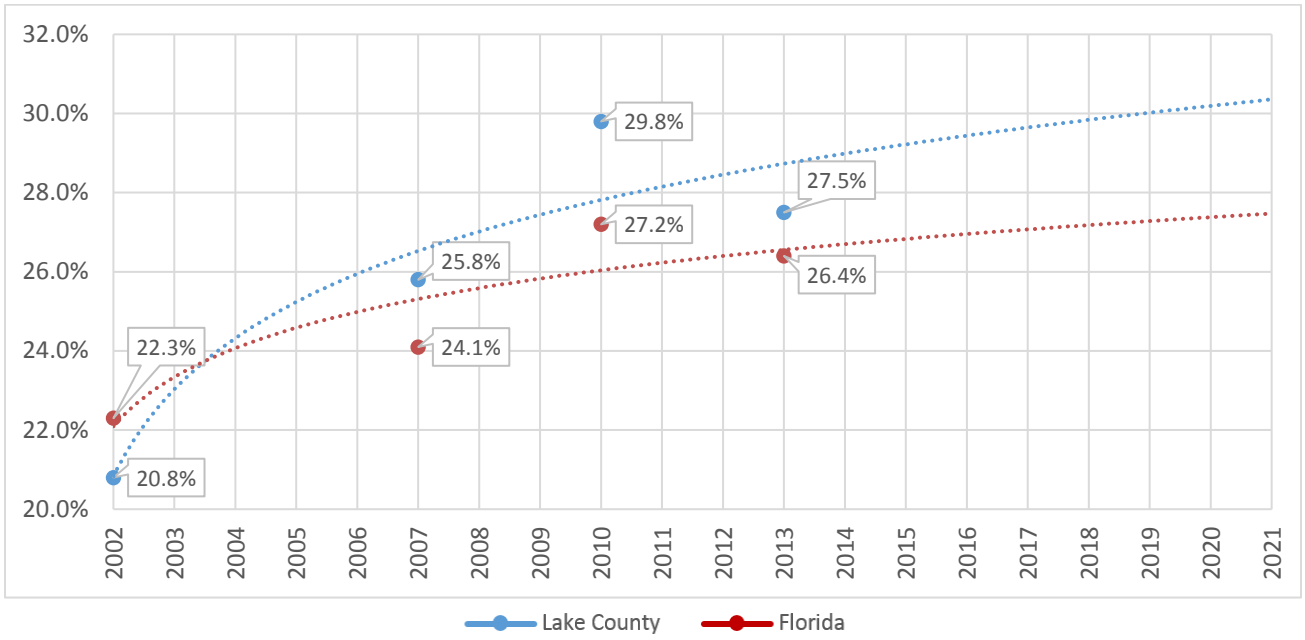
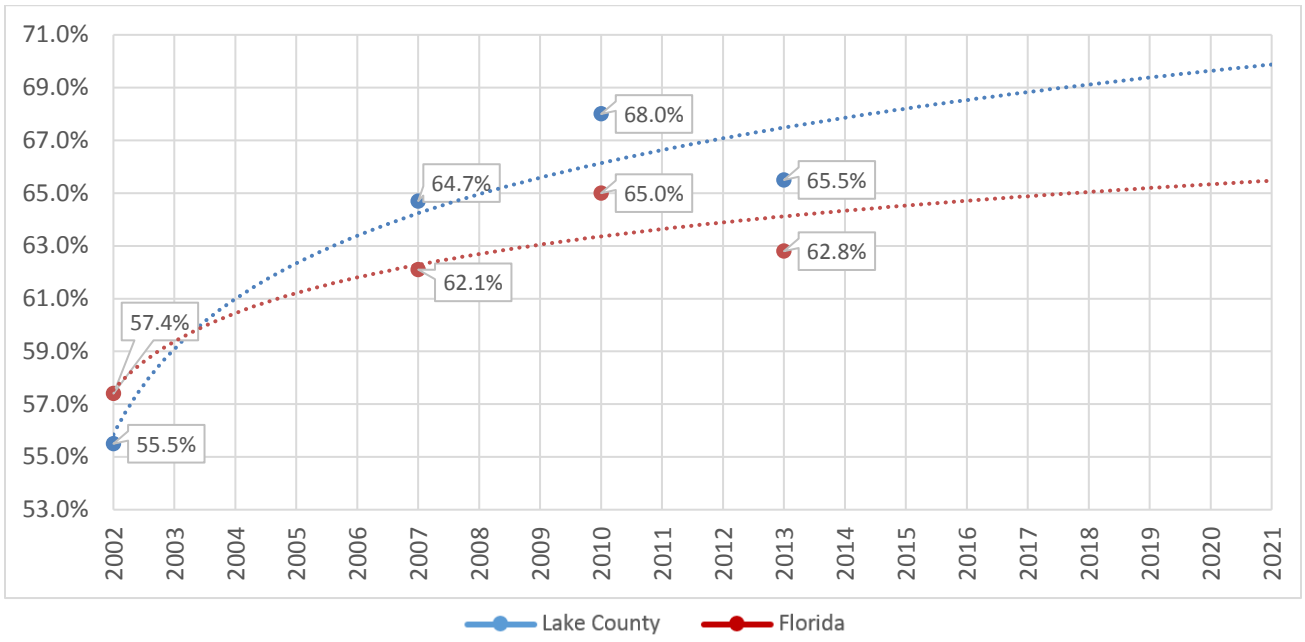


Figure 11: Percent of Adult Population who are Obese or Overweight



As the previous figures indicate, the prevalence of chronic diseases has risen since 2002, and is projected to continue to rise based on the trends. Lake County is anticipated to experience increasingly worse community health conditions compared to the state of Florida for four of the five health trends. Implementing Healthy Community Design (HCD) principles may help to change the trend lines and reduce the percent of the population living with these diseases. Offering active transportation options, and providing safe and convenient access to destinations including parks, schools, and grocery stores, are just some examples of how the transportation may implement HCD techniques. Utilizing HCD as an evaluation tool when analyzing alternatives will provide an opportunity to focus on the intersection of transportation, the built environment, and public health when determining appropriate improvements.

Because of this analysis, community health will be included in the Project Purpose and Need Statement. The project team will review potential alternative improvements to determine how or if they have an impact (either positive or negative) on community health as part of the screening process.

3.4 2021 Short-Term Scenario

An operational analysis was conducted to determine the LOS for the various modes in the 2021 short-term scenario assuming no improvements (outside of the planned improvements documented in Section 3.2.2). This scenario is often referred to as the 2021 “no build” or 2021 baseline. The same methodology used for determining the 2016 existing LOS was applied to this scenario.

For the 2021 future operational analysis, the projected traffic volumes were developed by applying the annual growth rate of 0.5% to the existing 2016 traffic volumes. In order to compare future roadway conditions (without recommended improvements from this study) to existing roadway conditions fairly, it was assumed the same signal timings would be utilized at each signalized intersection and the lane geometry would remain the same. Improvements identified in the FDOT 3R scope were assumed to be in place for the baseline 2021 future condition. It is important to note the sharrows identified in the 3R scope were not supported by the Project Visioning Team (PVT) during the meeting on March 9, 2017, in which PVT Members expressed concerns about bicyclists sharing the road with a high volume of truck traffic (approximately 9%). Depending on the final improvements identified in this study, the 3R scope can be amended in order to be consistent with this study’s final recommendations.

The results from the operational analysis for each mode are detailed in the following subsections.

3.4.1 2021 Roadway Operations

The 2021 projected roadway operations are provided in Table 4 for daily, AM peak hour, and PM peak hour. As depicted in Table 4, the SR 19 corridor is projected to operate within the adopted LOS standard.

Table 4: 2021 Projected Roadway Segment Level of Service

Roadway / Segment	No. of Lanes	Speed Limit (mph)	Adopted LOS	Maximum Service Volumes[1]		Daily			AM Peak Hour Directional Traffic				PM Peak Hour Directional Traffic			
				Daily	Peak	AADT	LOS	v/c	Volume	Dir	LOS	v/c	Volume	Dir	LOS	v/c
SR 19																
South of CR 450A	4D	45	D	39,800	2,000	19,157	C	0.48	874	SB	C	0.44	995	NB	C	0.50
CR 450A to Guerrant St/ Cassady St	4D	40	D	39,800	2,000	17,425	C	0.44	650	SB	C	0.33	811	NB	C	0.41
Guerrant St/Cassady St to W Ocala St (CR 450)/Bulldog Ln	4D	35	D	32,400	1,630	17,425	D	0.54	650	SB	C	0.40	811	NB	D	0.50
W Ocala St (CR 450)/Bulldog Ln to E. Collins St (CR 450)	2D	35	D	15,500	790	12,813	D	0.83	551	SB	D	0.70	675	NB	D	0.85
E. Collins St (CR 450) to Bulldog Way	2D	35	D	15,500	790	12,813	D	0.83	551	SB	D	0.70	675	NB	D	0.85
North of Bulldog Way	2D	45	D	18,600	920	10,196	C	0.55	438	SB	C	0.48	481	NB	C	0.52
CR 450A																
East of SR 19	2U	30	D	24,400	1,200	2,500	B	0.10	101	WB	B	0.08	118	EB	B	0.10
CR 450/W Ocala St																
West of SR 19	2U	35	D	24,200	1,190	3,700	B	0.15	138	WB	B	0.12	168	EB	B	0.14
CR 450/E. Collins St																
East of SR 19	2U	35	D	24,200	1,190	5,535	B	0.23	226	WB	B	0.19	347	EB	B	0.29
Umatilla Boulevard																
North of SR 19	2U	25	D	24,200	1,190	1,470	B	0.06	54	WB	B	0.05	90	WB	B	0.08

Source: FDOT FTI and supplemental daily and turning movement counts
1 - 2012 FDOT Quality/Level of Service Handbook

3.4.2 2021 Intersection Operations

2021 future intersection operations were examined during the AM, mid-day, and PM peak hours. In order to provide a baseline future scenario, it was assumed the same signal timings would be utilized at each signalized intersection and the lane geometry would remain the same (i.e., no improvements).

The results for the unsignalized intersections are provided in Table 5, while the results for the signalized intersections are provided in Table 6 (and illustrated graphically in Figure 12 through Figure 14). A queue length analysis was also performed and is included as Table 7. A copy of the Synchro output sheets is included in Appendix C.

When these results are compared to existing conditions (refer to Tables 2, 3, and 4 in Appendix A), there is very little change in both delay and queue length.

Table 5: 2021 Projected Unsignalized Intersection Level of Service without Improvements

Intersection	Movement	AM Peak			Mid-Day			PM Peak		
		v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]
SR 19 at CR 450A	WBL	0.168	17.6	C	N/A	N/A	N/A	0.221	27.5	D
	WBR	0.071	10.1	B	N/A	N/A	N/A	0.142	13.6	B
	NBT	Note 1	Note 1	Note 1	N/A	N/A	N/A	Note 1	Note 1	Note 1
	NBR	Note 1	Note 1	Note 1	N/A	N/A	N/A	Note 1	Note 1	Note 1
	SBL	0.036	8.5	A	N/A	N/A	N/A	0.085	11.1	B
	SBT	Note 1	Note 1	Note 1	N/A	N/A	N/A	Note 1	Note 1	Note 1
SR 19 at Umatilla Blvd	NBL	0.001	8.6	A	0.000	0.0	A	0.001	8.2	A
	NBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBR	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	EBL	0.008	14.2	B	0.020	13.9	B	0.031	14.1	B
	EBR	0.000	0.0	A	0.000	0.0	A	0.000	0.0	A
SR 19 at Lake St	NBL	0.165	8.9	A	0.095	8.4	A	0.070	8.2	A
	NBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBR	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	EBL	0.019	16.0	C	0.011	14.8	B	0.011	14.8	B
	EBR	0.288	13.2	B	0.200	11.6	B	0.129	10.9	B

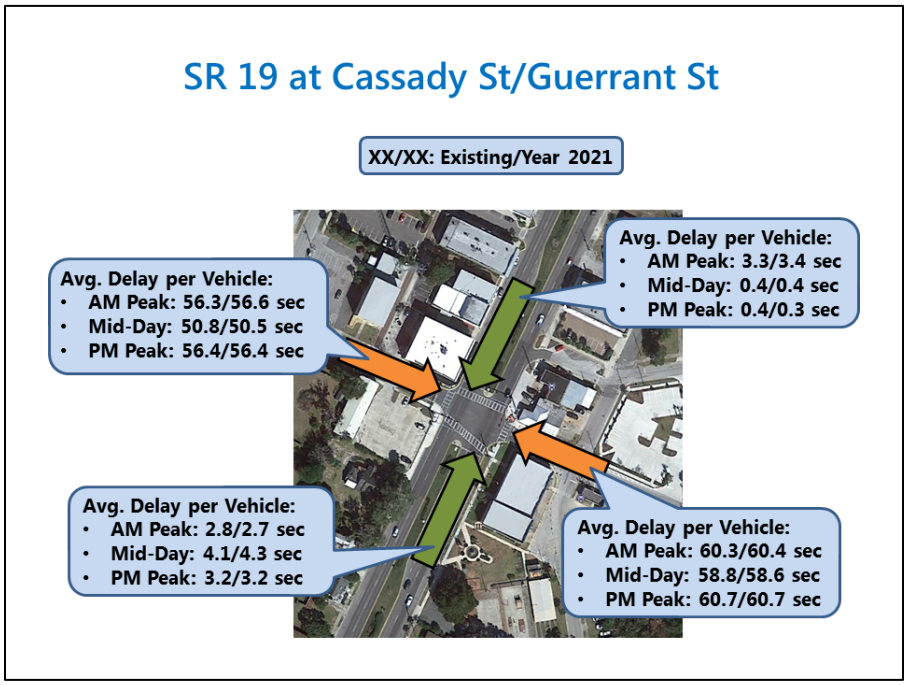
Note 1: Unopposed Movement
Source: VHB using HCM 2010 Methodology
1 Volume-to-capacity ratio
2 Average delay in seconds per vehicle
3 Level of service

Table 6: 2021 Projected Signalized Intersection Level of Service without Improvements

Intersection	Movement	AM Peak			Mid-Day			PM Peak		
		v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]
SR 19 at Guerrant St/ Cassady St	EBL/T/R	0.31	56.6	E	0.12	50.5	D	0.27	56.4	E
	WBL/T/R	0.58	60.4	E	0.68	58.6	E	0.59	60.7	E
	NBL	0.01	3.8	A	0.03	3.4	A	0.06	2.4	A
	NBT/R	0.18	2.7	A	0.28	4.3	A	0.34	3.2	A
	SBL	0.03	3.3	A	0.06	0.6	A	0.09	0.9	A
	SBT/R	0.27	3.4	A	0.25	0.4	A	0.22	0.3	A
	Total	**N/A**	**8.9**	**A**	**N/A**	**8.6**	**A**	**N/A**	**6.7**	**A**
SR 19 at Bulldog Ln/ W Ocala St (CR 450)	EBL/T/R	0.65	63.9	E	0.53	55.9	E	0.78	68.4	E
	WBL/T/R	0.08	52.3	D	0.71	67.2	E	0.60	55.6	E
	NBL	0.20	9.4	A	0.25	8.3	A	0.39	12.9	B
	NBT	0.33	10.9	B	0.45	15.1	B	0.63	24.7	C
	NBR	0.02	8.5	A	0.03	9.4	A	0.05	93.0	F
	SBL	0.03	7.5	A	0.03	11.2	B	0.14	20.1	C
	SBT/R	0.57	16.5	B	0.50	18.6	B	0.56	26.8	C
	SEL	0.48	66.8	E	0.43	65.3	E	0.50	63.3	E
	SER	0.00	59.5	E	0.00	59.6	E	0.00	56.9	E
	Total	**N/A**	**22.2**	**C**	**N/A**	**23.8**	**C**	**N/A**	**34.5**	**C**
SR 19 at E Collins St (CR 450)	WBL	0.81	65.5	E	N/A	N/A	N/A	0.83	65.5	E
	WBR	0.61	59.6	E	N/A	N/A	N/A	0.43	55.7	E
	NBT	0.29	6.3	A	N/A	N/A	N/A	0.40	7.6	A
	NBR	0.08	5.2	A	N/A	N/A	N/A	0.25	6.6	A
	SBL	0.08	4.0	A	N/A	N/A	N/A	0.19	5.2	A
	SBT	0.37	4.2	A	N/A	N/A	N/A	0.29	4.0	A
	Total	**N/A**	**15.8**	**B**	**N/A**	**N/A**	**N/A**	**N/A**	**14.5**	**B**

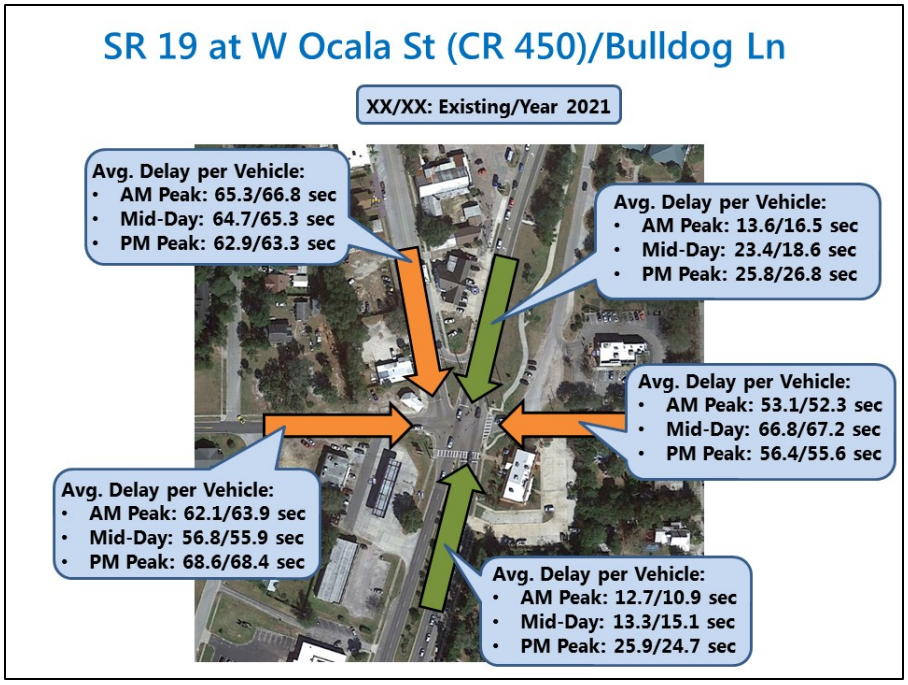
Source: VHB using HCM 2000 and 2010 Methodology
1 Volume-to-capacity ratio
2 Average delay in seconds per vehicle
3 Level of service

Figure 12: SR 19 at Cassady St/Guerrant St Year 2021 Average Delay per Vehicle Comparison



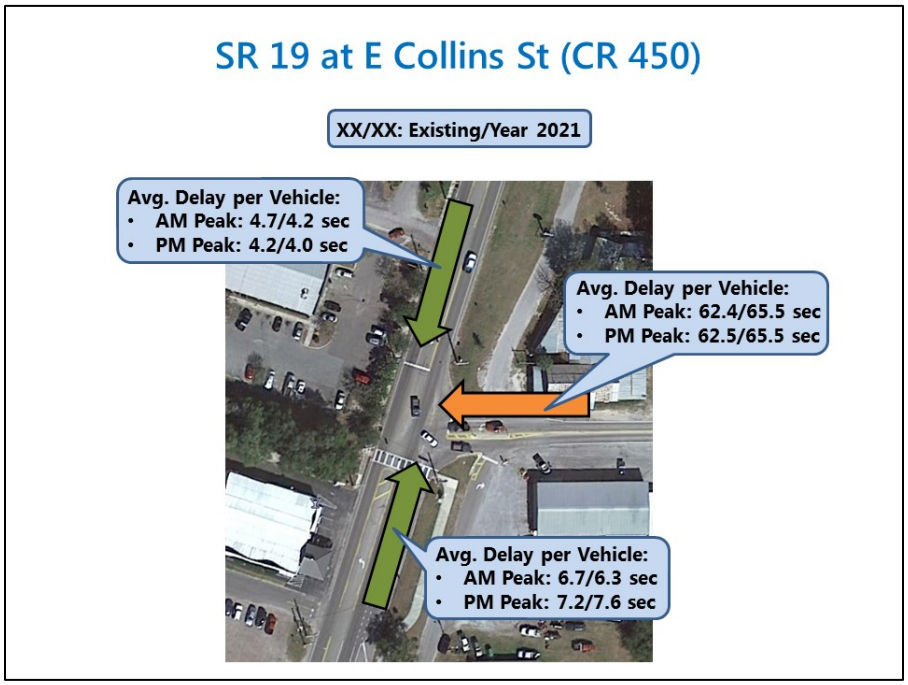
Note: Average delay per vehicle is presented for the major lane group only.

Figure 13: SR 19 at W Ocala St (CR 450)/Bulldog Ln Year 2021 Average Delay per Vehicle Comparison



Note: Average delay per vehicle is presented for the major lane group only.

Figure 14: SR 19 at E Collins St (CR 450) Year 2021 Average Delay per Vehicle Comparison



Note: Average delay per vehicle is presented for the major lane group only.

Table 7: 2021 Projected Signalized Intersection 95th Percentile Queues without Improvements

Intersection	Movement	AM Peak [feet]	Mid-Day [feet]	PM Peak [feet]
SR 19 at Guerrant St/ Cassady St	EBL/T/R	44	35	41
	WBL/T/R	137	190	136
	NBL	6	15	20
	NBT/R	82	155	177
	SBL	5	14	4
	SBT/R	53	125	23
SR 19 at W Ocala St (CR 450)/Bulldog Lane	EBL/T/R	148	126	208
	WBL/T/R	31	160	151
	NBL	51	100	146
	NBT	242	502	714
	NBR	0	17	38
	SBL	13	14	42
	SBT/R	585	438	448
	SEL	62	55	84
	SER	0	0	0
SR 19 at E Collins St (CR 450)	WBL	184	N/A	198
	WBR	50	N/A	50
	NBT	174	N/A	515
	NBR	25	N/A	99
	SBL	22	N/A	38
	SBT	207	N/A	159

Source: VHB using HCM 2000 and 2010 Methodology

3.4.3 2021 Bicycle Operations

The LOS for the bicycle mode is based on the number of vehicles traveling on the roadway and the coverage of available bicycle lanes provided along the corridor. The following are the bicycle improvements identified in the FDOT 3R scope:

- Restripe SR 19 from Golden Gem Drive to the Guerrant Street/Cassady Street intersection to provide a 9-foot buffered bicycle lane
- Restripe the roadway from Guerrant Street/Cassady Street to south of W Ocala Street (CR 450)/Bulldog Lane to provide a 15.5-foot outside lane to accommodate sharrows
- Remove the curb and gutter and widen the roadway from W Ocala Street (CR 450)/Bulldog Lane to Palmetto Street to provide a bicycle lane.

These improvements were included in the 2021 bicycle operations analysis. Table 8 presents the results of this analysis. When these results are compared to existing conditions (refer to Table 5 in Appendix A), the bicycle LOS along SR 19 from CR 450A to Guerrant Street/Cassady Street and from W Ocala Street (CR 450)/Bulldog Lane to E Collins Street (CR 450), improves as a result of the implementation of designated bicycle lanes along these segments.

Table 8: 2021 Projected Bicycle Mode Level of Service

Roadway/Segment	No. of Lanes[1]	Bike Lane Coverage[1]	LOS Standard*	Daily[2]		AM Peak Hour Directional Traffic[3]			PM Peak Hour Directional Traffic[3]		
				AADT	LOS	Volume	Dir	LOS	Volume	Dir	LOS
SR 19											
South of CR 450A	4D	50-84%	D	19,157	D	874	SB	D	995	NB	D
CR 450A to Guerrant St/ Cassady St	4D	85-100%	D	17,425	B	650	SB	B	811	NB	B
Guerrant St/Cassady St to W Ocala St (CR 450)/Bulldog Ln	4D	0-49%	D	17,425	E	650	SB	D	811	NB	E
W Ocala St (CR 450)/Bulldog Ln to E. Collins St (CR 450)	2D	50-84%	D	12,813	D	551	SB	D	675	NB	D
E. Collins St (CR 450) to Bulldog Way	2D	0-49%	D	12,813	E	551	SB	E	675	NB	E
North of Bulldog Way	2D	0-49%	D	10,196	E	438	SB	E	481	NB	E
Umatilla Boulevard											
North of SR 19	2U	0-49%	D	1,470	C	54	SB	C	90	SB	C

Source: Compiled by VHB.

1 FDOT Straight Line Diagrams (SLD)

2 FDOT FTI and supplemental daily counts

3 Turning movement counts within the roadway segment

*Note: Although there are no specific level of service standards established for bicyclists or other non-motorized vehicles, the maximum service volumes for LOS D are used for comparison purposes.

Note: Level of service for the bicycle mode in this table is based on number of motorized vehicles, not number of bicyclists using the facility.

3.4.4 2021 Pedestrian Operations

The 2021 future pedestrian operations were examined during the daily condition and the AM and PM peak hours. There were no significant sidewalk improvements identified in the FDOT 3R scope; therefore, it was assumed the sidewalk coverage would remain the same throughout the corridor.

The pedestrian LOS is based on the number of vehicles traveling on the roadway and the coverage of available sidewalks provided along the corridor. When these results are compared to existing conditions (refer to Table 6 in Appendix A), it is apparent there is little change in the pedestrian LOS due to the minimal increase in traffic expected to occur along the corridor. Pedestrians are expected to continue experiencing poor LOS south of CR 450A and north of E Collins Street (CR 450), due to the sparse sidewalk coverage. Pedestrians are expected to experience LOS D or better along Umatilla Boulevard, depending on the time period being considered.

Table 9: 2021 Projected Pedestrian Mode Level of Service

Roadway/Segment	No. of Lanes[1]	Sidewalk Coverage[1]	LOS Standard*	Daily[2]		AM Peak Hour Directional Traffic[3]			PM Peak Hour Directional Traffic[3]		
				AADT	LOS	Volume	Dir	LOS	Volume	Dir	LOS
SR 19											
South of CR 450A	4D	0-49%	D	19,157	F	874	SB	E	995	NB	F
CR 450A to Guerrant St/ Cassady St	4D	50-84%	D	17,425	E	650	SB	D	811	NB	D
Guerrant St/Cassady St to W Ocala St (CR 450)/Bulldog Ln	4D	85-100%	D	17,425	C	650	SB	C	811	NB	C
W Ocala St (CR 450)/Bulldog Ln to E. Collins St (CR 450)	2D	50-84%	D	12,813	E	551	SB	E	675	NB	E
E. Collins St (CR 450) to Bulldog Way	2D	0-49%	D	12,813	F	551	SB	F	675	NB	F
North of Bulldog Way	2D	0-49%	D	10,196	F	438	SB	E	481	NB	F
Umatilla Boulevard											
North of SR 19	2U	50-84%	D	1,470	C	54	SB	C	90	SB	D

Source: Compiled by VHB.
1 FDOT Straight Line Diagrams (SLD)
2 FDOT FTI and supplemental daily counts
3 Turning movement counts within the roadway segment
*Note: Although there are no specific level of service standards established for pedestrians or other non-motorized vehicles, the maximum service volumes for LOS D are used for comparison purposes.
Note: Level of service for the pedestrian mode in this table is based on number of motorized vehicles, not number of pedestrians using the facility.

3.4.5 2021 Transit Operations

Transit LOS was also examined. Presently, Route 4 provides service along the corridor every two hours. According to the Lake Xpress TDP, frequency on Route 4 will increase from every 2 hours to every hour in 2020. According to the 2012 FDOT Quality/Level of Service Handbook, while the headway will be improved, the existing low sidewalk coverage along SR 19 (calculated to be at approximately 65%) will continue to result in LOS F conditions in 2021.

3.5 2040 Long-Term Scenario

Similar to the short-term scenario, an operational analysis was conducted to determine the LOS for the various modes in the 2040 long-term scenario. This scenario is often referred to as the 2040 "no build" or 2040 baseline. The same methodology used for determining the 2016 and 2021 LOS was applied to this scenario.

For the 2040 future operational analysis, the projected traffic volumes were developed by applying the annual growth rate of 0.5% to the existing 2016 traffic volumes. Similar to the short-term scenario, in order to compare future roadway conditions (without recommended improvements from this study) to existing roadway conditions fairly, it was assumed the same signal timings would be utilized at each signalized intersection and the lane geometry would remain the same. Improvements identified in the FDOT 3R scope were assumed to be in place for the baseline 2040 future condition. The results from the operational analysis for each mode are detailed in the following subsections.

3.5.1 2040 Roadway Operations

The 2040 projected roadway operations are provided in Table 10 for daily, AM peak hour, and PM peak hour. As shown in Table 10, the SR 19 corridor is projected to operate within the adopted LOS standard.

Table 10: 2040 Projected Roadway Segment Level of Service

Roadway / Segment	No. of Lanes	Speed Limit (mph)	Adopted LOS	Maximum Service Volumes[1]		Daily			AM Peak Hour Directional Traffic				PM Peak Hour Directional Traffic			
				Daily	Peak	AADT	LOS	v/c	Volume	Dir	LOS	v/c	Volume	Dir	LOS	v/c
SR 19																
South of CR 450A	4D	45	D	39,800	2,000	20,933	C	0.53	955	SB	C	0.48	1,088	NB	C	0.54
CR 450A to Guerrant St/ Cassady St	4D	40	D	39,800	2,000	19,040	C	0.48	710	SB	C	0.36	886	NB	C	0.44
Guerrant St/Cassady St to W Ocala St (CR 450)/Bulldog Ln	4D	35	D	32,400	1,630	19,040	D	0.59	710	SB	C	0.44	886	NB	D	0.54
W Ocala St (CR 450)/Bulldog Ln to E. Collins St (CR 450)	2D	35	D	15,500	790	14,000	D	0.90	602	SB	D	0.76	738	NB	D	0.93
E. Collins St (CR 450) to Bulldog Way	2D	35	D	15,500	790	14,000	D	0.90	602	SB	D	0.76	738	NB	D	0.93
North of Bulldog Way	2D	45	D	18,600	920	11,141	C	0.60	479	SB	C	0.52	526	NB	C	0.57
CR 450A																
East of SR 19	2U	30	D	24,400	1,200	4,400	B	0.18	178	WB	B	0.15	207	EB	B	0.17
CR 450/W Ocala St																
West of SR 19	2U	35	D	24,200	1,190	4,979	B	0.21	185	WB	B	0.16	226	EB	B	0.19
CR 450/E. Collins St																
East of SR 19	2U	35	D	24,200	1,190	6,048	B	0.25	246	WB	B	0.21	380	EB	B	0.32
Umatilla Boulevard																
North of SR 19	2U	25	D	24,200	1,190	1,606	B	0.07	59	WB	B	0.05	99	WB	B	0.08

Source: FDOT FTI and supplemental daily and turning movement counts
1 - 2012 FDOT Quality/Level of Service Handbook

3.5.2 2040 Intersection Operations

2040 future intersection operations were examined during the AM, mid-day, and PM peak hours. In order to compare future conditions to existing conditions fairly, it was assumed the same signal timings would be utilized at each signalized intersection and the lane geometry would remain the same (i.e., no improvements).

The results for the unsignalized intersections are provided in Table 11, while the results for the signalized intersections are provided in Table 12 (and illustrated in Figure 15 through Figure 17). A queue length analysis was also performed and is included as Table 13. A copy of the Synchro output sheets is included in Appendix D.

When these results are compared to existing conditions (refer to Tables 2, 3, and 4 in Appendix A), it can be seen there is very little change in both delay and queue length. The two exceptions to this are:

- An increase in delay for the westbound left movement at SR 19 and CR 450A in the PM peak hour
- An increase in queue length for the southbound through/right movement at SR 19 and W Ocala Street (CR 450)/Bulldog Lane during the AM peak hour

Table 11: 2040 Projected Unsignalized Intersection Level of Service without Improvements

Intersection	Movement	AM Peak			Mid-Day			PM Peak		
		v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]
SR 19 at CR 450A	WBL	0.323	21.7	C	N/A	N/A	N/A	0.439	39.8	E
	WBR	0.130	10.7	B	N/A	N/A	N/A	0.271	15.9	C
	NBT	Note 1	Note 1	Note 1	N/A	N/A	N/A	Note 1	Note 1	Note 1
	NBR	Note 1	Note 1	Note 1	N/A	N/A	N/A	Note 1	Note 1	Note 1
	SBL	0.041	8.6	A	N/A	N/A	N/A	0.102	11.8	B
	SBT	Note 1	Note 1	Note 1	N/A	N/A	N/A	Note 1	Note 1	Note 1
SR 19 at Umatilla Blvd	NBL	0.001	8.8	A	0.000	0.0	A	0.001	8.3	A
	NBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBR	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	EBL	0.009	14.9	B	0.020	13.9	B	0.036	14.9	B
	EBR	0.000	0.0	A	0.000	0.0	A	0.000	0.0	A
SR 19 at Lake St	NBL	0.187	9.2	A	0.095	8.4	A	0.078	8.3	A
	NBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBR	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	EBL	0.024	17.2	C	0.011	14.8	B	0.012	15.6	C
	EBR	0.33	14.2	B	0.200	11.6	B	0.147	11.3	B

Note 1: Unopposed Movement
Source: VHB using HCM 2010 Methodology
1 Volume-to-capacity ratio
2 Average delay in seconds per vehicle
3 Level of service

Table 12: 2040 Projected Signalized Intersection Level of Service without Improvements

Intersection	Movement	AM Peak			Mid-Day			PM Peak		
		v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]
SR 19 at Guerrant St/ Cassady St	EBL/T/R	0.31	55.4	E	0.12	50.5	D	0.27	55.6	E
	WBL/T/R	0.60	59.8	E	0.68	58.6	E	0.61	60.3	E
	NBL	0.02	4.5	A	0.03	3.4	A	0.07	2.6	A
	NBT/R	0.20	3.1	A	0.28	4.3	A	0.38	3.6	A
	SBL	0.04	3.8	A	0.06	0.6	A	0.11	1.2	A
	SBT/R	0.30	3.9	A	0.25	0.4	A	0.24	0.4	A
	Total	**N/A**	**9.3**	**A**	**N/A**	**8.6**	**A**	**N/A**	**6.9**	**A**
SR 19 at Bulldog Ln/ W Ocala St (CR 450)	EBL/T/R	0.73	66.5	E	0.53	55.9	E	0.85	71.2	E
	WBL/T/R	0.16	49.9	D	0.71	67.2	E	0.64	52.9	D
	NBL	0.26	13.2	B	0.25	8.3	A	0.53	18.5	B
	NBT	0.38	13.5	B	0.45	15.1	B	0.75	33.8	C
	NBR	0.02	10.5	B	0.03	9.4	A	0.06	84.0	F
	SBL	0.04	8.8	A	0.03	11.2	B	0.22	23.6	C
	SBT/R	0.66	21.8	C	0.50	18.6	B	0.67	31.2	C
	SEL	0.49	66.8	E	0.43	65.3	E	0.60	69.6	E
	SER	0.01	59.4	E	0.00	59.6	E	0.00	57.4	E
	Total	**N/A**	**26.7**	**C**	**N/A**	**23.8**	**C**	**N/A**	**40.5**	**D**
SR 19 at E Collins St (CR 450)	WBL	0.82	64.9	E	N/A	N/A	N/A	0.84	64.9	E
	WBR	0.62	58.7	E	N/A	N/A	N/A	0.43	54.7	D
	NBT	0.33	6.9	A	N/A	N/A	N/A	0.44	8.4	A
	NBR	0.09	5.6	A	N/A	N/A	N/A	0.27	7.1	A
	SBL	0.09	4.4	A	N/A	N/A	N/A	0.23	6.0	A
	SBT	0.41	4.8	A	N/A	N/A	N/A	0.32	4.5	A
	Total	**N/A**	**16.1**	**B**	**N/A**	**N/A**	**N/A**	**N/A**	**14.9**	**B**

Source: VHB using HCM 2000 and 2010 Methodology
1 Volume-to-capacity ratio
2 Average delay in seconds per vehicle
3 Level of service

Figure 15: SR 19 at Cassady St/Guerrant St Year 2040 Average Delay per Vehicle Comparison

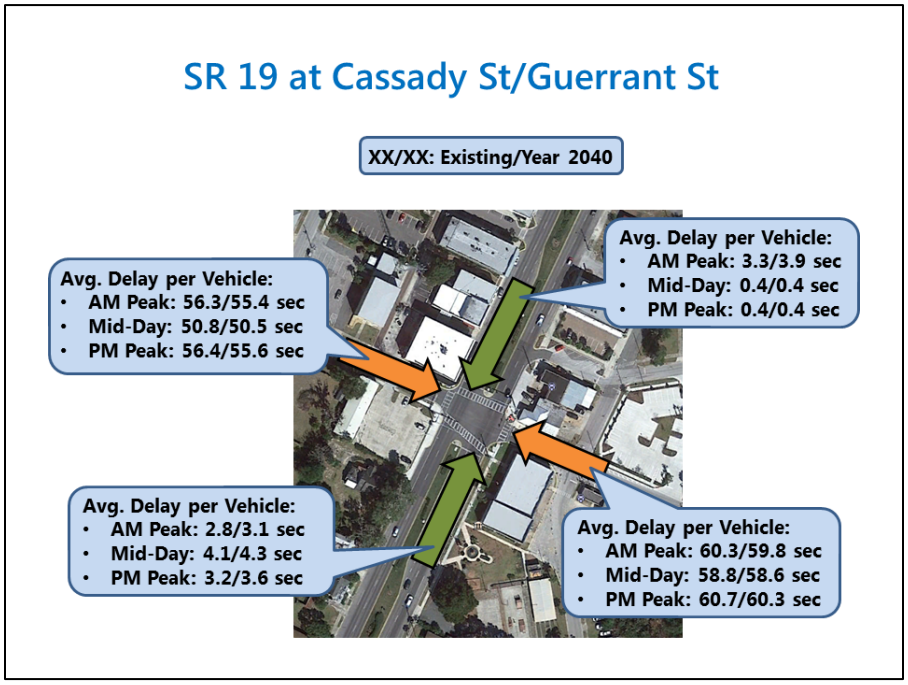


Figure 16: SR 19 at W Ocala St (CR 450)/Bulldog Ln Year 2040 Average Delay per Vehicle Comparison

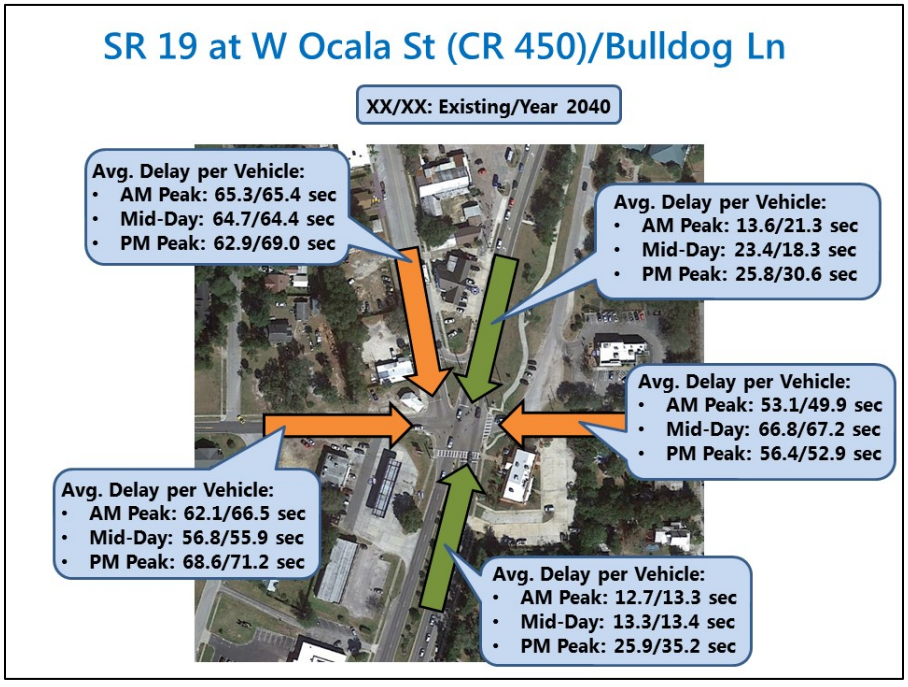


Figure 17: SR 19 at E Collins St (CR 450) Year 2040 Average Delay per Vehicle Comparison

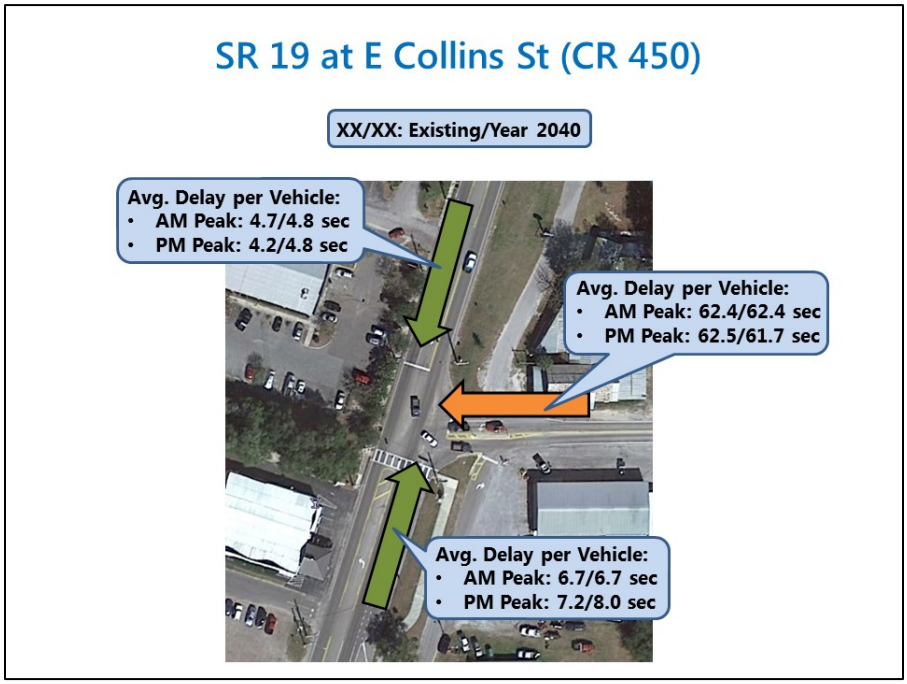


Table 13: 2040 Projected Signalized Intersection 95th Percentile Queues without Improvements

Intersection	Movement	AM Peak [feet]	Mid-Day [feet]	PM Peak [feet]
SR 19 at Guerrant St/ Cassady St	EBL/T/R	46	35	42
	WBL/T/R	148	190	146
	NBL	7	15	22
	NBT/R	95	155	211
	SBL	6	14	11
	SBT/R	75	125	76
SR 19 at W Ocala St (CR 450)/ Bulldog Lane	EBL/T/R	189	126	277
	WBL/T/R	64	160	193
	NBL	62	100	153
	NBT	279	502	831
	NBR	0	17	45
	SBL	14	14	46
	SBT/R	743	438	472
	SEL	64	55	96
	SER	0	0	0
SR 19 at E Collins St (CR 450)	WBL	197	N/A	213
	WBR	56	N/A	56
	NBT	198	N/A	565
	NBR	31	N/A	190
	SBL	25	N/A	42
	SBT	245	N/A	186

Source: VHB using HCM 2010 Methodology

3.5.3 2040 Bicycle Operations

The LOS for the bicycle mode is based on the number of vehicles traveling on the roadway and the coverage of available bicycle lanes provided along the corridor. The same bicycle lane coverage from the baseline 2021 future conditions analysis, which included the improvements identified in the FDOT 3R scope, were used for the baseline 2040 future conditions analysis.

Table 14 presents the results of the 2040 projected bicycle mode LOS analysis. When these results are compared to existing conditions (refer to Table 5 in Appendix A), the bicycle LOS along SR 19 from CR 450A to Guerrant Street/Cassady Street and from W Ocala Street (CR 450)/Bulldog Lane to E Collins Street (CR 450) improves as a result of the implementation of designated bicycle lanes along these segments. These results are consistent with the results from the 2021 future conditions analysis.

Table 14: 2040 Projected Bicycle Mode Level of Service

Roadway/Segment	No. of Lanes[1]	Bike Lane Coverage[1]	LOS Standard*	Daily[2]		AM Peak Hour Directional Traffic[3]			PM Peak Hour Directional Traffic[3]		
				AADT	LOS	Volume	Dir	LOS	Volume	Dir	LOS
SR 19											
South of CR 450A	4D	50-84%	D	20,933	D	955	SB	D	1,088	NB	D
CR 450A to Guerrant St/ Cassady St	4D	85-100%	D	19,040	C	710	SB	B	886	NB	B
Guerrant St/Cassady St to W Ocala St (CR 450)/Bulldog Ln	4D	0-49%	D	19,040	E	710	SB	D	886	NB	E
W Ocala St (CR 450)/Bulldog Ln to E. Collins St (CR 450)	2D	50-84%	D	14,000	D	602	SB	D	738	NB	D
E. Collins St (CR 450) to Bulldog Way	2D	0-49%	D	14,000	E	602	SB	E	738	NB	E
North of Bulldog Way	2D	0-49%	D	11,141	E	479	SB	E	526	NB	E
Umatilla Boulevard											
North of SR 19	2U	0-49%	D	1,606	C	59	SB	C	99	SB	C

Source: Compiled by VHB.

1 FDOT Straight Line Diagrams (SLD)

2 FDOT FTI and supplemental daily counts

3 Turning movement counts within the roadway segment

*Note: Although there are no specific level of service standards established for bicyclists or other non-motorized vehicles, the maximum service volumes for LOS D are used for comparison purposes.

Note: Level of service for the bicycle mode in this table is based on number of motorized vehicles, not number of bicyclists using the facility.

3.5.4 2040 Pedestrian Operations

The 2040 future pedestrian operations were examined during the daily condition and the AM and PM peak hours. There were no significant sidewalk improvements identified in the FDOT 3R scope; therefore, it was assumed the sidewalk coverage would remain the same throughout the corridor.

The pedestrian LOS is based on the number of vehicles traveling on the roadway and the coverage of available sidewalks provided along the corridor. When these results are compared to existing conditions (refer to Table 6 in Appendix A), it is evident there is little change in the pedestrian LOS due to the minimal increase in traffic expected to occur along the corridor. Pedestrians are expected to continue to experience poor LOS south of CR 450A and north of E Collins Street (CR 450), due to the sparse sidewalk coverage. Pedestrians are expected to experience LOS D or better along Umatilla Boulevard, depending on the time period being considered.

Table 15: 2040 Projected Pedestrian Mode Level of Service

Roadway/Segment	No. of Lanes[1]	Sidewalk Coverage[1]	LOS Standard*	Daily[2]		AM Peak Hour Directional Traffic[3]			PM Peak Hour Directional Traffic[3]		
				AADT	LOS	Volume	Dir	LOS	Volume	Dir	LOS
SR 19											
South of CR 450A	4D	0-49%	D	20,933	F	955	SB	E	1,088	NB	F
CR 450A to Guerrant St/ Cassady St	4D	50-84%	D	19,040	E	710	SB	D	886	NB	E
Guerrant St/Cassady St to W Ocala St (CR 450)/Bulldog Ln	4D	85-100%	D	19,040	C	710	SB	C	886	NB	C
W Ocala St (CR 450)/Bulldog Ln to E. Collins St (CR 450)	2D	50-84%	D	14,000	E	602	SB	E	738	NB	E
E. Collins St (CR 450) to Bulldog Way	2D	0-49%	D	14,000	F	602	SB	F	738	NB	F
North of Bulldog Way	2D	0-49%	D	11,141	F	479	SB	E	526	NB	F
Umatilla Boulevard											
North of SR 19	2U	50-84%	D	1,606	D	59	SB	C	99	SB	D

Source: Compiled by VHB.
1 FDOT Straight Line Diagrams (SLD)
2 FDOT FTI and supplemental daily counts
3 Turning movement counts within the roadway segment
*Note: Although there are no specific level of service standards established for pedestrians or other non-motorized vehicles, the maximum service volumes for LOS D are used for comparison purposes.
Note: Level of service for the pedestrian mode in this table is based on number of motorized vehicles, not number of pedestrians using the facility.

3.5.5 2040 Transit Operations

Transit LOS was also examined. According to the TDP, no new transit improvements are identified for Route 4 after frequency is improved in 2020. Assuming no improvements are made to the sidewalk coverage, LOS F conditions will continue in 2040.

4

Chapter Four: Identified Needs

4.1 Introduction

Identifying a corridor's needs are the first step in developing the corridor alternatives. Corridor needs can include anything from a second left-turn lane, striping a bike lane, filling in sidewalk gaps, or installing a bus stop landing pad.

Identified needs are presented in four subsequent sections, one for each mode: roadway (vehicular), bicycle, pedestrian, and transit.

Roadway needs were identified using results from the analysis of short-term (year 2021) and long-term (year 2040) no build scenarios. When a particular movement was found to operate at a LOS below the standard, a need was identified.

Bicycle, pedestrian, and transit needs were identified using a more qualitative approach and were based on stakeholder feedback and a field review. Due to the qualitative nature of the identification, a horizon for implementation (short-term vs. long-term) was not assigned.

4.2 Roadway (Vehicular) Network Needs

This section documents the needs for the roadway network. It is grouped into short-term (year 2021) and long-term (year 2040) needs.

4.2.1 Short-Term Needs

Below is a list of identified short-term needs:

- Investigate mitigation measures to improve safety at the two intersections (SR 19 at Guerrant Street/Cassady Street; and SR 19 at E Collins Street (CR 450)) which experiences an average crash rate higher than the statewide average crash rate for similar facilities.

4.2.2 Long-Term Needs

Below is a list of identified long-term needs:

- Investigate how to improve operations at SR 19 at W Ocala Street (CR 450)/Bulldog Lane/Umatilla Boulevard
- Investigate how to improve access management (driveways and median openings) along the corridor

4.3 Bicycle Network Needs

Needs for the bicycle network include the following:

- Need for continuous bicycle accommodations (bike lane or multi-purpose trail) along the entire length of the corridor

Potential strategies to address the identified needs are presented in Section 5.3 and will be assessed in greater detail during the alternatives screening process.

4.4 Pedestrian Network Needs

Needs for the pedestrian network include the following:

- Need for continuous sidewalk network along the entire length of the corridor

Potential strategies to address the identified needs are presented in Section 5.4 and will be assessed in greater detail during the alternatives screening process.

4.5 Transit Network Needs

Needs for the transit network include the following:

- Installation of landing pads at stops within the Study Area to allow for easier boarding and alighting
- Installation of amenities (e.g., benches and shelters) at bus stops within the Study Area to improve the passenger waiting experience
- Need to provide continuous sidewalks to all bus stops within the Study Area

Potential strategies to address the identified needs are presented in Section 5.5 and will be assessed in greater detail during the alternatives screening process.

5

Chapter Five: Preliminary Development and Assessment of Identified Improvements

5.1 Introduction

This chapter serves two purposes. The first is to present a preliminary list of improvements addressing the needs identified in Chapter 4. The second is to evaluate the effects of implementing these improvements. The improvements are broken down by mode and are presented in each respective section.

5.2 Roadway Improvements

The roadway improvements identified for SR 19 are broad and cover a wide array of items; some are easy and cost little to implement, while others may require allocation of funding to further design and study the proposed improvement. For ease of understanding, the roadway improvements are presented in a general order of complexity and time of completion, with the simpler and easier to implement improvements being presented first.

The identified improvements to be presented are:

- Existing Geometry with Signal Retiming
- Add Turn Lanes at SR 19 and W Ocala Street (CR 450)/Bulldog Lane/Umatilla Boulevard
- Roundabout at SR 19 and W Ocala Street (CR 450)/Bulldog Lane/Umatilla Boulevard
- One Way Pair
- Road Diet

5.2.1 Existing Geometry with Signal Retiming

This improvement would keep the existing roadway geometry but retime all three signalized intersections to better meet vehicular demand. The results of this analysis is presented for both 2021 and 2040 in the following subsections.

Appendix E and F present the Synchro output sheets for these two conditions, respectively.

2021 Conditions with Retiming

For 2021, the results for the unsignalized intersections are provided in Table 16, while the results for the signalized intersections are provided in Table 17. The queue length analysis which was performed is included as Table 18.

When these results are compared to the 2021 baseline condition without improvements (see Section 3.4.2), it depicts the retiming results in the side streets generally having reduced delay, and the main street having a slight increase in delay. In terms of queuing, the analysis indicates the retiming reduces the length of many long queues, including those on SR 19.

Table 16: 2021 Projected Unsignalized Intersection Level of Service with Retiming

Intersection	Movement	AM Peak			Mid-Day			PM Peak		
		v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]
SR 19 at CR 450A	WBL	0.168	17.6	C	N/A	N/A	N/A	0.221	27.5	D
	WBR	0.071	10.1	B	N/A	N/A	N/A	0.142	13.6	B
	NBT	Note 1	Note 1	Note 1	N/A	N/A	N/A	Note 1	Note 1	Note 1
	NBR	Note 1	Note 1	Note 1	N/A	N/A	N/A	Note 1	Note 1	Note 1
	SBL	0.036	8.5	A	N/A	N/A	N/A	0.085	11.1	B
	SBT	Note 1	Note 1	Note 1	N/A	N/A	N/A	Note 1	Note 1	Note 1
SR 19 at Umatilla Blvd	NBL	0.001	8.7	A	0.000	0.0	A	0.001	8.2	A
	NBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBR	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	EBL	0.008	14.3	B	0.021	14.0	B	0.031	14.2	B
	EBR	0.000	0.0	A	0.000	0.0	A	0.000	0.0	A
SR 19 at Lake St	NBL	0.165	8.9	A	0.095	8.4	A	0.070	8.2	A
	NBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBR	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	EBL	0.019	16.0	C	0.011	14.8	B	0.011	14.8	B
	EBR	0.288	13.2	B	0.200	11.6	B	0.129	10.9	B

Note 1: Unopposed Movement
Source: VHB using HCM 2010 Methodology
1 Volume-to-capacity ratio
2 Average delay in seconds per vehicle
3 Level of service

Table 17: 2021 Projected Signalized Intersection Level of Service with Retiming

Intersection	Movement	AM Peak			Mid-Day			PM Peak		
		v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]
SR 19 at Guerrant St/ Cassady St	EBL/T/R	0.28	38.9	D	0.11	34.3	C	0.24	38.6	D
	WBL/T/R	0.49	41.0	D	0.60	39.6	D	0.51	41.3	D
	NBL	0.01	2.5	A	0.04	3.6	A	0.07	6.7	A
	NBT/R	0.19	3.0	A	0.30	4.5	A	0.37	3.6	A
	SBL	0.03	0.2	A	0.06	0.6	A	0.10	16.7	B
	SBT/R	0.29	0.5	A	0.26	0.5	A	0.23	13.0	B
	Total	**N/A**	**5.5**	**A**	**N/A**	**6.7**	**A**	**N/A**	**10.0**	**B**
SR 19 at W Ocala St (CR 450)/ Bulldog Ln	EBL/T/R	0.55	41.1	D	0.48	38.0	D	0.76	50.5	D
	WBL/T/R	0.07	35.5	D	0.64	43.8	D	0.59	40.0	D
	NBL	0.25	6.3	A	0.30	13.3	B	0.46	22.2	C
	NBT	0.38	10.4	B	0.52	17.6	B	0.70	32.2	C
	NBR	0.02	9.1	A	0.03	9.7	A	0.05	12.0	B
	SBL	0.03	7.8	A	0.04	12.2	B	0.18	14.5	B
	SBT/R	0.66	14.8	B	0.61	20.9	C	0.63	20.1	C
	SEL	0.52	50.4	D	0.39	45.1	D	0.58	50.5	D
	SER	0.00	41.5	D	0.00	40.9	D	0.00	40.1	D
	Total	**N/A**	**17.5**	**B**	**N/A**	**22.2**	**C**	**N/A**	**29.3**	**C**
SR 19 at E Collins St (CR 450)	WBL	0.76	45.1	D	N/A	N/A	N/A	0.79	45.4	D
	WBR	0.58	41.1	D	N/A	N/A	N/A	0.40	38.4	D
	NBT	0.33	7.2	A	N/A	N/A	N/A	0.85	32.2	C
	NBR	0.09	5.9	A	N/A	N/A	N/A	0.53	24.9	C
	SBL	0.08	4.5	A	N/A	N/A	N/A	0.14	18.5	B
	SBT	0.39	4.6	A	N/A	N/A	N/A	0.31	4.2	A
	Total	**N/A**	**12.6**	**B**	**N/A**	**N/A**	**N/A**	**N/A**	**24.1**	**C**

Source: VHB using HCM 2000 and 2010 Methodology
1 Volume-to-capacity ratio
2 Average delay in seconds per vehicle
3 Level of service

Table 18: 2021 Projected Signalized Intersection 95th Percentile Queues with Retiming

Intersection	Movement	AM Peak [feet]	Mid-Day [feet]	PM Peak [feet]
SR 19 at Guerrant St/ Cassady St	EBL/T/R	34	27	32
	WBL/T/R	99	130	97
	NBL	6	14	19
	NBT/R	73	136	158
	SBL	3	16	11
	SBT/R	65	135	66
SR 19 at W Ocala St (CR 450)/ Bulldog Ln	EBL/T/R	110	96	186
	WBL/T/R	1	122	119
	NBL	8	86	123
	NBT	222	310	515
	NBR	2	0	21
	SBL	8	11	32
	SBT/R	285	321	302
	SEL	48	43	79
	SER	0	0	0
SR 19 at E Collins St (CR 450)	WBL	132	N/A	142
	WBR	41	N/A	35
	NBT	83	N/A	96
	NBR	3	N/A	2
	SBL	21	N/A	35
	SBT	188	N/A	144

Source: VHB using Synchro Methodology

2040 Conditions with Retiming

For 2040, the results for the unsignalized intersections are provided in Table 19, while the results for the signalized intersections are provided in Table 20. The queue length analysis which was performed is included as Table 21.

When these results are compared to the 2040 baseline condition without improvements (see Section 3.5.2), it indicates the retiming results in the side streets generally having reduced delay, and the main street having a slight increase in delay. In terms of queuing, the analysis confirms the retiming reduces the length of many long queues, including those on SR 19.

Table 19: 2040 Projected Unsignalized Intersection Level of Service with Retiming

Intersection	Movement	AM Peak			Mid-Day			PM Peak		
		v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]
SR 19 at CR 450A	WBL	0.323	21.7	C	N/A	N/A	N/A	0.439	39.8	E
	WBR	0.130	10.7	B	N/A	N/A	N/A	0.271	15.9	C
	NBT	Note 1	Note 1	Note 1	N/A	N/A	N/A	Note 1	Note 1	Note 1
	NBR	Note 1	Note 1	Note 1	N/A	N/A	N/A	Note 1	Note 1	Note 1
	SBL	0.041	8.6	A	N/A	N/A	N/A	0.102	11.8	B
	SBT	Note 1	Note 1	Note 1	N/A	N/A	N/A	Note 1	Note 1	Note 1
SR 19 at Umatilla Blvd	NBL	0.001	8.8	A	0.000	0.0	A	0.001	8.3	A
	NBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBR	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	EBL	0.009	14.9	B	0.025	14.6	B	0.036	14.9	B
	EBR	0.000	0.0	A	0.000	0.0	A	0.000	0.0	A
SR 19 at Lake St	NBL	0.187	9.2	A	0.106	8.5	A	0.078	8.3	A
	NBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBR	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	EBL	0.024	17.2	C	0.012	15.7	C	0.012	15.6	C
	EBR	0.330	14.2	B	0.228	12.1	B	0.147	11.3	B

Note 1: Unopposed Movement
Source: VHB using HCM 2010 Methodology
1 Volume-to-capacity ratio
2 Average delay in seconds per vehicle
3 Level of service

Table 20: 2040 Projected Signalized Intersection Level of Service with Retiming

Intersection	Movement	AM Peak			Mid-Day			PM Peak		
		v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]
SR 19 at Guerrant St/ Cassady St	EBL/T/R	0.29	38.3	D	0.12	33.4	C	0.24	38.0	D
	WBL/T/R	0.51	40.7	D	0.62	39.0	D	0.53	41.0	D
	NBL	0.02	2.7	A	0.04	3.9	A	0.07	2.8	A
	NBT/R	0.21	3.2	A	0.34	5.1	A	0.40	4.0	A
	SBL	0.04	0.2	A	0.08	0.9	A	0.12	1.4	A
	SBT/R	0.32	0.6	A	0.29	0.6	A	0.26	0.5	A
	Total	**N/A**	**5.7**	**A**	**N/A**	**7.0**	**A**	**N/A**	**5.6**	**A**
SR 19 at W Ocala St (CR 450)/ Bulldog Ln	EBL/T/R	0.72	49.0	D	0.59	38.8	D	0.88	61.5	E
	WBL/T/R	0.11	34.6	C	0.75	49.7	D	0.68	41.4	D
	NBL	0.42	11.3	B	0.38	9.4	A	0.63	24.3	C
	NBT	0.43	10.6	B	0.59	12.2	B	0.82	24.3	C
	NBR	0.02	9.8	A	0.04	10.7	B	0.06	13.7	B
	SBL	0.04	8.6	A	0.05	13.4	B	0.30	18.2	B
	SBT/R	0.73	17.6	B	0.69	24.5	C	0.76	26.8	C
	SEL	0.60	59.6	E	0.52	49.7	D	0.70	64.6	E
	SER	0.01	41.8	D	0.00	41.6	D	0.00	40.4	D
	Total	**N/A**	**20.7**	**C**	**N/A**	**22.7**	**C**	**N/A**	**31.2**	**C**
SR 19 at E Collins St (CR 450)	WBL	0.78	44.7	D	N/A	N/A	N/A	0.80	45.1	D
	WBR	0.58	40.6	D	N/A	N/A	N/A	0.41	37.7	D
	NBT	0.37	7.8	A	N/A	N/A	N/A	0.50	9.6	A
	NBR	0.10	6.3	A	N/A	N/A	N/A	0.31	8.1	A
	SBL	0.10	5.0	A	N/A	N/A	N/A	0.24	6.7	A
	SBT	0.43	5.2	A	N/A	N/A	N/A	0.34	4.7	A
	Total	**N/A**	**13.0**	**B**	**N/A**	**N/A**	**N/A**	**N/A**	**12.8**	**B**

Source: VHB using HCM 2000 and 2010 Methodology
1 Volume-to-capacity ratio
2 Average delay in seconds per vehicle
3 Level of service

Table 21: 2040 Projected Signalized Intersection 95th Percentile Queues with Retiming

Intersection	Movement	AM Peak [feet]	Mid-Day [feet]	PM Peak [feet]
SR 19 at Guerrant St/ Cassady St	EBL/T/R	36	29	33
	WBL/T/R	106	142	104
	NBL	7	16	21
	NBT/R	84	160	186
	SBL	5	20	28
	SBT/R	117	222	181
SR 19 at W Ocala St (CR 450)/ Bulldog Ln	EBL/T/R	169	126	269
	WBL/T/R	0	172	179
	NBL	37	39	135
	NBT	289	389	587
	NBR	0	0	0
	SBL	9	13	34
	SBT/R	283	377	334
	SEL	50	46	92
	SER	0	0	0
SR 19 at E Collins St (CR 450)	WBL	141	N/A	152
	WBR	41	N/A	36
	NBT	51	N/A	246
	NBR	1	N/A	9
	SBL	23	N/A	39
	SBT	222	N/A	166

Source: VHB using Synchro Methodology

5.2.2 Add Turn Lanes at SR 19 and W Ocala St (CR 450)/Bulldog Ln/Umatilla Blvd

This improvement would add left turn lanes on W Ocala Street (CR 450) and Bulldog Lane at the intersection of SR 19. This would improve operations at the intersection, reducing delay for these two side streets.

To evaluate the impact of this improvement, a Synchro model was run under 2040 conditions with retiming. Table 22 indicates the operational results while Table 23 shows the queuing results. The other study intersections are not displayed in these tables as there are no noticeable changes as a result of this improvement. A copy of the Synchro output sheets is included in Appendix G.

As the tables indicate, when compared to the 2040 baseline condition without improvements, this improvement generally reduced delay and queue lengths on W Ocala Street (CR 450) and Bulldog Lane, while having no impact on SR 19.

Table 22: 2040 Projected Signalized Intersection Level of Service with Turn Lanes at W Ocala St/Bulldog Ln

Intersection	Movement	AM Peak			Mid-Day			PM Peak		
		v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]
SR 19 at W Ocala St (CR 450)/ Bulldog Ln	EBL	0.47	41.9	D	0.46	39.1	D	0.68	50.5	D
	EBT/R	0.33	39.8	D	0.20	36.2	D	0.54	40.6	D
	WBL	0.69	55.9	E	0.66	47.5	D	0.56	42.6	D
	WBT/R	0.03	37.5	D	0.24	36.5	D	0.39	38.1	D
	NBL	0.35	9.3	A	0.34	7.5	A	0.53	16.6	B
	NBT	0.40	8.9	A	0.55	10.1	B	0.74	17.7	B
	NBR	0.02	8.4	A	0.04	9.1	A	0.06	11.3	B
	SBL	0.04	7.5	A	0.04	11.5	B	0.22	14.2	B
	SBT/R	0.68	14.9	B	0.64	20.6	C	0.67	20.5	C
	SEL	0.56	53.1	D	0.44	46.3	D	0.51	44.1	D
	SER	0.01	41.5	D	0.00	41.0	D	0.00	38.8	D
	Total	**N/A**	**19.0**	**B**	**N/A**	**19.6**	**B**	**N/A**	**23.6**	**C**

Source: VHB using HCM 2000 Methodology
1 Volume-to-capacity ratio
2 Average delay in seconds per vehicle
3 Level of service

Table 23: 2040 Projected Signalized Intersection 95th Percentile Queues with Turn Lanes at W Ocala St (CR 450)/Bulldog Ln

Intersection	Movement	AM Peak [feet]	Mid-Day [feet]	PM Peak [feet]
SR 19 at W Ocala St (CR 450)/ Bulldog Ln	EBL	69	74	129
	EBT	75	54	117
	WBL	98	101	93
	WBT	0	59	89
	NBL	36	39	109
	NBT	285	389	231
	NBR	0	0	0
	SBL	8	13	28
	SBT/R	271	377	353
	SEL	50	46	70
	SER	0	0	0

Source: VHB using Synchro Methodology

5.2.3 Roundabout at SR 19 and W Ocala St (CR 450)/Bulldog Ln/Umatilla Blvd

This improvement would replace the traffic signal at the intersection of SR 19 and W Ocala Street (CR 450)/Bulldog Lane/Umatilla Boulevard with a roundabout.

A roundabout is a type of circular intersection in which traffic travels counterclockwise around a central island and entering traffic must yield to circulating traffic. When designed properly, a roundabout improves safety for all users and improves efficiency at the intersection by reducing delay and queuing.

The intersection of SR 19 at W Ocala Street (CR 450)/Bulldog Lane/Umatilla Boulevard is an excellent candidate for a roundabout. As an intersection with five approaches, there is more vehicular delay than a typical four-legged intersection, brought on by the need for more traffic signal phases. This longer than normal delay also results in longer queue lengths at this intersection. Furthermore, due to the atypical geometry of the five legs of the intersection, there are also driver expectancy issues which can result in more crashes than a typical intersection.

An analysis of a roundabout was performed for both 2021 and 2040 using the roundabout modeling software, SIDRA. Table 24 and Table 25 depict the projected LOS and queues, respectively, for 2021. Table 26 and Table 27 depict the projected LOS and queues, respectively, for 2040. A copy of the SIDRA output sheets are included in Appendix H.

When these results are compared to the 2021 and 2040 baseline conditions as well as the 2021 and 2040 conditions with retiming, the roundabout results in reduced delay and queues for all approaches and all time periods.

Prior to implementation, additional analyses and design will need to be performed to determine the suitability of a roundabout at this location.

Table 24: 2021 Projected Roundabout Level of Service

	AM Peak			Mid-Day			PM Peak		
Approach*	**v/c[1]**	**Delay[2]**	**LOS[3]**	**v/c[1]**	**Delay[2]**	**LOS[3]**	**v/c[1]**	**Delay[2]**	**LOS[3]**
South-Lane 1 (Inner)	0.122	10.5	B	0.184	11.0	B	0.272	11.8	B
South-Lane 2 (Outer)	0.361	4.8	A	0.484	5.0	A	0.658	6.1	A
East	0.177	10.4	B	0.258	12.2	B	0.300	12.6	B
North	0.695	8.2	A	0.644	9.6	A	0.676	10.5	B
Northwest	0.113	11.7	B	0.081	12.3	B	0.134	11.6	B
West	0.280	12.4	B	0.218	12.6	B	0.336	12.1	B
Total	**0.695**	**8.0**	**A**	**0.644**	**8.5**	**A**	**0.676**	**9.2**	**A**

*Note: Unlike the signalized LOS tables, this indicates which leg of the roundabout, not the direction of the movement.

Source: VHB using SIDRA Methodology

1 Volume-to-capacity ratio

2 Average delay in seconds per vehicle

3 Level of service

Table 25: 2021 Projected Roundabout 95th Percentile Queues

Movement	AM Peak [feet]	Mid-Day [feet]	PM Peak [feet]
South-Lane 1 (Inner)	16.7	27.2	40.8
South-Lane 2 (Outer)	67.2	105.6	168.9
East	19.0	29.3	35.8
North	197.5	172.6	186.5
Northwest	17.5	12.2	20.7
West	45.5	34.3	55.5

Source: VHB using SIDRA Methodology

Table 26: 2040 Projected Roundabout Level of Service

Approach*	AM Peak			Mid-Day			PM Peak		
	v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]
South-Lane 1 (Inner)	0.140	10.8	B	0.199	11.4	B	0.318	12.4	B
South-Lane 2 (Outer)	0.404	5.1	A	0.542	5.4	A	0.755	8.7	A
East	0.239	11.1	B	0.352	13.5	B	0.456	15.7	C
North-Lane 1 (Inner)	0.330	6.1	A	0.308	6.9	A	0.323	7.7	A
North-Lane 2 (Outer)	0.330	5.6	A	0.308	6.3	A	0.323	6.4	A
Northwest	0.116	9.3	A	0.100	10.4	B	0.150	9.7	A
West	0.348	11.0	B	0.293	11.4	B	0.455	12.0	B
Total	**0.404**	**7.1**	**A**	**0.542**	**7.8**	**A**	**0.755**	**9.6**	**A**

*Note: Unlike the signalized LOS tables, this indicates which leg of the roundabout, not the direction of the movement.

Source: VHB using SIDRA Methodology

1 Volume-to-capacity ratio

2 Average delay in seconds per vehicle

3 Level of service

Table 27: 2040 Projected Roundabout 95th Percentile Queues

Movement	AM Peak [feet]	Mid-Day [feet]	PM Peak [feet]
South-Lane 1 (Inner)	19.0	29.0	48.3
South-Lane 2 (Outer)	76.6	122.5	264.6
East	26.8	44.0	64.4
North-Lane 1 (Inner)	53.6	50.7	51.6
North-Lane 2 (Outer)	54.4	51.8	53.0
Northwest	11.6	10.2	15.6
West	40.0	32.6	61.1

Source: VHB using SIDRA Methodology

5.2.4 One-Way Pair

This improvement would introduce a one-way pair between W Ocala Street (CR 450)/Bulldog Lane and Lake Street. SR 19 would be converted into two lanes serving northbound traffic while Umatilla Boulevard would be converted into two lanes serving southbound traffic. Prior to implementation, additional analysis and design will need to be performed to determine the suitability of this treatment, particularly with regard to the rerouting of traffic.

As a long-term improvement, the one-way pair was analyzed for 2040 conditions. Table 28 depicts the results of the unsignalized intersection LOS while Table 29 depicts the signalized intersection LOS. The queue analysis is illustrated in Table 30. A copy of the Synchro output sheets is included in Appendix I.

When compared to 2040 baseline condition with retiming, the results indicate this improvement reduces delay and queue length for the SR 19 through movements.

Table 28: 2040 Projected Unsignalized Intersection Level of Service with One-Way Pair

Intersection	Movement	AM Peak			Mid-Day			PM Peak		
		v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]
SR 19 at CR 450A	WBL	0.316	21.2	C	N/A	N/A	N/A	0.427	38.2	E
	WBR	0.130	10.7	B	N/A	N/A	N/A	0.273	16.0	C
	NBT	Note 1	Note 1	Note 1	N/A	N/A	N/A	Note 1	Note 1	Note 1
	NBR	Note 1	Note 1	Note 1	N/A	N/A	N/A	Note 1	Note 1	Note 1
	SBL	0.041	8.7	A	N/A	N/A	N/A	0.102	11.8	B
	SBT	Note 1	Note 1	Note 1	N/A	N/A	N/A	Note 1	Note 1	Note 1
SR 19 at Lake St	NBL	0.188	9.2	A	0.104	8.5	A	0.078	8.3	A
	NBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBT	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	SBR	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
	EBL	0.024	17.2	C	0.012	15.7	C	0.012	15.6	C
	EBR	0.332	14.2	B	0.226	12.0	B	0.147	11.3	B

Note 1: Unopposed Movement
Source: VHB using HCM 2010 Methodology
1 Volume-to-capacity ratio
2 Average delay in seconds per vehicle
3 Level of service

Table 29: 2040 Projected Signalized Intersection Level of Service with One-Way Pair

Intersection	Movement	AM Peak			Mid-Day			PM Peak		
		v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]
SR 19 at Guerrant St/ Cassady St	EBL/T/R	0.27	37.6	D	0.11	32.6	C	0.23	37.4	D
	WBL/T/R	0.52	40.4	D	0.63	38.7	D	0.54	40.8	D
	NBL	0.02	8.9	A	0.05	9.9	A	0.08	4.5	A
	NBT/R	0.22	3.4	A	0.35	5.5	A	0.43	4.3	A
	SBL	0.04	12.8	B	0.08	19.0	B	0.12	7.2	A
	SBT/R	0.31	15.5	B	0.28	16.5	B	0.25	3.9	A
	Total	**N/A**	**13.7**	**B**	**N/A**	**13.4**	**B**	**N/A**	**7.0**	**A**
SR 19 at W Ocala St (CR 450)/ Bulldog Ln	EBL/T/R	0.60	39.6	D	0.53	35.8	D	0.75	43.0	D
	WBL/T/R	0.68	45.8	D	0.68	42.7	D	0.57	34.3	C
	NBL	0.12	2.1	A	0.19	1.8	A	0.27	2.5	A
	NBT/R	0.25	6.1	A	0.32	5.4	A	0.50	10.6	B
	SBL	0.04	6.5	A	0.05	7.0	A	0.17	10.7	B
	SBT/R	0.35	8.0	A	0.29	8.0	A	0.36	16.5	B
	Total	**N/A**	**13.6**	**B**	**N/A**	**12.4**	**B**	**N/A**	**17.5**	**B**
SR 19 at E Collins St (CR 450)	EBL/T	0.18	38.2	D	0.37	41.4	D	0.24	38.8	D
	WBT	0.38	29.3	C	0.38	28.5	C	0.34	25.9	C
	WBR	0.07	26.7	C	0.07	25.8	C	0.05	23.3	C
	NBL	0.04	4.2	A	0.04	4.4	A	0.08	3.8	A
	NBT	0.21	4.6	A	0.21	4.6	A	0.30	4.9	A
	NBR	0.06	1.3	A	0.13	1.2	A	0.19	1.7	A
	Total	**N/A**	**13.9**	**B**	**N/A**	**15.1**	**B**	**N/A**	**11.1**	**B**
Umatilla Blvd at W Collins St	EBT/R	0.03	26.5	C	0.03	25.5	C	0.03	23.2	C
	WBL/T	0.70	20.1	C	0.70	19.1	B	0.73	25.8	C
	SBL	0.06	6.5	A	0.14	7.6	A	0.11	8.6	A
	SBT/R	0.27	7.7	A	0.18	7.6	A	0.23	9.4	A
	Total	**N/A**	**11.1**	**B**	**N/A**	**11.5**	**B**	**N/A**	**14.8**	**B**

Source: VHB using HCM 2010 Methodology
1 Volume-to-capacity ratio
2 Average delay in seconds per vehicle
3 Level of service

Table 30: 2040 Projected Signalized Intersection 95th Percentile Queues with One-Way Pair

Intersection	Movement	AM Peak [feet]	Mid-Day [feet]	PM Peak [feet]
SR 19 at Guerrant St/ Cassady St	EBL/T/R	36	28	33
	WBL/T/R	105	141	104
	NBL	7	16	22
	NBT/R	90	168	200
	SBL	2	18	4
	SBT/R	91	166	15
SR 19 at W Ocala St (CR 450)/Bulldog Ln	EBL/T/R	128	113	184
	WBL/T/R	121	140	130
	NBL	5	7	18
	NBT/R	133	175	266
	SBL	11	12	41
	SBT/R	108	119	175
SR 19 at E Collins St (CR 450)	EBL/T	80	162	125
	WBT	117	121	115
	WBR	34	34	27
	NBL	16	17	16
	NBT	50	53	40
	NBR	4	4	0
Umatilla Blvd at W Collins St	EBT/R	20	20	18
	WBL/T	63	62	220
	SBL	36	81	66
	SBT/R	135	87	120

Source: VHB using Synchro Methodology

5.2.5 Road Diet

This improvement would implement a road diet along a portion of SR 19. A road diet involves reducing the number of travel lanes in order to provide accommodations for other users. In this case, the road diet would involve removing one travel lane in each direction along SR 19 and adding a dedicated bike lane in each direction. The existing on-street parking will remain in place. The road diet would begin north of Golden Gem Drive and extend north to the intersection of W Ocala Street (CR 450)/Bulldog Lane. The only intersection within these limits which would experience geometric changes would be SR 19 at Guerrant Street/Cassady Street. This intersection was analyzed for the 2021 and 2040 conditions, assuming the following lane geometry:

Northbound: 1 left turn lane, 1 shared through/right turn lane, 1 bicycle lane
Southbound: 1 left turn lane, 1 shared through/right turn lane, 1 bicycle lane
Eastbound: 1 shared left/through/right lane
Westbound: 1 shared left/through/right lane

Table 31 illustrates the results of the signalized intersection LOS for the 2021 condition. As can be expected, the northbound and southbound volume-to-capacity (v/c) ratios increase considerably as compared to the 2021 Conditions with Retiming scenario. This is a direct result of eliminating one of the through lanes in the northbound and southbound directions. Other than the increase in the v/c ratios, all other parameters remain comparable to the 2021 Retiming conditions. The overall LOS for the intersection is LOS A in the AM, Mid-Day, and PM peak hours. The 2021 queue analysis is depicted in Table 32. Again, the only movements with a considerable change in queue length from the 2021 Retiming scenario are the northbound and southbound through movements, which will increase due to the road diet. The northbound and southbound left turn lanes will need to be lengthened in order for left turning vehicles to bypass the through lane queue. A copy of the Synchro output sheets for this analysis is included in Appendix J.

Table 31: 2021 Projected Signalized Intersection Level of Service with Road Diet

Intersection	Movement	AM Peak			Mid-Day			PM Peak		
		v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]
SR 19 at Guerrant St/ Cassady St	EBL/T/R	0.28	39.1	D	0.11	34.6	C	0.24	38.9	D
	WBL/T/R	0.50	41.4	D	0.61	40.1	D	0.52	41.8	D
	NBL	0.01	2.4	A	0.03	3.5	A	0.06	2.6	A
	NBT/R	0.37	3.5	A	0.59	6.5	A	0.71	6.9	A
	SBL	0.03	0.6	A	0.08	3.1	A	0.12	5.8	A
	SBT/R	0.56	1.5	A	0.51	1.4	A	0.45	1.0	A
	Total	**N/A**	**6.3**	**A**	**N/A**	**8.0**	**A**	**N/A**	**7.5**	**A**

Source: VHB using HCM 2010 Methodology
1 Volume-to-capacity ratio
2 Average delay in seconds per vehicle
3 Level of service

Table 32: 2021 Projected Signalized Intersection 95th Percentile Queues with Road Diet

Intersection	Movement	AM Peak [feet]	Mid-Day [feet]	PM Peak [feet]
SR 19 at Guerrant St/ Cassady St	EBL/T/R	34	27	34
	WBL/T/R	100	133	102
	NBL	6	14	16
	NBT/R	182	395	495
	SBL	14	6	27
	SBT/R	517	91	359

Source: VHB using Synchro Methodology

The 2040 intersection analysis and queue analysis are depicted in Table 33 and Table 34, respectively. Similar to the 2021 scenario comparison, the only impact the road diet has on the 2040 Conditions with Retiming is the increase in the v/c ratios for the northbound and southbound through movements. In the 2040 baseline condition, the intersection experiences an overall LOS A in the AM, Mid-Day, and PM peak hours. As a result of the road diet, the northbound and southbound through queues will increase significantly from the 2040 Retiming scenario; however, when compared to the 2021 Road Diet analysis, the northbound queue increases by approximately 150 feet and the longest southbound queue will not exceed

the longest 2021 southbound queue. A copy of the Synchro output sheets for this analysis is included in Appendix J.

Table 33: 2040 Projected Signalized Intersection Level of Service with Road Diet

Intersection	Movement	AM Peak			Mid-Day			PM Peak		
		v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]	v/c[1]	Delay[2]	LOS[3]
SR 19 at Guerrant St/ Cassady St	EBL/T/R	0.29	38.6	D	0.12	33.8	C	0.25	38.4	D
	WBL/T/R	0.52	41.0	D	0.64	39.6	D	0.54	41.5	D
	NBL	0.02	2.6	A	0.04	3.8	A	0.07	2.7	A
	NBT/R	0.41	3.9	A	0.65	7.9	A	0.79	9.2	A
	SBL	0.04	0.9	A	0.10	4.7	A	0.17	9.7	A
	SBT/R	0.61	2.0	A	0.57	1.8	A	0.50	1.2	A
	Total	**N/A**	**6.7**	**A**	**N/A**	**8.9**	**A**	**N/A**	**8.9**	**A**

Source: VHB using HCM 2010 Methodology
1 Volume-to-capacity ratio
2 Average delay in seconds per vehicle
3 Level of service

Table 34: 2040 Projected Signalized Intersection 95th Percentile Queues with Road Diet

Intersection	Movement	AM Peak [feet]	Mid-Day [feet]	PM Peak [feet]
SR 19 at Guerrant St/ Cassady St	EBL/T/R	37	30	35
	WBL/T/R	109	150	112
	NBL	7	15	18
	NBT/R	208	453	636
	SBL	14	16	3
	SBT/R	449	300	41

Source: VHB using Synchro Methodology

5.3 Bicycle Improvements

For this analysis, it was assumed bicycle facilities would be provided along the full length of the corridor. The final bicycle improvements will be decided upon during a later phase of this project.

In the Future Build condition, there are two potential roadway cross-sections which could be selected for SR 19 between Golden Gem Drive and W Ocala Street (CR 450)/Bulldog Lane. At this time, it is not known whether the four-lane divided section will be maintained or the road diet will be implemented to reduce the cross-section to a two-lane divided roadway. The LOS for the bicycle mode is based on the number of vehicles traveling on the roadway (which is determined by the number of travel lanes) and the coverage of available bicycle lanes provided along the corridor. Table 35 provides the bicycle LOS analysis summary assuming the existing cross-section will be maintained while Table 36 provides the bicycle LOS analysis assuming a two-lane cross-section.

When compared to 2040 baseline conditions, with the implementation of bike lanes throughout the study corridor, the bicycle LOS analysis indicates the LOS for cyclists improves from LOS E or better between CR 450A and Bulldog Way, to LOS C or better.

Table 35: 2040 Projected Bicycle Mode Level of Service (4-Lane Divided Cross-Section)

Roadway/Segment	No. of Lanes[1]	Bike Lane Coverage[1]	Daily[2]		AM Peak Hour Directional Traffic[3]			PM Peak Hour Directional Traffic[3]		
			AADT	LOS	Volume	Dir	LOS	Volume	Dir	LOS
SR 19										
South of CR 450A*	4D	50-84%	20,933	D	955	SB	D	1,088	NB	E
CR 450A to Guerrant St/ Cassady St	4D	85-100%	19,040	C	710	SB	B	886	NB	B
Guerrant St/Cassady St to W Ocala St (CR 450)/Bulldog Ln	4D	85-100%	19,040	C	710	SB	B	886	NB	B
W Ocala St (CR 450)/Bulldog Ln to E. Collins St (CR 450)	2D	85-100%	14,000	C	602	SB	C	738	NB	C
E. Collins St (CR 450) to Bulldog Way	2D	85-100%	14,000	C	602	SB	C	738	NB	C
North of Bulldog Way	2D	0-49%	11,141	E	479	SB	E	526	NB	E
Umatilla Boulevard										
North of SR 19	2U	0-49%	1,606	C	59	SB	C	99	SB	C

Source: Compiled by VHB.
1 FDOT Straight Line Diagrams (SLD)
2 FDOT FTI and supplemental daily counts
3 Turning movement counts within the roadway segment
Note: Level of service for the bicycle mode in this table is based on number of motorized vehicles, not number of bicyclists using the facility. Although there are no specific level of service standards established for bicyclists or other non-motorized vehicles, the maximum service volumes for LOS D are used for comparison purposes.
*Note: This segment falls outside the Study Area.

As Table 35 illustrates, the bicycle LOS associated with the addition of bike lanes along SR 19 between CR 450A and W Ocala Street (CR 450)/Bulldog Lane with the existing cross-section is LOS C in the daily condition, and LOS B in both the AM and PM peak hours. In Table 36, it is apparent with the road diet in place, the bicycle LOS degrades to LOS C in the AM and PM peak hours for this segment. Regardless of the roadway cross-section, the implementation of dedicated bicycle lanes will provide cyclists with improved accommodations when riding along the corridor.

Table 36: 2040 Projected Bicycle Mode Level of Service (2-Lane Divided Cross-Section)

Roadway/Segment	No. of Lanes[1]	Bike Lane Coverage[1]	Daily[2]		AM Peak Hour Directional Traffic[3]			PM Peak Hour Directional Traffic[3]		
			AADT	LOS	Volume	Dir	LOS	Volume	Dir	LOS
SR 19										
South of CR 450A*	4D	50-84%	20,933	D	955	SB	D	1,088	NB	E
CR 450A to Guerrant St/ Cassady St	2D	85-100%	19,040	C	710	SB	C	886	NB	C
Guerrant St/Cassady St to W Ocala St (CR 450)/Bulldog Ln	2D	85-100%	19,040	C	710	SB	C	886	NB	C
W Ocala St (CR 450)/Bulldog Ln to E. Collins St (CR 450)	2D	85-100%	14,000	C	602	SB	C	738	NB	C
E. Collins St (CR 450) to Bulldog Way	2D	85-100%	14,000	C	602	SB	C	738	NB	C
North of Bulldog Way	2D	0-49%	11,141	E	479	SB	E	526	NB	E
Umatilla Boulevard										
North of SR 19	2U	0-49%	1,606	C	59	SB	C	99	SB	C

Source: Compiled by VHB.
1 FDOT Straight Line Diagrams (SLD)
2 FDOT FTI and supplemental daily counts
3 Turning movement counts within the roadway segment
Note: Level of service for the bicycle mode in this table is based on number of motorized vehicles, not number of bicyclists using the facility. Although there are no specific level of service standards established for bicyclists or other non-motorized vehicles, the maximum service volumes for LOS D are used for comparison purposes.
*Note: This segment falls outside the Study Area.

5.4 Pedestrian Improvements

For this analysis, it was assumed sidewalks or other pedestrian facilities would be provided along the full length of the corridor. The final pedestrian improvements will be decided upon during a later phase of this project. As indicated in Table 37, the implementation of a sidewalk throughout the corridor will provide pedestrians with LOS D or better along SR 19.

Table 37: 2040 Projected Pedestrian Mode Level of Service

Roadway/Segment	No. of Lanes[1]	Sidewalk Coverage[1]	Daily[2]		AM Peak Hour Directional Traffic[3]			PM Peak Hour Directional Traffic[3]		
			AADT	LOS	Volume	Dir	LOS	Volume	Dir	LOS
SR 19										
South of CR 450A*	4D	0-49%	20,933	F	955	SB	E	1,088	NB	F
CR 450A to Guerrant St/ Cassady St	4D	85-100%	19,040	C	710	SB	C	886	NB	C
Guerrant St/Cassady St to W Ocala St (CR 450)/Bulldog Ln	4D	85-100%	19,040	C	710	SB	C	886	NB	C
W Ocala St (CR 450)/Bulldog Ln to E. Collins St (CR 450)	2D	85-100%	14,000	D	602	SB	D	738	NB	D
E. Collins St to Bulldog Way	2D	85-100%	14,000	D	602	SB	D	738	NB	D
North of Bulldog Way	2D	85-100%	11,141	D	479	SB	C	526	NB	C
Umatilla Boulevard										
North of SR 19	2U	50-84%	1,606	D	59	SB	C	99	SB	D

Source: Compiled by VHB.
1 FDOT Straight Line Diagrams (SLD)
2 FDOT FTI and supplemental daily counts
3 Turning movement counts within the roadway segment
Note: Level of service for the pedestrian mode in this table is based on number of motorized vehicles, not number of pedestrians using the facility. Although there are no specific level of service standards established for pedestrians or other non-motorized vehicles, the maximum service volumes for LOS D are used for comparison purposes.
*Note: This segment falls outside the Study Area.

5.5 Transit Improvements

Transit improvements to be identified as part of this study will include identifying bus stops in need of accessibility improvements (i.e., landing pads, sidewalks) or amenities (e.g., benches and shelters). A more detailed bus stop improvement analysis will be conducted in the next phase of this project.

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Chapter Six: Next Steps

6.1 Summary

This report served several purposes. First, it summarized the key findings from the existing conditions effort. Second, it presented the analysis of the 2021 and 2040 no build future conditions for the various modes. Third, it identified needs based on this future conditions assessment. And finally, it presented preliminary improvements and the results of the evaluation which was conducted.

6.2 Next Steps

The next steps for this effort are as follows:

- Develop the Purpose and Need for this project based on the findings contained in Chapter 4 of this report
- Refine and finalize the list of improvements based on the feedback received from the public workshop to be held in April 2017
- Evaluate all the improvements and develop an implementation package of improvements, which will be documented in the final report

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