

DRAFT
**ROADWAY CONCEPTUAL ANALYSIS
REPORT**

**McCulloch Road Widening
From N. Orion Boulevard to N. Tanner Road
Orange County, Florida**

Prepared For:



**Orange County Board of County Commissioners
Orange County, Florida**

County Contract # Y20-832-CN

Prepared By:

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PROFESSIONAL ENGINEERING CERTIFICATE ROADWAY CONCEPTUAL ANALYSIS REPORT

Project: McCulloch Road

Orange County Project No.: Y20-832-CN

This preliminary engineering report contains engineering information that fulfills the purpose and needs for the McCulloch Road Roadway Conceptual Analysis Study from N. Orion Blvd to N. Taner Road in Orange County, Florida. I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of transportation engineering as applied through professional judgement and experience.

I hereby certify that I am a registered professional engineer in the State of Florida practicing with Dewberry Engineers Inc., and that I have prepared or approved the evaluation, findings, opinions, conclusions or technical advice for this project.

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Executive Summary

The study started as a Roadway Conceptual Analysis (RCA) study but was completed as a Project Development and Environment (PD&E) Study. In addition, North Orion Boulevard was renamed during the study to Ken Dixon Way. References for these two items were not updated in this document to be consistent with the other supporting documentation prepared for the study.

ES.1 Introduction

Orange County has conducted a Roadway Conceptual Analysis (RCA) study for McCulloch Road from North Orion / Lockwood Boulevard to North Tanner Road. The jurisdictional boundary line between Orange County and Seminole County is aligned along McCulloch Road and the northern portion of public road right-of-way (ROW) is in Seminole County with the southern portion of public road ROW in Orange County. Orange and Seminole County have an interlocal agreement for the maintenance of McCulloch Road and coordination with Seminole County Public Works was provided during the study.

The objective of the RCA is to identify a preferred improvement alternative to address the current and future transportation needs along the corridor. The preferred improvements identified in this report will serve as the basis for the subsequent design of the roadway improvements. This RCA Report summarizes the essential components of the study, including public involvement, data collection, traffic analysis, roadway design, drainage design, and environmental impacts.

ES.2 Purpose and Need for Improvement

The purpose and need for the project are based on three key factors: 1) provide traffic capacity to meet social/economic demands, 2) be consistent with transportation plans, and 3) enhance safety. This segment of McCulloch Road is currently operating at an acceptable level of service (LOS), but by the design year 2048, McCulloch Road within project limits will operate at an unacceptable LOS F. Roadway improvements are needed to provide an acceptable LOS.

The widening of McCulloch Road is included in the Orange County Capital Improvement Program (CIP), the Orange County 2030 Long-Range Transportation Plan (LRTP), and the Orange County Ten-Year Roadway Plan.

Crash reports for the five-year period between December 2016 and November 2021 were obtained and reviewed. A total of 166 crashes occurred within the study corridor. Forty-one (41) crashes occurred at the Orion Rd/Lockwood Blvd intersection over the three-year period, and fifty (50) crashes occurred along the segment from N. Orion Rd/Lockwood Blvd. to Worchester Dr. Capacity and intersection improvements will enhance safety along the corridor.

ES.3 Existing Conditions

Within the project limits, McCulloch Road is a two-lane undivided curbed roadway and is classified as an Urban Collector with a posted speed and design speed of 45 MPH. The area surrounding the corridor includes the northern entrance of the UCF campus and UCF stadium, Orange/Seminole Fire Rescue Station 65, and residential communities (University Estates, Madison Park, Hawthorne Glen). Based on the area characteristics, the recommended FDOT context classification is C3R – Suburban Residential. LYNX does not currently provide bus service along McCulloch Road.

The project is located within Basin 19 of the Econlockhatchee River Nested cumulative impact basin, within the jurisdiction of the St. Johns River Water Management District (SJRWMD). There are adjacent wetland systems, a wildlife crossing, and a crossing of a tributary of the Little Econlockhatchee River and its Riparian Habitat Protection Zone (RHPZ) that may require mitigation for any impacts to those

systems.

ES.4 Traffic Analysis

Detailed project traffic analyses are provided in the *Design Traffic Technical Memorandum (DTTM)*. These documents include an analysis of the existing traffic conditions of the area as well as Year 2048 forecasts of future traffic demands. Based on these demands, four-lane roadway improvements are recommended to provide improved traffic operations by providing an acceptable level of service along the corridor. A summary of the traffic analyses is included in Section 5.

ES.5 Alternatives

To satisfy the forecasted traffic demands and provide multimodal accommodation for McCulloch Road, the proposed typical section will consist of two 11-foot travel lanes in each direction separated by a raised median. Type E curb and gutter will be used along the median and Type F curb and gutter is proposed along the outside lanes. A six-foot sidewalk will be located on the north side of the roadway while a 10-foot path will be provided along the south side of McCulloch Road.

The proposed typical sections require a right-of-way width varying from 94 to 106 feet. The existing right-of-way width varies from 90 to 120 feet. Most of the existing right-of-way is available to accommodate the proposed improvements with minimal takings. The additional right-of-way needs are primarily from common areas of the adjacent subdivisions.

Two Build Alternatives – Typical Section 1 and Typical Section 2 - were developed for developed for evaluation. The typical sections were developed based on current complete streets considerations and design criteria elements. Alternative Typical Section 1 includes the reconstruction of the entire roadway, while Alternative Typical Section 2 utilizes the existing roadway for the eastbound lanes and constructs the two parallel westbound lanes.

An evaluation matrix was developed to compare the No-Build Alternative and two Build Alternatives. The matrix, shown in **Table ES.1**, considers the social, natural, and physical impacts, and the capital costs of the alternatives.

Table ES.1 Alternatives Evaluation Matrix

Criteria	No Build	Alternative 1	Alternative 2
Property Impacts			
R/W Impacts (Ac)	0	6.7	6.3
Parcels Impacted	0	15	13
Residential Relocations	0	0	0
Business Relocations	0	0	0
Social, Natural & Physical Impacts			
Social and Neighborhood	None	Low	Low
Potential Species Impacts	None	None	None
Potential Contamination Sites (Medium/High)	0	0	0

Criteria	No Build	Alternative 1	Alternative 2
Wetland Impacts (Ac)	0	0.4	0.3
Potential Impacts to Cultural Resources	None	None	None
Estimated Costs			
Design (10% of Construction)	No Cost	\$2,599,000	\$2,129,000
Right-of-Way	No Cost	\$7,370,000	\$6,930,000
Wetland Mitigation	No Cost	\$56,000	\$42,000
Construction	No Cost	\$25,992,000	\$21,291,000
Construction Engineering & Inspection (12% of Construction)	No Cost	\$3,119,000	\$2,555,000
Total Cost	No Cost	\$39,136,000	\$32,947,000

ES.6 Preferred Alternative

The preferred typical section alternative is Alternative Typical Section 2, which maximizes use of the existing right-of-way and drainage infrastructure and minimizes impacts. The preferred typical section is shown in **Figure ES.1**, and contains the following design elements:

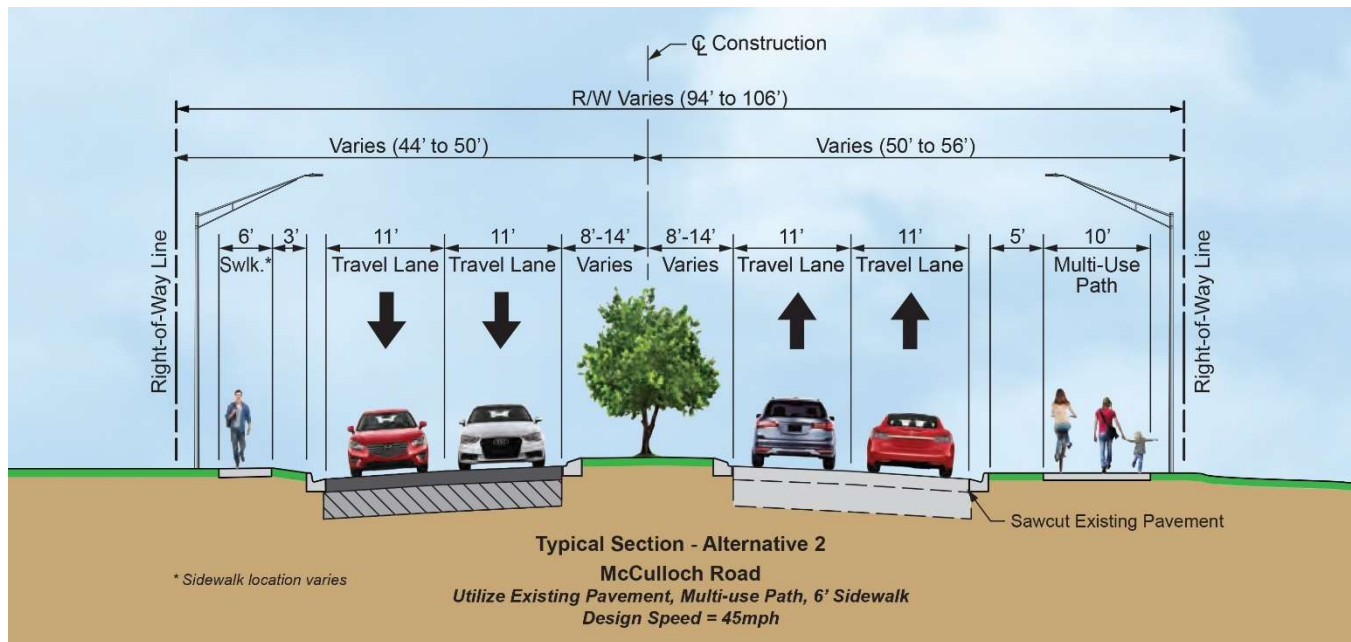
- Four 11-foot travel lanes
- A six-foot sidewalk located on one north side of the roadway and 10-foot multi-use path the south side
- A 16 to 22-foot raised median with Type E curb and gutter to include street trees
- Type F curb and gutter along the outside lanes with grassed utility strips between the back of curb and the sidewalk or path
- A grass strip between the path or sidewalk with the right-of-way line of varying width
- A proposed right-of-way width of 94 to 106 feet

ES.7 Public Involvement

Critical to the success of this project is the feedback received from the local community and stakeholders. A Public Involvement Plan (PIP) was prepared and submitted to Orange County for approval in November 2021.

The PIP for this RCA study establishes the framework for informing and engaging elected and appointed officials, agencies, businesses, residents, advocacy groups, community asset representatives, and interested parties within the RCA study area. This PIP also describes opportunities for stakeholders to share their ideas and concerns with the study team, thus creating an open and transparent flow of information between the study team and those affected by the proposed improvements in the McCulloch Road area. Stakeholder contributions to this study will ensure that a final set of recommendations will have community acceptance while also being technically sound. This PIP was updated as key outreach activities are completed during the RCA study.

Figure ES.1: Preferred Build Alternative: Typical Section 2



ES.8 Conclusions and Recommendations

The objective of the McCulloch Road RCA is to develop and evaluate alternatives for improvements to McCulloch Road from North Orion / Lockwood Boulevard to North Tanner Road / Old Lockwood Road in order to address the current and future transportation needs along the corridor. The preferred improvements identified in this report will serve as the basis for the subsequent design of the roadway improvements.

The development of the proposed improvements incorporated the insights from planning, engineering, and the public to refine the alternatives and to ultimately advance a preferred alternative. It is recommended that the preferred alternative detailed in Section 7 of this report be advanced to the design phase.

Commitments:

1. A Public Involvement Plan will be continued through the remaining phases of the project.
2. Reevaluate the intersection configuration at the following two locations:
 - a. Worchester Drive/Amour de Flame Way and McCulloch Road be monitored for a signal based on traffic demand at that time.
 - b. Tanner Road/Old Lockwood Boulevard and McCulloch Road if eastbound dual right turn lanes can be replaced with a single right turn lane.

1.0 Introduction

Orange County conducted a Roadway Conceptual Analysis (RCA) for McCulloch Road from North Orion / Lockwood Boulevard to North Tanner Road which is located in northeast Orange County (Figure 1.1), a distance of 1.1 miles in length. Existing McCulloch Road is a two-lane, urban collector roadway located in a suburban area of northeast Orange County in Commission District Five. The roadway alignment is straight, and the corridor is surrounded by a mix of housing developments, wetlands, conservation areas, and some commercial development near both ends of the project.

Figure 1.1: Project Location Map



Orange County's RCA process applies a comprehensive interdisciplinary approach, combining the strengths of engineering and transportation planning disciplines in the initial development phases of Orange County's major roadway improvement projects. The interdisciplinary approach also seeks to assure early and systematic coordination with all affected County Departments and Divisions, the appropriate state and local entities, and the citizenry.

The resulting effort is to accurately gather and convey information pertinent to the development of the project, thereby identifying viable opportunities to expedite or advance the project design and construction phases. This contract also includes a commensurate public involvement effort to provide citizens with clear and concise information regarding the overall improvements and to receive input regarding alternatives and impacts.

This RCA documents the existing conditions along McCulloch Road and identifies various characteristics within the study area that may influence the development of alternatives and proposed improvements. The corridor analysis activities include an examination of existing traffic demands, land use and development patterns, and the presence of any environmental, cultural, archaeological/historical, hydrologic, and natural sensitive areas within the corridor.

The existing traffic volume along McCulloch Road ranges from approximately 13,600 AADT to 16,600 AADT and operates at LOS C to D. Traffic is expected to increase in the future, influenced in part by new

developments within Orange and Seminole County. By the Design Year 2048, traffic is forecasted to reach 24,600 AADT to 30,000 AADT and operate at LOS F. These traffic demands on McCulloch Road will exceed the capacity of the current two-lane facility and create congestion and delays.

1.1 Purpose of Report

The purpose of this RCA Report is to present an overview of existing conditions, document the findings of the engineering and environmental studies conducted for this project, summarize the results of the alternatives evaluation, and identify the recommended improvements. Additional information will be provided regarding the decisions made regarding typical roadway sections, a summary of existing and future traffic conditions and a comparative analysis of improvement alternatives that would satisfy existing and future transportation demands.

Potential typical section and alignment alternatives were developed based upon the engineering and environmental data collected, a review of the Orange County Comprehensive Plan and the application of current roadway design standards. The alternatives were evaluated based on impacts resulting from the alignment locations and configurations. Each alternative was assessed using evaluation criteria developed for that purpose. From that comparative evaluation, the preferred typical section, roadway alignment, and stormwater management system were identified.

This RCA Study includes an analysis of existing and projected traffic conditions, development of alignment and typical section alternatives, an evaluation of impacts to the social, natural, and physical environment, and a public involvement program. This report has been prepared to assist Orange County in identifying a recommended design concept and will serve as the document of record for support of subsequent engineering decisions for the final design, right-of-way acquisition, and construction phases that follow.

The recommended conceptual roadway alignment plans, included in **Appendix A** are an integral part of this document. The concept plans reflect specific details concerning each area of the project and will supplement information that is contained in this report.

2.0 Purpose and Need for Project

The purpose and need for the proposed project improvements are determined based on several factors including traffic capacity, land use, demographics, social/economic demands, consistency with transportation plans, and safety considerations. Each of these factors are discussed below.

2.1 Traffic Capacity

A *Design Traffic Technical Memorandum (DTTM)* was developed to estimate future traffic demands. Several scenarios were prepared for the No Build and Build conditions for the years 2028, 2038, and 2048.

Without improvements, McCulloch Road will operate at an unacceptable LOS F by the design year 2048 (see Figure 2.1). The roadway segments and intersections were analyzed using the procedures of the Highway Capacity Manual. The No Build analysis used forecasted traffic volumes applied against the existing travel lane conditions.

All project segments and intersections have unacceptable LOS in the design year 2048 and without capacity improvements. Capacity improvements are needed to achieve an acceptable level of service along McCulloch Road.

2.2 Land Use

The Orange County Future Land Use Map indicates that land use along the south side of the McCulloch Road corridor is designated as predominantly Low Density Residential or Institutional. While the Seminole County Future Land Use Map indicates that the land use along the north side of the road is primarily planned development and higher intensity planned development, transitional.

2.3 Demographics

Demographic data from the US Census 5-year American Community Survey (2019-2023 Estimated) was used to analyze the demographic conditions of the study area.

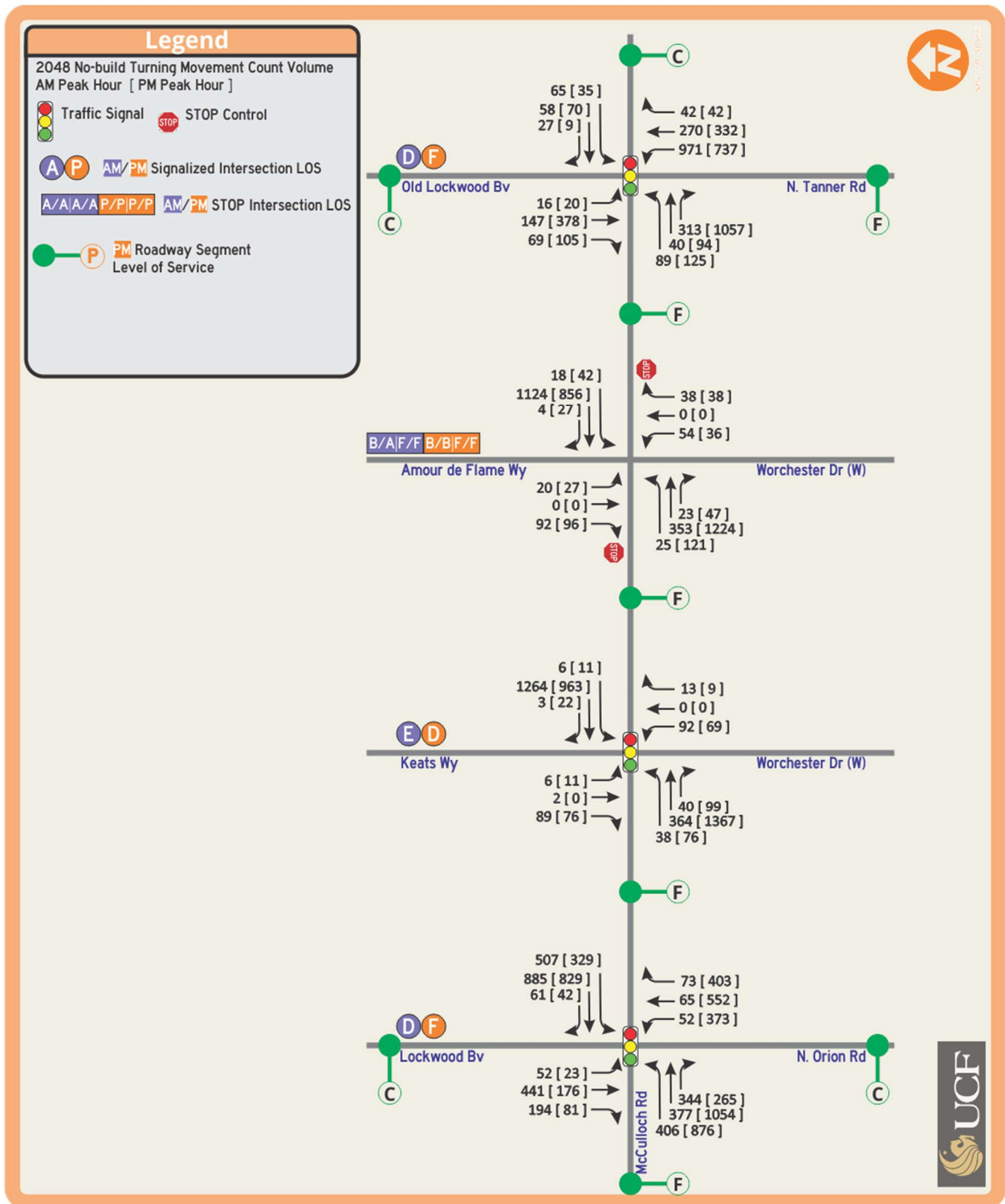
The McCulloch Road corridor passes through two US Census Block Groups within the study area. The total population of these block groups is 24,665 people. Approximately 70% of this population identifies themselves as 'White Alone'. The remainder of the population identifies themselves as 'Asian Alone' (5%), 'Black African American Alone' (7%), 'Some Other Race Alone' (4%), 'Two or More Races' (14%), and American Indian and Alaska Native Alone' (0.2%). Approximately 21% of the population identifies as having Hispanic or Latino origins.

Within the project block groups there are 3,706 total households. Of these, there are 100 households that fall below the poverty line, approximately 2.7%. The average median household income within the project block groups is \$126,560, however, individual median household incomes of block groups range from \$105,345 to \$147,774. The average median age within the project block groups is 32.5 and approximately 8% of the population is over the age of 65.

Socioeconomic Data

Socioeconomic data for the project area were derived using census tract-level data. The most recent data were used for each socioeconomic indicator. In 2023 data, the project was within Census Tract 165.14 in Orange County, Florida and Census Tract 213.16 in Seminole County Florida. The project is located approximately 13 miles east of downtown Orlando. The information gathered included general population, demographics, environmental justice, limited English proficiency, and access to personal vehicle data.

Figure 2.1: 2048 No Build Segment and Intersection Analysis



General Population, Economics, and Housing Data

The following data was pulled from the 2023 American Community Survey (ACS) 5-year estimates for Census Tracts 165.14, and 213.16, via Census Reporter. The data include information such as the median age, percentage of population below the poverty line, median household income, number of persons per household, occupation of housing units, and percentage of population born outside of the United States:

- The median age is 32.5 years old.
- 2.7% of the population is below the poverty line.
- The median household income is \$126,560.
- There is an average of 3.0 persons per household.
- 94% of households are occupied.
- 13.7% of the population was born outside of the United States.

Environmental Justice (EJ) Community Status

The 2023 American Community Survey (ACS) 5-year estimates for Census Tract 165.14 and 213.16 included information such as the percentage of the population who are people of color, below poverty level, limited English-speaking, or who have less than a high school education:

- 30.0% of the population is a minority.
- 2.7% of the population is below poverty level.
- 3.9% of households are limited English-speaking households.
- 3.5% of population 25 years and over with less than a high school education.

Limited English Proficiency (LEP)

The data from the 2023 American Community Survey (ACS) 5-year estimates, for Census Tract 165.14 and 213.16 indicate that 3.9% of adults have limited English proficiency (LEP), that is, who speak English less than “very well.” Of those adults with LEP, 86.1% speak Spanish and 13.9% speak other languages.

2.4 Consistency with Transportation Plans

The widening of McCulloch Road, from North Orion / Lockwood Boulevard to North Tanner Road, is included in the County’s Long Range Transportation Plan. The improvements to McCulloch Road are consistent with the goals, objectives, and policies of the adopted Orange County Comprehensive Plan. Improvements to McCulloch Road, from North Orion Boulevard to North Tanner Road are included in the Orange County’s long-term 10-year schedule of capital improvements.

The County’s Transportation Element Future Conditions Number of Lanes 2030 Map indicates McCulloch Road is to be improved to a four-lane section. Other planned transportation improvements in the vicinity of McCulloch Road include:

- East Orange Trail – This trail is planned to coincide with McCulloch Road improvements and is to be constructed in the McCulloch Road right-of-way
- SR 434 safety upgrades from McCulloch Road to Remington Drive.

2.5 Safety

A historical crash review was performed for the corridor to identify vehicular crash patterns and hotspots. To identify crash patterns along the corridor, crash data was obtained from the Orange County Traffic Engineering Division for vehicular crashes for the five years (December 2016 to November 2021) along McCulloch Road from North Orion Boulevard to North Tanner Road.

The crash data was analyzed by Roadway Segment and at the four intersections within the project

limits. A total of 166 crashes occurred within the study corridor. Forty-one (41) crashes occurred at the North Orion Blvd intersection, 6 crashes occurred at Worchester Dr, 9 crashes occurred at Amour De Flame Way and 28 crashes occurred at the North Tanner Rd intersection over the five-year period. In addition, fifty (50) crashes occurred along the segment from North Orion Blvd. to Worchester Dr, 14 occurred in the segment from Worchester Dr to Amour De Flame Way and 18 crashes occurred in the segment from Amour De Flame Way to North Tanner Rd. Capacity and intersection improvements will enhance safety along the corridor.

3.0 Existing Conditions

3.1 Roadway Characteristics

3.1.1 Functional Classification

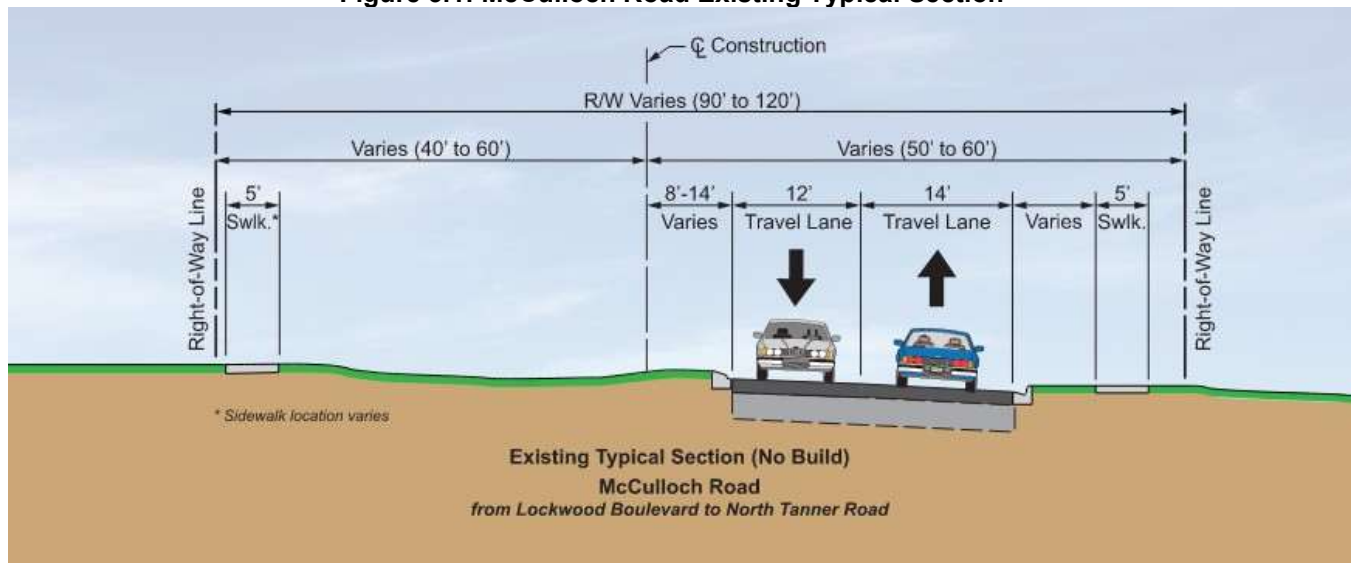
McCulloch Road is classified as an Urban Collector with a posted speed and design speed of 45 MPH. Based on the surrounding area characteristics, the recommended FDOT context classification is C3R – Suburban Residential.

3.1.2 Typical Section

The roadway ROW information was obtained using available property appraiser data, title searches, and from ROW surveys for alignment and recovery of monumentation. The jurisdictional boundary line between Orange County and Seminole County is aligned along McCulloch Road and the northern portion of public road ROW is in Seminole County with the southern portion of public road ROW in Orange County. Orange and Seminole County have an interlocal agreement for the maintenance of McCulloch Road. The existing ROW varies from 90 feet to 120 feet along the corridor.

Within the study area, McCulloch Road is a two-lane curbed undivided roadway as shown on Figure 3.1. Left and right turn lanes are provided at the intersecting side streets. Type A curb is adjacent to the WB lane (north side) and Type F curb and gutter is adjacent to the EB lane (south side). Both the EB and WB lanes are sloped to the south side with stormwater runoff from the roadway collected by inlets on the south side and conveyed in a closed drainage system to existing stormwater ponds.

Figure 3.1: McCulloch Road Existing Typical Section



A 5-foot sidewalk is continuous along the south side, separated from the roadway by a grassed utility strip that varies in width. On the north side, there is a discontinuous 5-foot sidewalk which is typically located along the northern ROW line, set back from the existing roadway. There is no existing sidewalk provided on the north side of McCulloch Road from east of Lockwood Boulevard to west of Keats Way, approximately 1200 feet.

3.1.3 Intersections and Signalization

Figure 3.2 illustrates existing lane configurations along McCulloch Road and at the following intersections: North Orion/Lockwood Boulevard (signalized), Worchester Drive/Keats Way (signalized), Worchester Drive/Amour de Flame Way (Unsignalized) and North Tanner/Old Lockwood Road (signalized).

3.1.4 Pedestrian and Bicycle Facilities

Within the study area, a continuous 5-foot sidewalk, separated from the roadway by a grassed utility strip that varies in width, is provided along the south side of McCulloch Road. On the north side of McCulloch Road, a 5-foot sidewalk is provided, generally set back further from the roadway at the northern ROW line. No existing sidewalk is provided on the north side from east of Lockwood Boulevard to west of Keats Way, approximately 1,200 feet. There are no roadway shoulders available for bicyclists to use. Pedestrian crosswalks are provided at the three signalized intersections. Crosswalks on the cross street are provided at the Amour de Flame Way/Worchester Drive non-signalized intersection.



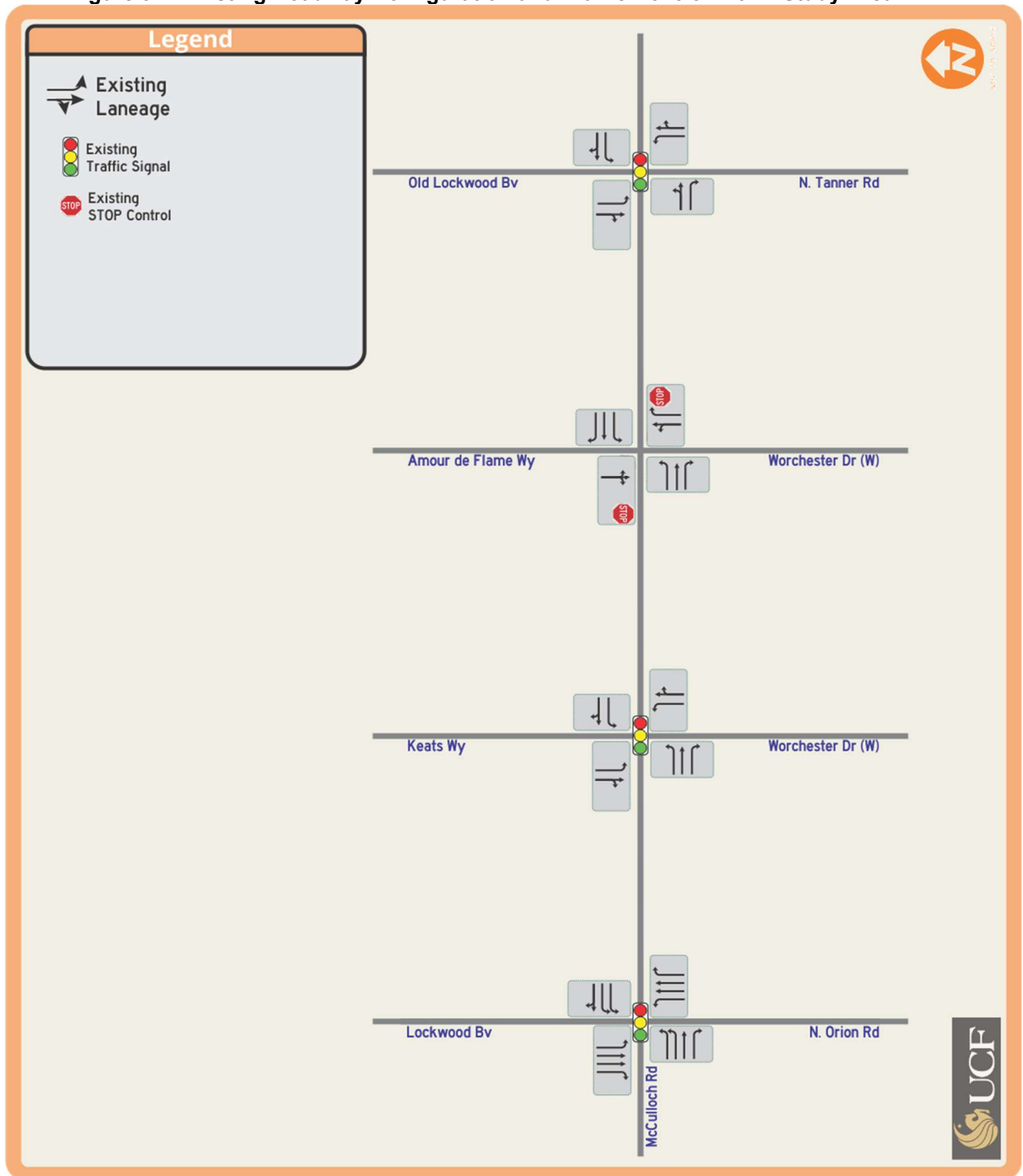
3.1.5 Right-of-Way

The roadway ROW information was obtained using available property appraiser data, title searches, and from ROW surveys for alignment and recovery of monumentation. The jurisdictional boundary line between Orange County and Seminole County is aligned along McCulloch Road and the northern portion of public road ROW is in Seminole County with the southern portion of public road ROW in Orange County. Orange and Seminole County have an interlocal agreement for the maintenance of McCulloch Road. The ROW varies from 90 feet to 120 feet along the corridor.

3.1.6 Horizontal and Vertical Geometry

Existing McCulloch Road is on a generally west/east tangent horizontal alignment from North Orion Boulevard to Tanner Road. The existing profile grade of the roadway varies with the topography along the corridor. The profile grade slopes from a high point at North Orion Boulevard (elev. 56.31) to a low located near the 5-72" RCP cross drain for the tributary to the Little Econ (elev. 49.14). From there, the profile grade generally rises to a high point located at Amour de Flame Way (elev. 62.13). The profile grade then slopes generally downward to the intersection with North Tanner Road (elev. 61.29).

Figure 3.2: Existing Roadway Configuration and Traffic Control within Study Area



3.2 Crash Data

A historical crash review was performed for the corridor to identify vehicular crash patterns and hotspots. To identify crash patterns along the corridor, crash data was obtained from the Orange County Traffic Engineering Division for vehicular crashes for the five years (December 2016 to November 2021) along McCulloch Road from North Orion Boulevard to North Tanner Road.

The crash data was analyzed by Roadway Segment and at the four signalized intersections within the project limits and is summarized in **Table 3.1** with the computed Safety Ratio.

Crash summaries for the Signalized Intersections are included in **Table 3.2** and Crash summaries for the Roadway Segments are included in **Table 3.3**.

Table 3.1: Crash Data Summary and Safety Ratios

McCulloch Road Roadway Conceptual Analysis - From North Orion Boulevard to North Tanner Road
Safety Ratio at Study Signalized Intersections

Signalized Intersection	Total Number of Vehicles Entering (AADT)	Total Number of Crashes	Safety Ratio ¹
McCulloch Road @			
N. Orion Rd-Lockwood Bv	33,388	41	1.12
Worcester Dr	16,191	6	0.34
Amour De Flame Wy	14,616	9	0.56
N. Tanner Rd	18,410	28	1.39

Safety Ratio at Study Roadway Segments

Roadway Segment	Total Number of Vehicles (AADT)	Total Number of Crashes	Segment Length	Safety Ratio ²
McCulloch Road @				
N. Orion Rd-Lockwood Bv to Worcester Dr	16,894	50	0.504	5.37
Worcester Dr to Amour De Flame Wy	15,488	14	0.350	2.36
Amour De Flame Wy to N. Tanner Rd	13,743	18	0.202	5.93
		82		4.48

Notes:

1 - Intersection Million Entering Vehicles Formula: $(1,000,000 \times \text{Crashes}) \div (365 \times \text{Years of Data} \times \text{Entering AADT}) = \text{MEV}$

2 - Segment Million Vehicle-Miles of Travel Formula: $(1,000,000 \times \text{Crashes}) \div (365 \times \text{Years of Data} \times \text{Entering AADT} \times \text{Length}) = \text{MVMT}$

Table 3.2: Crash Summary at Signalized Intersections

Major Route: McCulloch Rd												
Intersecting Route: N. Orion Rd-Lockwood Bv												
County: Orange												
Study Period: 12/1/2016 To 11/30/2021												
Engineer: JAL												
CRASH REF. NO.	CRASH REF. NO.	DATE	DAY	TIME	CRASH TYPE	FATAL	INJURY	PROPERTY DAMAGE	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE	
1	85409796	12/25/2016	Sunday	8:30 PM	Rear End	0	0	\$ 1,600	Night	Dry	Careless	
2	86788766	2/20/2017	Monday	6:25 PM	Pedestrian	0	1	\$ -	Night	Dry	Careless	
3	86789774	4/3/2017	Monday	12:04 PM	Rear End	0	0	\$ 1,000	Day	Dry	Follow too close	
4	86789943	4/21/2017	Friday	11:25 AM	Angle	0	0	\$ 4,000	Day	Dry	Careless	
5	85488066	4/22/2017	Saturday	12:15 PM	Rear End	0	1	\$ 500	Day	Dry	Careless	
6	85561641	10/25/2017	Wednesday	2:15 PM	Left Turn	0	2	\$ 10,000	Day	Dry	Improper Turn	
7	85561647	11/11/2017	Saturday	5:15 PM	Rear End	0	3	\$ 4,000	Day	Dry	Careless	
8	85947455	11/14/2017	Tuesday	3:40 PM	Rear End	0	0	\$ 2,500	Day	Dry	Follow too close	
9	87105976	11/25/2017	Saturday	1:17 PM	Right Turn	0	0	\$ 4,000	Day	Dry	FTYROW	
10	87352910	12/8/2017	Friday	2:52 PM	Sideswipe	0	0	\$ 2,000	Day	Dry	Failure to Maintain Lane	
11	85561660	12/22/2017	Friday	3:40 PM	Rear End	0	1	\$ 6,000	Day	Dry	Careless	
12	87136671	12/31/2017	Sunday	3:00 PM	Angle	0	0	\$ 16,000	Day	Dry	FTYTCD	
13	87353757	2/19/2018	Monday	12:43 PM	Rear End	0	0	\$ 300	Day	Dry	Careless	
14	87173800	3/9/2018	Friday	2:28 PM	Rear End	0	0	\$ 1,300	Day	Dry	Careless	
15	87106002	4/9/2018	Monday	2:00 PM	Rear End	0	0	\$ 4,100	Day	Dry	Careless	
16	87506807	4/11/2018	Wednesday	9:30 PM	Bicycle	0	1	\$ 300	Night	Dry	FTY Ped	
17	87507409	5/27/2018	Sunday	10:16 PM	Left Turn	0	0	\$ 21,535	Night	Dry	FTYTCD	
18	85592467	8/28/2018	Tuesday	11:27 AM	Rear End	0	0	\$ 12,400	Day	Dry	Careless	
19	87291509	9/11/2018	Tuesday	7:05 AM	Rear End	0	0	\$ 7,500	Dawn/Dusk	Dry	Careless	
20	88768695	9/21/2018	Friday	7:12 AM	Animal	0	0	\$ 2,000	Day	Dry	Animal	
21	88769234	11/4/2018	Sunday	11:06 PM	Off Road	0	0	\$ 5,000	Night	Wet	Careless	
22	87999710	12/16/2018	Sunday	9:50 PM	Left Turn	0	2	\$ 12,000	Night	Dry	FTYROW	
23	88044402	2/1/2019	Friday	6:26 PM	Left Turn	0	0	\$ 1,000	Night	Dry	FTYROW	
24	87291544	2/12/2019	Tuesday	12:30 PM	Left Turn	0	0	\$ 6,000	Day	Dry	FTYROW	
25	88000951	2/15/2019	Friday	7:00 AM	Left Turn	0	0	\$ 16,000	Day	Dry	FTYTCD	
26	87366175	4/9/2019	Tuesday	1:12 PM	Angle	0	0	\$ 20,000	Day	Dry	FTYROW	
27	88179265	7/22/2019	Monday	8:23 AM	Angle	0	2	\$ 11,000	Day	Dry	FTYTCD	
28	88188048	8/25/2019	Sunday	1:10 PM	Left Turn	0	1	\$ 17,000	Day	Dry	FTYROW	
29	89273698	10/8/2019	Tuesday	2:05 PM	Rear End	0	0	\$ 550	Day	Wet	Follow too close	
30	89273828	10/18/2019	Friday	9:31 PM	Rear End	0	1	\$ -	Night	Wet	Follow too close	
31	89273910	10/25/2019	Friday	8:31 PM	Rear End	0	2	\$ 1,300	Night	Wet	Careless	
32	88188070	10/28/2019	Monday	4:30 PM	Left Turn	0	2	\$ 13,000	Day	Dry	FTYROW	
33	88240618	11/6/2019	Wednesday	9:24 PM	Rear End	0	0	\$ 200	Night	Dry	Careless	
34	88204133	11/15/2019	Friday	9:00 AM	Rear End	0	0	\$ 4,500	Day	Wet	Careless	
35	89274765	12/27/2019	Friday	3:17 PM	Sideswipe	0	0	\$ 8,000	Day	Wet	Failure to Maintain Lane	
36	88188100	3/4/2020	Wednesday	5:55 PM	Left Turn	0	0	\$ 3,000	Day	Dry	FTYROW	
37	89857133	3/4/2021	Thursday	9:42 AM	Left Turn	0	0	\$ 10,000	Day	Dry	FTYROW	
38	24245392	3/22/2021	Monday	8:30 PM	Left Turn	0	0	\$ 10,000	Night	Dry	FTYROW	
39	24245654	4/16/2021	Friday	7:20 PM	Other	0	0	\$ 1,000	Dawn/Dusk	Dry	Careless	
40	24567000	11/26/2021	Friday	11:41 AM	Sideswipe	0	0	\$ 1,500	Day	Dry	Failure to Maintain Lane	
41	88474118	11/29/2021	Monday	4:55 PM	Left Turn	0	0	\$ 10,500	Day	Dry	FTYTCD	
Total						0	19	\$ 252,585				
CRASH TYPE												
Total Crashes	Fatal Crashes	Injury Crashes	Prop. Damage	Ped / Bike	Rear End	Left Turn	Right Turn	Sideswipe	Angle	Ran Off Road	Animal	Other
41	0	12	39	2	8	11	0	2	2	1	1	14
100.0%	0.0%	29.3%	95.1%	4.9%	19.5%	26.8%	0.0%	4.9%	4.9%	2.4%	2.4%	34.1%
CONTRIBUTING CAUSE												
One Vehicle	Time of Day		Road Condition		Other	Careless Driving	Follow Too Close	FTYROW	FTYTCD	Fail to Maint Lane	Distracted	Alc/Drugs
	Day	Night	Wet	Dry								
1	28	11	6	35	3	16	4	10	5	3	10	0
2.4%	68.3%	26.8%	14.6%	85.4%	7.3%	39.0%	9.8%	24.4%	12.2%	7.3%	24.4%	0.0%

Table 3.2: Crash Summary at Signalized Intersections (con't)

Major Route: McCulloch Rd										County: Orange		
Intersecting Route: Worchester Dr												
Study Period: 12/1/2016 To 11/30/2021					Engineer: JAL							
CRASH REF. NO.	CRASH REF. NO.	DATE	DAY	TIME	CRASH TYPE	FATAL	INJURY	PROPERTY DAMAGE	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE	
42	87137843	1/8/2018	Monday	10:46 AM	Left Turn	0	0	\$ 5,000	Day	Dry	FTYROW	
43	87353740	2/18/2018	Sunday	8:25 AM	Other	0	1	\$ 14,500	Day	Dry	-Unknown-	
44	88769666	12/6/2018	Thursday	6:05 PM	Rear End	0	0	\$ 11,000	Night	Dry	Careless	
45	88116743	5/16/2019	Thursday	2:30 AM	Off Road	0	0	\$ 10,000	Night	Dry	Careless	
46	88771122	7/4/2019	Thursday	3:41 AM	Rear End	0	0	\$ 8,000	Night	Dry	Careless	
47	89275523	3/5/2020	Thursday	8:48 AM	Rear End	0	0	\$ 4,000	Day	Dry	Careless	
Total						0	1	\$ 52,500				
					CRASH TYPE							
Total Crashes	Fatal Crashes	Injury Crashes	Prop. Damage	Ped / Bike	Rear End	Left Turn	Right Turn	Sideswipe	Angle	Ran Off Road	Animal	Other
6	0	1	6	0	3	1	0	0	0	1	0	1
100.0%	0.0%	16.7%	100.0%	0.0%	50.0%	16.7%	0.0%	0.0%	0.0%	16.7%	0.0%	16.7%
					CONTRIBUTING CAUSE							
One Vehicle	Time of Day		Road Condition		Other	Careless Driving	Follow Too Close	FTYROW	FTYTCD	Fail to Maint Lane	Distracted	Alc/Drugs
	Day	Night	Wet	Dry								
0	3	3	0	6	1	4	0	1	0	0	3	0
0.0%	50.0%	50.0%	0.0%	100.0%	16.7%	66.7%	0.0%	16.7%	0.0%	0.0%	50.0%	0.0%

Major Route: McCulloch Rd												
Intersecting Route: Worchester Dr (E) - Amour De Flame Wy												
Study Period: 12/1/2016 To 11/30/2021						County: Orange Engineer: JAL						
CRASH REF. NO.	CRASH REF. NO.	DATE	DAY	TIME	CRASH TYPE	FATAL	INJURY	PROPERTY DAMAGE	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE	
48	85449544	4/4/2017	Tuesday	4:40 PM	Left Turn	0	0	\$ 7,500	Day	Wet	FTYTCD	
49	87506873	4/16/2018	Monday	2:20 PM	Other	0	1	\$ 10,000	Day	Dry	Improper Turn	
50	88127891	7/16/2019	Tuesday	4:27 PM	Left Turn	0	1	\$ 2,500	Day	Dry	FTY Sidewalk	
51	89274524	12/10/2019	Tuesday	11:00 AM	Off Road	0	0	\$ 15,000	Day	Dry	-Unknown-	
52	88231394	11/13/2020	Friday	10:08 PM	Left Turn	0	1	\$ 12,000	Night	Dry	FTYROW	
53	88304645	2/16/2021	Tuesday	11:30 AM	Left Turn	0	1	\$ 14,000	Day	Dry	FTYTCD	
54	24565469	7/12/2021	Monday	7:00 PM	Angle	0	0	\$ 6,000	Day	Wet	FTYROW	
55	89564684	10/29/2021	Friday	10:10 AM	Left Turn	0	1	\$ 18,500	Day	Dry	FTYROW	
56	89583327	11/21/2021	Sunday	6:11 PM	Angle	0	1	\$ 8,000	Night	Dry	FTYTCD	
Total						0	6	\$ 93,500				
CRASH TYPE												
Total Crashes	Fatal Crashes	Injury Crashes	Prop. Damage	Ped / Bike	Rear End	Left Turn	Right Turn	Sideswipe	Angle	Ran Off Road	Animal	Other
9	0	6	9	0	0	5	0	0	2	1	0	1
100.0%	0.0%	66.7%	100.0%	0.0%	0.0%	55.6%	0.0%	0.0%	22.2%	11.1%	0.0%	11.1%
CONTRIBUTING CAUSE												
One Vehicle	Time of Day		Road Condition		Other	Careless Driving	Follow Too Close	FTYROW	FTYTCD	Fail to Maint Lane	Distracted	Alc/Drugs
	Day	Night	Wet	Dry								
1	7	2	2	7	3	0	0	3	3	0	4	1
11.1%	77.8%	22.2%	22.2%	77.8%	33.3%	0.0%	0.0%	33.3%	33.3%	0.0%	44.4%	11.1%

Table 3.2: Crash Summary at Signalized Intersections (con't)

Major Route: McCulloch Rd						County: Orange						
Intersecting Route: N. Tanner Rd						Engineer: JAL						
Study Period: 12/1/2016 To 11/30/2021												
CRASH REF. NO.	CRASH REF. NO.	DATE	DAY	TIME	CRASH TYPE	FATAL	INJURY	PROPERTY DAMAGE	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE	
57	85407855	12/12/2016	Monday	1:12 PM	Left Turn	0	0	\$ 5,500	Day	Dry	Careless	
58	85434341	2/4/2017	Saturday	7:57 PM	Left Turn	0	0	\$ 9,500	Night	Dry	FTYROW	
59	86789584	4/17/2017	Monday	11:41 PM	Angle	0	0	\$ 4,000	Night	Dry	FTYTCD	
60	85487908	5/5/2017	Friday	5:15 PM	Right Turn	0	0	\$ 6,000	Day	Dry	FTYROW	
61	85400244	7/22/2017	Saturday	8:45 AM	Left Turn	0	0	\$ 6,500	Day	Dry	FTYROW	
62	85593102	10/7/2017	Saturday	11:47 AM	Right Turn	0	0	\$ 4,500	Day	Dry	FTYROW	
63	87116721	11/11/2017	Saturday	8:11 AM	Rear End	0	0	\$ 5,000	Day	Dry	Careless	
64	87130170	11/29/2017	Wednesday	8:55 AM	Right Turn	0	0	\$ 700	Day	Dry	FTYROW	
65	85561654	12/8/2017	Friday	6:25 PM	Rear End	0	6	\$ 31,000	Night	Dry	Careless	
66	83751870	1/28/2018	Sunday	7:46 PM	Rear End	0	0	\$ 100	Night	Wet	Follow too close	
67	87159892	1/31/2018	Wednesday	7:10 PM	Left Turn	0	0	\$ 5,400	Night	Dry	FTYTCD	
68	87138597	2/14/2018	Wednesday	11:55 AM	Right Turn	0	1	\$ 1,300	Day	Dry	Careless	
69	87508596	9/10/2018	Monday	12:15 PM	Left Turn	0	0	\$ 1,000	Day	Dry	FTYROW	
70	88014272	9/27/2018	Thursday	4:16 PM	Left Turn	0	1	\$ 19,000	Day	Dry	FTYROW	
71	87212260	11/2/2018	Friday	9:00 PM	Rear End	0	3	\$ 200	Night	Wet	Careless	
72	88019276	11/19/2018	Monday	6:45 PM	Pedestrian	0	1	\$ -	Night	Dry	FTY Ped	
73	88770195	2/12/2019	Tuesday	7:02 PM	Left Turn	0	0	\$ 50,000	Night	Wet	Careless	
74	89273807	10/17/2019	Thursday	2:45 PM	Left Turn	0	0	\$ 5,500	Day	Dry	FTYROW	
75	89273870	10/23/2019	Wednesday	9:05 PM	Left Turn	0	0	\$ 6,000	Night	Dry	Careless	
76	89275985	5/15/2020	Friday	9:30 PM	Left Turn	0	0	\$ 10,000	Night	Wet	Careless	
77	88283364	10/22/2020	Thursday	8:34 PM	Left Turn	0	0	\$ 3,000	Night	Dry	FTYROW	
78	89856951	2/11/2021	Thursday	7:23 PM	Other	0	0	\$ 4,000	Night	Dry	-Unknown-	
79	88455687	2/15/2021	Monday	8:09 PM	Rear End	0	0	\$ 500	Night	Dry	Careless	
80	24565839	8/14/2021	Saturday	3:27 PM	Right Turn	0	0	\$ 1,500	Day	Dry	FTYROW	
81	88472659	9/13/2021	Monday	7:32 PM	Left Turn	0	1	\$ 4,000	Night	Dry	FTYTCD	
82	24566181	9/15/2021	Wednesday	9:49 PM	Left Turn	0	1	\$ 20,000	Night	Dry	FTYTCD	
83	88523878	10/15/2021	Friday	10:25 AM	Angle	0	0	\$ 2,500	Day	Dry	FTYTCD	
84	24567176	12/14/2021	Tuesday	11:39 AM	Rear End	0	0	\$ 6,000	Day	Dry	Careless	
Total						0	14	\$ 212,700				
				CRASH TYPE								
Total Crashes	Fatal Crashes	Injury Crashes	Prop. Damage	Ped / Bike	Rear End	Left Turn	Right Turn	Sideswipe	Angle	Ran Off Road	Animal	Other
28	0	7	27	1	6	13	5	0	2	0	0	1
100.0%	0.0%	25.0%	96.4%	3.6%	21.4%	46.4%	17.9%	0.0%	7.1%	0.0%	0.0%	3.6%
CONTRIBUTING CAUSE												
One Vehicle	Time of Day		Road Condition		Other	Careless Driving	Follow Too Close	FTYROW	FTYTCD	Fail to Maint Lane	Distracted	Alc/Drugs
	Day	Night	Wet	Dry								
1	13	15	4	24	2	10	1	10	5	0	8	0
3.6%	46.4%	53.6%	14.3%	85.7%	7.1%	35.7%	3.6%	35.7%	17.9%	0.0%	28.6%	0.0%

Table 3.3: Crash Summary by Roadway Segments

Major Route: McCulloch Rd												
Segment: N. Orion Rd-Lockwood Bv to Worchester Dr										County: Orange		
Study Period: 12/1/2016 To 11/30/2021										Engineer: JAL		
CRASH REF. NO.	CRASH REF. NO.	DATE	DAY	TIME	CRASH TYPE	FATAL	INJURY	PROPERTY DAMAGE	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE	
85	86788634	1/11/2017	Wednesday	8:32 AM	Rear End	0	0	\$ 1,250	Day	Dry	Careless	
86	85462417	1/23/2017	Monday	7:12 PM	Rear End	0	0	\$ 4,000	Night	Dry	Careless	
87	85325777	2/1/2017	Wednesday	2:15 PM	Rear End	0	1	\$ 3,500	Day	Dry	Careless	
88	85434339	2/3/2017	Friday	4:20 PM	Rear End	0	0	\$ 2,500	Day	Dry	Careless	
89	85314605	2/21/2017	Tuesday	7:28 AM	Rear End	0	3	\$ 6,000	Day	Dry	Careless	
90	86789329	2/23/2017	Thursday	8:57 AM	Rear End	0	0	\$ 1,500	Day	Wet	Careless	
91	85325788	2/23/2017	Thursday	3:20 PM	Rear End	0	0	\$ 1,500	Day	Wet	Follow too close	
92	86790070	5/12/2017	Friday	9:35 PM	Sideswipe	0	0	\$ 2,000	Dawn/Dusk	Dry	Failure to Maintain Lane	
93	87351326	8/23/2017	Wednesday	8:24 AM	Rear End	0	0	\$ 6,000	Day	Dry	Careless	
94	85596133	9/5/2017	Tuesday	8:15 PM	Rear End	0	0	\$ 650	Night	Dry	Careless	
95	87352200	10/20/2017	Friday	7:05 AM	Other	0	0	\$ 1,000	Dawn/Dusk	Wet	-Unknown-	
96	87352458	11/10/2017	Friday	8:49 AM	Rear End	0	0	\$ 2,000	Day	Dry	Follow too close	
97	87353400	1/19/2018	Friday	5:15 PM	Rear End	0	0	\$ 1,000	Day	Dry	Follow too close	
98	85947518	1/24/2018	Wednesday	5:33 PM	Sideswipe	0	0	\$ 1,500	Day	Dry	Careless	
99	87170244	2/18/2018	Sunday	5:44 PM	Rear End	0	0	\$ 700	Day	Dry	Careless	
100	87506111	2/22/2018	Thursday	8:07 AM	Rear End	0	0	\$ 3,100	Day	Dry	Follow too close	
101	87179791	3/14/2018	Wednesday	8:20 AM	Rear End	0	1	\$ 1,900	Day	Dry	Careless	
102	87174553	4/2/2018	Monday	8:45 AM	Rear End	0	0	\$ 27,000	Day	Dry	Careless	
103	87506934	4/19/2018	Thursday	2:45 PM	Rear End	0	0	\$ 2,000	Day	Dry	Follow too close	
104	87247665	7/17/2018	Tuesday	5:00 PM	Rear End	0	1	\$ 5,000	Day	Wet	Careless	
105	85947712	8/31/2018	Friday	3:45 PM	Sideswipe	0	0	\$ 210	Day	Dry	Failure to Maintain Lane	
106	87229666	9/4/2018	Tuesday	7:02 PM	Sideswipe	0	0	\$ 3,000	Day	Dry	Careless	
107	88768691	9/20/2018	Thursday	5:40 PM	Rear End	0	0	\$ 2,000	Day	Dry	Follow too close	
108	88014690	10/3/2018	Wednesday	4:39 PM	Rear End	0	3	\$ 5,000	Day	Dry	Careless	
109	88012526	10/24/2018	Wednesday	12:33 PM	Rear End	0	2	\$ 3,000	Day	Dry	Careless	
110	87259955	12/19/2018	Wednesday	6:40 PM	Rear End	0	3	\$ 2,000	Night	Wet	Careless	
111	88037840	2/24/2019	Sunday	6:00 PM	Right Turn	0	0	\$ 8,000	Night	Dry	FTYROW	
112	88021151	3/4/2019	Monday	3:45 PM	Rear End	0	1	\$ 7,750	Day	Dry	Careless	
113	85947973	3/28/2019	Thursday	12:15 PM	Rear End	0	0	\$ 2,500	Day	Dry	Careless	
114	87265362	4/2/2019	Tuesday	11:50 AM	Rear End	0	0	\$ 1,000	Day	Wet	Careless	
115	88770643	5/21/2019	Tuesday	11:50 AM	Rear End	0	1	\$ 1,500	Day	Dry	Follow too close	
116	88121499	5/28/2019	Tuesday	5:04 PM	Rear End	0	1	\$ 4,499	Day	Dry	Careless	
117	88134159	5/28/2019	Tuesday	5:32 PM	Unknown	0	0	\$ 2,000	Day	Dry	Careless	
118	85948053	7/15/2019	Monday	11:30 AM	Other	0	0	\$ 850	Day	Dry	FTYROW	
119	88127931	10/4/2019	Friday	8:41 PM	Rear End	0	2	\$ 7,500	Night	Dry	Careless	
120	88123782	10/7/2019	Monday	3:42 PM	Rear End	0	0	\$ 100	Day	Wet	Careless	
121	88204703	12/15/2019	Sunday	6:35 PM	Rear End	0	0	\$ 250	Night	Dry	Follow too close	
122	88277694	1/10/2020	Friday	6:58 AM	Rear End	0	0	\$ 5,500	Dawn/Dusk	Dry	Careless	
123	85948274	1/13/2020	Monday	5:49 PM	Rear End	0	0	\$ 1,200	Day	Dry	Follow too close	
124	88204267	2/10/2020	Monday	3:32 AM	Off Road	0	1	\$ 2,000	Night	Dry	Careless	
125	88306216	3/9/2020	Monday	11:51 PM	Rear End	0	0	\$ 13,000	Night	Wet	Follow too close	
126	88330221	3/12/2020	Thursday	6:21 PM	Other	0	0	\$ 2,000	Day	Dry	Careless	
127	88378720	8/18/2020	Tuesday	3:30 PM	Rear End	0	1	\$ 13,000	Day	Wet	Follow too close	
128	88231383	9/28/2020	Monday	12:17 PM	Sideswipe	0	0	\$ 1,100	Day	Wet	Failure to Maintain Lane	
129	88395838	10/12/2020	Monday	7:21 PM	Rear End	0	0	\$ 800	Dawn/Dusk	Dry	Careless	
130	89656233	11/16/2020	Monday	7:49 AM	Rear End	0	0	\$ 2,100	Day	Dry	Follow too close	
131	88448324	1/10/2021	Sunday	6:45 PM	Rear End	0	0	\$ 9,400	Dawn/Dusk	Dry	Careless	
132	88477788	3/10/2021	Wednesday	8:00 AM	Angle	0	0	\$ 50	Day	Dry	FTYROW	
133	88298369	7/31/2021	Saturday	12:43 PM	Rear End	0	1	\$ 3,000	Day	Dry	Careless	
134	88457604	11/17/2021	Wednesday	7:44 PM	Rear End	0	1	\$ 2,000	Night	Dry	Careless	
Total						0	23	\$ 180,409				
CRASH TYPE												
Total Crashes	Fatal Crashes	Injury Crashes	Prop. Damage	Ped / Bike	Rear End	Left Turn	Right Turn	Sideswipe	Angle	Ran Off Road	Animal	Other
50	0	15	50	0	38	0	1	5	1	1	0	4
100.0%	0.0%	30.0%	100.0%	0.0%	76.0%	0.0%	2.0%	10.0%	2.0%	2.0%	0.0%	8.0%
CONTRIBUTING CAUSE												
One Vehicle	Time of Day		Road Condition		Other	Careless Driving	Follow Too Close	FTYROW	FTYTCD	Fail to Maint Lane	Distracted	Alc/Drugs
	Day	Night	Wet	Dry								
2	36	9	10	40	1	31	12	3	0	3	9	0
4.0%	72.0%	18.0%	20.0%	80.0%	2.0%	62.0%	24.0%	6.0%	0.0%	6.0%	18.0%	0.0%

Table 3.3: Crash Summary by Roadway Segments (con't)

Major Route: McCulloch Rd												
Segment: Worchester Dr to Amour De Flame Wy												
County: Orange												
Engineer: JAL												
Study Period: 12/1/2016 To 11/30/2021												
CRASH REF. NO.	CRASH REF. NO.	DATE	DAY	TIME	CRASH TYPE	FATAL	INJURY	PROPERTY DAMAGE	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE	
135	86789941	4/19/2017	Wednesday	8:50 AM	Rear End	0	0	\$ 2,500	Day	Dry	Follow too close	
136	85488069	5/1/2017	Monday	4:00 PM	Left Turn	0	1	\$ 6,000	Day	Dry	Careless	
137	85587653	1/22/2018	Monday	9:45 AM	Rear End	0	0	\$ 17,000	Day	Dry	Careless	
138	87507375	5/24/2018	Thursday	8:10 AM	Rear End	0	0	\$ 2,000	Day	Dry	Follow too close	
139	88769104	10/26/2018	Friday	1:09 PM	Rear End	0	0	\$ 600	Day	Wet	Follow too close	
140	88029244	12/26/2018	Wednesday	8:35 AM	Animal	0	0	\$ 1,000	Day	Dry	Animal	
141	88191238	11/21/2019	Thursday	4:16 PM	Rear End	0	0	\$ 10,000	Day	Dry	Careless	
142	88346335	5/17/2020	Sunday	5:07 AM	Animal	0	0	\$ 1,500	Night	Dry	Animal	
143	88126267	9/1/2020	Tuesday	12:50 AM	Rear End	0	0	\$ 7,000	Day	Dry	Careless	
144	88306326	10/20/2020	Tuesday	10:35 PM	Rear End	0	0	\$ 5,500	Night	Dry	Careless	
145	88283365	10/29/2020	Thursday	4:24 PM	Other	0	0	\$ 3,000	Day	Dry	Improper Turn	
146	88460520	9/10/2021	Friday	8:55 AM	Rear End	0	0	\$ 2,400	Day	Dry	Careless	
147	88588083	10/27/2021	Wednesday	3:05 PM	Rear End	0	0	\$ 6,000	Day	Dry	Careless	
148	88544956	12/24/2021	Friday	7:10 PM	Animal	0	0	\$ 1,000	Night	Dry	Animal	
Total						0	1	\$ 65,500				
					CRASH TYPE							
Total Crashes	Fatal Crashes	Injury Crashes	Prop. Damage	Ped / Bike	Rear End	Left Turn	Right Turn	Sideswipe	Angle	Ran Off Road	Animal	Other
14	0	1	14	0	9	1	0	0	0	0	3	1
100.0%	0.0%	7.1%	100.0%	0.0%	64.3%	7.1%	0.0%	0.0%	0.0%	0.0%	21.4%	7.1%
					CONTRIBUTING CAUSE							
One Vehicle	Time of Day		Road Condition		Other	Careless Driving	Follow Too Close	FTYROW	FTYTCD	Fail to Maint Lane	Distracted	Alc/Drugs
	Day	Night	Wet	Dry								
3	11	3	1	13	4	7	3	0	0	0	5	0
21.4%	78.6%	21.4%	7.1%	92.9%	28.6%	50.0%	21.4%	0.0%	0.0%	0.0%	35.7%	0.0%

Major Route: McCulloch Rd												
Segment: Amour De Flame Wy to N. Tanner Rd												
County: Orange												
Engineer: JAL												
Study Period: 12/1/2016 To 11/30/2021												
CRASH REF. NO.	CRASH REF. NO.	DATE	DAY	TIME	CRASH TYPE	FATAL	INJURY	PROPERTY DAMAGE	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE	
149	85409806	1/26/2017	Thursday	4:00 PM	Rear End	0	0	\$ 15,500	Day	Dry	Careless	
150	85415450	1/29/2017	Sunday	7:25 PM	Rear End	0	0	\$ 7,500	Night	Dry	Careless	
151	85400219	2/9/2017	Thursday	8:45 AM	Rear End	0	1	\$ 6,000	Day	Dry	Careless	
152	83751871	1/28/2018	Sunday	7:47 PM	Rear End	0	0	\$ 400	Night	Wet	Follow too close	
153	87182885	2/28/2018	Wednesday	5:33 PM	Rear End	0	1	\$ 7,500	Day	Dry	Careless	
154	87182901	3/6/2018	Tuesday	7:32 PM	Sideswipe	0	0	\$ 250	Night	Dry	Failure to Maintain Lane	
155	85561688	4/17/2018	Tuesday	6:20 PM	Rear End	0	5	\$ 11,000	Day	Dry	Follow too close	
156	88014271	9/27/2018	Thursday	4:27 PM	Rear End	0	1	\$ 6,000	Day	Dry	Follow too close	
157	87259950	12/4/2018	Tuesday	5:48 PM	Rear End	0	0	\$ 10,000	Night	Dry	Careless	
158	87365714	3/5/2019	Tuesday	10:33 AM	Other	0	0	\$ 3,000	Day	Wet	-Unknown-	
159	88025738	4/25/2019	Thursday	5:23 PM	Rear End	0	0	\$ 20,000	Day	Dry	Careless	
160	88225578	10/22/2019	Tuesday	7:25 PM	Rear End	0	0	\$ 10,000	Night	Dry	Careless	
161	88204713	1/22/2020	Wednesday	5:17 PM	Rear End	0	0	\$ 750	Dawn/Dusk	Dry	Careless	
162	88386427	12/4/2020	Friday	5:38 PM	Sideswipe	0	1	\$ 5,000	Day	Dry	Careless	
163	88483212	4/6/2021	Tuesday	6:10 PM	Sideswipe	0	0	\$ 400	Day	Dry	Failure to Maintain Lane	
164	88426201	9/15/2021	Wednesday	3:41 PM	Left Turn	0	1	\$ 3,000	Day	Dry	Failure to Maintain Lane	
165	88349755	11/11/2021	Thursday	4:46 PM	Rear End	0	0	\$ 2,000	Day	Wet	Careless	
166	88544948	12/9/2021	Thursday	2:48 PM	Left Turn	0	3	\$ 8,000	Day	Dry	Failure to Maintain Lane	
Total						0	13	\$ 116,300				
					CRASH TYPE							
Total Crashes	Fatal Crashes	Injury Crashes	Prop. Damage	Ped / Bike	Rear End	Left Turn	Right Turn	Sideswipe	Angle	Ran Off Road	Animal	Other
18	0	7	18	0	12	2	0	3	0	0	0	1
100.0%	0.0%	38.9%	100.0%	0.0%	66.7%	11.1%	0.0%	16.7%	0.0%	0.0%	0.0%	5.6%
					CONTRIBUTING CAUSE							
One Vehicle	Time of Day		Road Condition		Other	Careless Driving	Follow Too Close	FTYROW	FTYTCD	Fail to Maint Lane	Distracted	Alc/Drugs
	Day	Night	Wet	Dry								
0	12	5	3	15	1	10	3	0	0	4	3	1
0.0%	66.7%	27.8%	16.7%	83.3%	5.6%	55.6%	16.7%	0.0%	0.0%	22.2%	16.7%	5.6%

3.3 Public Transportation

LYNX provides bus service along SR 434 (Alafaya Trail), located 1 mile west of the study limits, however, there is no LYNX bus service on McCulloch Road.

3.4 Long-Range Transportation Improvements

The widening of McCulloch Road, from North Orion Boulevard to North Tanner Road, is included in the County's Long Range Transportation Plan. These improvements to McCulloch Road are consistent with the goals, objectives, and policies of the adopted Orange County Comprehensive Plan. Improvements to McCulloch Road, from North Orion / Lockwood Boulevard to North Tanner Road are included in the Orange County's long-term 10-year schedule of capital improvements.

The County's Transportation Element Future Conditions Number of Lanes 2030 Map indicates McCulloch Road is to be improved to a four-lane section. Other planned transportation improvements in the vicinity of McCulloch Road include:

- East Orange Trail – This trail is planned to coincide with McCulloch Road improvements and will be constructed in the McCulloch Road right-of-way
- SR 434 safety upgrades from McCulloch Road to Remington Drive.

3.5 Lighting

There is limited pedestrian level lighting at the North Orion / Lockwood Boulevard intersection.

3.6 Utilities

An 811 Design Ticket was obtained to identify Utility Agency Owner's (UAOs) within the McCulloch Road RCA Study area. Coordination was provided with the UAOs to identify facility types and **Table 3.4** summarizes the results of the coordination efforts. UAO facilities identified within the project limits are based on information provided by the UAOs. Exact location of utility type and side to be determined during final design.

3.7 Soils

Subsurface exploration was completed in December 2021 to evaluate soil and groundwaters conditions in the corridor. The subsurface exploration consisted of 18 auger borings to a depth of 5 feet and 10 auger borings to a depth of 20 feet at 600-foot intervals. The borings were established in the unpaved areas along the eastbound and westbound shoulders of McCulloch Road.

The results of the geotechnical exploration indicate that the near-surface soils encountered along the corridor are generally sandy soils that are classified as AASHTO A-3, A-2-4 and A-2-6 and are considered Select and Plastic, respectively. Groundwater levels measured in the open borings during the exploration indicate that the groundwater table ranged from about 1.5 to 6.5 feet below existing grade. Groundwater was not encountered in nine (9) 5-foot auger borings at the time of the exploration, but will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences, and areas of covered soil (roadways, sidewalks).

Detailed results of the soils exploration as well as encountered and estimated seasonal groundwater levels on the soil boring profiles are included in the *Preliminary Roadway Soil Report*.

Table 3.4: Utilities within Study Area

UAO	Facilities within Project Limits
TECO	<i>4" coated steel gas main on north R/W</i>
Lumen / Embarq	<i>Underground (UG) fiber</i>
Spectrum / Charter	<i>UG fiber from Orion to approximately 500' east of Orion (both sides) Aerial from 500' east of Orion to Amour de Flame Way (north side) UG fiber from Amour de Flame to Tanner (both sides) UG fiber Road crossings – east of Orion; east of Keats Way; east of Amour de Flame; west of Tanner</i>
ATT	<i>UG fiber from Orion to Keats Way (both sides) Aerial from Keats Way to Amour de Flame Way (north side)</i>
Orange Co.	<i>12" PVC water main (south side); 20" DIP water main (south side) – west of Tanner</i>
Seminole Co.	<i>UG fiber - Orion (south side), crosses McCulloch and runs along north side to Tanner Seminole Co. maintains traffic signals at Orion, Keats Way, Tanner Rd 12" to 16" water main (north side) 24" reuse main (north side) 6" water (fire service) – north side Amour de Flame to Tanner</i>
City of Orlando	<i>48" wetlands transmission line along the McCulloch Rd EB edge of pavement/curb line. Conveys treatment effluent from the City's Iron Bridge Regional Water reclamation facility to Wetlands Park in Christmas</i>
Zayo Group	<i>UG fiber from Orion to approximately 500' east of Orion (north side)</i>
Duke Energy	<i>Aerial and UG distribution feeder (12.47/7.2kV) and aerial transmission line (69 kV) UG distribution crossings at Keats and Amour de Flame Way to service neighborhoods</i>
MCI	<i>No responses received to date</i>
Crown Castle	<i>UG fiber crosses McCulloch just west of Dollar General entrance</i>
Summit	<i>UG fiber on west side of Orion and west of Orion</i>
Smart City	<i>UG fiber to Orion (north side) – no facilities east of Orion</i>
Uniti Fiber	<i>UG fiber crossing just west of Orion – no facilities east of Orion</i>

3.8 Potential Contamination

A *Contamination Screening Evaluation Report (CSER)* was prepared as part of this RCA study. The results of the *CSER* indicate that five sites were identified within or adjacent to the McCulloch study area. Two of the sites, the 7-11 convenience store (1640 McCulloch Road) and Orange County Fire and Rescue 65, were assigned a Low risk assessment and three were assigned No risk assessment. There were no facilities identified as Medium or High risk.

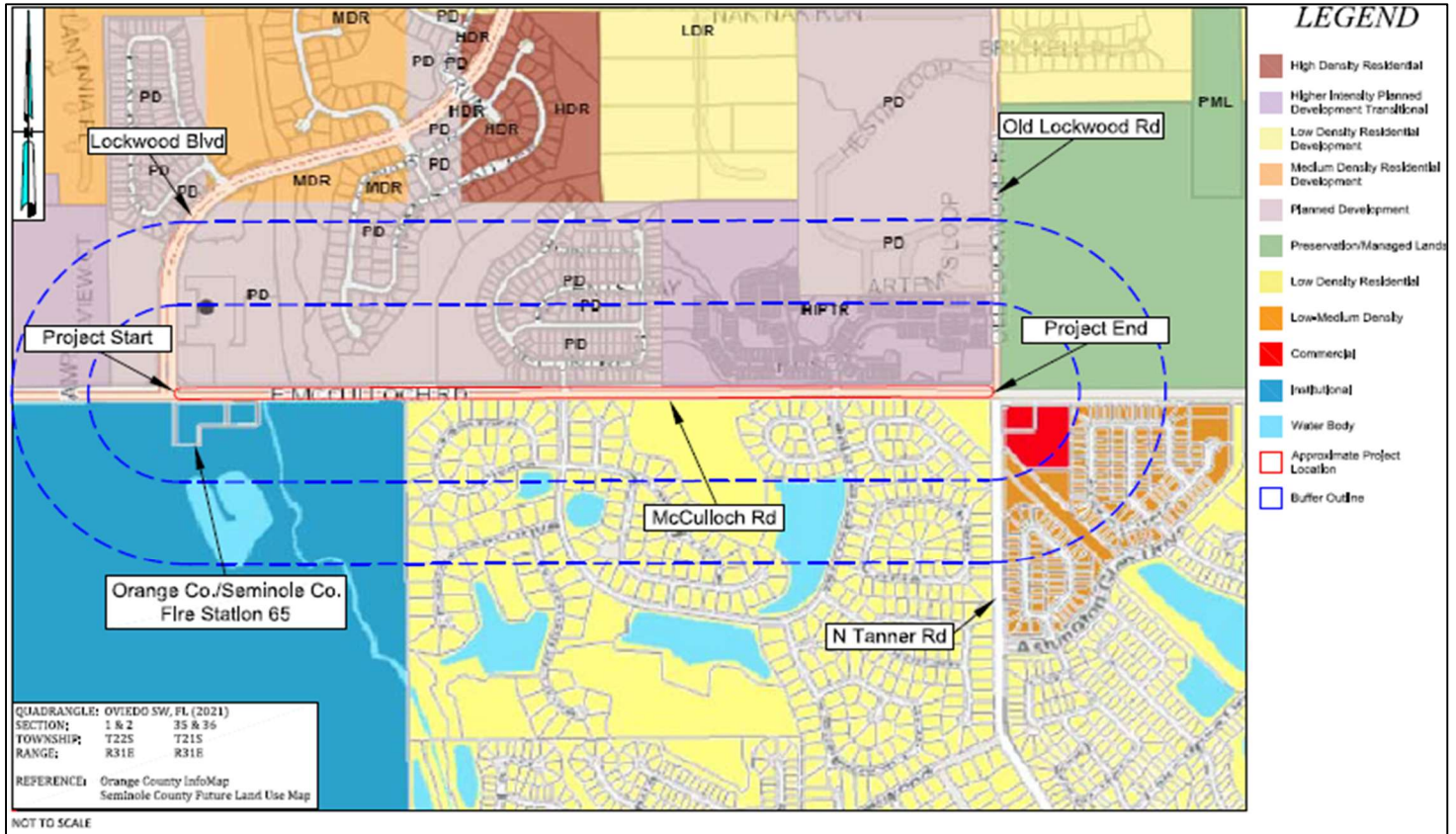
One concern would be dewatering operations during construction near known or potentially contaminated sites with the possible migration of contaminated groundwater during dewatering. It is recommended that an updated *CSER* be prepared during the final design phase to identify any changed conditions during the time period from the completion of this *CSER*.

3.9 Existing Land Use

Existing and future land use patterns along the McCulloch Road corridor are important to consider when evaluating potential improvements to the roadway. Future land use designations assigned to the study

area are generally consistent with the existing land uses. The property boundary of the UCF campus (Institutional land use) extends approximately 1,500 feet east of Orion Boulevard on the south side of McCulloch Road while the remainder of the study area's existing land use is primarily residential as depicted in **Figure 3.3**. Two businesses are within the study limits, a 7-11 convenience store/gas station in the northeast quadrant of the Lockwood Boulevard intersection and a Dollar General in the northwest quadrant of the Tanner Road intersection.

Figure 3.3: Land Use Map



3.10 Cultural Features

The following cultural features were identified found along the McCulloch Corridor and are depicted in **Figure 3.4**.

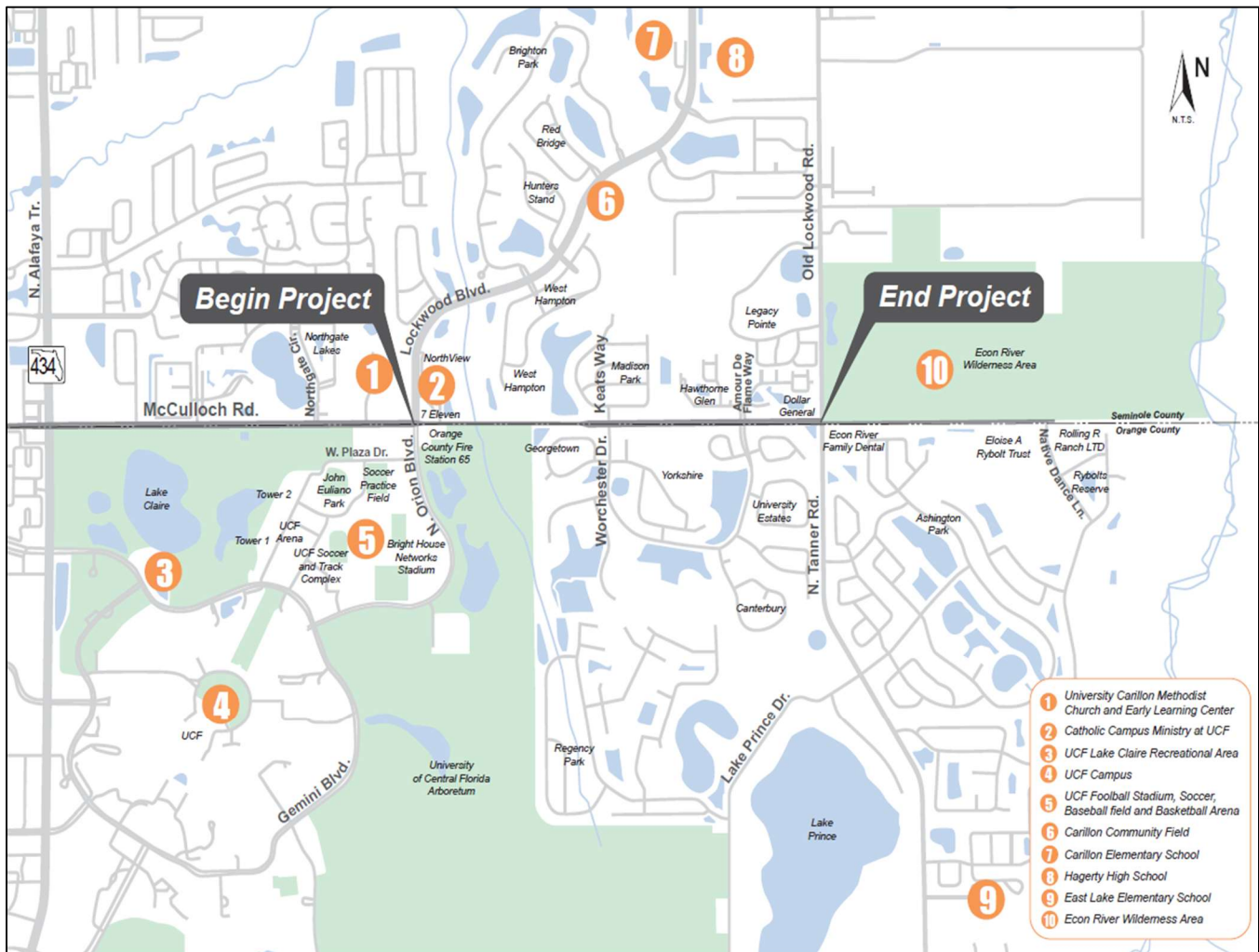
Religious Institutions

- University Carillon Methodist Church and Early Learning Center
- Catholic Campus Ministry at UCF

Schools

- University Carillon Early Learning Center
- Carillon Elementary School
- Hagerty High School
- East Lake Elementary School
- UCF Main Campus

Figure 3.4: Educational, Recreational, and Public Safety Features



Police/Fire Protection

- Orange Seminole Fire Station 65

Community Centers

- University Carillon Early Learning Center

Hospitals

- None

Cemeteries

- None

Parks and Trails

- Econ River Wilderness Area
- Carillon Community Field
- UCF Lake Claire Recreational Area
- UCF Athletics Fields (football, soccer, baseball, softball, and basketball)

3.10.1 Orange and Seminole County Public Schools

Coordination with Orange and Seminole County Public Schools Transportation Services (PSTS) was completed as part of the study efforts and information obtained from Orange and Seminole County PSTS is summarized below:

Orange County

- Bus stops are located on Worchester Drive (University Estates community)
- Although no bus stops are located on McCulloch Road within the project limits, County school buses do travel along McCulloch Road when school is in session.

Seminole County

- Students that attend Hagerty High School and Carillon Elementary School are within two miles and therefore do not receive transportation services.
- The school pedestrian walk path for both Hagerty HS and Carillon ES is along the sidewalk on the north side of McCulloch Road from the Hawthorne Glen community to the subdivision of Madison Park. Students travel to the back of the Madison Park subdivision to Lockwood Boulevard and then head north, taking the pedestrian walk path (sidewalk) to both schools.
- There are bus stops within the project limits for other schools outside the two-mile limits at the following locations:
 - McCulloch Road and Amour de Flame Way (Hawthorne Glen community)
 - McCulloch Road and Keats Way (Madison Park community)

3.10.2 Orange Seminole Fire Station 65

Coordination with Orange/Seminole Fire Station 65, located in the southeast quadrant of the McCulloch/Orion Blvd. intersection, was conducted as part of the study efforts. Access and setback issues associated with the Orion Boulevard widening were coordinated to ensure efficient operation of the fire station. In addition, the Orange Co. Fire & Rescue Department, Planning Division, confirmed that there are currently no plans for expansion.

During the final design phase, the following recommendations should be implemented:

- Include accommodations for school bus access and bus stops, and emergency services during construction in the final design Maintenance of Traffic plans.
- Coordinate with Orange and Seminole County PSTS and Orange Seminole Fire Station 65 during final design to identify any changes since the completion of this study.

3.11 Archaeological and Historic Features

A *Cultural Resource and Archaeological Report* was performed for the McCulloch Road study area to identify any cultural and historic resources that may be impacted by the project. This analysis was completed in 2026. Based on this analysis, there are no cultural resources listed, determined eligible, or appear to be potentially eligible for listing in the National Register of Historic Places (NRHP).

3.12 Natural and Hydrologic Features

3.12.1 Topography and Hydrologic Features

Type A curb is adjacent to the WB lane (north side) and Type F curb and gutter is adjacent to the EB lane (south side). In general, both the EB and WB lanes are sloped to the south side with stormwater runoff from the roadway collected by inlets on the south side and conveyed in a closed drainage system. There is one (1) existing cross drain within the project limits which allows offsite and onsite stormwater runoff to flow beneath McCulloch Road and continue along its historical path to the Little

Econlockhatchee (Econ) River. The 5 – 72” RCP cross drain conveys the Little Econ River tributary north to the Econ River and ultimately the Middle St. Johns River. Between N. Orion Boulevard and Tanner Road, ground elevations range between elevation 48 feet at the Little Econ tributary cross drain to 61 feet at the Tanner Road intersection.

The project is located within the Lake Price Outlet sub-basin of the Middle St. Johns River Watershed under the jurisdiction of the SJRWMD. The project traverses two (2) WBID’s: Lake Price Outlet (WBID 3012) and Econ River (WBID 2991). A majority of the project is located in the Lake Price Outlet WBID and only the Tanner Road intersection is located in the Econ River WBID. WBID 2991 is impaired for bacteria (*E. coli*). WBID 3012 itself is not an impaired waterbody but it discharges into the Little Econ River below Michael’s Reservoir (WBID 3001C) which is impaired for nutrients (macrophytes) and is part of the TMDL for fecal coliform.

The tributary which accepts the discharge from this project flows north for approximately 1 mile and joins the Econ River, which is categorized as a “Special Water” Outstanding Florida Water (OFW). According to the FDEP, the DEP and the WMDs cannot issue permits for direct discharges to OFWs that would lower ambient water quality. In most cases this requires increased treatment for stormwater discharging directly into an OFW. DEP and WMDs also may not issue permits for indirect discharges that would significantly degrade a nearby waterbody designated as an OFW.

Additionally, McCulloch Road traverses a wetland approximately 0.5 miles to the east of the tributary crossing. The wetland located on the north side of the road drains to the west toward the tributary via pipe and a roadside ditch. The wetland located on the south side of the road discharges through a control structure and closed pipe system and drains to the tributary. There are no known or documented cross drains connecting the north wetland to the south wetland beneath the road at this location.

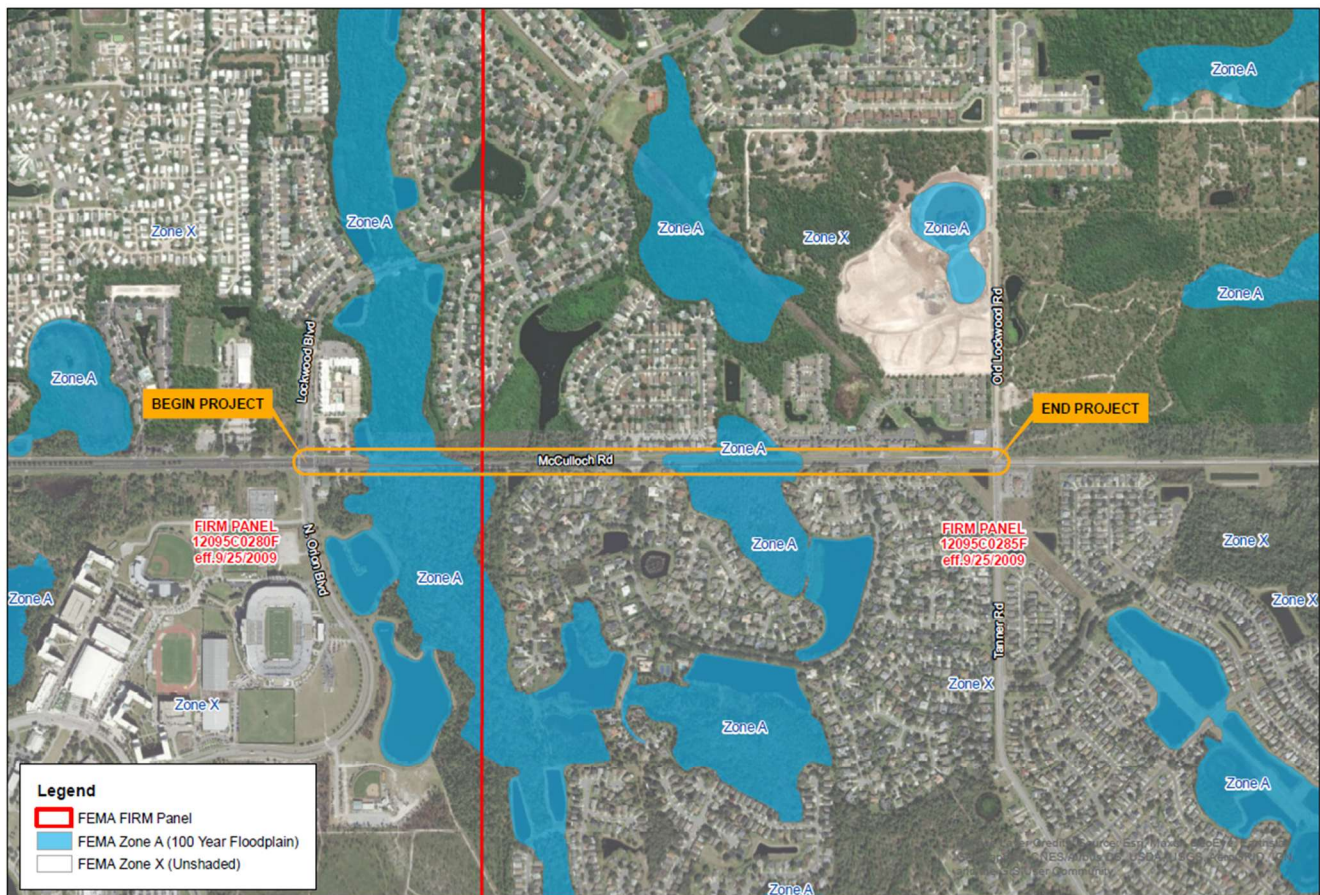
During the design phase, a hydraulic analysis will need to be performed on the 5 - 72” RCP cross drain with recommendations to either extend or replace based on the analysis, physical condition, and remaining design service life.

3.12.2 Floodplains and Floodways

According to the Federal Emergency Management Agency (FEMA), the relevant Flood Insurance Rate Map (FIRM) panel numbers are 12095C0280F and 12095C0285F dated September 25, 2009. The FEMA FIRM indicates that the roadway is located within Zones A and X of the FEMA flood hazard areas, shown on **Figure 3.6**. Zone A makes up part of the 100-year floodplain where predicted flood water elevations have not been established. Areas in Zone X are areas outside of the 100-year and 500-year floodplains and pose minimal flood hazards. The flood zone is depicted as being above the roadway, however there is no history of floodwaters overtopping the roadway. It is anticipated that portions of the roadway improvements will encroach upon these flood zones. There are no federally regulated floodways within the project limits.

Development within the 100-year floodplain has the potential for placing citizens and property at risk of flooding and producing changes in floodplain elevations and plan view extent. Development (such as roadways, housing developments, strip malls and other commercial facilities) within floodplains increases the potential for flooding by limiting flood storage capacity and exposing people and property to flood hazards. Development also reduces vegetated buffers that protect water quality and damages important habitats for fish and wildlife. The area surrounding the proposed roadway improvements project has and will continue to experience growth.

Figure 3.6: Floodplain Map



3.12.3 Flooding and Maintenance Concerns

Maintenance records from the past 15 years were obtained from the Orange County Public Works Department in reference to any issues regarding the storm drain system, cross drains or ponds along McCulloch Road.

According to the documented inquiries, the County was contacted on July 23rd, 2018 regarding standing water along the southern portion of the road between the western entrance of University Estates and Tanner Road. When County maintenance personnel inspected the area the following day, no standing water was found.

The County was contacted on July 1st, 2007 regarding standing water at the intersection of McCulloch Road and N. Orion Boulevard. On July 8th, 2007 the system was cleaned, and no obstructions were found in the system. This occurred again on September 10th, 2017 and within three days County maintenance personnel were successful at draining the standing water.

The County was contacted on July 15th, 2007 regarding standing water between N. Orion Boulevard and N. Tanner Road. On August 25th, 2007 County maintenance personnel were able to clean the system and clear any blockages.

3.12.4 Existing Drainage Permits

The available permits within the project limits were reviewed to obtain environmental and design information for the stormwater systems which may impact or affect the drainage design for the project. The sections below briefly describe the permitted condition, the impact to the permit associated with the proposed improvements and the action necessary to mitigate for the impacts.

Permit No. 12-095-0004SM: University Estates – McCulloch Road Construction

This permit authorizes the excavation of 936 cubic yards of material and placement of 13,043 cubic yards of fill material in Waters of the State for construction of McCulloch Road to provide access to a residential development known as University Estates. The permit was authorized in July 1989. A Lake Monitoring Report was also submitted with information pertaining to four (4) lakes and a mitigation area within the project limits.

Permit No. 4-095-0301: University Estates – McCulloch Road SWMS

This permit authorizes the construction of the surface water management system and stormwater system to serve 10.9 acres for road improvements to McCulloch Road and Tanner Road, and a 223-acre residential development known as University Estates. The stormwater system consists of eight (8) retention/detention ponds with side-bank filterdrain and underdrain, rear-lot swales, and stormsewer. Additionally, 4.2 acres of off-site area are being proposed as the site for mitigation to compensate for wetland encroachments due to the construction of McCulloch Road. Stormwater runoff from the site is directed via overland flow to on-site wetland areas which discharge to the west to a tributary of the Little Econlockhatchee River. Plans included with this permit show the construction of the 5 – 72" RCP cross drains under McCulloch Road.

Permit No. 4-095-20580-4: Additional Turn Lane at McCulloch Road and Tanner Road

This letter modification was submitted for the construction of turn lanes at the intersection of McCulloch Road and North Tanner Road resulting in an additional 0.17 acres of impervious area being added to the existing permitted impervious area. The permit states that the additional runoff produced by the 0.17-acre impervious area added for the proposed McCulloch Road turn lanes is negligible and will have no impact to the water quality or flood attenuation functions of the existing water retention system.

Permit No. 4-117-22032-8: Intersection Improvements McCulloch Road and Lockwood Blvd

This permit authorizes the construction of additional turn lanes from E McCulloch Road onto northbound Lockwood Boulevard and additional turn lanes along Lockwood Boulevard. Discharge from the intersection improvements is routed to the existing onsite stormwater facility and subsequently to the adjacent Little Econlockhatchee tributary. This permit will not be affected by the proposed improvements under this project.

Permit No. 4-095-64900-1: Tanner Road Widening

This permit authorizes the widening and paving of existing Tanner Road between Lake Pickett Road and McCulloch Road to a two-lane urban roadway with Type F curb and gutter. The permit states that management of surface water runoff will be accomplished via a combination of inlets and stormsewers and three (3) wet detention ponds. Any interaction with the existing drainage system at the intersection of McCulloch Road and Tanner Road will be considered during design.

Permit No. 40-117-91175-3: Commercial Retail Store (CRS) - Oviedo

This permit authorizes the construction of a 7545 square foot commercial retail store with associated parking, driveway, and a dry retention pond. The 1.48-acre commercial development located on the northwest corner of the intersection of Old Lockwood Road and McCulloch Road sheet flowed under

existing conditions to the wet retention pond for the adjacent Hawthorn Glen Subdivision. Under proposed conditions, runoff from the site will be treated in a new dry detention pond before discharging to the wet pond. Discharge from the site will not be affected by the proposed improvements along McCulloch Road.

Permit No. 40-117-28885-11: Northview Student Housing

This permit authorized the construction of the Northview Student Housing property in place of an existing Winn-Dixie grocery store. The Northview Student Housing property consists of 7.57 acres of land.

Permit No. 40-117-0125AM5-ERP (28885-6): Tract 202, Carillon PUD

This permit authorized the expansion of an existing detention pond and site grading of 0.83 acres of McCulloch Road for future commercial development. The permit was authorized in June 1998.

3.12.5 Existing Drainage Basins

There are six (6) existing roadway basins which are described in the following sections and depicted in **Figure 3.7**. Worchester Drive is a loop that intersects McCulloch Road at two locations and is referred to as eastern and western Worchester Drive for the purposes of this section.

Basin 1 consists of the northern portion of McCulloch Road starting at N. Orion Boulevard and continuing east for approximately 500 feet. The northern portion of the road drains to a roadside ditch which is conveyed via pipe to an existing retention pond which ultimately discharges to the adjacent Little Econ tributary.

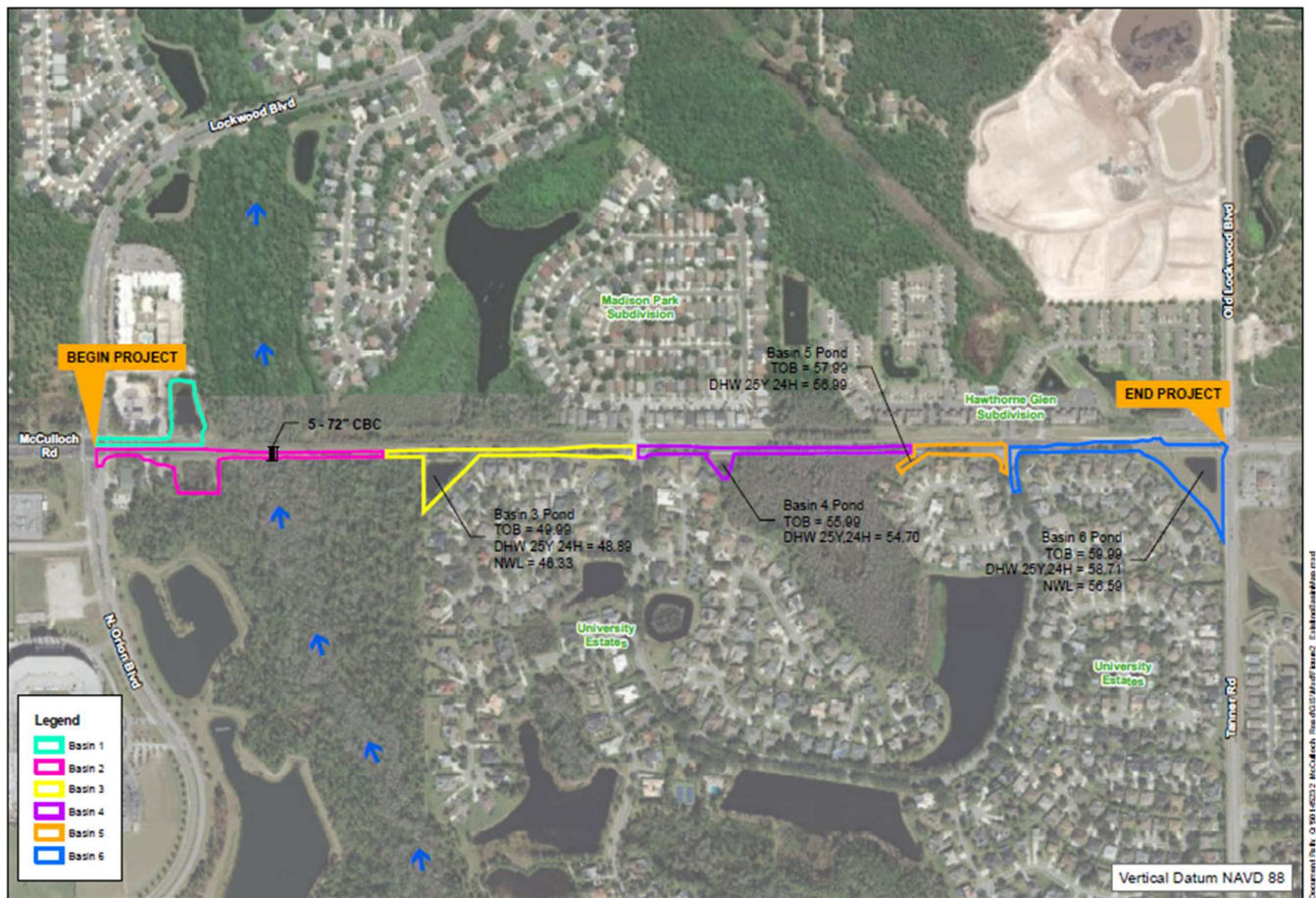
Basin 2 begins at N. Orion Boulevard and continues east for approximately 1,500 feet to a high point in the roadway. A transition in the roadway causes all lanes to drain to the south side of the road. The runoff is collected by curb inlets and conveyed via pipe to a wet pond located approximately 500 feet east of the intersection. The pond discharges to nearby wetlands.

Basin 3 begins at approximately 1,500 feet east of the N. Orion Boulevard intersection and continues east for approximately 1,200 feet to the western Worchester Drive. The basin encompasses the area between two high points in the existing roadway profile. Both sides of the road drain toward the south and are conveyed via pipe to a wet pond located 950 feet to the west of the western Worchester Drive intersection. The pond discharges to wetlands that drain to the tributary.

Basin 4 begins at the western Worchester Drive intersection and continues east for approximately 1,400 feet. Both sides of the road drain toward the south and are conveyed via pipe to a dry pond located 400 feet east of the western Worchester Drive intersection. The dry pond was designed with an underdrain and has an emergency outfall weir to discharge to nearby wetlands which ultimately drain back to the tributary via a closed pipe system. Currently the pond remains wet for long durations. However, a non-compliance report has not been received for the pond to date.

Basin 5 begins at approximately 500 feet west of the eastern Worchester Drive and continues to a high point in the roadway at the eastern Worchester Drive intersection. Both sides of the road drain toward the south and are conveyed via pipe to a pond located at the beginning of the basin. The pond discharges to nearby wetlands via a concrete flume which ultimately drains back to the tributary via a closed pipe system. Currently the pond remains wet for long durations. However, a non-compliance report has not been received for the pond to date.

Figure 3.7: Existing Drainage Basins



Existing Basin Map
McCulloch Road RCA Study

Orange County, Florida

January 2022
Data Source: Dewberry
Image Source: ESRI
Vertical Datum NAVD 88
0 300 600 Feet
Dewberry

Basin 6 begins at a high point in the road at the eastern Worchester Drive intersection and continues east for approximately 1,100 feet to the Tanner Road intersection. It appears that the westbound turn lanes into the Hawthorne Glen subdivision drain toward a curb inlet on the north side of the road which is conveyed to an onsite pond. This connection will be confirmed with the survey and field reconnaissance. The remainder of the road drains to the south to the road's curb and gutter and is collected by curb inlets which drain to a wet retention pond located at the southwest corner of the Tanner Road intersection. The pond is equipped with an underdrain system and discharges through a closed pipe system to another pond located downstream in the conveyance system (Basin 5). Currently the pond remains wet for long durations. However, a non-compliance report has not been received for the pond to date.

3.13 Wetlands

Wetlands are defined jointly by the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA) as *“those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under natural circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions”* (USACE 1987). Wetlands within the study corridor were identified through a review of available site-specific data and field verification.

Using the information from the reviewed literature and data sources as a guide, field surveys were conducted on November 10, 2021 to verify wetland locations and characterize wetland habitat within the study corridor. Community composition was noted for each wetland including type, plant composition, vegetative stratification, and hydric characteristics. The jurisdictional extent of wetlands and/or other surface water systems were approximated in accordance with the 1987 USACE Wetlands Delineation Manual (Technical Report Y-87-1), the November 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic Gulf Coastal Plain Region and the State of Florida's Delineation of the Landward Extent of Wetlands and Surface Waters (Chapter 62-340, Florida Administrative Code).

Habitat types within the study corridor were reviewed through SJRWMD's land use classification system and were revised based on current conditions following field surveys. Wetlands found within the project corridor are classified as Wetland Forested Mixed. The vegetation within these wetland systems is comprised of bald cypress (*Taxodium distichum*), red maple (*Acer rubrum*), cabbage palm (*Sabal palmetto*), salt bush (*Atriplex* spp.), peruvian primrose (*Ludwigia peruviana*), slash pine (*Pinus elliotii*), pond pine (*Pinus serotina*), wax myrtle (*Myrica cerifera*), and Virginia chain fern (*Woodwardia virginica*).

Four (4) wetland systems and ten (10) surface water systems, including Other Surface Waters (OSWs), are present within the study area shown on **Figure 3.8a-b**. The character, condition, and quality of wetland systems within and adjacent to the study area vary in response to drainage pattern alterations, intensity of recent human activity, development and natural succession. The jurisdictional limits of these wetland systems have not been approved by state or federal regulatory agencies.

Figure 3.8a: Wetlands Map (1 of 2)

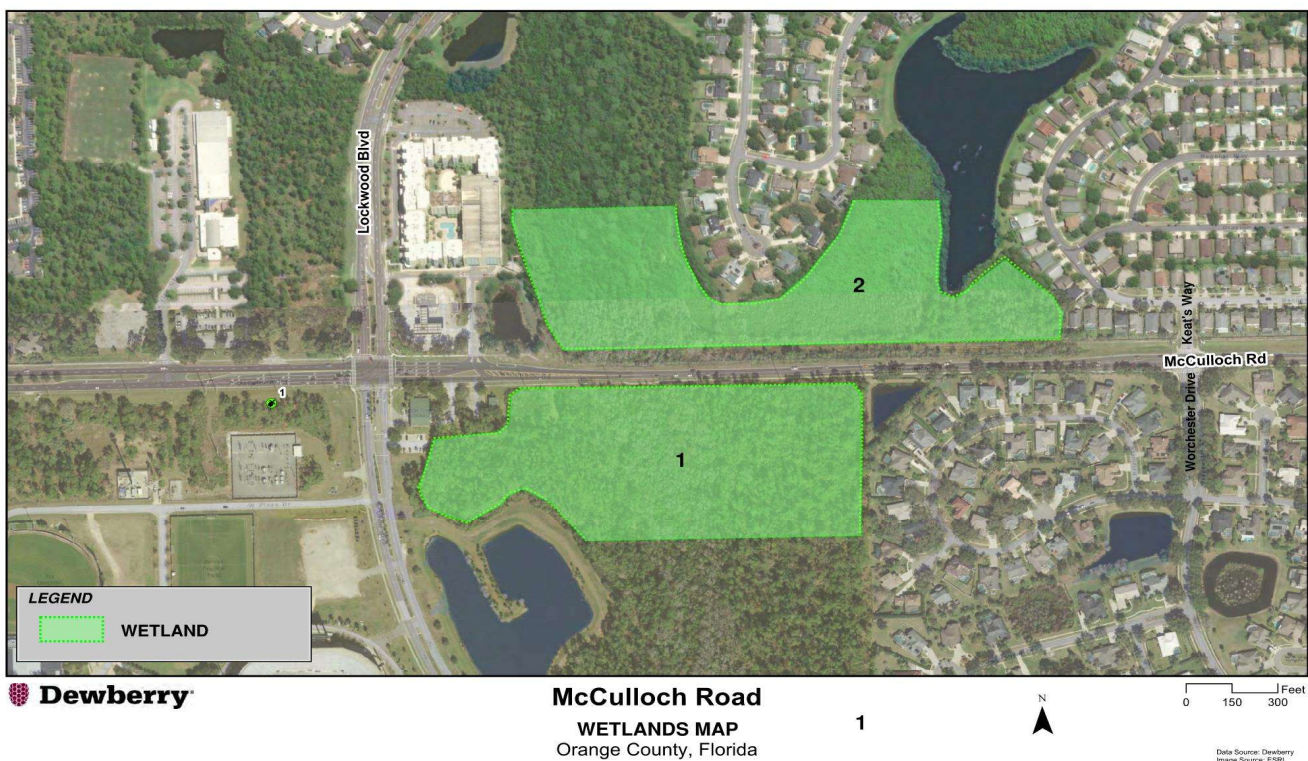


Figure 3.8b: Wetlands Map (2 of 2)

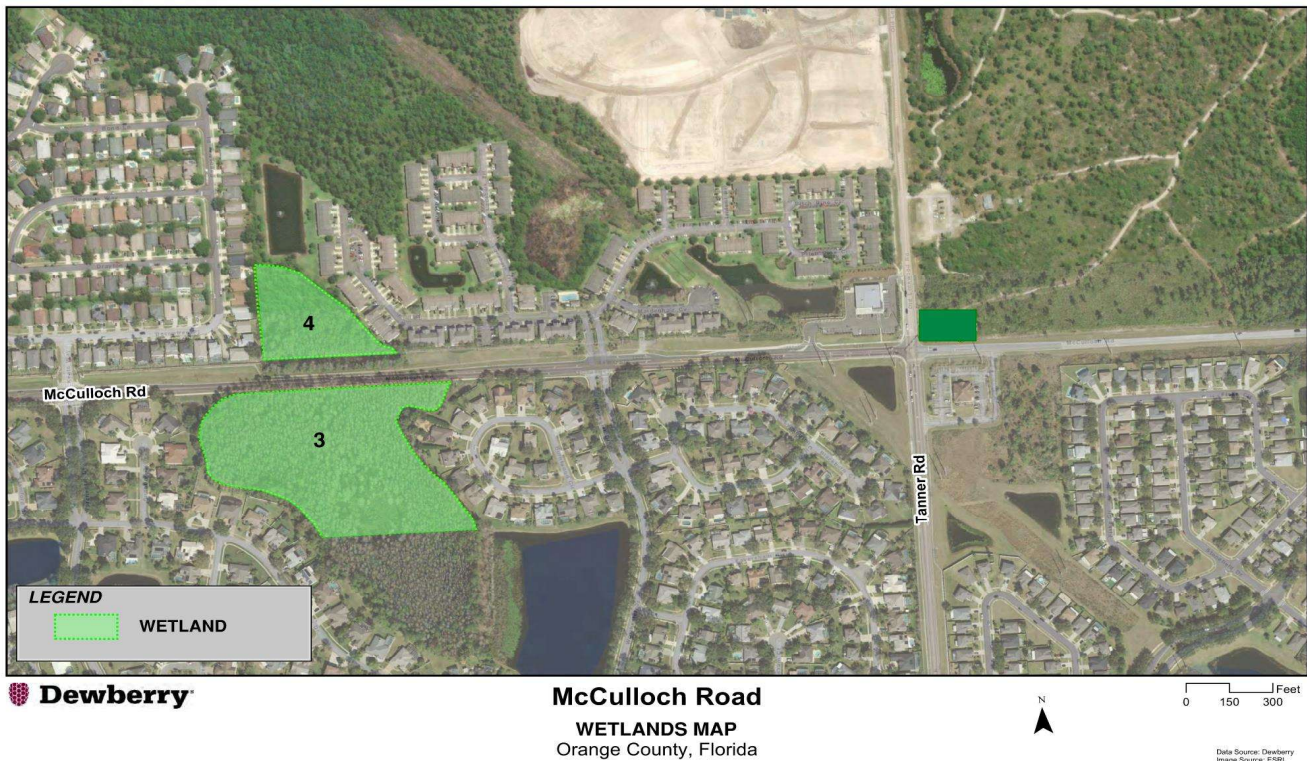


Table 3.5 identifies the wetland and/or other surface waters within the study area and provides specific land use codes for each location.

Table 3.5: Wetlands and Other Surface Waters within the Study Area with Land Use Codes

Wetland ID	Land Use Code	Description
Wetland 1-4	6300	Wetland Forested Mixed
Surface Waters 1-10	5100	Streams and Waterways
Surface Waters 1-10	5300	Reservoir

3.14 Threatened and Endangered Species

The study area and adjacent areas consist of single and multi-family residential dwellings, state owned lands, UCF campus, and commercial development along McCulloch Road. The study corridor includes a significant amount of wetland habitat; however, it is divided by the existing roadway. Natural wetlands, surface waters, OSWs and upland habitats occur throughout the area abutting McCulloch Road. Existing development surrounding remaining natural habitat within the study corridor likely results in limited wildlife species utilizing the study corridor, when compared to historical conditions.

The presence of protected species and the potential for occurrence within the study area was evaluated through the review of state (Florida Fish and Wildlife Conservation Commission, FWC) and federal (United States Fish and Wildlife Service, FWS) databases, available literature, and field reviews conducted on November 10, 2021.

The probability of each wildlife and vegetative species occurrence within the study area was

ranked using the following scale: 1) Low, 2) Moderate, and 3) High based on presence of suitable habitat. Ranking of “Low” indicates that marginally suitable habitat may exist within the study area, but species was not observed during field survey. The ranking of “Moderate” indicates that suitable habitat exists within the study area; however, the species was not observed during field surveys. The ranking of “High” indicates that suitable habitat exists within the study area, and the species of interest was observed during field survey. **Table 3.6** identifies federal and/or state-listed wildlife known to occur within the regional area of the study limits, due to the availability of suitable habitat.

The FWC database was also queried within one mile of the study area for known bald eagle (*Haliaeetus leucocephalus*) nest sites. One nest site was identified within 0.40 miles of the study area. Nest ID OR036 is located south of McCulloch Road and east of Tanner Road. This nest was last surveyed and observed as active during the 2021 monitoring season.

Table 3.6: Federal and/or State-Listed Wildlife Species with Potential for Occurrence

Scientific Name	Common Name	FWS Status	FWC Status	Occurrence Potential
Reptiles				
<i>Drymarchon corais couperi</i>	Eastern Indigo Snake	T	T	Moderate
* <i>Gopherus polyphemus</i>	Gopher Tortoise	-	T	High
<i>Pituophis melanoleucus</i>	Pine Snake	-	SSC	Moderate
Birds				
<i>Haliaeetus leucocephalus</i>	Bald Eagle	--	--	Low
<i>Egretta caerulea</i>	Little Blue Heron	--	T	Moderate
<i>Egretta tricolor</i>	Tricolored Heron	--	T	Moderate
<i>Rostrhamus sociabilis plumbeus</i>	Everglade Snail Kite	E	E	Low
<i>Grus canadensis pratensis</i>	Florida Sandhill Crane	--	T	Moderate
<i>Mycteria americana</i>	Wood Stork	T	T	Moderate
<i>Polyborus plancus audubinii</i>	Audubon's Crested Caracara	T	T	Low
<i>Pandion haliaetus</i>	Osprey	--	SSC	Moderate

Code Key, T = Threatened, SSC= Species of Special Concern. E = Endangered.

Source: http://myfwc.com/media/1515251/threatened_endangered_species.pdf and Florida Natural Areas Inventory (FNAI) Tracking List Orange Co Updated July 2017

The study corridor is located within the core foraging areas of two known wood stork (*Mycteria americana*) colonies. The core foraging area for Central Florida consists of a 15-mile radius around each colony.

Federal and/or state-listed flora that have the potential for occurrence within the study area are listed in **Table 3.7**. No federal and/or state-listed flora were observed within or adjacent to the McCulloch Road study area. The Econ River Wilderness Area, owned by Seminole County, is adjacent to the eastern limits of the study corridor, just east of Old Lockwood Rd on the north side of McCulloch Road. While no impacts are currently anticipated to this conservation area, any potential change in the project limits likely alters species occurrence potential and may require additional permitting not discussed within this report.

3.14.1 Wildlife Corridor Analysis

Senate Bill 976 (SB 976), approved in 2021, and filed in Section 1055, Chapter 259, Florida Statutes, is known as the “The Florida Wildlife Corridor Act”. The Act states that the Department of Environmental Protection (DEP) shall encourage and promote various measures of investing in and protecting the Florida Wildlife Corridor. In response to this legislation, Orange County assessed the McCulloch Road corridor, to determine feasibility of maintaining and possibly improving wildlife habitat connectivity, during the design of roadway capacity improvements.

Table 3.7: Federal and/or State-Listed Flora with Potential for Occurrence

Scientific Name	Common Name	Habitat	FWS Status	FWC Status	Occurrence Potential
<i>Deeringothamnus pulchellus</i>	Beautiful Pawpaw	Longleaf and slash pine flatwoods	E	E	Low
<i>Nolina brittoniana</i>	Britton's Beargrass	Open scrub, high pines, mesic hammocks	E	E	Low
<i>Prunus geniculate</i>	Scrub Plum	Dry, sunny, nutrient-poor sites	E	E	Low
<i>Warea amplexifolia</i>	Wide-leaf Warea	High pine or sandhill communities	E	E	Low
<i>Bonamia grandiflora</i>	Florida Bonamia	Scrub vegetation with evergreen scrub oaks and sand pine	T	T	Low
<i>Paronychia chartacea</i>	Papery Whitlow-wort	Sand pine scrub	T	E	Low
<i>Clitoria fragrans</i>	Piegon Wings	High pine and scrub communities	T	E	Low
<i>Chionanthus pygmaeus</i>	Pygmy Fringe-tree	High pine and scrub communities with low-nutrient St. Lucie fine sand	E	E	Low
<i>Polygonella myriophylla</i>	Sandlace	Xeric hammock	E	E	Low
<i>Eriogonum longifolium</i> var. <i>gnaphalifolium</i>	Scrub Buckwheat	High pine and turkey oak barrens	T	E	Low
<i>Lupinus aridorum</i>	Scrub Lupine	Well-drained sandy soils with little organic accumulation	E	E	Low

Source: FNAI Tracking List Orange Co Updated July 2017; Atlas of Florida Plants Institute for Systematic Botany; FL Department of Agriculture and Consumer Services Endangered, Threatened and Commercially Exploited Plants of Florida; USFWS North Florida Ecological Services Office Species Account/Biologue.

During field review conducted on November 10, 2021, three potentially occupied gopher tortoise burrows were observed within the study area. No other federal and/or state-listed wildlife species were observed during field surveys and there is no documented significant movement of listed wildlife species across the study corridor. General wildlife species (e.g., raccoons, opossums, armadillo, and deer) likely utilize existing vegetative communities along the residential corridor; however, no wildlife species were observed. Existing conditions (residential and commercial development and existing roadways) within the study corridor have fragmented natural vegetative communities, which restricts wildlife movement across McCulloch Road.

While there are existing conservation easements (primarily regulatory easements granted to the SJRWMD) immediately adjacent to the project corridor, as well as state-owned lands associated with UCF, the lack of upland corridor connectivity limits the immediate population of wildlife from ingress and egress to primarily wetland habitat, as the adjacent upland and ecotonal areas have been developed into stormwater ponds, upland "buffers" for residential communities, and single family/multi-family neighborhoods. Additionally, much of the wetland habitat immediately surrounding the study area is inundated with water for at least half of the calendar year.

During site visits, a 5 – 72" RCP culvert was observed adjacent to UCF campus (owned by the state of Florida), approximately 500 feet east of North Orion Boulevard. "Wildlife Crossing" signs at the culvert are posted and wildlife cameras are installed on site, adjacent to the culvert, on the state-owned property. It is anticipated that UCF staff likely track movement at this location. Further analysis is recommended, during early design phase, to determine if any improvement to the existing structure (such as shelves) might benefit existing wildlife movement. Consideration of impacts to natural wetland systems should be analyzed, to determine cost-benefit analysis and impact to the natural floodplain. Analysis of wildlife fencing should also be further assessed during early design phase, as more recent studies demonstrate that wildlife underpasses without proper fencing are significantly less effective.

Given the amount of inundation in existing wetland systems adjacent to the corridor, residential/commercial development beyond the remaining wetlands that have eliminated the majority of upland habitat within a mile radius, and no priority lands proposed for future conservation purchases by state or local municipalities, no additional crossings are recommended during design phase.

4.0 Design Controls and Standards

4.1 Roadway Design Criteria

Design criteria used for the study of McCulloch Road has been determined using FDOT *Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (Florida Greenbook (FGB) 2018 Edition)*, 2022 FDOT *Design Manual (FDM)*, and the FDOT *Standard Plans for Road and Bridge Construction*, the *Manual of Uniform Traffic Control Devices (MUTCD)*.

Specific design elements and criteria for the study is identified below:

- **Design Speed:** 45 mph (Posted 45 mph)
- **Curb Type:** Type F (outside); Type E (median)
- **Functional Classification:** Urban Collector
- **Context Classification:** C3R – Suburban Residential
- **Intersection Level of Service (LOS) in Design Year:** LOS of “C” or better
- **Travel and Turn Lane Widths:** 11’ min. (FGB, Table 3-20 and FDM Table 210.2.1)
- **Median Width:** 16-22’ min. (FGB Table 3 -23 and FDM Table 210.3.1)
- **Sidewalk Width:** 6’ w/ 2’ utility strip min., 6’ adjacent to curb (FGB); 6’ (FDM for C3)
- **Border Width:** 14’ from outside edge of pavement / lip of gutter (FDM Table 210.7.1)
- **Multi-Purpose Path:** 10’ width with 4’ clear both sides of path; 5’ min. from face of curb (FDM 224)

4.2 Drainage Design Criteria

The study area is located within the St. John’s River Water Management District (SJRWMD). Final design of the stormwater management systems will be required to be designed in accordance with SJRWMD and Orange County criteria. These design criteria include requirements for providing water quality protection and attenuation of discharge rates. The following is a summary of the drainage design criteria required by each of the governing agencies.

Orange County Criteria

- **Water Quality:** Pollution abatement will be accomplished by retention, or detention with filtration, of one-half (½) inch of runoff from the developed site or the runoff generated from the first one (1) inch of rainfall on the developed site, whichever is greater.
- **Water Quantity:** The post development peak rate of discharge permitted from the site will not exceed the predevelopment peak rate of discharge from the site during a 25-year frequency/24-hour duration storm event. A rainfall amount of 8.6 inches using the Orange County distribution is used for this analysis.
- **Detention Pond Configuration:**
 - **Maintenance Berm:** Design ponds to provide a minimum 20 feet of horizontal clearance between the top edge of the control elevation and the right-of-way line. Provide at least 15 feet adjacent to the pond at a slope of 1:5 or flatter. Create the inside edge of the maintenance berm to have a minimum radius of 30 feet toward the pond and be a minimum of one foot above the maximum design stage elevation. Sod the berm area. Discuss maintenance needs with the County before acquiring additional right-of-way to construct maintenance access around the full perimeter.
 - **Freeboard:** As a safety factor for hydrologic inaccuracies, grading irregularities, control structure clogging, and downstream stage uncertainties, at least one foot of freeboard is

required above the maximum design stage of the pond. The freeboard is the vertical distance between the maximum design stage elevation of the pond and the inside edge of the berm.

- For linear swales, the minimum freeboard is 0.5 foot.
- Slopes: For facilities designed to be wet, sod pond slopes to the control elevation of the pond. For facilities designed to be dry, sod pond slopes to the bottom of the slope.
- Fencing: Install fences around ponds that meet the following criteria.
 - If pond slopes steeper than 1:5 are unavoidable then fencing is required.
 - If the pond slope is 1:5 or flatter, however below the water's edge is steeper than 1:3 then fencing is required.
 - The site is likely to experience significant exposure to children or the elderly. Examples of such locations are ponds immediately adjacent to schools, daycares, assisted living facilities, nursing homes, public playgrounds, public basketball courts, etc.
 - Livestock are expected to wander into the stormwater management facility.
 - Illicit dumping has historically occurred or is expected to occur.
- **Floodplain:** The Flood Insurance Study for Orange County, Florida and Incorporated Areas dated September 24, 2021, and subsequent amendments and revisions, and the accompanying FIRMs, and subsequent amendments and revisions to FIRMs, serve as the minimum basis for establishing flood hazard areas. Compensating storage is to be accomplished between the normal high water of the special flood hazard area and the estimated one-hundred-year flood.

SJRWMD Criteria

■ **Water Quality:**

Wet Detention Ponds: Treatment will be provided for the greater of one inch (1") of runoff over the drainage area or two and a half inches (2.5") of runoff from the impervious area (excluding water bodies).

- The outfall structure shall be designed to drawdown one-half the required treatment volume within 24 and 30 hours following a storm event, but no more than one-half of this volume will be discharged within the first 24 hours.

The project traverses one (1) Waterbody ID (WBID) within SJRWMD: 3012 Lake Price Outlet which is not impaired according to the current FDEP 303(d) list of impaired water bodies. However, the project eventually discharges into the Econlockhatchee River approximately 1-mile north of the project, which is considered an Outstanding Florida Waters (OFW). During the pre-application meeting with the SJRWMD dated April 19, 2022, Richard Lee (SJRWMD) explained that the additional 50% required treatment volume for discharges to OFW's will not be required for this project.

- **Water Quantity** – For open basins, SJRWMD requires that the post-development peak discharges shall be at or below pre-development peak discharges for the 25-year/24-hour and mean annual storms. For closed basins, SJRWMD requires that the post-development peak discharges shall be at or below the pre-development peak discharges for the 25-year/96-hour storm event.

Offsite discharges and peak stages for the existing and proposed conditions shall be computed using the SJRWMD 25-year/24-hour and 25-year/96-hour rainfall depth and the Natural Resources Conservation Service (NRCS) Type II Florida Modified 24-hour rainfall distribution with an AMC II.

- **Nutrient Load Reduction** – Calculations for the phosphorous loading for the site are based on the methodology outlined in the preliminary Florida Department of Environmental Protection (FDEP) Stormwater Quality Applicant's Handbook. For sites draining to an impaired water body, the proposed

development phosphorous and nutrient load leaving the site must meet the performance standards specified in Applicant's Handbook Vol. I Sections 8.2.3 through 8.3.6. Options for Nutrient Load reductions are:

- Dry treatment ponds before stormwater outfalls to wet pond
- Dry swales located on the side of proposed road
- Bio swales located in the proposed road median
- Filter media in inlets
- Smart ponds
- Purchase stormwater credits (if available within this basin)

■ **Pond Configuration:**

Wet Detention Facilities: The average length to width ratio of the pond must be at least 2:1. If short flow paths are unavoidable, the effective flow path can be increased by adding diversion barriers such as islands, peninsulas, or baffles to the pond. Inlet structures should be designed to dissipate the energy of water entering the pond.

- Permanent Pool – The permanent pool shall be sized to provide at least a 14-day average residence time during the wet season (June – October).
- Littoral Zone – The littoral zone shall be gently sloped (1:6 or flatter). At least 30 percent of the wet detention pond surface area shall consist of a littoral zone. The percentage of littoral zone is based on the ratio of vegetated littoral zone to surface area of the pond at the control elevation.
 - Littoral Zone Alternatives:
 - An additional 50% of the appropriate permanent pool volume.
 - Pre-treatment of the stormwater prior to the stormwater entering the wet detention pond. The level of pre-treatment must be at least that required for retention, underdrain, exfiltration or swale systems.
- Pond Depth – Wet detention systems shall provide for a maximum pond depth of 12 feet and a mean (pond volume divided by the pond area at the control elevation) between 2 and 8 feet.
- Side Slopes – The pond must be designed so that the average pond side slope measured between the control elevation and two feet below the control elevation is no steeper than 1:3.

5.0 Traffic Conditions

This section describes the analysis of traffic flow operating conditions for existing (2021) traffic conditions at the study intersections and roadway segments along McCulloch Road. In analyzing the year 2021 operating conditions of the intersections and roadway segments, traffic counts collected from the field were used along with the existing roadway and intersection geometry. The turning movement volumes collected in the field were reviewed for consistency and reasonableness and used for the year 2021 level of service (LOS) analysis for the intersections and roadway segments. The existing conditions intersection level of service (LOS) analysis was performed using Synchro 11 software based on the *Highway Capacity Manual, 6th Edition*. The following sub-sections describe the overall process.

5.1 Existing (2021) Traffic Characteristics

Figure 5.1 provides the location of traffic counts and type of traffic count data collected for the study. All existing traffic count data was collected during the month of September 2021. The data collected included:

1. 72-Hour Classification Counts (9 locations)
2. 10-Hour intersection turning movement counts for AM and PM peak hours (4 intersections)

The weekday turning movement counts were collected for the intersections along McCulloch Road between the peak hours of 7:00-9:00 a.m. and 12:00-8:00 p.m.

All traffic count data collected were adjusted utilizing the latest (2020) FDOT seasonal adjustment factors for Orange County to provide 2021 annual average conditions. Daily classification counts were adjusted to AADT using FDOT peak season adjustment factors only, as no axle adjustment was necessary. **Figure 5.2** provides the existing AADT's for the entire corridor as well as traffic control for the study intersections. **Table 5.1** details the daily traffic counts and adjustments.

As part of the traffic count program for this project, all nine (9) of the 72-hour count locations were utilized in this study as vehicle classification counts. Vehicle composition for the classification counts was broken into three primary vehicle types:

1. Passenger Vehicles – Motorcycles, Cars, Vans, and Pickups;
2. Medium Bus/Truck – Buses and 2 axle Single Unit Trucks;
3. Heavy Trucks – (3 or 4 axles) Single Unit Trucks, 2 axle Tractors (with 1 or 2 axle Trailer), 3 axle Trailers (2 or 3 axle Trailers), and (5, 6 and 7 axle) Multi-trailers.

Percentages for overall buses and trucks (medium and heavy) were determined for peak and daily traffic conditions and are presented in **Table 5.1**. FDOT axle and seasonal adjustment factors for Orange County and all traffic count data are provided in DTTM.

The existing traffic characteristics were established using the traffic counts collected. Specific traffic characteristics are listed below:

1. K – the proportion of AADT occurring during the peak study hour for the study roadway
2. D – the proportion of traffic in the design hour of the design year traveling in the peak direction
3. T – the percentage of buses and trucks occurring during a day (24-hours)
4. DHT – the percentage of buses and trucks occurring during the design hour

Figure 5.1: Traffic Count Location by Type



Figure 5.2: Existing Annual Average Daily Traffic (AADT) Volumes and Traffic Control

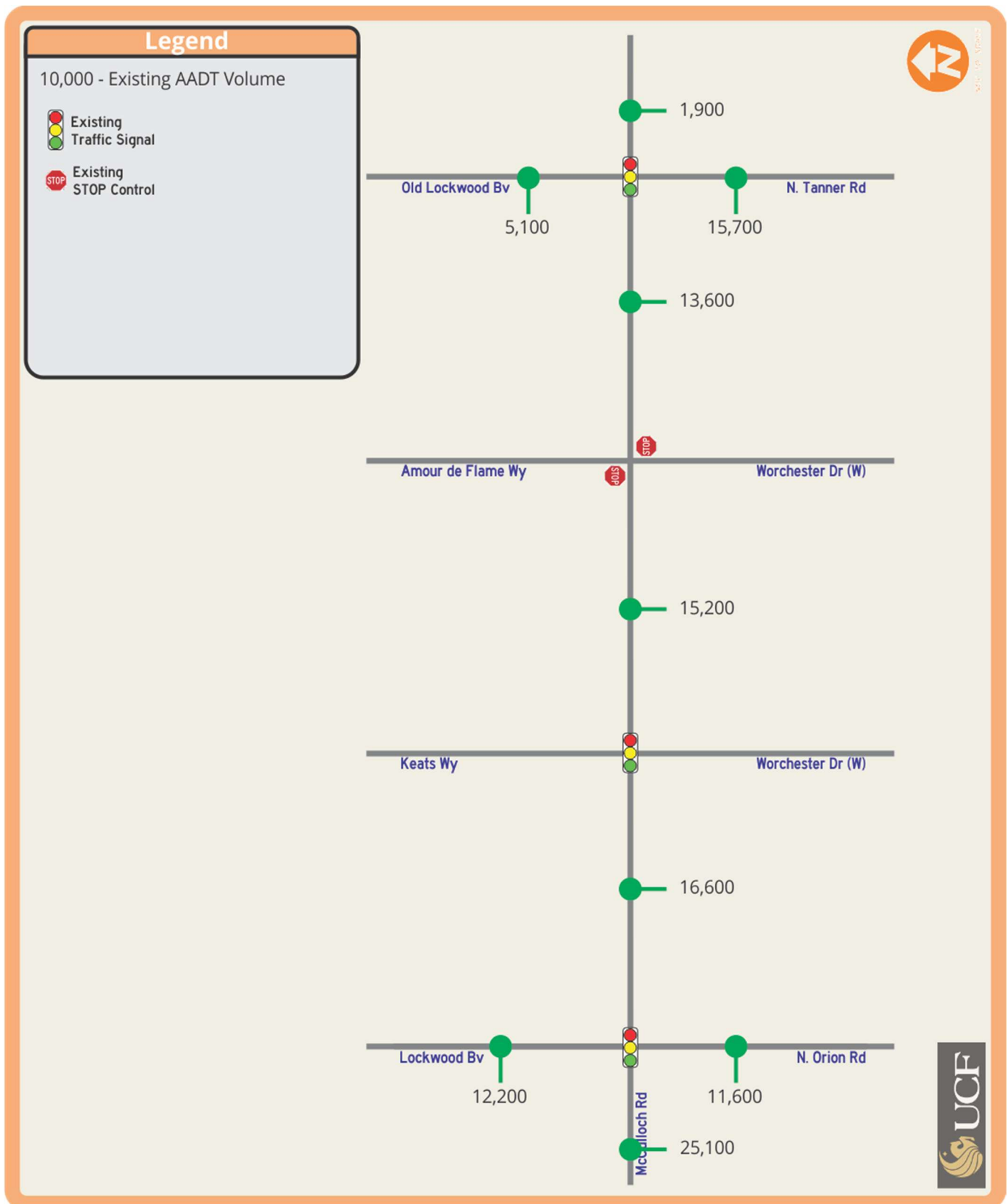


Table 5.1: Existing 2021 Traffic Characteristics

Roadway/Segment	Type of Count	Measured Characteristics					Axle Adj. ¹	Seasonal Adj. ²	Adjusted AADT ³
		ADT	Peak Hr. Volume	NB/EB Volume	SB/WB Volume	Peak Time			
Mainline Characteristics									
McCulloch Rd									
West of N. Orion Bv / Lockwood Bv	72 Hr Classification	25,651	2,097	1,198	899	5:15-6:15 PM	8.18%	57.13%	25,100
N. Orion Bv / Lockwood Bv to Worchester Dr	72 Hr Classification	16,894	1,417	822	595	5:15-6:15 PM	8.39%	58.01%	16,600
Worchester Dr to Amour De Flame Wy	72 Hr Classification	15,488	1,297	765	532	5:00-6:00 PM	8.37%	58.98%	15,200
Amour De Flame Wy to N. Tanner Dr / Old Lockwood Rd	72 Hr Classification	13,743	1,181	679	502	5:15-6:15 PM	8.59%	57.49%	13,600
East of N. Tanner Dr / Old Lockwood Rd	72 Hr Classification	1,902	150	52	98	5:30-6:30 PM	7.89%	65.33%	1,900
Side Street Characteristics									
N. Orion Bv / Lockwood Bv									
North of McCulloch Rd	72 Hr Classification	12,404	1,115	707	408	5:00-6:00 PM	8.99%	63.41%	12,200
South of McCulloch Rd	72 Hr Classification	11,826	1,168	755	413	5:00-6:00 PM	9.88%	64.64%	11,600
N. Tanner Dr / Old Lockwood Rd									
North of McCulloch Rd	72 Hr Classification	5,191	485	208	277	4:30-5:30 PM	9.34%	57.11%	5,100
South of McCulloch Rd	72 Hr Classification	15,984	1,426	597	829	5:00-6:00 PM	8.92%	58.13%	15,700

Notes:

1. Axle adjustment factor for Chulusta Area Roadways is 1.00 as the classification count includes all vehicles. See Table 2 for T Factors.
2. Most recent seasonal adjustment factors for all the roadways were obtained from FDOT Florida Traffic Online (2021).
3. Measured ADT * Axle Adjustment * Seasonal Adjustment = Adjusted AADT (adjusted to nearest hundred).

These measured K, D, and T-daily factors are annotated in **Table 5.2**. This table also includes FDOT and Orange County K and D factors for comparisons purposes.

Table 5.3 presents the recommended design traffic characteristics for McCulloch Road and the intersecting side streets. The design traffic characteristics are used to develop design hour volumes (DHV) and directional design hour volumes (DDHV). The recommended T factor is used to determine the Equivalent Single Axle Loadings (ESALs) for the project corridor for pavement design and the recommended DHT factor is used in the intersection operational analysis.

The K factor was based on the FDOT PTFH Large Urbanized Area Arterials & Highways Standard K factor. Existing D factors were compared to historical FDOT D factors for McCulloch Road for the last six years and compared to the range of acceptable factors found in the FDOT PTFH. Side street D factors were based on existing D percentages. The McCulloch Road T and DHT factors were based on the average of the existing traffic count percentages. Minor street T and DHT factors were also based on the McCulloch Road factors.

Table 5.2: Traffic Characteristics Comparison

Roadway/Segment	Measured Characteristics			"K" Estimated ¹	FDOT 2020 FTI ²			County Counts ³		
	"K"	"D"	"Tdaily"		"K"	"D"	"Tdaily"	"K"	"D"	"Tdaily"
Mainline Characteristics										
McCulloch Rd										
West of N. Orion Bv / Lockwood Bv	8.18%	57.13%	4.63%	6.63%	9.00%	53.00%	6.00%	8.60%	57.80%	--
N. Orion Bv / Lockwood Bv to Worchester Dr	8.39%	58.01%	1.73%	6.80%	--	--	--	8.60%	61.10%	--
Worchester Dr to Amour De Flame Wy	8.37%	58.98%	1.71%	6.79%	--	--	--	--	--	--
Amour De Flame Wy to N. Tanner Dr / Old Lockwood Rd	8.59%	57.49%	1.98%	6.96%	--	--	--	--	--	--
East of N. Tanner Dr / Old Lockwood Rd	7.89%	65.33%	3.46%	6.40%	--	--	--	--	--	--
Average	8.28%	59.39%	2.70%	6.72%	9.00%	53.00%	6.00%	8.60%	59.45%	--
Side Street Characteristics										
N. Orion Bv / Lockwood Bv										
North of McCulloch Rd	8.99%	63.41%	3.43%	7.29%	--	--	--	11.20%	85.60%	--
South of McCulloch Rd	9.88%	64.64%	4.11%	8.01%	--	--	--	--	--	--
N. Tanner Dr / Old Lockwood Rd										
North of McCulloch Rd	9.34%	57.11%	4.20%	7.57%	--	--	--	9.70%	52.60%	--
South of McCulloch Rd	8.92%	58.13%	1.72%	7.23%	9.00%	52.40%	3.80%	--	--	--
Average	9.28%	60.82%	3.37%	7.53%	9.00%	52.40%	3.80%	10.45%	69.10%	--

Notes:

1. Estimated K Standard = Measured K * (median of the thirteen highest consecutive peak season factors / median of thirteen lowest consecutive peak season factors).
(0.9 / 1.11) = 0.810811
2. FDOT Florida Traffic Online (2020)
3. Orange County Public Works 2020 Traffic Counts [orange highlight], Seminole County Public Works 2020 Traffic Counts [blue highlight]

Table 5.3: Recommended Traffic Characteristics

Roadway/Segment	Recommended Design Characteristics *			
	"K" Factor	"D" Factor	"Tdaily" Factor	"Tpeak" Factor
Mainline Characteristics				
McCulloch Rd				
From North Orion Boulevard to North Tanner Road	9.00%	57.28%	2.70%	1.35%
Side Street Characteristics				
N. Orion Bv / Lockwood Bv	9.00%	64.03%	2.70%	1.35%
N. Tanner Dr / Old Lockwood Rd	9.00%	64.64%	2.70%	1.35%

NOTES:

* K Factor for McCulloch Road and side streets are based on FDOT Standard K values recommended for an urban arterial from the **2019 Project Traffic Forecasting Handbook**.

* D Factor for McCulloch Road is based on the average of the field data collected for Avalon Road.

'D' factor calculation is $57.28\% = (59.39\% + 53.00\% + 59.45\%) / 3$

* D Factor for the side streets are based on the measured values for the side street.

* The Tdaily Factor for McCulloch Road and Side Streets are based on the average of the field data collected for McCulloch Road.

* The Tpeak Factor is the Tdaily factor divided by 2

5.2 Existing Intersection Geometry

The following intersections on McCulloch Road are evaluated as part of the existing conditions analysis for this study:

- 1) North Orion Blvd. (Signalized)
- 2) Worchester Drive (Signalized)
- 3) Amour De Flame Way (Unsignalized)
- 4) N. Tanner Road (Signalized)

The existing intersection geometry (see **Figure 3.2**) plays a vital role in assessing the intersection level of service (LOS). LOS is a qualitative measure of how efficient a roadway or intersection operates. LOS A represents the highest traffic flow quality, while LOS E represents traffic flow at capacity. LOS F represents forced flow congested conditions. LOS B, C and D represent a gradual degradation in traffic flow quality before reaching capacity. The existing geometry will be considered as one of the factors in determining intersection improvements to accommodate the travel demand.

5.3 Existing Level of Service

Intersection turning movement counts were obtained for the AM and PM peak hour conditions for the study intersections. The turning movement volumes collected at the study intersections along McCulloch Road are shown in **Figure 5.3** for the AM and PM peak hours. The 10-hour summary of the turning movement volumes were assessed for consistency and reasonableness.

Table 5.4 provides a list of the roadway parameters utilized in this analysis, taken from the County Concurrency Management System. Included in this table are number of lanes, functional classification, adopted LOS standard, roadway service volumes, AM and PM peak hour traffic volumes and existing LOS. Based upon this analysis, all McCulloch Road roadway segments currently operate within acceptable LOS.

Figure 5.3: Existing AM and PM Peak Hour Volumes and LOS

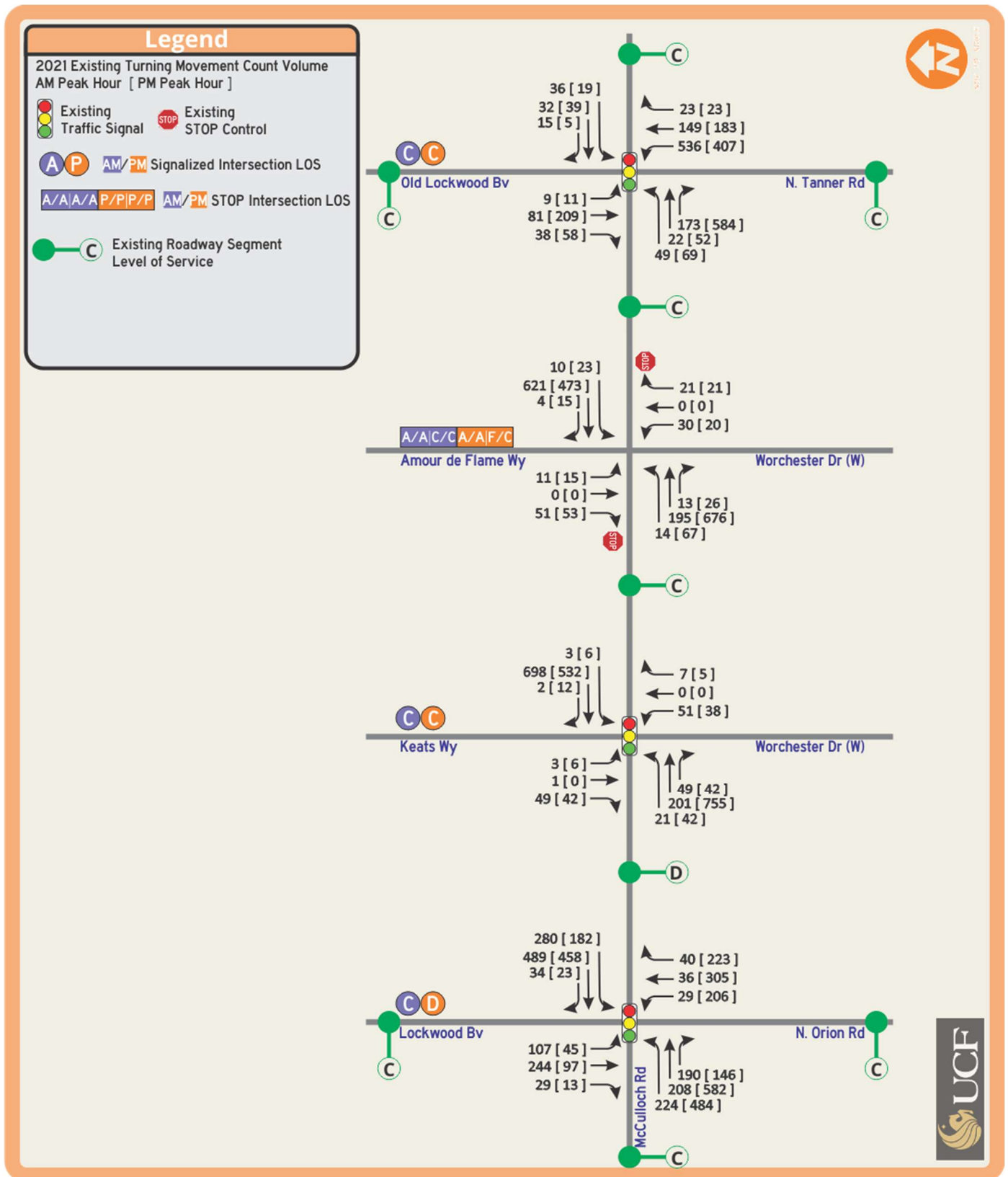


Table 5.4: Existing Roadway LOS

Roadway/Segment	Adopted		# of Lanes	Roadway Service Volumes					AADT (2)	Peak Hour		Peak Time (2)	LOS
	Functional Class	LOS		Peak Hour / Peak Direction Capacity Table (1)						Traffic Volumes (2)			
Mainline Characteristics													
McCulloch Rd				A	B	C	D	E		EB	WB		
West of N. Orion Bv / Lockwood Bv	Arterial	E	4	0	0	1,910	2,000	2,000	25,100	1294	965	5:15-6:15 PM	C
N. Orion Bv / Lockwood Bv to Worchester Dr	Collector	E	2	0	0	830	880	880	16,600	856	638	5:15-6:15 PM	D
Worchester Dr to Amour De Flame Wy	Collector	E	2	0	0	830	880	880	15,200	784	584	5:00-6:00 PM	C
Amour De Flame Wy to N. Tanner Dr / Old Lockwood Rd	Collector	E	2	0	0	830	880	880	13,600	701	523	5:15-6:15 PM	C
East of N. Tanner Dr / Old Lockwood Rd	Collector	E	2	0	0	830	880	880	1,900	73	98	5:30-6:30 PM	C
Side Street Characteristics													
N. Orion Bv / Lockwood Bv				A	B	C	D	E		NB	SB		
North of McCulloch Rd	Arterial	E	4	0	0	1,910	2,000	2,000	12,200	629	469	5:00-6:00 PM	C
South of McCulloch Rd	Arterial	E	4	0	0	1,910	2,000	2,000	11,600	598	446	5:00-6:00 PM	C
N. Tanner Dr / Old Lockwood Rd				A	B	C	D	E		NB	SB		
North of McCulloch Rd	Local	E	2	0	0	830	880	880	5,100	196	263	4:30-5:30 PM	C
South of McCulloch Rd	Local	E	2	0	0	830	880	880	15,700	604	809	5:00-6:00 PM	C

Notes:

1. From Orange County Traffic Concurrency Management Program

2. Daily and Peak Hour traffic volumes from Table 1, with recommended "D" applied, and the maximum of either the recommended "D" or the observed "D".

The study intersections were analyzed under existing conditions using the procedures of the **Highway Capacity Manual, 6th Edition** for signalized and unsignalized intersections. This analysis used existing traffic volumes, existing geometric conditions, and existing signal timings. **Table 5.5** includes the summary results for the AM and PM peak hour intersection delay and level of service.

Table 5.5: Existing Intersection LOS

Study Intersections	Traffic Control	AM Peak Hour		PM Peak Hour	
		Delay (Sec/Veh)	LOS	Delay (Sec/Veh)	LOS
McCulloch Rd					
N. Orion Rd	Signal	29.8	C	44.4	D
Worchester Dr	Signal	27.8	C	20.3	C
Amour De Flame Wy	STOP ¹	8.9 / 7.8 24.7 / 15.7	A / A C / C	8.6 / 9.2 50.1 / 21.1	A / A F / C
N. Tanner Rd	Signal	20.0	C	22.1	C

Notes:

¹ - EB / WB Left Turn Major Street Movement | NB / SB Minor Street Movements

5.4 Existing Pedestrian and Bicycle Counts

Pedestrian and bicycle counts were also collected at the study intersections during the 7:00-10:00 AM and 2:00-7:00 PM time periods. The pedestrian and bicycle counts are summarized for the AM (7:00-10:00), midday (2:00-4:00) and PM (4:00-7:00) peak periods in **Table 5.6**.

Table 5.6: Pedestrian and Bicycle Volumes at Study Intersections

Study Intersections	Major Ped Crossing	Pedestrian Volumes						Bicycle Volumes					
		AM 6:00-9:00		Mid-day 12:00-2:00		PM 4:00-7:00		AM 6:00-9:00		Mid-day 12:00-2:00		PM 4:00-7:00	
		Major	Minor	Major	Minor	Major	Minor	Major	Minor	Major	Minor	Major	Minor
McCulloch Rd													
at N. Orion Rd	Yes	14	27	32	8	60	22	17	9	42	12	48	7
at Worchester Dr	Yes	1	30	0	8	0	6	1	3	1	12	5	10
at Amour De Flame Wy	Yes	4	33	2	3	9	15	2	3	6	10	8	9
at N. Tanner Rd	No	15	3	3	2	5	4	1	2	8	0	4	1

Notes:

¹ - For the purposes of this table, "Major" always refers to McCulloch Road

5.5 Future Traffic Volumes

Orange County estimates that the opening year target for the widening of McCulloch Road is 2028. Given this anticipated schedule, the following periods were used to provide design traffic forecasts for the McCulloch Road Roadway Conceptual Analysis study.

- Opening Year 2028
- Mid-Design Year 2038
- Design Year 2048

5.6 Operational Analysis

Design traffic volumes were developed for two traffic conditions, No-Build and Build. The No-build condition for McCulloch Road, between North Orion Boulevard/Lockwood Boulevard and North Tanner Road/Old Lockwood Road, assumes that the subject facilities will maintain existing lane geometry and intersection configurations. The Build condition includes McCulloch Road from North Orion Road to North Tanner Road being widened to a four-lane roadway.

No Build Scenario

The projected roadway level of service for the No Build Alternative in 2028 are LOS F from North Orion Boulevard to Worchester Drive. From that point to the east limits of the study corridor, the LOS is D or better. The year 2038 and 2048 segment conditions are LOS F for the entire study corridor from North Orion Road to North Tanner Road. The signalized intersections at N. Orion Boulevard and N. Tanner Road will operate at LOS E or F for years 2028 through 2048. The signalized intersection at Worchester Drive (W) will operate at LOS C for years 2028 and 2038 and LOS D in year 2048. The unsignalized intersection at Amour De Flame Way will operate with LOS E or F delays for some minor side street movements and at LOS A or B for the major street movements for all design years.

Build Scenario

The projected roadway level of service, for the Build Alternative in 2028 through 2048 segment conditions are LOS C for the entire corridor from west of North Orion Boulevard to North Tanner Road. The signalized intersections at N. Orion Boulevard, Worchester Drive (W) and N. Tanner Road will operate at LOS D or better through design year 2048. The unsignalized intersection at Amour De Flame Way will operate with LOS E or F delays for some minor side street movements and at LOS A or B for the major street movements for all design years.

Figure 5.4: 2048 No Build Segment and Intersection Analysis

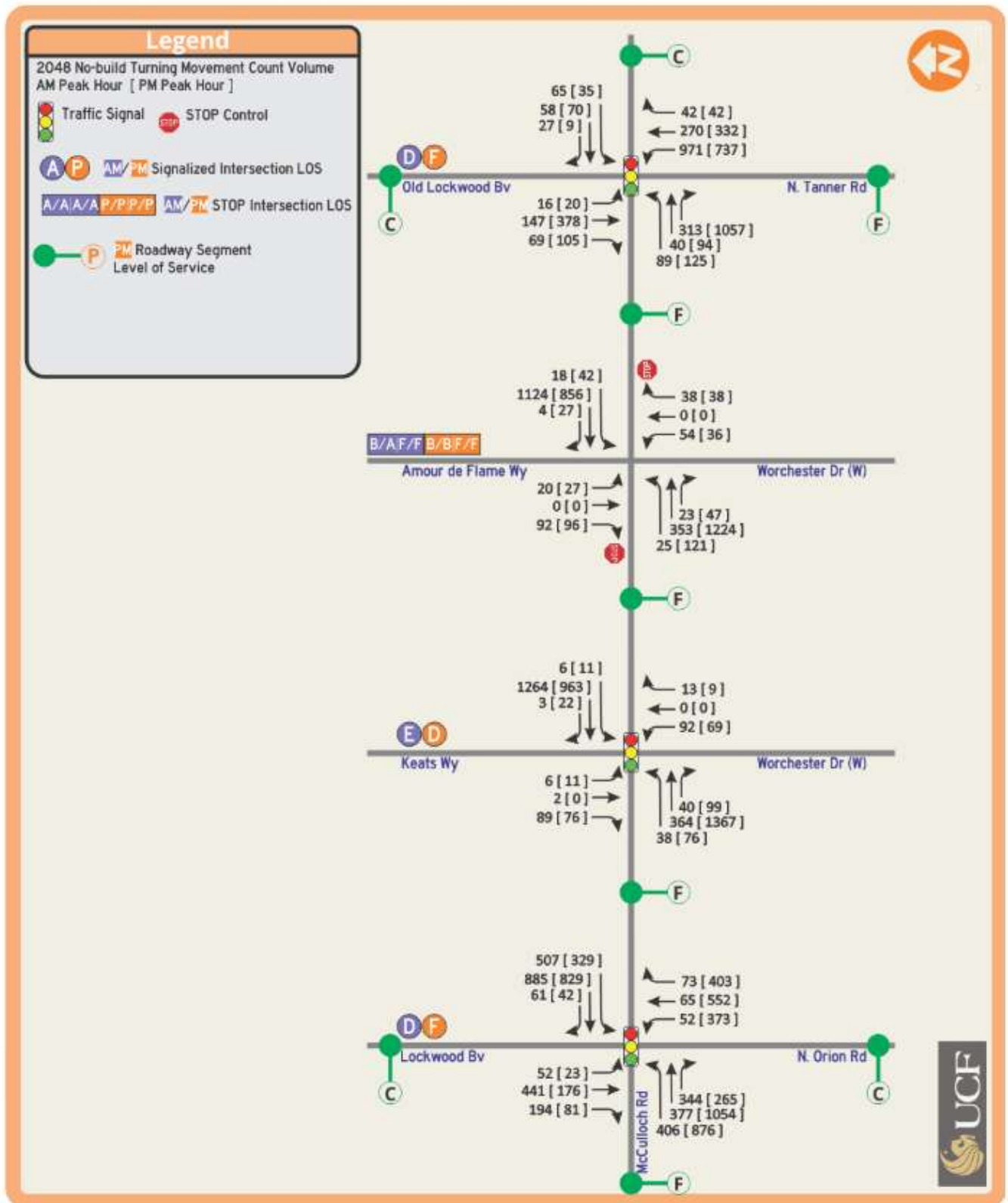
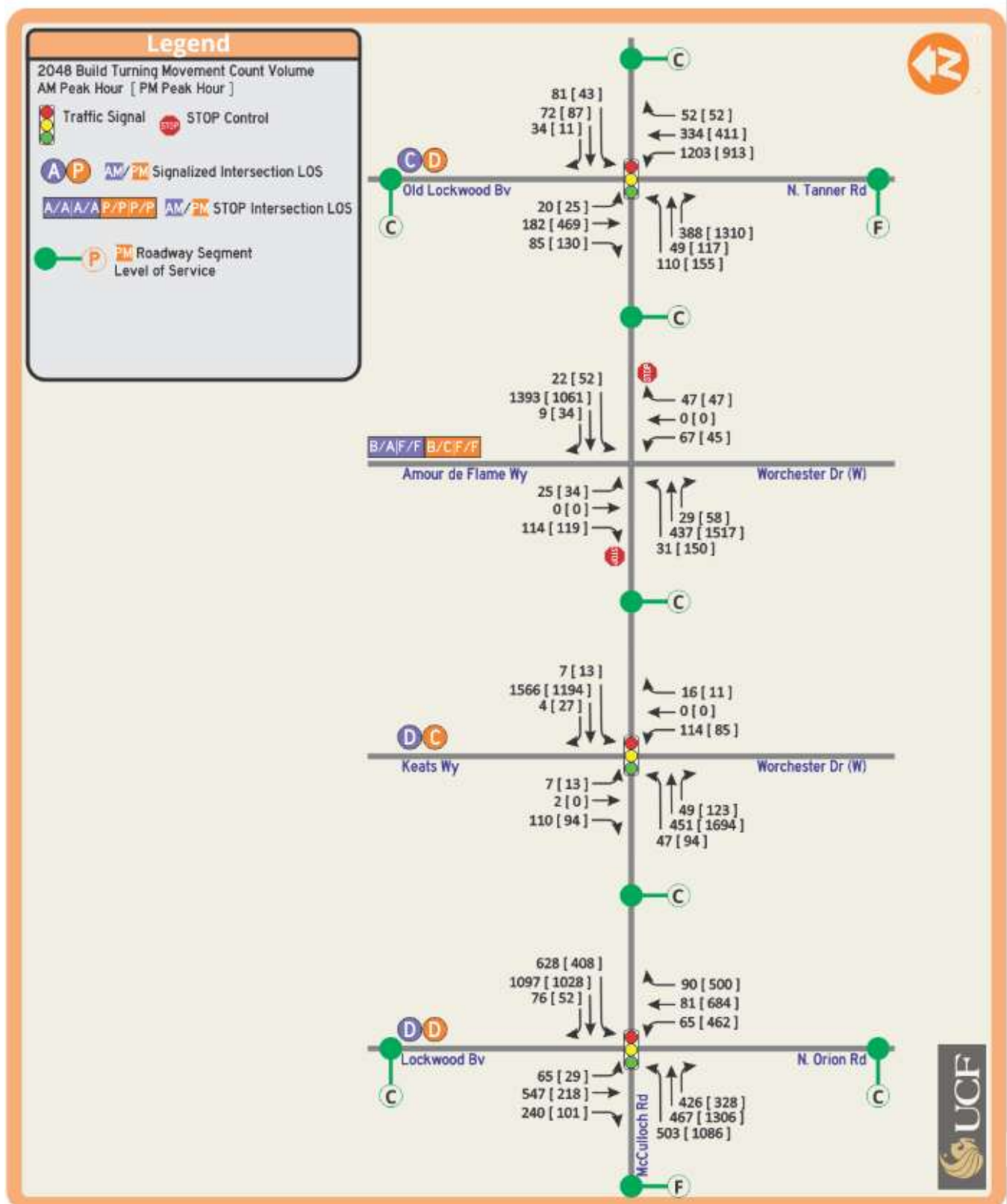


Figure 5.5: 2048 Build Segment and Intersection Analysis



5.7 Intersection Control Evaluation

An *Intersection Control Evaluation (ICE) Memorandum* was prepared to evaluate intersection control alternatives along McCulloch Rd from N. Orion Blvd/Lockwood Blvd to N. Tanner Rd/Old Lockwood Rd. The evaluation is needed as the future population growth in the area will increase the traffic on these roads substantially. A widening project through this section of McCulloch Rd will expand McCulloch Rd from a 2-lane undivided to a 4-lane divided road with a design year of 2048. Control strategy alternatives were evaluated for the four intersections in this segment of McCulloch Rd.

Stage 1 Results

The CAP-X analysis compared a signalized intersection and 2-lane roundabout using the geometry for the widening project. The signalized control strategies have better V/C ratios and higher ped/bike accommodation scores than the 2-lane roundabouts for the N. Orion Blvd, Keats Way, and N. Tanner Rd intersections. At Amour de Flame Way, the 2-lane roundabout has better V/C ratios and higher ped/bike accommodation scores than the current two-way stop control.

The SPICE analysis concluded that the 2-lane roundabouts at N. Orion Blvd and Amour de Flame Way produce more total crashes but slightly less fatalities/injuries than the current control strategies. The 2-lane roundabouts at Keats Way and Tanner Rd produce more total crashes and more fatalities/injuries than the current control strategies.

Stage 2 Results

Stage 2 ICE included operational analyses for both the current intersection configuration and roundabout alternatives for the opening year and design year, as well as a benefit/cost analysis. The design year 2048 operational analysis for Stage 2 is provided in **Table 5.7**. At the N. Orion Blvd and N. Tanner Rd intersections, the signalized control provides much better LOS than the roundabout, particularly in the design year of 2048 where the roundabout fails during peak hours. This leads to the traffic signal having a large net present value over the roundabout for these two intersections. At the Worchester intersection, the roundabout offers a slight improvement in the LOS at peaks hours, which leads to the net present value over the traffic signal. At the Amour de Flame intersection, the roundabout provides an improvement in the LOS in the 2048 PM peak hour, which leads to a net present value over the two-way stop control.

Table 5.7: Stage 2 Operational Analysis – Design Year 2048

Intersection	Control Strategy	Weekday AM Peak		Weekday PM Peak	
		LOS	Delay (sec.)	LOS	Delay (sec.)
McCulloch Rd at Lockwood Blvd/O Orion Blvd	Signalized	D	37.8	D	51.2
	Roundabout (2-lane)	F	225.4	F	1093.3
McCulloch Rd at Keats Way/ Worchester Dr	Signalized	D	35.7	C	26.5
	Roundabout (2-lane)	B	11.5	B	13.0

Intersection	Control Strategy	Weekday AM Peak		Weekday PM Peak	
		LOS	Delay (sec.)	LOS	Delay (sec.)
McCulloch Rd at Amour de Flame Way/ Worchester Dr	Two-Way Stop Control	A	7.4	E	57.8
	Roundabout (2-lane)	A	9.2	B	12.2
McCulloch Rd at N Tanner Rd/ Old Lockwood Rd	Signalized	C	23.1	D	36.6
	Roundabout (2-lane)	F	134.5	F	176.6

Recommended Intersection Control

At the N. Orion Blvd intersection, the signalized control is recommended based on a better LOS, lower cost, better V/C ratio, higher ped/bike accommodation scores, and less total crashes when compared to a 2-lane roundabout.

At the Worchester intersection, the signalized control is recommended based on better V/C ratios, higher ped/bike accommodation scores, less total crashes, and less injuries/fatalities when compared to a 2-lane roundabout. The 2-lane roundabout had slightly better LOS and net present value, but the roundabout would require additional right-of-way, impact subdivision entrance features and walls and impact existing utilities due to the larger area needed to construct. A roundabout does not appear feasible due to the additional right-of-way and development impacts.

At the Amour de Flame intersection, the two-way stop control is recommended based on acceptable LOS through the design year, lower total crashes compared to a 2-lane roundabout, and the space constraints for building a roundabout. The 2-lane roundabout had slightly better LOS and net present value, but the roundabout would require additional right-of-way, impact subdivision entrance features and walls and impact existing utilities due to the larger area needed to construct. A roundabout does not appear feasible due to the additional right-of-way and development impacts.

At the N. Tanner Rd intersection, the signalized control is recommended based on a better LOS, lower cost, better V/C ratio, higher ped/bike accommodation scores, less total crashes, and less fatalities/injuries when compared to a 2-lane roundabout.

5.8 Recommended Improvements

The Build geometries and traffic controls for McCulloch Road from North Orion Boulevard / Lockwood Boulevard to North Tanner Road/Old Lockwood Road, as shown in **Figure 5.6** assume the improved four-lane, divided cross-section and additional turn lanes as needed based on the estimated intersection operational conditions. The peak hour DHV's for the intersections were developed using the McCulloch Road Build Alternative annual growth rate (4.61% per year through Design Year 2048) to project AADT's for the Opening Year, Mid-Design Year, and Design Year, and to calculate DHV's based on the approved K and D factors, as well as the observed existing turning movements. **Figure 5.7** presents the Build AADT for the study roadway segments.

The projected year 2048 LOS for the McCulloch Road RCA roadway segments and study intersections are summarized in **Figure 5.5** for the peak hour conditions. The remaining unsignalized intersection (at Amour De Flame Way) is anticipated to have failing (LOS “F”) for the side street movements. All the signalized intersections are projected to operate at LOS D or better for the AM and PM peak hours year 2048 Build conditions.

Based on the evaluation of operating conditions for the design year 2048 Build Alternative, this study provides the following recommendations to improve the traffic flow along McCulloch Road from North Orion Boulevard / Lockwood Boulevard to North Tanner Road/Old Lockwood Road:

- The study results support the need for the widening of McCulloch Road to a four-lane, divided typical section, from North Orion Boulevard / Lockwood Boulevard to North Tanner Road / Old Lockwood Road.

The Year 2048 Build Alternative recommended intersection improvements included:

- Add the following turn lanes at the North Orion Boulevard intersection:
 - Northbound right-turn lane (dual right-turn lanes)
 - Northbound left-turn lane (dual left-turn lanes)
 - Eastbound right-turn lane (dual right-turn lanes)
 - Westbound left-turn lane
- Signalize the Worchester Drive/Keats Way intersection
- Two-way stop for Worchester Drive/Amour de Flame Way and monitored for the need for a traffic signal in the future.
- Add the following turn lanes at the North Tanner Road intersection:
 - Northbound left-turn lane (dual left-turn lanes)
 - Eastbound right-turn lane (dual right-turn lanes)
 - Eastbound left-turn lane
 - Southbound right-turn lane
- Intersection design plans should accommodate the pedestrian crosswalks and bike lanes to enhance the safe operations, particularly with vehicular turning movements

Figure 5.6: Build Geometry

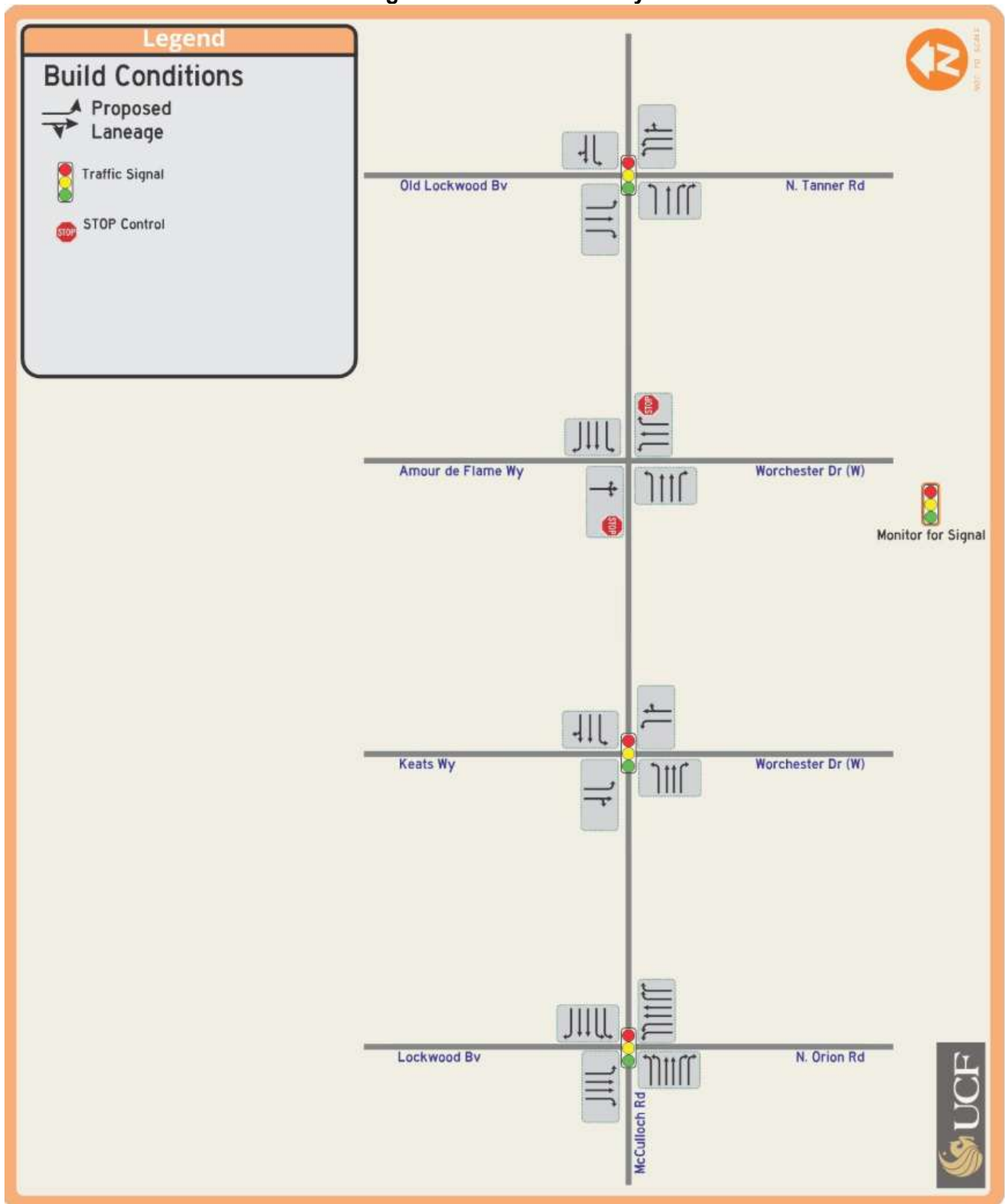
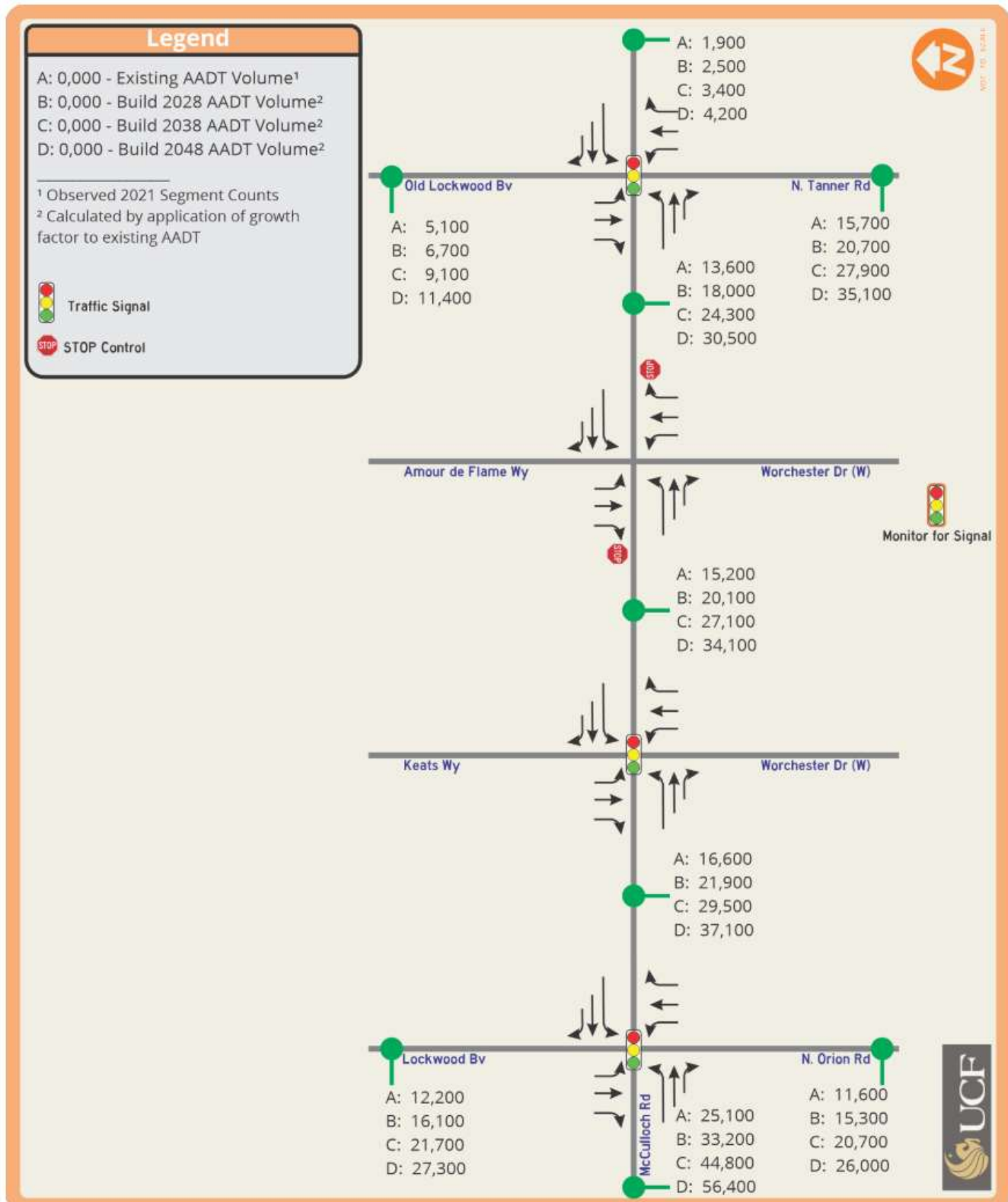


Figure 5.7: Build AADT Volume



6.0 Alternatives Analysis

The objective of the alternatives analysis process is to identify technically and environmentally sound alternatives to provide a safe transportation facility that meets the purpose and need of the project, is acceptable to the community, minimizes impacts on the environment, and is cost effective. The process results in the selection of a Preferred Alternative, which can be advanced to the design phase. This section summarizes the alternatives considered for this project.

Given that the McCulloch Road corridor already has an existing right-of-way width that is generally adequate to accommodate the proposed typical section, the alternatives are somewhat limited and would include the following:

- No-Build Alternative
- Transportation Systems Management (TSM)
- Build Alternatives
 - Build Preferred Alternative – Note, since sufficient existing right-of-way width is available for most of the project, the proposed improvements can generally be built within the existing right-of-way, thus eliminating a need for a left/right/center alignment analysis.

6.1 No-Build Alternative

The No-Build Alternative assumes that no modifications or improvements will be implemented for McCulloch Road within the limits of the study. The primary advantages of the No-Build Alternative are that it does not directly require any capital or expenditure of funds and it produces no physical or social impacts.

Certain advantages would be associated with the implementation of the No-Build Alternative:

- No acquisition of right-of-way as well as no design, right-of-way, or construction costs
- No inconvenience to the traveling public and property owners during construction
- No impacts to utilities
- No impacts to the adjacent natural, physical, and human environment

The potential disadvantages of the No-Build Alternative include:

- Is not consistent with the Orange County Comprehensive Plan
- Does not improve multimodal mobility, particularly for pedestrians and bicyclists
- Results in reduced LOS and increased traffic congestion
- May increase crashes, property damage, injuries, and fatalities due to increased congestion
- Potentially higher user costs due to increased levels of congestion

6.2 Transportation Systems Management (TSM)

TSM alternatives involve low-cost improvements designed to maximize the utilization and efficiency of the existing facility through improved system and demand management. Various TSM options typically include minor projects such as traffic signal and intersection improvements, access management, and transit improvements.

However, the additional capacity required to meet the projected traffic demands along McCulloch Road cannot be met solely through the implementation of TSM improvements only. Viable TSM alternatives are limited because traffic demands are very high and cannot be addressed by low-cost minor projects such as adding signals or simple intersection widenings (the needed capacity cannot be provided). Instead, only major widening improvements can address the forecasted traffic demands and provide an acceptable LOS.

Where possible, this study has incorporated a number of improvements into the final recommendations that reflect the theme of TSM. Complete Streets were considered in the RCA recommendations which reflect FDOT's Context Classifications of C3R Suburban Residential. The proposed recommendations include access measures and improvements, and roadway and ped/bike measures, all of which are consistent with this designation.

- To support the design speed limit, the travel lanes are proposed to be 11-foot wide
- All proposed improvements comply with ADA requirements
- The proposed median separation will improve the safety and efficiency of the corridor.
- Roundabouts were evaluated, though are not recommended due in part to longer delays, increased right-of-way takes, and concerns over two-lane operations
- Major intersections have dedicated right and left turn lanes to improve overall intersection efficiencies.

6.3 Build Alternatives

The original design of McCulloch Road prepared the corridor for an ultimate 4-lane divided typical section. The initial improvements constructed the two eastbound lanes of a future 4-lane divided urban roadway. The lanes were situated in the southern half of the existing right-of-way and striped for one lane in each direction, shown on **Figure 3.1**.

Two Build Alternatives – Typical Section 1 and Typical Section 2 - were developed for evaluation. The typical sections were developed based on current complete streets considerations and design criteria elements. Concept Plans for each of the Alternative Typical Sections are provided in **Appendix B**.

6.3.1 Alternative Typical Section 1

Alternative Typical Section 1 included the reconstruction of the existing roadway, shown on **Figure 6.1**. The 11-foot-wide travel lanes would be separated by a 22-foot median with two lanes in each direction. Type E curb and gutter is used along the inside lanes while Type F curb and gutter is used along the outside lanes. Pedestrian and bicycle accommodation would be by a six-foot sidewalk on the north side and ten-foot multi-use path on the south side. A grass strip would separate the sidewalk and multi-use path. The preferred right-of-way width is 106 feet. In addition, the consideration and location of median trees is recommended during final design.

6.3.2 Alternative Typical Section 2

Alternative Typical Section 2 utilizes the existing roadway for the eastbound lanes, shown on **Figure 6.2**. Four feet of the existing pavement would be removed to create two 11-foot-wide travel lanes and to provide room for the pedestrian facilities on the south side. The westbound 11-foot-wide travel lanes would be constructed parallel to the existing pavement and separated by a 16 to 22-foot median. Type E curb and gutter is used along the inside lanes while Type F curb and gutter is used along the outside lanes. Pedestrian and bicycle accommodation would be by a six-foot sidewalk on the north side and ten-foot multi-use path on the south side. A grass strip would separate the sidewalk and multi-use path.

The preferred right-of-way width ranges from 94 to 106 feet. In addition, the consideration and location of median trees is recommended during final design.

Figure 6.1: Alternative Typical Section 1

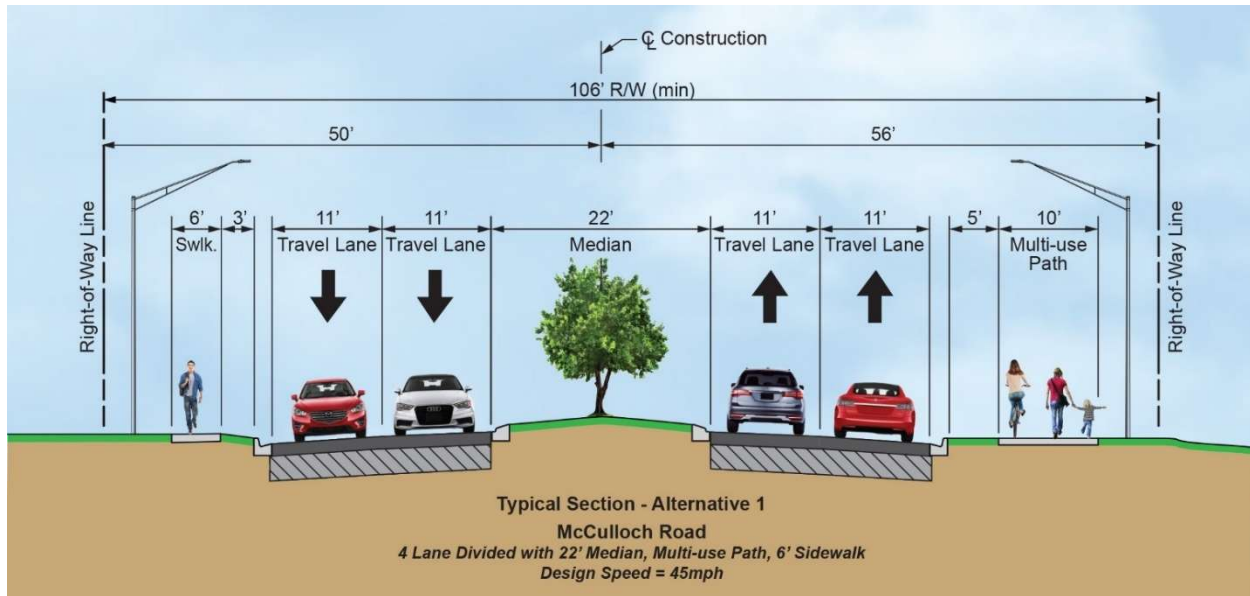
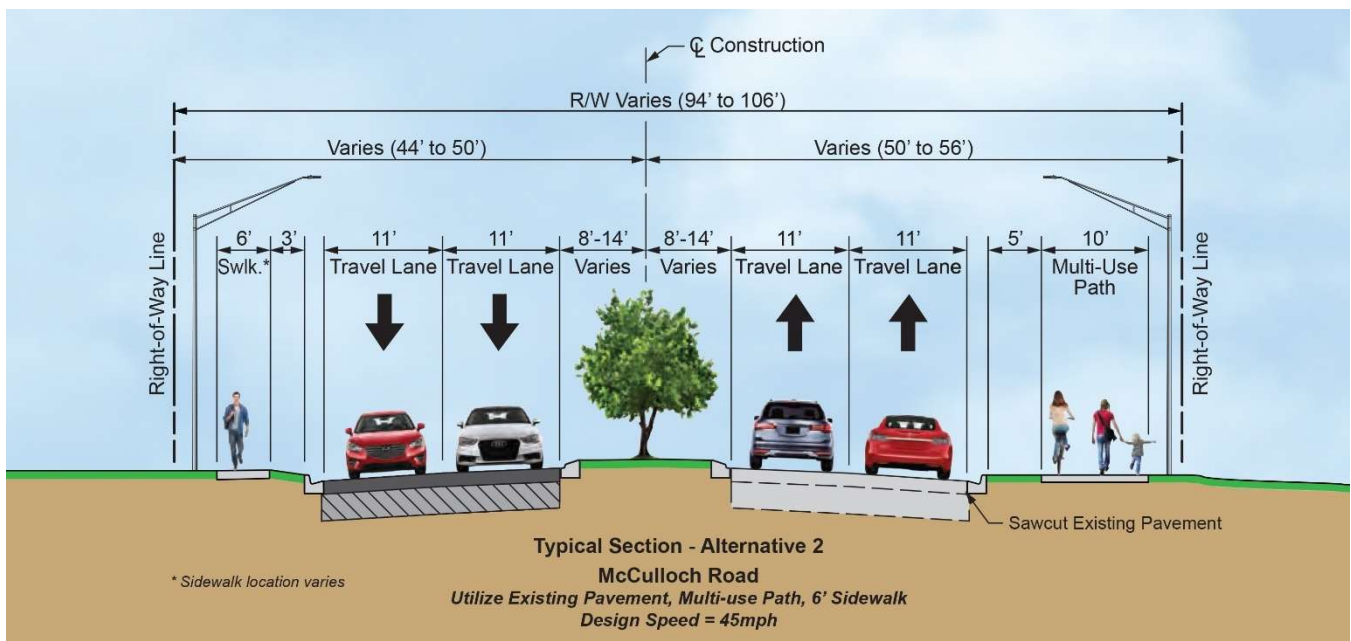


Figure 6.2: Alternative Typical Section 2



6.4 Evaluation of Build Alternatives

The No-Build and Build Alternatives were evaluated based on meeting the project purpose and objectives – “to improve mobility for all users on McCulloch Road.” This project has the following objectives:

- Create a roadway environment for users of all ages and abilities
- Provide safe access for pedestrians/bicyclists to and from schools, religious institutions, businesses, and residential areas – for all modes of travel

Typical Section alternatives, along with the No-Build alternative, were evaluated based on a number of evaluation factors, including impacts to right-of-way, residential and business relocations, wetlands, floodplains, threatened and endangered species, archaeological and historic resources, and potential contamination sites. The matrix evaluation also includes estimated project costs for right-of-way acquisition, environmental mitigation, construction (**Appendix C**), utility relocations, construction engineering and inspection (CEI), and engineering design. The alternatives evaluation matrix is shown in **Table 6.1**.

Table 6.1 Alternatives Evaluation Matrix

Criteria	No Build	Alternative 1	Alternative 2
Property Impacts			
R/W Impacts (Ac)	0	6.7	6.3
Parcels Impacted	0	15	13
Residential Relocations	0	0	0
Business Relocations	0	0	0
Social, Natural & Physical Impacts			
Social and Neighborhood	None	Low	Low
Potential Species Impacts	None	None	None
Potential Contamination Sites (Medium/High)	0	0	0
Wetland Impacts (Ac)	0	0.4	0.3
Potential Impacts to Cultural Resources	None	None	None
Estimated Costs			
Design (10% of Construction)	No Cost	\$2,599,000	\$2,129,000
Right-of-Way	No Cost	\$7,370,000	\$6,930,000
Wetland Mitigation	No Cost	\$56,000	\$42,000
Construction	No Cost	\$25,992,000	\$21,291,000
Construction Engineering & Inspection (12% of Construction)	No Cost	\$3,119,000	\$2,555,000
Total Cost	No Cost	\$39,136,000	\$32,947,000

6.5 Selection of Preferred Alternative

Based on the matrix evaluation, the preferred alternative will improve operations, minimize right-of-way impacts, and is expected to improve safety with the divided roadway section. A comparative analysis of the No Build and Build Alternatives using the Evaluation Comparison Matrix (**Table 6.1**), and presents a summary of the results:

- The No Build Alternative will not have any impacts to the surrounding area or expenditure of funds but fails to meet the project's purpose and need. The existing conditions will lead to congestion and increased potential for safety issues resulting in additional loss of time and money for the traveling public.
- Typical Section 1 would impact thirteen parcels and impact the existing transmission powerlines along the northern right-of-way. The reconstruction of the eastbound travel lanes increased the overall project costs.
- Typical Section 2 would impact eleven parcels and minimizes the impacts to the adjacent properties and right-of-way needs. Utilizing the existing pavement reduces the project cost and simplifies construction.

In summary, Typical Section 2 is preferred to advance to the Design phase, primarily because this alternative would require the least amount of right-of-way, reduce utility impacts and have the lowest construction cost. The Preferred Alternative is described in more detail in this report in Section 7.0 Preliminary Design Analysis.

7.0 Preferred Alternative

This section presents the results of the preliminary design analysis that was conducted for the preferred alternative identified in Section 6.4. The proposed project improvements will address the increased mobility demands and safety needs along the corridor, while minimizing impacts to the social, natural, and physical environment. The Preferred Alignment Concept Plans are provided in **Appendix A**.

7.1 Design Traffic Volumes

The McCulloch Road DTTM documents the existing traffic conditions and the analysis of the No-Build and Build scenarios. The existing and future traffic conditions and the associated analyses are summarized in Section 5 of this report.

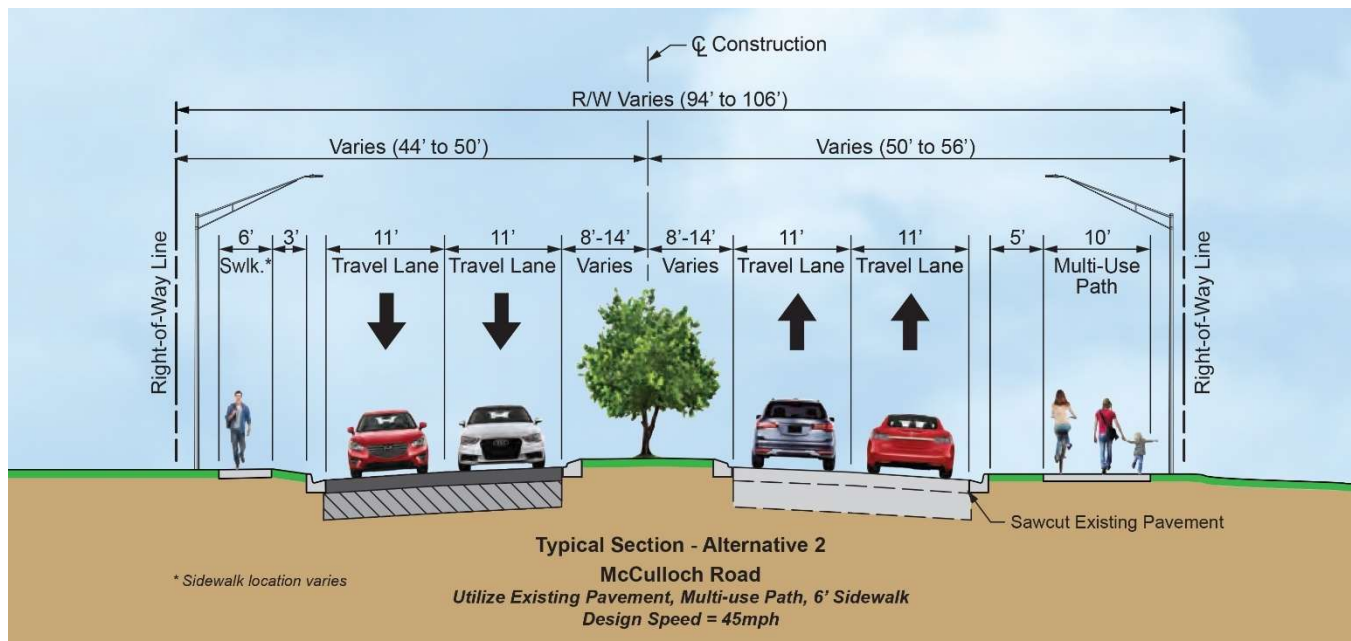
With the proposed four-lane widening improvements, all roadway segments and intersections will operate at an acceptable level of service in the design year of 2048 except for the unsignalized Amour de Flame Way/Worcester Drive (West) intersection, the latter only during certain hours of the day. Without the proposed widening (no build scenario), portions of McCulloch Road will reach capacity by opening year, and all of McCulloch Road will be at LOS F by the year 2038.

7.2 Typical Section

The proposed typical section is shown on **Figure 7.1** and reflected on the concept plans contained in **Appendix A**. The roadway design elements incorporated into the preferred alternative include the following:

- Four 11-foot travel lanes
- A six-foot sidewalk located on one north side of the roadway and 10-foot multi-use path the south side
- A 16 to 22-foot raised median with Type E curb and gutter to include street trees
- Type F curb and gutter along the outside lanes with grassed utility strips between the back of curb and the sidewalk or path
- A grass strip between the path or sidewalk with the right-of-way line of varying width
- A proposed right-of-way width of 94 to 106 feet

Figure 7.1: Preferred Typical Section



7.3 Intersection Concepts and Signal Analysis

Within the project limits, the proposed signalized intersections are at North Orion Boulevard/Lockwood Boulevard, Keats Way/Worcester Drive (West) and Old Lockwood Road/Tanner Road. By the design year, it is anticipated that the Worcester Drive/Amour De Flame Way intersection will require signalization. No other intersections met the necessary signal warrants. The full improvements and intersection concepts for the entire project are shown in **Appendix A**.

7.4 Alignment and Right-of-Way Needs

In general, the preferred alignment will be along the existing right-of-way, shown in **Appendix A**. In general, the proposed typical section can be accommodated within the existing right-of-way. Additional right-of-way required is primarily taken along the north side of the roadway. These areas are primarily the common landscaping areas of the neighborhoods. Right turn lanes require additional right-of-way at the beginning and end of the project. There are minimal improvements within the right-of-way acquisition areas. The right-of-way requirements are shown in the concept plans contained in **Appendix A**.

7.5 Drainage

7.5.1 Preliminary Design Analysis

The design of the stormwater management facilities for the project is governed by the rules set forth by SJRWMD and Orange County. Water treatment and attenuation requirements will comply with the guidelines as defined in the SJRWMD ERP Manual.

The stormwater management facilities have been sized to meet the criteria of the SJRWMD and the Orange County Public Works Department Engineering Manual. These design criteria include requirements for providing water quality protection and attenuation of discharge rates.

7.5.2 Stormwater Management Facilities

The preliminary stormwater ponds have been sized based upon the proposed typical sections to determine the impervious surface of the road. The impervious surface was then used to determine the required treatment volume and runoff volume for the basins. The ponds were only sized for the right of way areas that will drain to each pond. The detailed pond analysis is provided in the *Pond Siting Report*.

The pond sites were selected based upon several criteria. This criterion included existing land use, right-of-way and drainage easements, topography, impacts to wetlands, floodplain, cultural resources, contamination and utilities. Topography was reviewed to provide sufficient elevation change for conveyance of the run-off from the roadway to the pond site. Where possible, wetland and flood plain impacts have been avoided.

The analysis for proposed pond alternatives estimates right-of-way needs using a volumetric analysis, which accounts for water quality treatment and water quantity for runoff attenuation. The existing ponds which currently provide treatment and attenuation for the existing two-lane section of McCulloch Road are expected to be able to continue this stormwater pattern.

The preferred stormwater management facilities and floodplain compensation ponds were derived based on a number of factors including avoidance of wetlands, hydrologic considerations, and available right-of-way. The preferred pond sites are provided in Table 7.1.

The final design effort will refine the current preliminary ponds based on surveys and additional borings which will provide detailed information to further define the pond elements, determine pond bottom

elevations, and pond control elevations. Accordingly, pond sizes and pond configurations may vary from the preliminary ponds based upon final topographic surveys and geotechnical information.

Table 7.1 Preferred Ponds

Basin	Preferred Pond Alternative	Pond Right-of-Way Area Including Access (ac)
Basin 1	1	0.00
Basin 2	2	0.00
Basin 3	3	0.00
Basin 4	4	0.00
Basin 5	5	0.00
Basin 6	6	0.00
Basin 7	7A	4.08

7.5.3 Cross Drains

The existing cross drains were analyzed, and a preliminary determination was undertaken regarding the need for replacement. This report recommends that the current pipe sizes remain. The cross drain that accommodates the Econlockhatchee River tributary at approximately station 319+25 via five 72" pipes, is recommended to be extended to accommodate the widening cross section.

7.5.4 Floodplain and Floodways

Based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM's) dated September 28, 2007, portions of the study area are located within Zone A and X of the FEMA flood zone hazard areas. The two floodplain impacts are located as follows:

- FIA-1: North side of the widening between station 315+53 and station 323+23
- FIA-2: North side of the widening between station 343+80 and station 350+45

There are no floodways within the project limits.

There will be floodplain impacts within the project right-of-way due to the proposed improvements which will be mitigated by providing compensatory volume in proposed floodplain compensation ponds.

A floodplain compensation pond is required for FIA-1 and several locations were reviewed. Pond Alternative 7K is the recommended floodplain compensation pond for FIA-1 due to its undeveloped nature and proximity to the floodplain. Floodplain compensation for FIA-2 will be provided during the final design phase via flood modeling of the isolated floodplain impact area. It should be noted that a location directly adjacent to a floodplain is preferred for compensation to meet the County's cup-for-cup compensation requirement.

7.6 Estimated Project Costs

The estimated project costs for the preferred alternative are under development.

Table 7.2 Estimated Project Costs

Item	Cost
Estimated Costs	
Design (10% of Construction)	\$2,129,000
Right-of-Way	\$6,930,000
Wetland Mitigation	\$42,000
Construction	\$21,291,000
Construction Engineering & Inspection (12% of Construction)	\$2,555,000
Total Cost	\$32,947,000

7.7 Recycling of Salvaged Materials

The opportunity to recycle any salvageable materials by the contractor is encouraged by Orange County. Such materials may include old asphaltic concrete pavement, concrete, base material and drainage structures.

The existing pavement on existing roadways may be milled for recycling during the construction of the project. Any other salvageable materials will be identified during the design of the project. If these materials should be removed from the construction site, it is to be done as specified in the current FDOT Standard Specifications for Road and Bridge Construction.

7.8 User Benefits

Highway user costs are defined by AASHTO's A Manual on User Benefit Analysis of Highway and Bus-Transit Improvements, 1977, as the sum of (1) motor vehicle running cost, (2) the value of the vehicle user travel time and (3) traffic accident cost. User benefits are the cost reductions and other advantages that occur to highway motor vehicle users through the use of a particular transportation facility as compared with the use of another. Benefits are generally measured in terms of a decrease in user costs.

It is anticipated that the preferred alternative will provide user benefits due to a reduction in roadway congestion as compared to the "No Build" alternative. In addition, the improved typical section and access management provided with the project should reduce the crash experience along the roadway such as minimizing head-on crashes through the use of a median.

7.9 Pedestrian and Bicycle Facilities

A continuous six-foot wide sidewalk will be provided on the north side of McCulloch Road, and a 10 multi-use path will be provided on south side of the roadway. The sidewalk and the multi-use path will be separated from the roadway by curb and gutter and a grass/utility strip. Pedestrian features, including crosswalks and pedestrian signals, will be provided at each signalized intersection. The pedestrian and bicycle facilities will comply with the Americans with Disabilities Act (ADA).

7.10 Social and Economic Impacts

The project will not have significant social and economic impacts. Below is a summary of the evaluation performed.

7.10.1 Social

The US Census 5-year American Community Survey (2019-2023 Estimated) was evaluated to determine potential social impacts. The median household income in the project area is \$126,560. The median household income in Orange County was \$77,011 and in Seminole County was \$83,030. Approximately 2.7% of the population in the project area is considered low-income because their annual income is below the poverty level. This is less than Orange County (12.4%) and similar to Seminole County (9.2%).

The study area contains Limited English Proficiency populations with 3.9% of the population in the project area speaks English not well or not at all. The most recent available data show that the project area in 2010 was 30% percent minority, which is less than Orange County (62%) and Seminole County (44%). There were no special cases identified on this project such as handicapped or disabled displacements that warrant special assistance. The project is not expected to contribute to social isolation of any special populations of elderly, handicapped, minority or transit-dependent groups. No relocations are proposed under the Preferred Alternative. Due to the limited area of additional right-of-way and no residential relocations, no significant impacts are anticipated to community cohesion, community characteristics, special community designation, safety/emergency response, demographics, and community goals and quality of life.

Based on the analysis of census data and the results of field inspections and public involvement efforts, it was determined that the Preferred Alternative would not cause disproportionately high and adverse effects on any minority or low-income populations and is in accordance with the provisions of Executive Order 12898 and Federal Highway Administration (FHWA) Order 6640.23a. For all the reasons outlined above, it was determined that the project will have no substantial impact on social resources.

7.10.2 Economic

A review of potential impacts to commerce and the tax base was conducted. The study determined that there would be no relocations or displacements under the Preferred Alternative, so no significant negative economic impacts are anticipated. The project may enhance the local economy by improving the transportation system and enhancing connectivity to/from major employment centers.

7.10.3 Land Use

Land use cover descriptions provided for both uplands and wetlands are classified utilizing the Florida Land Use Cover and Forms Classifications System (FLUCCS) designations. In addition to existing right-of-way, the roadway impacts under the Preferred Alternative would impact 0.45 acre of Residential, Medium Density (FLUCCS 1200), 0.30 acre of Residential, High Density (FLUCCS 1300), 0.60 acre of Pine Flatwoods (FLUCCS 4110), 0.11 acre of Mixed Wetland Hardwoods (FLUCCS 6170) and 0.14 acre of Cypress (FLUCCS 6210). Pond impacts under the Preferred Alternative would total 2.7 acres and would occur to areas mapped as Pine Flatwoods (FLUCCS 4110).

The project is compatible and consistent with the planned land uses documented in the Orange County and Seminole County Comprehensive Plans. No secondary development or similar changes in land use are anticipated as a result of the proposed project. For these reasons, no significant impacts to land use are anticipated.

7.10.4 Mobility

The project is anticipated to enhance mobility through additional roadway capacity and connectivity with sidewalks and multi-use paths. The sidewalks and shared use paths will provide mobility options besides vehicles and will be available to elderly, young, disabled and low-income individuals.

7.10.5 Community Cohesion

The project does not bifurcate any neighborhoods or developments.

7.10.6 Aesthetics

A review of the potential viewshed, and compatibility issues was conducted. The Preferred Alternative follows an existing roadway corridor and would not introduce any unnatural or unusual elements into the surrounding viewshed. Because of the urban nature of the area and the location along a transportation corridor with similar infrastructure, these impacts will not change the character of the viewshed and are compatible with the intended use of these transportation corridors.

7.10.7 Relocation Potential

The preferred alternative has no residential or business displacements for the project.

7.10.8 Farmland

Lands within the project vicinity do not meet the definition of farmland as defined in 7 CFR Part 658 and the provisions of the Farmland Protection Policy Act of 1981 do not apply because the entire project area is located in the urbanized area of Orlando with no designated farmlands adjacent to the project corridor.

7.10.9 Historical/Archaeology

Based on the analysis conducted for this study, there are no cultural resources listed, determined eligible, or appear to be potentially eligible for listing in the NRHP. As such, historic resources will not be an issue on this project.

7.11 Natural Impacts

7.11.1 Wetlands and Surface Waters

The recommended improvements have approximately 0.3 acres of wetland impacts. During final design, Federal, State, and local government agencies generally require mitigation to offset unavoidable impacts as a condition of the permit.

Mitigation requirements are based on a compilation of wetland parameters including quality, type, function, and size. Impacts to wetlands and/or other surface waters will be avoided and minimized to the maximum extent possible while maintaining safe and sound engineering and construction practices. Primarily, avoidance and minimization efforts are related to the proposed stormwater management pond locations.

A mitigation plan that adequately offsets adverse impacts will be developed and implemented during the design phase. Adverse wetland impacts that may result from the construction of this project will be mitigated, satisfying the County requirements. Compensatory mitigation for this project will be completed through the use of mitigation banks and/or any other mitigation options that satisfy federal and state requirements.

7.11.2 Water Quality

A Water Quality Impact Evaluation was completed for the proposed project and are included in the project file. The project spans parts of Orange and Seminole Counties and their associated MS4 systems and ultimately discharges into Econlockhatchee River. There is no Sole Source Aquifer or Basin Management Area Plan within the project area. FDOT Standard Best Management Practices for Road and Bridge Construction will be implemented to avoid and minimize downstream impacts, particularly from sedimentation and erosion.

7.11.3 Threatened and Endangered Species

The potential impact on federal and/or state-listed wildlife species was evaluated based upon the occurrence determinations for Orange County, Florida. Further analysis will be required during final design to specifically address quantities of impact, current status of wildlife species, and other design and/or construction measures which can be incorporated to reduce or eliminate potential impacts.

7.11.4 Other Natural Features

The project area did not have any occurrence of the following features and thus no impacts are anticipated.

- Essential Fish Habitat
- Aquatic Preserves
- Outstanding Florida Waters
- Wild and Scenic Rivers
- Coastal Barrier Resources

7.12 Physical Impacts

7.12.1 Noise

A noise study was completed for the project limits. Six common noise environments and two special land use areas were identified along the project corridor. Noise levels were predicted at 58 Noise Abatement Criteria (NAC) B receptors representing 342 residences and two NAC C SLU receptors representing two areas of outdoor use. Noise levels are not predicted to approach or exceed the NAC of 67 (FHWA) or 66 (FDOT) under the 2048 Build condition at any noise sensitive sites within the project limits, and therefore noise abatement was not considered for any of the communities along McCulloch Road.

7.12.2 Air Quality

This project is not expected to create adverse impacts on air quality because the project area is in attainment for all National Ambient Air Quality Standards (NAAQS) and because the project is expected to improve the Level of Service (LOS) and reduce delays and congestion on all facilities within the study area.

Construction activities may cause short-term air quality impacts in the form of dust from earthwork and unpaved roads. These impacts will be minimized by adherence to applicable state regulations and to applicable FDOT Standard Specifications for Road and Bridge Construction.

7.12.3 Contamination

No facilities were identified as Medium or High risk. The major concern would be dewatering during construction near known or potentially contaminated sites and the possible migration of contamination during dewatering. It is recommended that an updated CSER be prepared during the final design phase to identify any changed conditions during the time period from the completion of this CSER.

7.12.4 Construction

During the construction phase, the project will comply with the Orange County Standard Specifications to Road and Bridge Construction to avoid and minimize impacts. This may include measures such as silt fences or silt stops to avoid erosion and sedimentation. Construction phase impacts are anticipated to be short-term in duration and localized around the site of construction. A National Pollution Discharge Elimination System Permit will be required for construction.

Based on the existing land use within the limits of this project, the construction of the proposed roadway improvements will have temporary noise and vibration impacts. Construction noise sensitive sites include all sites detailed in the Noise Study Report. Vibration-sensitive sites on the project include residences.

During the construction phase, short-term noise and vibration may be generated by stationary and mobile construction equipment. The construction noise and vibration will be temporary at any location and controlled by adherence to the most recent edition of the Orange County Standard Specifications for Road and Bridge Construction. The project will have no significant impacts from construction.

7.12.5 Utilities

Many of the utilities along the corridor will be affected by the preferred alternative since the proposed improvements will occupy most of the existing right-of-way. In particular, the overhead lines are likely to be affected by the roadway widening, and the underground lines may be affected by the new storm sewer.

One utility requiring special consideration is the Duke Energy overhead transmission lines along the north side widened section. The proposed roadway and drainage improvements will run parallel to these lines. Close coordination with Duke Energy will be required during the course of design and construction phases.

7.13 Traffic Control Plan

A formal traffic control plan (TCP) will be developed during the final design process. Typically, the TCP staging will include building two new lanes on one side of the road while traffic is carried on the existing travel lanes. Once the new lanes are completed, traffic will be shifted to the completed lanes and work continues on finishing the remaining two lanes of improvements.

7.14 Special Features

7.14.1 Access Management

The access management plan for McCulloch Road was developed in general conformance with the Florida Department of Transportation (FDOT) Access Management criteria. By providing the proposed intersection spacing shown on the concept plans in **Appendix A**, most of the project can attain Access Class 5 or better.

The neighborhoods established entry points to provide limited access points and control flow along the corridor when developed in the late 1980's. All of existing side streets will maintain full access onto McCulloch Road. The existing driveways will be maintained but will be limited to right-in, right-out movements.

7.14.2 Wildlife Crossing

As previously discussed in Section 3.14.1 Wildlife Corridor Analysis, provisions for a wildlife corridor or crossing as part of the McCulloch Road improvements was reviewed near the existing 5 – 72" RCP culvert crossing east of N. Orion Boulevard. While there are existing conservation easements (primarily regulatory easements granted to the SJRWMD) immediately adjacent to the project corridor, as well as state-owned lands associated with UCF, the lack of upland corridor connectivity limits the immediate population of wildlife from ingress and egress to primarily wetland habitat, as the adjacent upland and ecotonal areas have been developed into stormwater ponds, upland "buffers" for residential communities, and single family/multi-family neighborhoods. Additionally, much of the wetland habitat immediately surrounding the study area is inundated with water for at least half of the calendar year. However, this location for a wildlife crossing should be reviewed further during final design.

7.14.3 Street Lighting

It is the County's policy to provide street lighting along the corridor. Street lighting will be addressed during the design phase.

8.0 Public Involvement

8.1 Public Involvement Plan

A Public Involvement Plan (PIP) was prepared and submitted to Orange County for approval in November 2021.

The PIP for this RCA study establishes the framework for informing and engaging elected and appointed officials, agencies, businesses, residents, advocacy groups, community asset representatives, and interested parties within the RCA study area. This PIP also describes opportunities for stakeholders to share their ideas and concerns with the study team, thus creating an open and transparent flow of information between the study team and those affected by the proposed improvements in the McCulloch Road area. Stakeholder contributions to this study will ensure that a final set of recommendations will have community acceptance while also being technically sound. This PIP will be updated as key outreach activities are completed during the RCA study.

8.2 Public Information Distribution

Public information for this project will be dispersed through the following methods:

- Newsletters were mailed to property owners, tenants, and other interested persons
- Public meeting advertisements were placed in Florida Administrative Register (FAR), The Orlando Sentinel, and El Sentinel
- A project website was created which contains information such as the project study area map, project schedule, meeting notices, newsletters, and other study documents.

8.3 Coordination and Small Group Meetings

Small group meetings, as requested, were held with representatives from Seminole County, property owners, utility companies, and other interested parties.

8.4 Public Meetings

A community public meeting was held on February 23, 2026. The meeting format consisted of an open house that allows informal discussions between the project team and the public, followed by a presentation and an open question and answer forum. The meeting was held at University Carillon United Methodist Church, 1395 Campus View Court, Oviedo, FL 32765. The open house began at 5:30 pm, followed by a formal presentation and a question-and-answer forum at 6:00 pm. Meeting attendees include Orange County Commissioner Semrad, Seminole County Bob Dallari, 69 citizens signed in from both Orange and Seminole County, Orange and Seminole County staff, and project team members. The comments received included concerns about wildlife crossings, flooding in the area, safety especially turning from the side streets, right of way acquisition and future extension of McCulloch Road further east over the Little Econlockhatchee River.

9.0 Conclusion and Recommendations

The objective of the McCulloch Road RCA is to develop and evaluate alternatives for improvements to McCulloch Road from North Orion / Lockwood Boulevard to North Tanner Road / Old Lockwood Road in order to address the current and future transportation needs along the corridor. The preferred improvements identified in this report will serve as the basis for the subsequent design of the roadway improvements.

The development of the proposed improvements incorporated the insights from planning, engineering, and the public to refine the alternatives and to ultimately advance a preferred alternative. It is recommended that the preferred alternative detailed in Section 7 of this report be advanced to the design phase.

Commitments:

1. A Public Involvement Plan will be continued through the remaining phases of the project.
2. Reevaluate the intersection configuration at the following two locations:
 - a. Worchester Drive/Amour de Flame Way and McCulloch Road if the intersection control needs to be a signal in opening year based on traffic demand at that time.
 - b. Tanner Road/Old Lockwood Boulevard and McCulloch Road if eastbound dual right turn lanes can be replaced with a single right turn lane.

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APPENDIX A

Preferred Alignment Concept Plans

MCCULLOCH ROAD ROADWAY CONCEPTUAL ANALYSIS (RCA) PROJECT

from West of Ken Dixon Way to East of N. Tanner Road

PREFERRED



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APPENDIX B

Concept Plans

MCCULLOCH ROAD ROADWAY CONCEPTUAL ANALYSIS (RCA) PROJECT

from West of Ken Dixon Way to East of N. Tanner Road

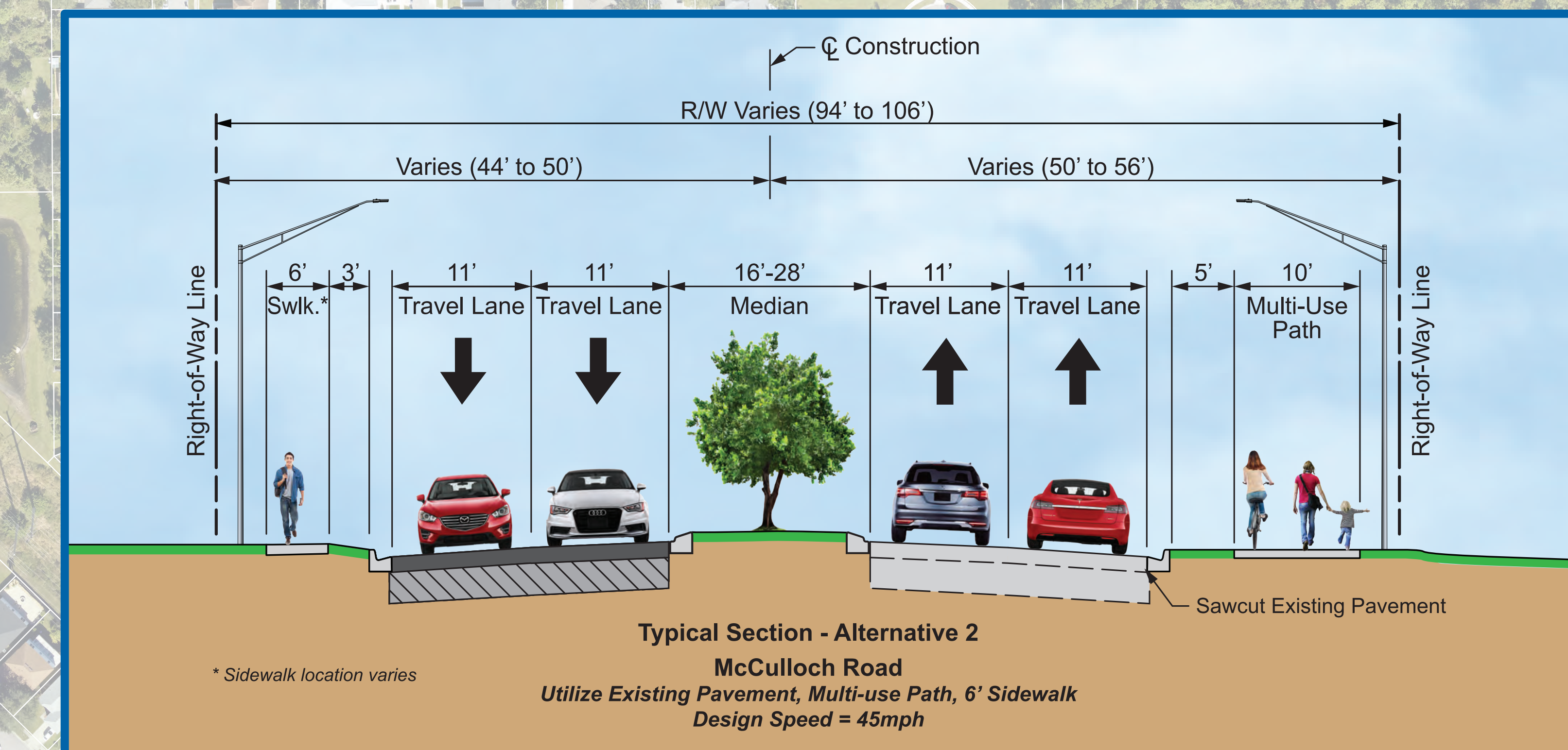
ALTERNATIVE 1



MCCULLOCH ROAD ROADWAY CONCEPTUAL ANALYSIS (RCA) PROJECT

from West of Ken Dixon Way to East of N. Tanner Road

ALTERNATIVE 2



.

APPENDIX C

Construction Cost Estimates

MCCULLOCH ROAD Bid Estimate OPTION 1

From ORION BOULEVARD to N. TANNER ROAD

Orange County

1/5/2026

Pay Item	Description	Unit	Quantity	Weighted Average Unit Price	Total Cost
101-1	MOBILIZATION	LS	1	\$1,347,639.95	\$1,347,639.95
102-1	MAINTENANCE OF TRAFFIC	LS	1	\$1,985,632.22	\$1,985,632.22
104-14	PREVENTION, CONTROL & ABATEMENT OF EROSION AND WATER POLLUTION	LS	1	\$458,635.81	\$458,635.81
110-1-1	CLEARING & GRUBBING	LS	1	\$360,250.00	\$360,250.00
120-4	SUBSOIL EXCAVATION (MUCK REMOVAL) (A-8 SOIL)	CY	1,818	\$33.00	\$59,994.00
120-9	EXCAVATION, EMBANKMENT AND GRADING	LS	1	\$1,500,000.00	\$1,500,000.00
160-4	TYPE B STABILIZATION (12") (MIN LBR 40)	SY	53,500	\$15.00	\$802,500.00
270-12	SOIL CEMENT BASE (12" 300 PSI) W/PRIME	SY	51,500	\$60.00	\$3,090,000.00
327-70-2	MILLING EXISTING ASPH PAVT (1 1/2" AVG DEPTH)	SY	1,000	\$6.50	\$6,500.00
334-1-25	SUPERPAVE ASPH CONC (TRAFFIC C) (INC. TACK COAT)(2 1/2")(SP 12.5)	SY	51,500	\$35.00	\$1,802,500.00
337-7-43	ASPH CONC FRICTION COURSE (1 1/2") (TRAFFIC C) (FC-12.5) (PG 76-22)	SY	52,500	\$25.00	\$1,312,500.00
425-1-311	INLETS (CURB)(TYPE P-1)(<10')	EA	30	\$11,500.00	\$345,000.00
425-1-312	INLETS (CURB)(TYPE P-1)(>10')	EA	2	\$16,500.00	\$33,000.00
425-1-321	INLETS (CURB)(TYPE P-2)(<10')	EA	8	\$12,203.00	\$97,624.00
425-1-411	INLETS (CURB)(TYPE P-1)(TOP)	EA	0	\$8,000.00	\$0.00
425-1-421	INLETS (CURB)(TYPE P-2)(TOP)	EA	0	\$9,000.00	\$0.00
425-1-549	INLETS (DITCH BOT. TYPE D) (MODIFIED)(<10')	EA	1	\$15,780.00	\$15,780.00
425-2-61	MANHOLES (P-8)(<10')	EA	3	\$9,158.00	\$27,474.00
430-175-118	PIPE CULV (ROUND)(18"SS)	LF	3,140	\$178.00	\$558,920.00
430-175-124	PIPE CULV (ROUND)(24"SS)	LF	2,900	\$205.00	\$594,500.00
430-175-130	PIPE CULV (ROUND)(30"SS)	LF	1,700	\$230.00	\$391,000.00
430-175-136	PIPE CULV (ROUND)(36"SS)	LF	300	\$304.00	\$91,200.00
430-175-172	PIPE CULV (ROUND)(72"SS)	LF	300	\$900.00	\$270,000.00
430-572-500	STRAIGHT CONCRETE ENDWALL (ROUND)(72")(5 BARREL)	EA	1	\$250,000.00	\$250,000.00
430-982-138	MITERED END SECTION , OPTIONAL ROUND (36")	EA	3	\$8,500.00	\$25,500.00
520-1-7	CONCRETE CURB AND GUTTER, TYPE E	LF	12,950	\$53.13	\$688,033.50
520-1-10	CONCRETE CURB AND GUTTER, TYPE F	LF	14,380	\$48.86	\$702,606.80
522-1	CONCRETE SIDEWALK, 4" THICK	SY	5,402	\$75.00	\$405,150.00
522-2	CONCRETE SIDEWALK, 6" THICK	SY	730	\$100.00	\$73,000.00
527-2	DETECTABLE WARNINGS	SF	100	\$40.00	\$4,000.00
530-3-4	RIPRAP (RUBBLE) (DITCH LINING)	TN	698.8	\$480.00	\$335,424.00
570-1-2	PERFORMANCE TURF (SOD)	SY	52,050	\$5.50	\$286,275.00
603-1	SIGNALIZATION (LOCKWOOD BLVD)	LS	1	\$750,000.00	\$750,000.00
603-2	SIGNALIZATION (WORCHESTER DRIVE)	LS	1	\$750,000.00	\$750,000.00
603-2	SIGNALIZATION (TANNER ROAD)	LS	1	\$750,000.00	\$750,000.00
	SIGNING AND PAVEMENT MARKINGS	MI	1.30	\$25,000.00	\$32,500.00
	LANDSCAPING	MI	1.30	\$85,000.00	\$110,500.00
	LIGHTING	MI	1.30	\$220,000.00	\$286,000.00
					\$0.00
900-1	AS-BUILT PLANS	LS	1	\$350,000.00	\$350,000.00
	CONTINGENCY(30%)	LS	0.3	\$16,807,731.30	\$5,042,319.39
	Total				\$25,992,000.00

MCCULLOCH ROAD Bid Estimate OPTION 2

From ORION BOULEVARD to N. TANNER ROAD

Orange County

1/5/2026

Pay Item	Description	Unit	Quantity	Weighted Average Unit Price	Total Cost
101-1	MOBILIZATION	LS	1	\$1,099,687.32	\$1,099,687.32
102-1	MAINTENANCE OF TRAFFIC	LS	1	\$1,556,828.89	\$1,556,828.89
104-14	PREVENTION, CONTROL & ABATEMENT OF EROSION AND WATER POLLUTION	LS	1	\$379,890.61	\$379,890.61
110-1-1	CLEARING & GRUBBING	LS	1	\$165,000.00	\$165,000.00
120-4	SUBSOIL EXCAVATION (MUCK REMOVAL) (A-8 SOIL)	CY	1,818	\$33.00	\$59,994.00
120-9	EXCAVATION, EMBANKMENT AND GRADING	LS	1	\$1,200,000.00	\$1,200,000.00
160-4	TYPE B STABILIZATION (12") (MIN LBR 40)	SY	33,000	\$15.00	\$495,000.00
270-12	SOIL CEMENT BASE (12" 300 PSI) W/PRIME	SY	30,000	\$60.00	\$1,800,000.00
327-70-2	MILLING EXISTING ASPH PAVT (1 1/2" AVG DEPTH)	SY	22,500	\$6.50	\$146,250.00
334-1-25	SUPERPAVE ASPH CONC (TRAFFIC C) (INC. TACK COAT)(2 1/2")(SP 12.5)	SY	30,000	\$35.00	\$1,050,000.00
337-7-43	ASPH CONC FRICTION COURSE (1 1/2") (TRAFFIC C) (FC-12.5) (PG 76-22)	SY	52,500	\$25.00	\$1,312,500.00
425-1-311	INLETS (CURB)(TYPE P-1)(<10')	EA	15	\$11,500.00	\$172,500.00
425-1-312	INLETS (CURB)(TYPE P-1)(>10')	EA	1	\$16,500.00	\$16,500.00
425-1-321	INLETS (CURB)(TYPE P-2)(<10')	EA	4	\$12,203.00	\$48,812.00
425-1-411	INLETS (CURB)(TYPE P-1)(TOP)	EA	15	\$8,000.00	\$120,000.00
425-1-421	INLETS (CURB)(TYPE P-2)(TOP)	EA	5	\$9,000.00	\$45,000.00
425-1-549	INLETS (DITCH BOT. TYPE D) (MODIFIED)(<10')	EA	1	\$15,780.00	\$15,780.00
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430-175-172	PIPE CULV (ROUND)(72"SS)	LF	300	\$900.00	\$270,000.00
430-572-500	STRAIGHT CONCRETE ENDWALL (ROUND)(72")(5 BARREL)	EA	1	\$250,000.00	\$250,000.00
430-982-138	MITERED END SECTION , OPTIONAL ROUND (36")	EA	3	\$8,500.00	\$25,500.00
520-1-7	CONCRETE CURB AND GUTTER, TYPE E	LF	12,950	\$53.13	\$688,033.50
520-1-10	CONCRETE CURB AND GUTTER, TYPE F	LF	14,380	\$48.86	\$702,606.80
522-1	CONCRETE SIDEWALK, 4" THICK	SY	5,402	\$75.00	\$405,150.00
522-2	CONCRETE SIDEWALK, 6" THICK	SY	730	\$100.00	\$73,000.00
527-2	DETECTABLE WARNINGS	SF	100	\$40.00	\$4,000.00
530-3-4	RIPRAP (RUBBLE) (DITCH LINING)	TN	698.8	\$480.00	\$335,424.00
570-1-2	PERFORMANCE TURF (SOD)	SY	52,050	\$5.50	\$286,275.00
603-1	SIGNALIZATION (LOCKWOOD BLVD)	LS	1	\$750,000.00	\$750,000.00
603-2	SIGNALIZATION (WORCHESTER DRIVE)	LS	1	\$750,000.00	\$750,000.00
603-2	SIGNALIZATION (TANNER ROAD)	LS	1	\$750,000.00	\$750,000.00
	SIGNING AND PAVEMENT MARKINGS	MI	1.30	\$25,000.00	\$32,500.00
	LANDSCAPING	MI	1.30	\$85,000.00	\$110,500.00
	LIGHTING	MI	1.30	\$220,000.00	\$286,000.00
					\$0.00
900-1	AS-BUILT PLANS	LS	1	\$350,000.00	\$350,000.00
	CONTINGENCY(30%)	LS	0.3	\$13,773,099.30	\$4,131,929.79
	Total				\$21,291,435.91