DRAFT

PRELIMINARY ENGINEERING REPORT

Florida Department of Transportation

District One

State Road 544 (Lucerne Park Road) from Martin Luther King Boulevard to State Road 17

Project Development & Environment Study

Polk County, Florida

Financial Management Number: 440273-1-22-01

ETDM Number: 5873

January 2025

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. §327 and a Memorandum of Understanding dated May 26, 2022, and executed by Federal Highway Administration and FDOT.

PROFESSIONAL ENGINEER CERTIFICATION

PRELIMINARY ENGINEERING REPORT

Project: SR 544 PD&E Study

ETDM Number: 5873

Financial Project ID: 440273-1-22-01

Federal Aid Project Number: D119-048-B

This preliminary engineering report contains engineering information that fulfills the purpose and need for the State Road 544 (Lucerne Park Road) Project Development & Environment Study from Martin Luther King Boulevard to State Road 17 in Polk 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 judgment and experience.

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

This item has been digitally signed and sealed by *David S. Dangel, P.E.* on the date adjacent to the seal.

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

1.0 PROJECT SUMMARY

1.1 Project Description

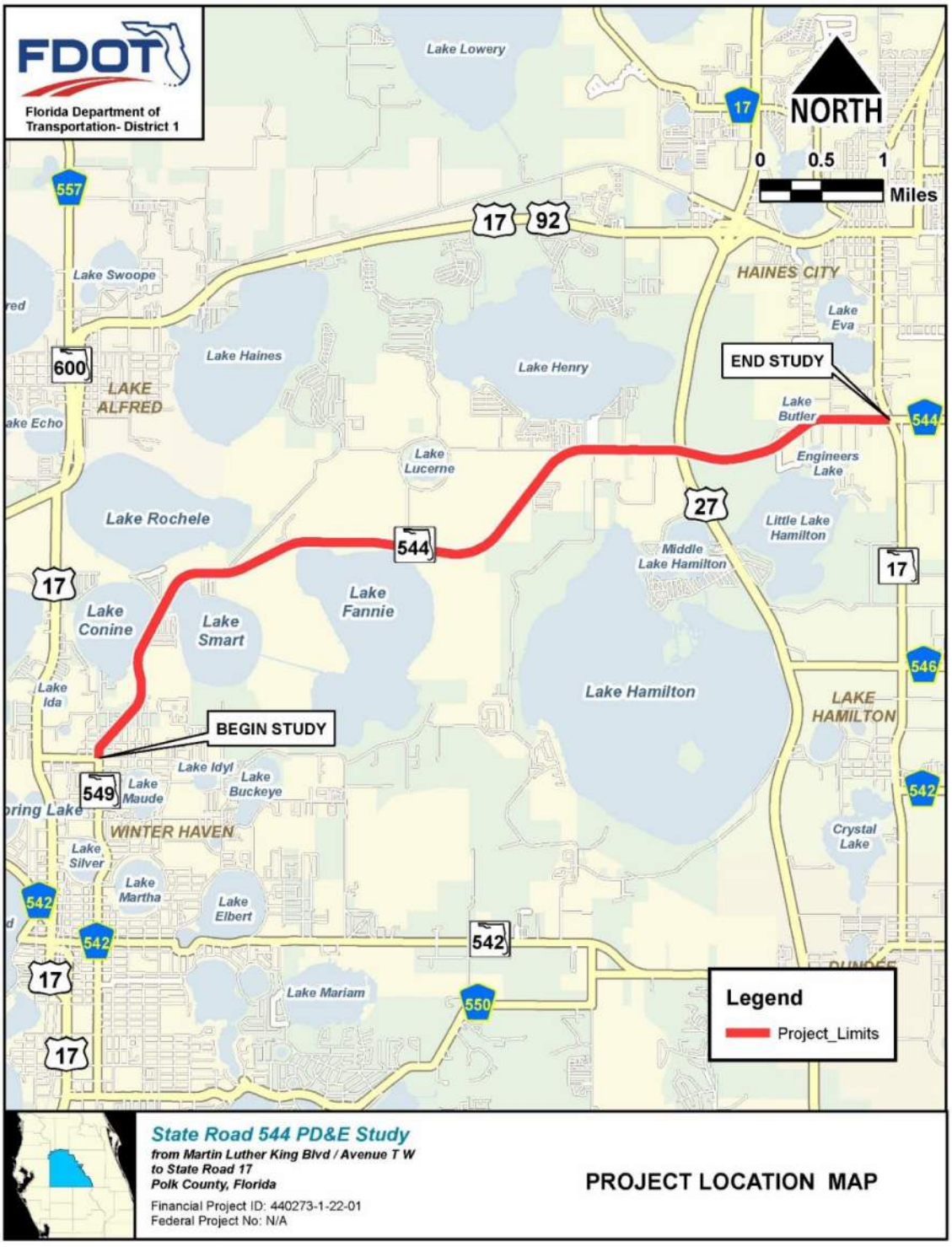
This project involves capacity and multi-modal improvements to SR 544 (Lucerne Park Road) from Martin Luther King Boulevard to SR 17 in Polk County, a length of 7.96 miles. The project location map is provided as **Figure 1-1**. The project corridor traverses three jurisdictions: the City of Winter Haven, Polk County, and Haines City. SR 544 (Lucerne Park Road) plays an important role in the regional network by providing east-west access for a growing area of east-central Polk County. It links two north-south principal arterials of Polk County (US 17 and US 27), US 27 being part of Florida's Strategic Intermodal System (SIS) and connects the cities of Winter Haven and Haines City, the second and third most populated cities within Polk County, respectively.

SR 544 (Lucerne Park Road) is classified as a two-lane urban minor arterial from Martin Luther King Boulevard to US 27 and as an urban collector from US 27 to SR 17. The roadway features two twelve-foot travel lanes with center and right turn lanes dispersed throughout the length of the corridor. The roadway also features an open drainage system; however, curbs and gutters exist from Martin Luther King Boulevard to Avenue Y and from La Vista Drive to SR 17 and in other areas where sidewalks are present.

Paved shoulders are present for the majority of the corridor and marked bicycle lanes exist on both sides of the roadway from 0.10 mile west of Brenton Manor Avenue to 0.2 mile east of US 27. The posted speed limit along the corridor ranges from 35 miles per hour to 55 miles per hour. Citrus Connection Route #60 (Winter Haven Northeast) operates along the eastern portion of the project corridor. Existing right-of-way along SR 544 (Lucerne Park Road) ranges from 50 feet to 84 feet from Martin Luther King Boulevard to Avenue Y, 90 feet to 163 feet from Avenue Y to La Vista Drive, and 64 feet to 66 feet from La Vista Drive to SR 17.

In addition to widening from two to four lanes, the proposed improvements may include paved shoulders/marked bicycle lanes, sidewalks, and/or a shared-use path to provide safe bicycle and pedestrian mobility and meet objectives of the Polk Transportation Planning Organization (TPO) in transforming this corridor into a Complete Street. Additional right-of-way may be required depending on the proposed improvements and specific right-of-way requirements will be determined during this Project Development and Environment (PD&E) Study.

Figure 1-1: Project Location Map



1.2 Purpose & Need

The purpose of this project is to address roadway capacity deficiency along SR 544 (Lucerne Park Road) from Martin Luther King Boulevard to SR 17 in Polk County to accommodate future travel demand as a result of projected population and employment growth in the area. Other goals of the project include enhancing mobility options and multi-modal access as well as supporting local economic development initiatives. The need for the project is based on the following criteria:

CAPACITY/TRANSPORTATION DEMAND: Improve Operational Conditions and Accommodate Projected Travel Demand

This project is anticipated to improve traffic operations along SR 544 (Lucerne Park Road) by increasing operational capacity to meet the projected travel demand as a result of Polk County population and employment growth and increased regional travel in the corridor.

The project segment occurs within two of the eight Polk County planning areas [Central Planning Area and East Planning Area] as depicted in Momentum 2040 [the Polk Transportation Planning Organization's (TPO) Long Range Transportation Plan (LRTP)]. Of the eight planning areas, the East Planning Area is expected to experience the highest increase in population growth between 2010 and 2040 with a 29% increase in single-family dwelling units and a 34% increase in multi-family dwelling units. The Central Planning Area is anticipated to experience the second highest increase in single family dwelling units (25% increase) during the same time period. Accordingly, the Central Planning Area will experience the highest increase in employment growth between 2010 and 2040 with a 42% increase in industrial employment, 34% increase in commercial employment, and a 32% increase in service employment. Likewise, the East Planning Area will experience the second highest increase in commercial employment (26% increase) and the third highest increase in service employment (21% increase) during the same time period. Countywide employment is expected to increase by 79% between 2010 and 2040. Growth within the project area may be attributed to the numerous developments that have been approved and continue to be approved by the City of Haines City.

The greater SR 544 corridor serves commuters of the area as it provides access to regional transportation facilities [including US 92, US 17, US 27, and SR 17] as well as residential and commercial hubs within central Polk County. The project segment of SR 544 (Lucerne Park Road) specifically facilitates local commuter traffic between the population and employment centers of Winter Haven and Haines City. Identified as a Secondary Freight Network Highway Corridor by the Polk TPO, SR 544 additionally serves as a freight distribution route as it connects to a Strategic Intermodal System (SIS) Highway Corridor [US 27], Regional Freight Network Highway Corridors as designated by the Polk TPO [US 92, US 27, and SR 17], and another designated Polk TPO Secondary Freight Network Highway Corridor [US 17]. Truck traffic composes between 7.0% and 9.9 % of the

total daily traffic present along the project segment of SR 544 (Lucerne Park Road). As such, this roadway plays an important role in facilitating truck traffic and the distribution of goods to both local and regional destinations.

While the roadway currently operates at an acceptable LOS, conditions are anticipated to deteriorate below established standards if no improvements occur by 2040 as the roadway lacks the capacity to accommodate the projected travel demand. With the proposed improvement, the corridor is expected to continue to operate at acceptable LOS or improved LOS.

MODAL INTERRELATIONSHIPS: Enhance Mobility Options and Multi-Modal Access

Notable pedestrian and bicycle traffic in the corridor was observed in the field despite the fact that sidewalks and bicycle lanes are intermittent and disconnected along the corridor. In addition, a large transit dependent population is present, composed primarily of minority and low-income populations as well as housing units with no vehicle available. Compared to the demographic characteristics for Polk County, the project analysis area [which consists of United States census block groups within a 500-foot buffer surrounding the project] contains a significantly higher minority population percentage [20.1% higher], a higher percentage of housing units with no vehicle available [1.2% higher], and a notably lower median family income [$11,246 less]. This indicates a population with a higher propensity to walk, bike, or take transit to access essential services. The need for multi-modal options within the corridor is critical as growth in the area has created a latent demand for increased bicycle and pedestrian activity.

It should be noted that a portion of the project segment [from Martin Luther King Boulevard to Old Lucerne Park Road] is identified by the Polk TPO as a Future Complete Streets Corridor. A Complete Street is defined as a corridor that is designed to provide safe access and travel for all users [pedestrians, bicyclists, motorists, and transit riders] of all ages and abilities. Some of the treatments proposed as part of the Future Complete Streets Corridor have been applied to a section immediately south/adjacent to the project corridor [from Martin Luther King Boulevard to Avenue O] and to the westernmost/southernmost section of the project segment [Martin Luther King Boulevard to Avenue Y]. These treatments included the reconstruction of driveways to meet Americans with Disabilities Act (ADA) standards, the addition of pedestrian street lighting, and the construction of crosswalks on intersecting minor streets. New or enhanced sidewalks, landscaping, enhanced bus stops, improved signage, as well as a shared use path [Old Dixie Trail - ETDM Project #14328] are some of the additional improvements being considered/evaluated along the project corridor.

Overall, the proposed project is anticipated to meet the mobility needs of the area by alleviating future congestion on the corridor, providing multimodal travel options, and improving east-west

access within east-central Polk County. The proposed bicycle and pedestrian facilities are to enhance multi-modal access and connections between community points of interest and to the regional trail network.

SOCIAL DEMANDS AND ECONOMIC DEVELOPMENT: Support Economic Development

One Florida Opportunity Zone [formerly titled Florida Enterprise Zone] borders the northern portion of the project corridor from Old Lucerne Park Road to US 27. This program provides tax incentives for investments in low-income communities. In addition, the easternmost/northernmost section of the project corridor occurs within the Haines City Community Redevelopment Area. Further, the westernmost/ southernmost section of the project [Martin Luther King Boulevard to Ware Avenue] occurs within the Florence Villa Community Redevelopment Area; the Winter Haven Community Redevelopment Agency fosters and promotes community redevelopment activities within this designated district of the City of Winter Haven. Community Redevelopment Areas are recognized as special districts under Florida Statute created to encourage investment within the district through a series of strategic and timely public investments; activities that occur within them are detailed in customized redevelopment plans and include: infrastructure improvements, streetscaping or beautification treatments, affordable housing, recreation and park facility improvements, economic development/redevelopment strategies, transportation improvements, and neighborhood enhancement.

The enhanced roadway operational conditions resulting from the project along with the bicycle and pedestrian facilities proposed for the corridor are intended to provide infrastructure to support commerce and customers as well as modal options to serve the Florida Opportunity Zone and other communities along the corridor. It will also renew the aesthetic appeal of the surrounding area, thereby stimulating economic growth/revitalization and investment in the adjacent communities. As such, the project aligns with the economic development initiatives of the proximate, local communities.

1.3 Commitments

1. A survey will be conducted for sand skinks in suitable sand skink habitat per USFWS protocol during the design phase.
2. The most recent version of the USFWS *Standard Protection Measures for the Eastern Indigo Snake* will be utilized during project construction.
3. A survey for listed plants will be performed during the design phase and coordination prior to construction with the appropriate agency will occur as needed if listed plants are observed within the project area.
4. The FDOT is committed to the construction of feasible and reasonable noise abatement measures at noise-impacted locations contingent upon the following conditions:

a) Final recommendations on the construction of abatement measures is determined during the project's final design and through the public involvement process;
b) Detailed noise analyses during the final design process support the need, feasibility and reasonableness of providing abatement;
c) Cost analysis indicates that the cost of the noise barrier(s) will not exceed the cost reasonable criterion;
d) Community input supporting types, heights, and locations of the noise barrier(s) is provided to the District Office; and
e) Safety and engineering aspects as related to the roadway user and the adjacent property owner have been reviewed and any conflicts or issues resolved.

1.4 Alternatives Analysis Summary

In order to meet the Purpose and Need for the project, four-lane roadway typical sections were developed and discussed with FDOT District One's Planning Studio. It was decided that due to the high speeds along SR 544 (Lucerne Park Road), herein referred to as SR 544, on-road bicycle lanes would not be considered. Therefore, a single 4-lane divided roadway typical section was developed for a majority of the project that includes 12-foot-wide outside travel lanes and 11-foot-wide inside travel lanes separated by a 22-foot raised median as well as 10-foot shared use paths along both sides of the road. However, due to constrained right-of-way conditions and potential impacts to existing residences and businesses, additional typical sections were considered at each end of the project corridor.

Below is a summary of the roadway improvements considered for each evaluation segment and the intersection improvements considered for the nine study intersections.

Segment 1 – Martin Luther King Boulevard to North of Avenue Y

Four alternative typical sections were considered through this historic minority neighborhood including a two-lane urban typical, a three-lane urban typical, a four-lane undivided rural typical and a five-lane urban typical section. Due to impacts to dozens of residences, churches and businesses associated with the four lane and five lane typical sections, they were eliminated from consideration and this section of SR 544 is considered constrained by the Polk Transportation Planning Organization. The two-lane and three-lane typicals that were considered include an 8-foot-wide sidewalk along the north side of the roadway, a 10-foot-wide shared-use-path on the south side and raised median refuge areas at the mid-block crosswalk locations. These options were presented to the Florence Villa community at two separate neighborhood meetings and there was support for both alternatives.

Segments 2 through 7 – North of Avenue Y to LaVista Drive

For a majority of the corridor, from Avenue Y to LaVista Drive, the four-lane divided typical section described earlier was considered. Additional right-of-way would be needed to accommodate this typical section in most areas, so alternatives included widening to the north side of the road and to the south side of the road. Consideration in the comparison of north side vs. south side widening was given for planned development, publicly owned parks and recreation areas, and a proposed Duke Energy transmission line that will be constructed adjacent to the SR 544 right-of-way in a new easement that Duke Energy is in the process of acquiring.

Segment 8 – LaVista Drive to SR 17

The proposed four-lane divided typical section was considered in Segment 8 and alignments evaluated widening to the north, to the south, and centered widening. However, due to the large number of residential relocations that would result from any of these three options, two additional alternatives were considered. The first one considered maintaining the existing four-lane undivided roadway and adding 8-foot-wide sidewalks along each side of the road. The other option considered a four-lane divided roadway with a reduced median width and 8-foot-wide sidewalks located at the back of curb on both sides of the road.

Intersections

Nine project intersections were evaluated using FDOT's Intersection Control Evaluation (ICE) process.

Martin Luther King Boulevard intersection

The proposed improvements at the Martin Luther King Boulevard intersection include maintaining the existing traffic signal but adding a new southbound right turn lane at the intersection.

Avenue Y intersection

Several alternatives were considered for the Avenue Y intersection including a traffic signal and several roundabouts, including two mini-roundabout alternatives.

Old Lucerne Park Road (west end)

Intersection improvement options at the Old Lucerne Park Road (west end) included a traffic signal and a roundabout. However, due to residential impacts and access issues to some residences in the northwest and northeast quadrants, a concept to realign Old Lucerne Park Road (west end) to align with Vista Del Lago Drive was considered. Both a traffic signal and roundabout were considered for this new intersection.

Lucerne Loop Road intersection

Both a traffic signal and a roundabout were considered for this intersection.

Old Lucerne Park Road (east end)

Several alternatives were considered for the intersection of Old Lucerne Park Road with SR 544. In addition to the skew of Old Lucerne Park Road at the intersection, new developments are planned on the south side of SR 544 across from the intersection and in the northwest quadrant of the intersection. Both a traffic signal and roundabout were evaluated at this intersection.

Lake Hamilton Drive intersection

Several alternatives were considered for this intersection, but a traffic signal was considered as the only viable alternative. This option includes realigning the two internal roads for the developments on the north side of SR 544 so that they would intersect SR 544 at a single location for the north leg of the intersection. Also, the ICE process identified the signalized thru-cut option as a viable alternative.

Brenton Manor Avenue intersection

Because of the proximity of this intersection to the US 27 intersection with SR 544 and the two options that were found to be viable at the US 27 intersection, the intersection type at Brenton Manor Avenue is tied to the concepts considered at US 27. Both a roundabout (paired with the single point urban interchange at US 27) and a traffic signal (paired with the northwest quadrant roadway concept at US 27) were evaluated.

US 27 intersection

Two concepts were found to be viable for consideration at the US 27 intersection with SR 544. These include a quadrant roadway in the northwest quadrant of the intersection that would include an intersection at Brenton Manor Avenue (traffic signal) and a new intersection at US 27. The other viable option is a single point urban interchange.

SR 17 intersection

The only concept identified for the SR 17 intersection was a traffic signal. Only improvements on the west leg of the intersection would be involved.

1.5 Description of Preferred Alternative

Below is a summary of the preferred alternative for each roadway segment and intersection.

Segment 1 – Martin Luther King Boulevard to North of Avenue Y

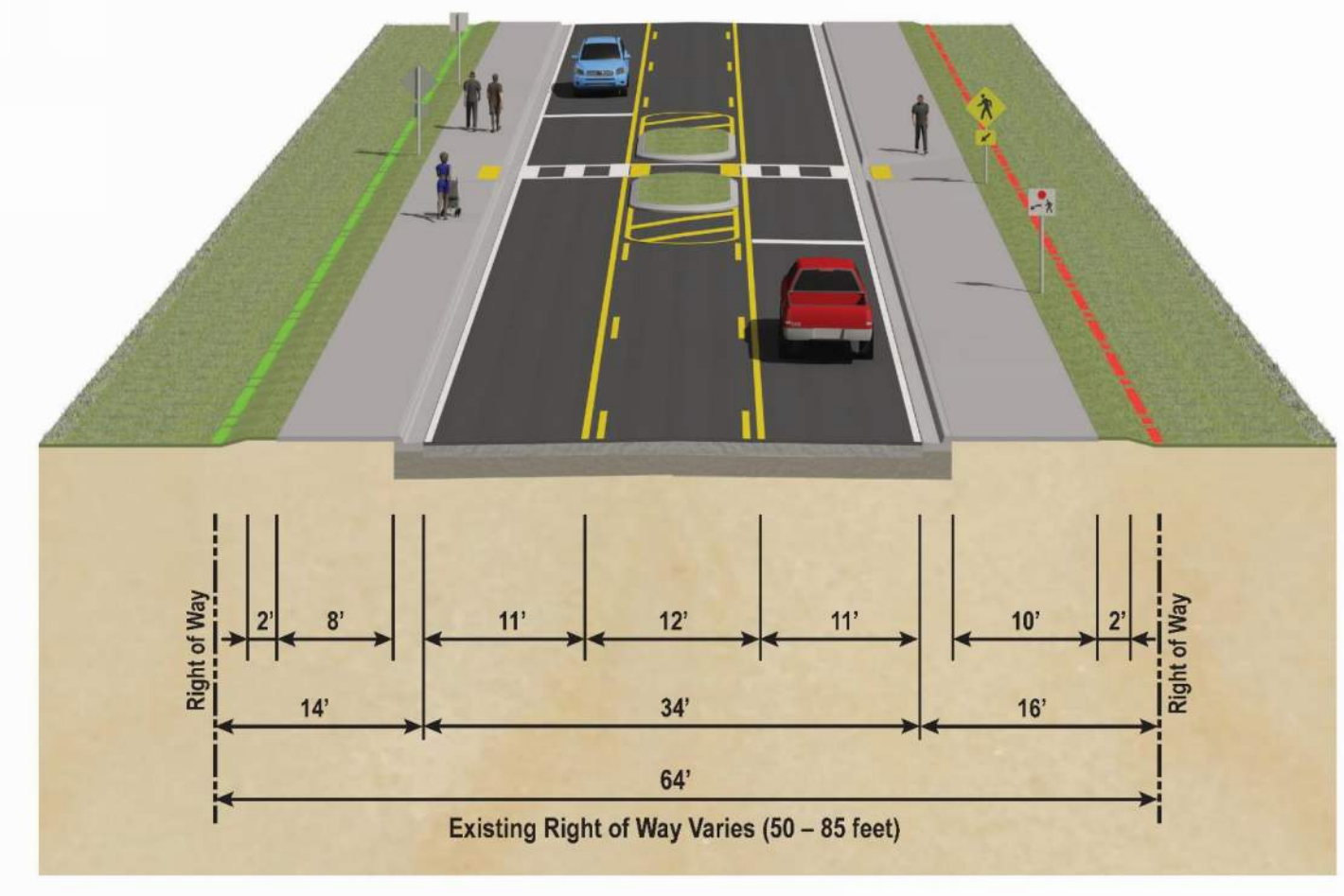
The preferred typical section in Segment 1 is the three-lane typical section with a best fit alignment. It is slightly wider and will have minor right-of-way impacts (no residential relocations) than the two-lane alternative but will provide additional safety and capacity for turning vehicles with the center turn lane. **Figure 1-2** illustrates this typical section.

The preferred improvement at the Martin Luther King Boulevard intersection is to maintain the existing traffic signal but add a new southbound right turn lane at the intersection. Improvements

also include realigning the 1st Street NW intersection with SR 544 farther away from the Martin Luther King Boulevard intersection.

The mini-roundabout with the 90-foot inscribed diameter is recommended at Avenue Y. This concept will minimize impacts to the residences, businesses and church located at this intersection while providing an opportunity for an entrance feature to the historic Florence Villa neighborhood and speed control for vehicles entering the neighborhood.

Figure 1-2 Segment 1 Preferred Typical Section



Segment 2 – North of Avenue Y to East of Lake Conine Canal

The four-lane divided roadway is proposed with widening to the south side of the road. This alignment is recommended to avoid impacts to the Lake Conine Wetland Restoration Area and due to the proximity of the road to Lake Conine and wetlands along the lake. **Figure 1-3** illustrates the proposed four-lane divided roadway typical section for Segments 2 through 7.

Segment 3 – East of Lake Conine Canal to East of Old Lucerne Park Road (west end)

The four-lane divided roadway is proposed with widening to the north side of the road. This alignment is recommended to avoid impacts to existing residential developments on the south side of SR 544 and due to the proximity of the road to Lake Smart and wetlands along the lake.

The preferred concept at the Old Lucerne Park Road (west end) intersection is to realign Old Lucerne Park Road (west end) to align with Vista Del Lago Drive and to provide a roundabout at the intersection. The roundabout will help with speed control along SR 544 and improve safety when compared to the traffic signal option.

Segment 4 – East of Old Lucerne Park Road (west end) to East of Lucerne Loop Road

The four-lane divided roadway is proposed with centered widening. The existing road right-of-way can accommodate the proposed four-lane divided roadway in this segment.

The preferred improvement at the Lucerne Loop Road intersection is the roundabout. It will help with speed control along SR 544 and improve safety when compared to the traffic signal option.

Segment 5 – East of Lucerne Loop Road to East of Lake Hamilton Canal

The four-lane divided roadway is proposed with widening to the north side of the road. This alignment is recommended to avoid impacts to the Lake Region Lakes Management District boat ramp on the south side of the road and also to avoid impacts to the proposed Duke Energy transmission easement/poles on the south side of the road.

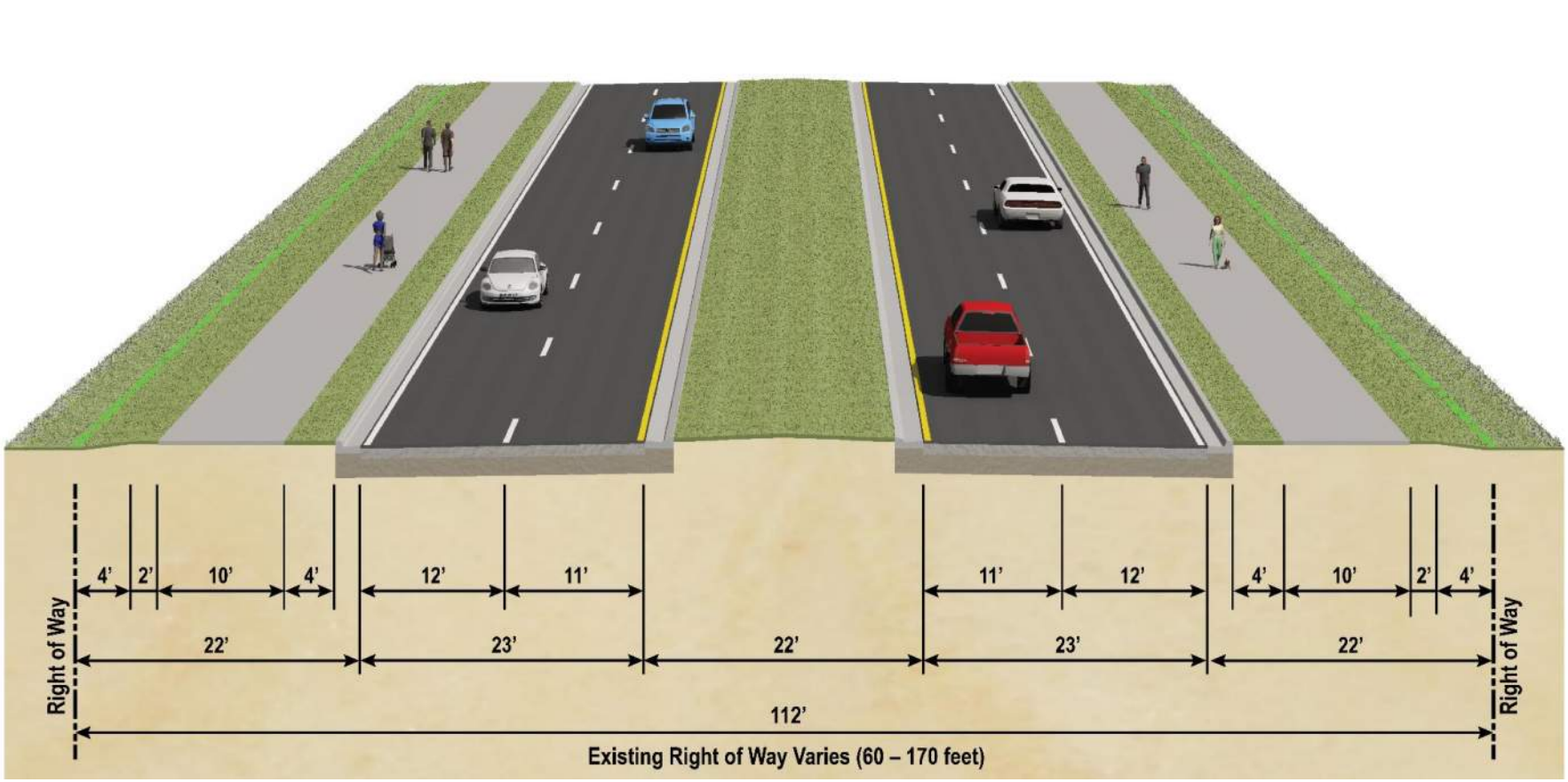
The preferred improvement at the Old Lucerne Park Road (east end) intersection is the roundabout. It will help with speed control SR 544 and increase safety when compared to the traffic signal option at this skewed intersection.

Segment 6 – East of Lake Hamilton Canal to West of Brenton Manor Avenue

The four-lane divided roadway is proposed with widening to the north side of the road. This alignment is recommended to avoid impacts to the Duke Energy transmission easement/poles and existing commercial development on the south side of the road.

The signalized thru-cut alternative is recommended at the Lake Hamiliton Drive intersection. This option includes realigning the two internal roads for the developments on the north side of SR 544 so that they intersect SR 544 in a single location (north leg of the intersection).

Figure 1-3 Segment 2 through Segment 7 Preferred Typical Section



Segment 7 – West of Brenton Manor Avenue to LaVista Drive

The four-lane divided roadway is proposed with widening to the north side of the road west of US 27 and to the south side of the road east of US 27. This alignment is recommended to avoid impacts to Duke Energy transmission easement/poles that switch from the south side of the road to the north side of the road through the US 27 intersection.

The preferred intersection improvement at Brenton Manor Avenue is the roundabout. This intersection concept is paired with the recommended single point urban interchange at US 27.

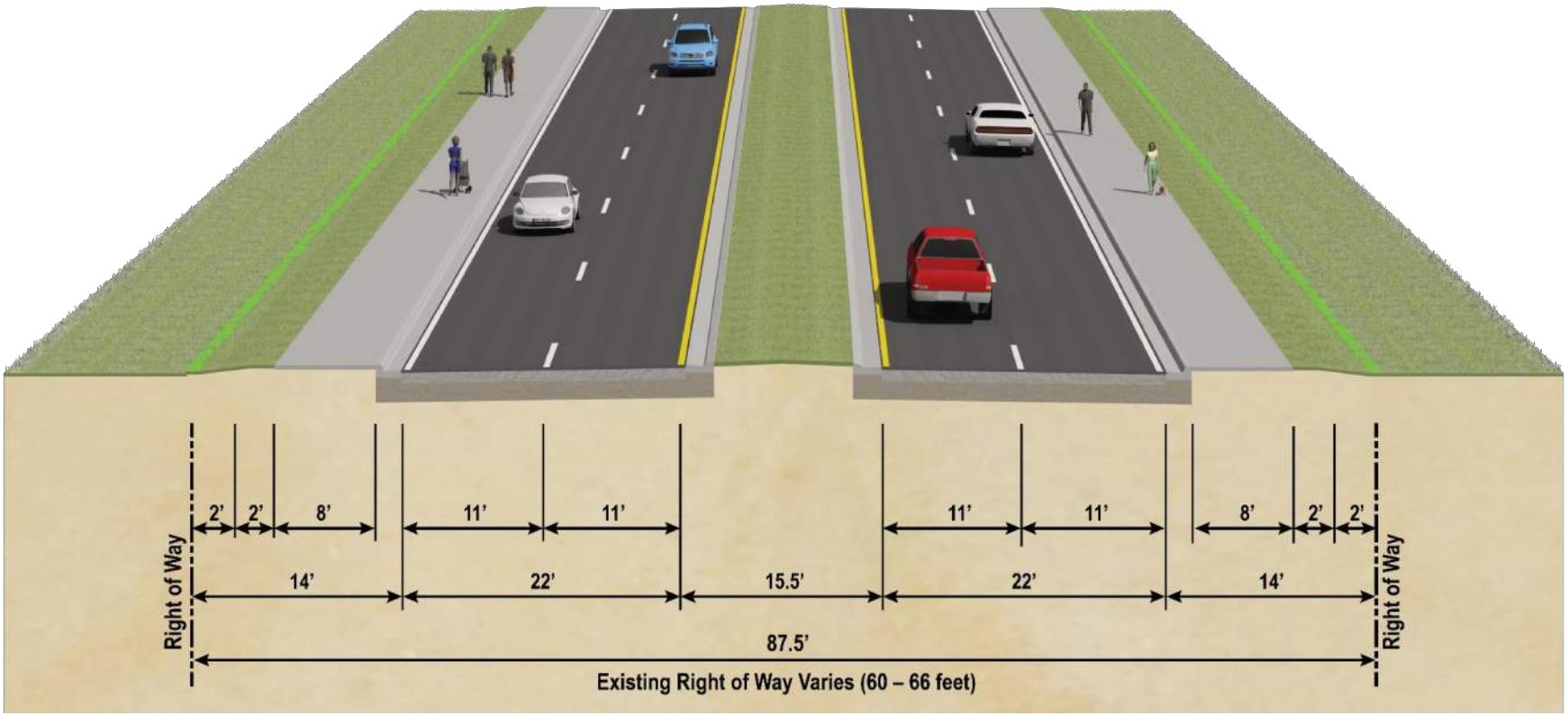
The single point urban interchange is the recommended improvement at the US 27 intersection due to the lower predicted life cycle crash costs with this concept compared to the northwest quadrant roadway with three signalized intersections.

Segment 8 – LaVista Drive to SR 17

The reduced four-lane divided roadway is proposed with centered widening through this segment. This alignment is recommended to minimize residential relocations through this segment of the project but provide access control with the raised median. **Figure 1-4** illustrates this typical section.

The preferred concept for the SR 17 intersection is a traffic signal with only improvements to the west leg of the intersection.

Figure 1-4 Segment 8 Preferred Typical Section



1.6 List of Technical Documents

- Engineering Reports
    - Project Traffic Analysis Report, *January 2021*
    - Pond Siting Report, *October 2023*
    - Location Hydraulics Report, *October 2023*
    - Utility Assessment Package, February 2024
    - Water Quality Impact Evaluation Checklist, *October 2023*
- Environmental Reports
    - Conceptual Stage Relocation Plan, *August 2023*
    - Contamination Screening Evaluation Report, *September 2023*
    - Cultural Resources Assessment Survey, *July 2023*
    - Natural Resources Evaluation, February 2024
    - Noise Study Report, *September 2023*
    - Type 2 Categorical Exclusion, December 2024
- Public Involvement Reports
    - Comments and Coordination Report, *to be completed following the public hearing*
    - Public Involvement Plan, *October 2019*
- Other Supporting Documents
    - ETDM Summary Report, *May 2020*
    - Polk TPO Complete Street Corridor Feasibility Study, *June 2016*

2.0 EXISTING CONDITIONS

2.1 Previous Planning Studies

One previous planning study was completed within the project limits. The Polk Transportation Planning Organization (Polk TPO) has designated SR 544 between Martin Luther King Boulevard and Old Lucerne Park Road as one of eight designated Complete Streets corridors due to the high number of pedestrian and bicycle crashes. The Polk TPO, in coordination with both the City of Winter Haven and Polk County, recently completed a Complete Streets Action Plan report for SR 544 between Martin Luther King Boulevard and Old Lucerne Park Road which included recommendations considered as part of this PD&E Study. SR 544 is also designated as a High Crash Corridor by the Polk TPO.

Separate recommendations were developed for Segment 1 between Martin Luther King Boulevard and Avenue Y and Segment 2 between Avenue Y and Old Lucerne Park Road. Recommendations for Segment 1 include reconstructed driveways, supplemental lighting, and gateway lighting north of Avenue Y. Recommendations for Segment 2 include addition of sidewalk on both sides of the road. In addition, throughout the corridor multi-modal strategies were recommended such as accessible pedestrian signals at signalized intersections, bike racks at destinations, and crosswalk markings across side streets, among others.

2.2 Existing Roadway Conditions

2.2.1 Roadway Typical Sections

SR 544 from Martin Luther King Boulevard to Avenue Y through Florence Villa is an urban roadway with two 12-foot travel lanes, 4-foot paved shoulders, type F curb and gutter, and 6-foot sidewalks on both sides of the road at the back of curb.

From Avenue Y to La Vista, SR 544 is a rural section with an open drainage system. The roadway has two 12-foot lanes, and 5-foot paved shoulders. There is no sidewalk in this section.

From La Vista Drive to SR 17, SR 544 transitions to a four-lane undivided urban section. It consists of four 12-foot travel lanes, type F curb and gutter, and 5-foot sidewalk on the west side of the roadway only.

SR 544 features center and right turn lanes dispersed throughout the length of the corridor at intersections. Existing roadway typical sections are depicted in the following **Figures 2-1 to 2-3**.

Figure 2-1 Existing Typical Section – Martin Luther King Boulevard to Avenue Y

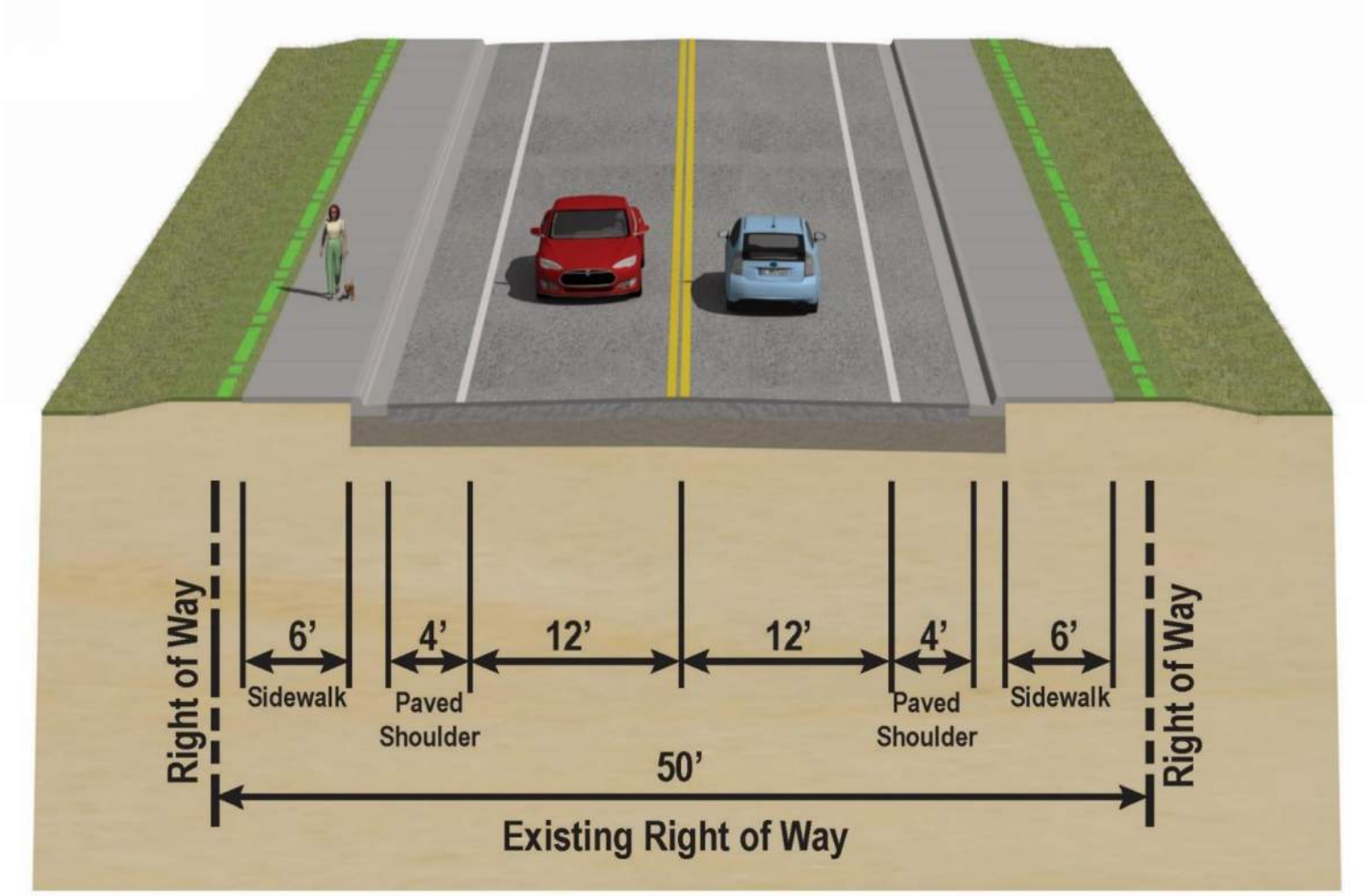


Figure 2-2 Existing Typical Section – Avenue Y to La Vista Drive

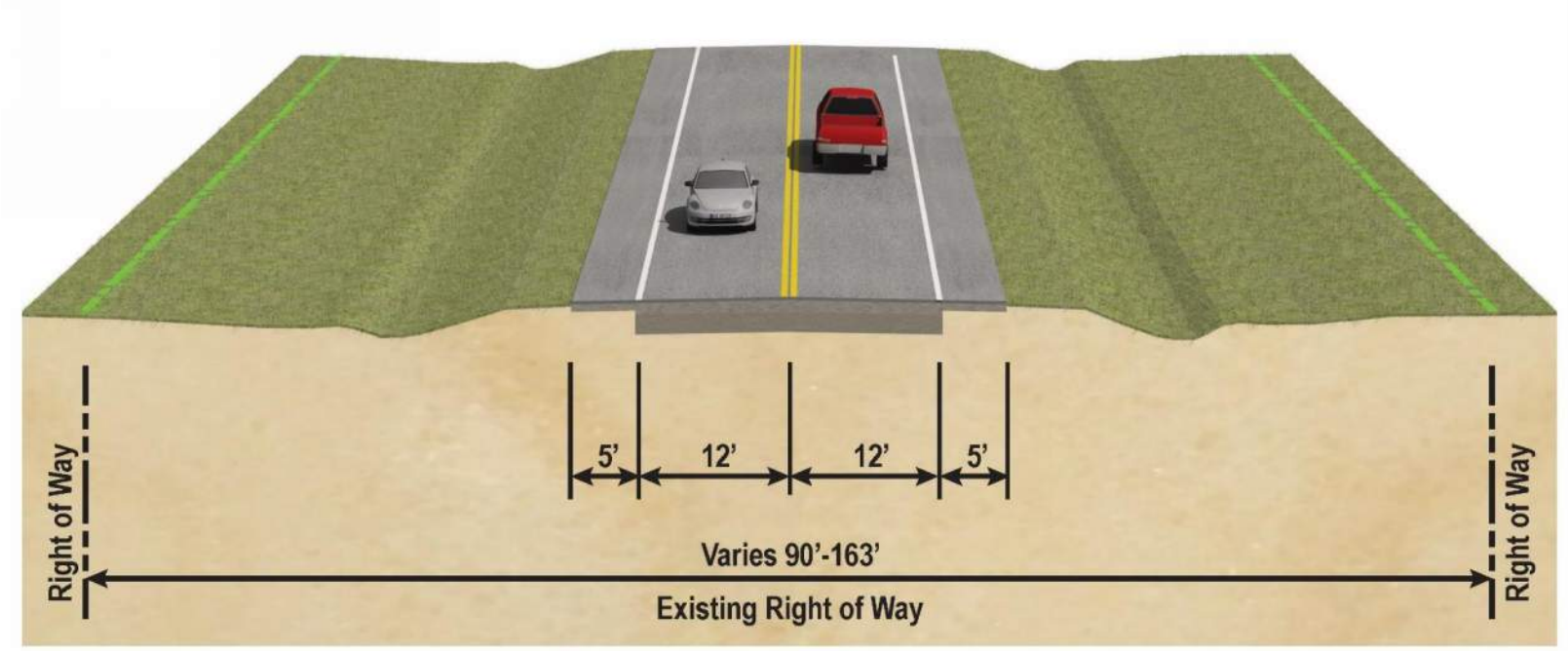
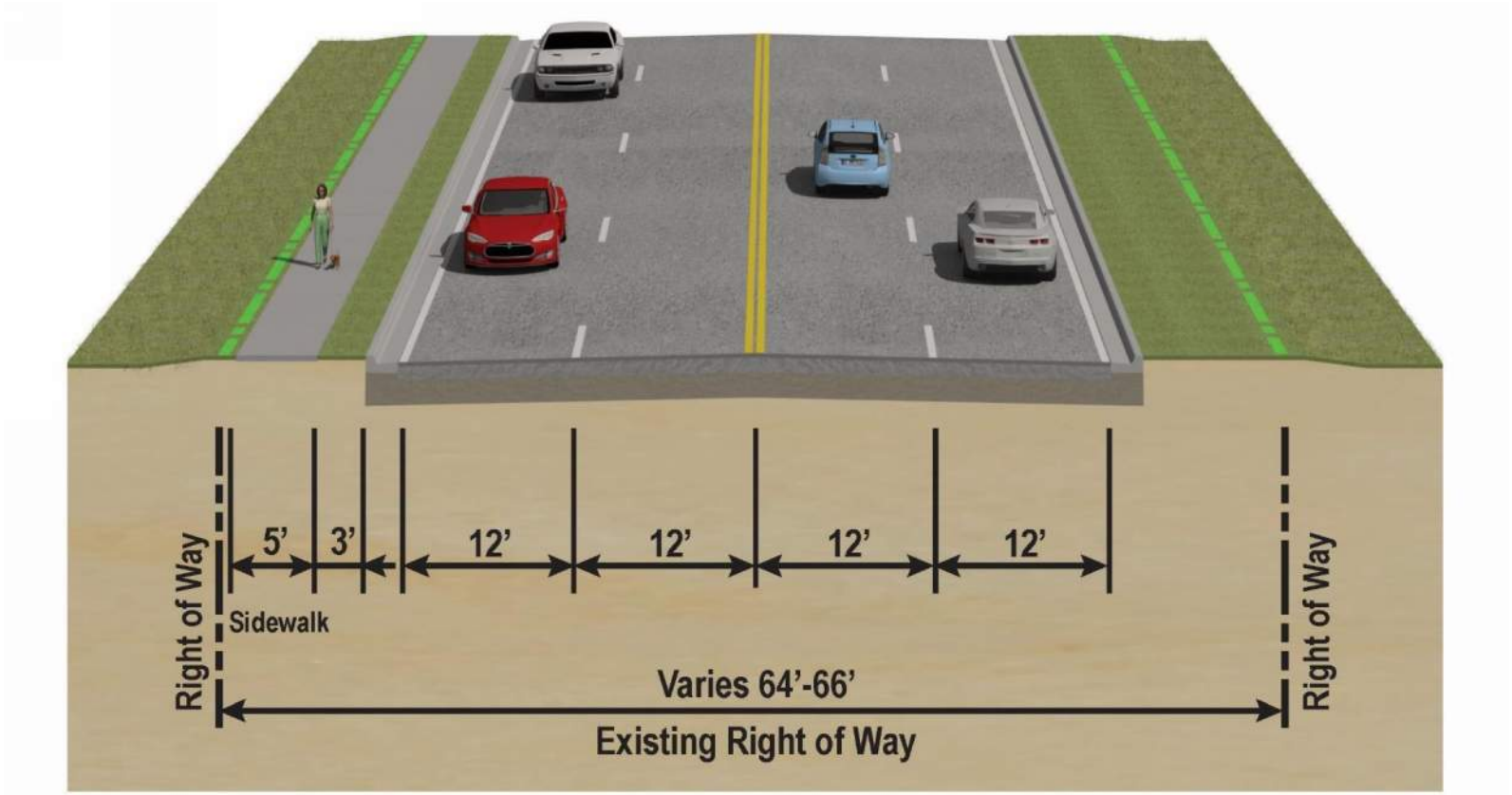


Figure 2-3 Existing Typical Section – La Vista Drive to SR 17



2.2.2 Roadway Functional & Context Classifications

SR 544 is functionally classified as an urban minor arterial from Martin Luther King Boulevard to US 27 and as an urban collector from US 27 to SR 17.

Context classifications vary along the corridor as follows:

- Martin Luther King Boulevard to Avenue Y: C4-Urban General
- Avenue Y to Old Lucerne Park Road: C3R-Suburban Residential
- Old Lucerne Park Road to US 27: C3C-Suburban Commercial
- US 27 to SR 17: C3R-Suburban Residential

2.2.3 Access Management Classification

The existing access management classification was identified from FDOT straight line diagrams. SR 544 is Access Class 7 from Martin Luther King Boulevard to north of Avenue Y, and Access Class 4 from north of Avenue Y to SR 17.

2.2.4 Right-of-Way

Existing right-of-way along SR 544 ranges from 50 feet to 84 feet from Martin Luther King Boulevard to Avenue Y, 90 feet to 163 feet from Avenue Y to La Vista Drive, and 64 feet to 66 feet from La Vista Drive to US 17. Right-of-way information was gathered from existing plans and from the Polk County Property Appraiser. Information regarding existing right-of-way is shown in **Table 2-1.**

Table 2-1: Existing Right-of-Way

Station	Right-of-Way Width	Location
0+00 to 29+30	50 feet to 84 feet	From Martin Luther King Boulevard to Avenue Y
29+30 to 331+60	90 feet to 163 feet	Avenue Y to La Vista Drive
331+60 to 425+00	64 feet to 66 feet	La Vista Drive to SR 17

2.2.5 Existing Land Use

The existing land use along SR 544 within the project limits includes crop land (12.77% or 74.87 acres), medium density residential (2 to 5 dwelling units per acres, 12.31% of the study area or 72.19 acres), open land (8.79% or 51.55 acres) and wetland forested mixed (7.89% or 46.25 acres). The remaining land uses include single family residential, institutional, natural land (wetlands, lakes and ponds), and commercial developments. Existing land use along the corridor is identified in **Figure 2-4**.

Figure 2-4 Existing Land Use Map

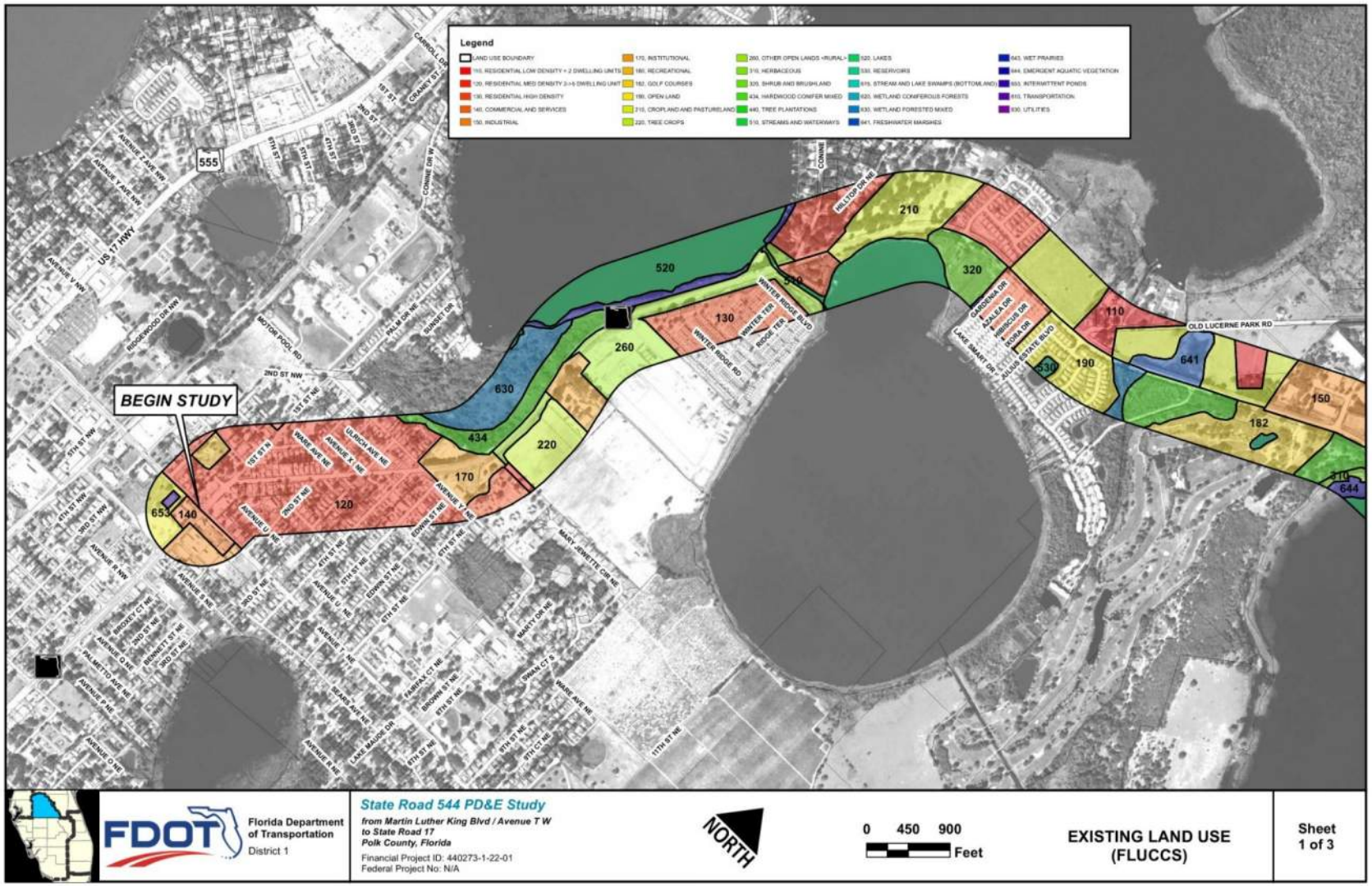


Figure 2-4 Existing Land Use Map, Continued

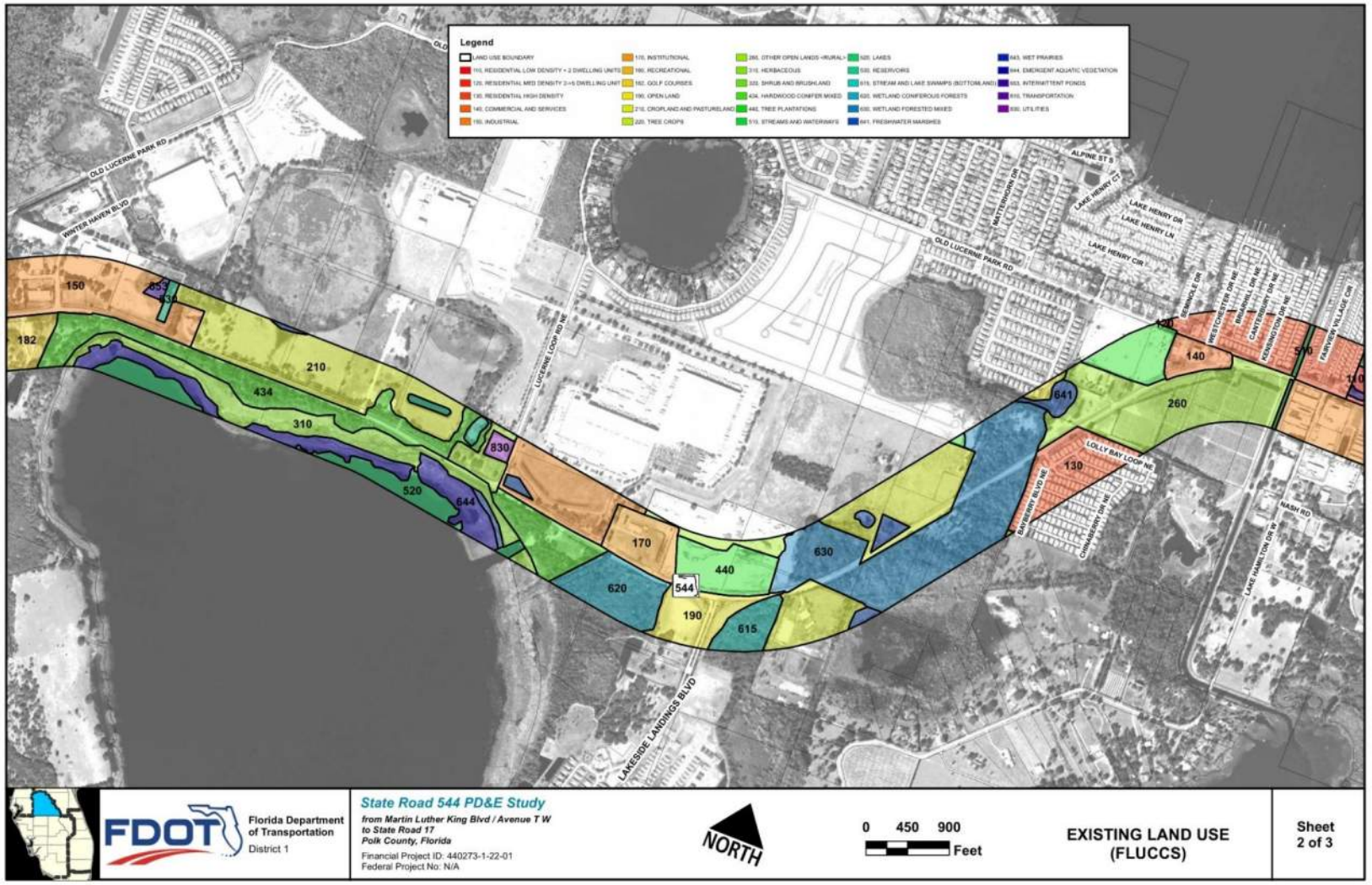
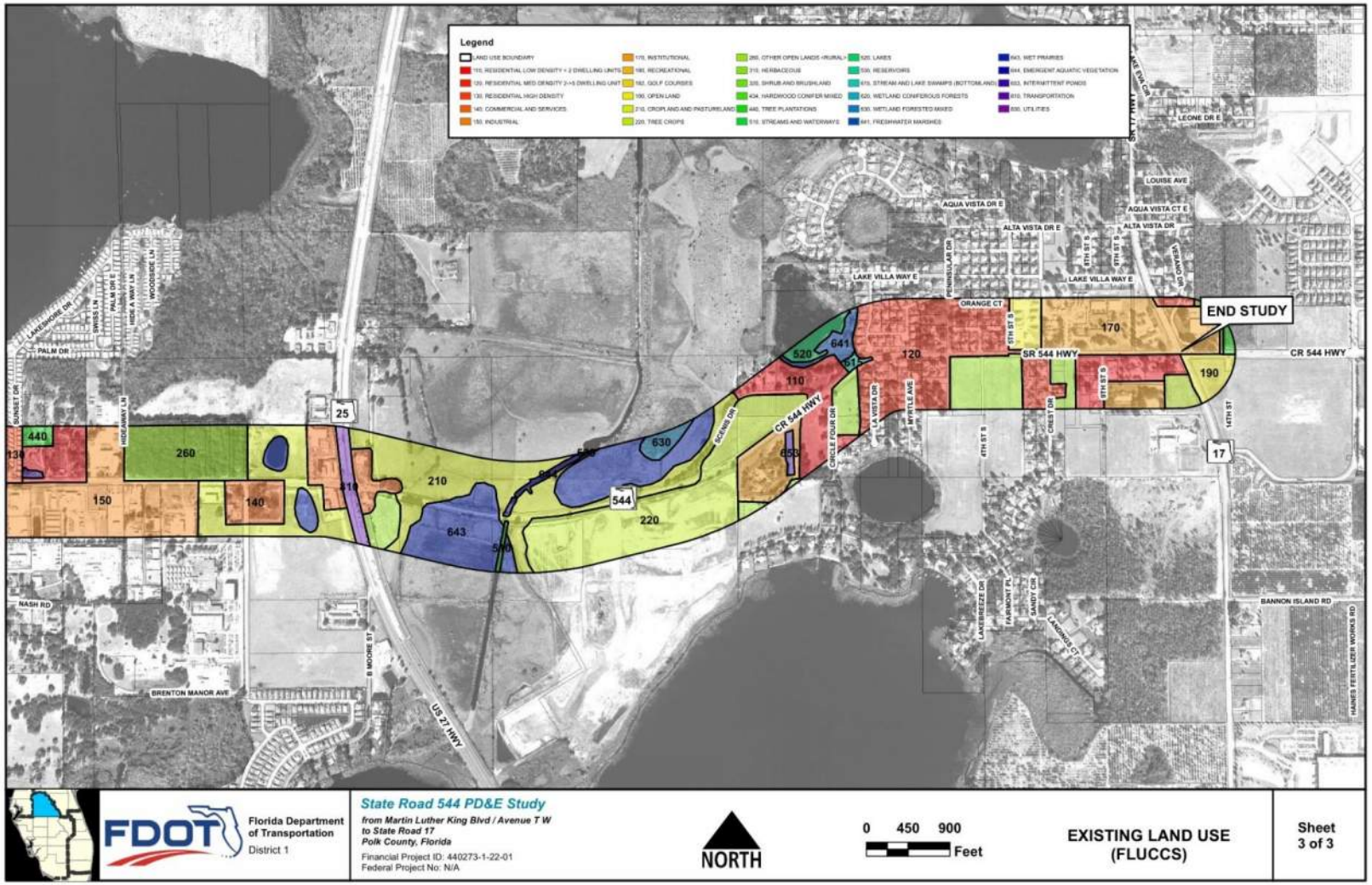


Figure 2-4 Existing Land Use Map, Continued



2.2.6 Pavement Type and Condition

FDOT rates pavement condition for cracking and ride on a scale of 0 to 10 with 0 the worst and 10 the best. A crack rating of 6.4 or less is considered deficient pavement. A ride rating of 6.4 or less is considered deficient for speed limits greater than 45 miles per hour and a ride rating of 5.4 is considered deficient for speed limits 45 miles per hour or less. The following bullets provide pavement condition details for deficient segments along the SR 544 corridor from the 2021 Pavement Condition Survey:

- Between MP 3.693 (Martin Luther King Boulevard) and MP 4.264 (north of Avenue Y) – 35 mph; Cracking = 5.5
- Between MP 4.264 (north of Avenue Y) and MP 8.775 (south of Old Lucerne Park Road) – highest speed 55 mph; Cracking = 5.5
- Between MP 8.775 (south of Old Lucerne Park Road) and MP 9.617 (west of SR 27) – highest speed 50 mph; Cracking = 5.5; Ride = 5.5
- Between MP 10.068 (east of US 27) and MP 11.012 (west of La Vista Drive) – highest speed 55 mph; Cracking = 6.0

2.2.7 Existing Design and Posted Speed

The posted speed limit along the corridor ranges from 35 miles per hour in the Florence Villa area to 55 miles per hour. The design speed and posted speed limits within each of the following roadway segments are provided in **Table 2-2.**

Table 2-2 Design and Posted Speed Limits

Segment	Design Speed	Posted Speed
Martin Luther King Blvd to N of Avenue Y	Unknown	35 MPH
N of Avenue Y to S of Conine Drive	55 MPH	45 and 55 MPH
S of Conine Drive to S of Old Lucerne Park Road (east)	60 MPH	55 MPH
S of Old Lucerne Park Road (east) to W of US 27	55 MPH	55 and 50 MPH
W of US 27 to La Vista Dr.	Unknown	50, 55, and 45 MPH
La Vista Dr. to E of SR 17	Unknown	45 MPH

There are two school zones along the corridor from 2nd Street to Avenue X in Florence Villa and from 8th Street South to 9th Street South near the eastern end of the corridor. The school zone in Florence Villa does not include flashing beacons or indicate the required times for reduced speed, although "End School Zone" signing is provided. The school zone for Alta Vista Elementary School west of SR 17 is a 15-mph reduced speed school zone when beacons are flashing.

2.2.8 Horizontal Alignment

SR 544 has fourteen horizontal curves within the project limits. Details for each curve are provided in **Table 2-3.**

Table 2-3 Horizontal Curves

Curve #	Delta	Direction	D	PC Station	PI Station	PT Station
1	41°26'30.00"	right	20°00'	MP 3.737	MP 3.758	MP 3.750
2	42°19'50.00"	left	5°00'	MP 4.191	MP 4.276	MP 4.352
3	12°33'00.00"	left	3°00'	MP 4.404	MP 4.428	MP 4.451
4	41°05'05.00"	right	4°00'	MP 4.519	MP 4.621	MP 4.714
5	61°50'00.00"	right	5°14'	MP 5.278	MP 5.399	MP 5.502
6	26°19'30.00"	left	3°00'	MP 5.701	MP 5.786	MP 5.868
7	26°35'00.00"	right	3°00'	MP 6.274	MP 6.359	MP 6.441
8	8°14'00.00"	right	2°00'	MP 6.956	MP 6.995	MP 7.034
9	60°50'00.00"	left	2°30'	MP 7.599	MP 7.854	MP 8.060
10	52°34'30.00"	right	3°00'	MP 8.747	MP 8.927	MP 9.079
11	13°16'40.00"	right	5°15'	MP 9.800	MP 9.825	MP 9.840
12	24°12'00.00"	left	2°00'	MP 10.055	MP 10.244	MP 10.350
13	22°40'40.00"	left	2°00'	MP 10.507	MP 10.616	MP 10.722
14	36°28'00.00"	right	6°00'	MP 10.974	MP 11.034	MP 11.089

Source: FDOT SR 544 Straight Line Diagram

2.2.9 Vertical Alignment

The information is based on a best fit profile generated from available Light Detection and Ranging (LiDAR) data. The existing vertical profile varies along the corridor. The profile begins on a hill near Martin Luther King Boulevard, and slowly decreases in elevation through a series of

vertical curves. The profile reaches its lowest point as it approaches Lake Conine/Lake Smart. North of both lakes, the profile reaches various peaks along the corridor. The highest point along the profile is near the end of the project limits at the intersection of SR 544 and SR 17.

2.2.10 Multi-Modal Facilities

Sidewalks occur within the following sections of the corridor:

- Along both sides of the roadway between Martin Luther King Boulevard and Avenue Y (except for a small gap on the west/north side from Avenue U to 1st Street)
- South side from west of Brenton Manor Avenue to US 27
- South side from Crest Drive to 8th Street
- North side from Peninsular Drive to SR 17

There are crosswalks across SR 544 at the following locations on the corridor:

- Ware Avenue NE (uncontrolled school crossing)
- Mid-block between Cedie Street and 4th Street NE (uncontrolled with rectangular rapid flashing beacons)
- SR 25/US 27 (signalized)
- Alta Vista Elementary School (uncontrolled within school zone)
- SR 17 (signalized)

Marked bicycle lanes exist on both sides of the roadway from west of Brenton Manor Avenue to east of US 27. Although not marked as bicycle lanes, four-foot-wide paved shoulders are currently provided from north of 1st Street to Avenue Y and five-foot-wide paved shoulders are currently provided from Avenue Y to Peninsular Drive.

Ride Citrus, Polk County's transit system, serves the project corridor with the Citrus Connection Route 60: Winter Haven Northeast. This route runs from the Downtown Winter Haven Terminal north around Lake Martha and up 11th Street, west on Martin Luther King Boulevard, up SR 544, then loops around along SR 544 to Lucerne Loop Road and back down SR 544 back to the Winter Haven Downtown Terminal. Stops include the start of the route at the Winter Haven Downtown Terminal, Polk State College, Winter Haven Recreation and Cultural Center on Martin Luther King Boulevard, the Walmart Distribution Center at Lucerne Loop Road, the Wilfred Smith Community Center on Avenue Y, and back to the Winter Haven Downtown Terminal. There is a transfer point at the Winter Haven Downtown Terminal.

Route 17X, the Lake Wales/Haines City Express, runs along SR 17 from Lake Wales to Haines City with a leg that runs along SR 544 from SR 17 to Ridge Technical College just west of US 27.

2.2.11 Intersections

The study corridor includes the nine major intersections listed below.

- Martin Luther King Boulevard (four-legged intersection)
- Avenue Y (four-legged intersection)
- Old Lucerne Park Road/Lake Smart Estates Drive (four-legged intersection)
- Lucerne Lake Road (T-intersection to the north)
- Old Lucerne Park Road (T-intersection to the north)
- Lake Hamilton Drive (four-legged intersection)
- Brenton Manor Avenue (T-intersection to the south)
- US 27 (four-legged intersection)
- SR 17 (four-legged intersection)

The Martin Luther King Boulevard, US 27 and SR 17 intersections are signalized intersections. There is a flashing beacon at the Lucerne Lake Road intersection with flashing yellow displayed on SR 544 and flashing red displayed on the cross street. The other five intersections are all unsignalized intersections controlled by stop signs located on the cross streets.

The intersection configuration and lane assignment for nine major SR 544 intersections within the project limits from Martin Luther King Boulevard to SR 17 are shown in **Figure 2-5**.

The existing conditions 2019 peak hour signalized intersection Level of Service (LOS) analyses were conducted using the SYNCHRO software. The Martin Luther King Boulevard intersection and the US 27 intersection are currently operating at LOS D overall during both the AM and PM peak hours. In addition, all the individual movements at these two intersections operate at LOS E or better during both peak hours. The SR 17 intersection is currently operating at LOS C overall during both peak hours and all the individual movements are operating at LOS C or better.

The existing conditions 2019 peak hour unsignalized intersection LOS analyses were conducted using the unsignalized intersection module of the Highway Capacity Software (HCS). All the SR 544 left turn movements at the unsignalized intersections are operating at LOS B or better during both peak hours; however, many of the cross-street left turn and through movements are operating at LOS F during one or both peak hours. A summary of the existing peak hour intersection operational analysis is presented in **Table 2-4**.

Figure 2-5 Existing Intersection Geometry

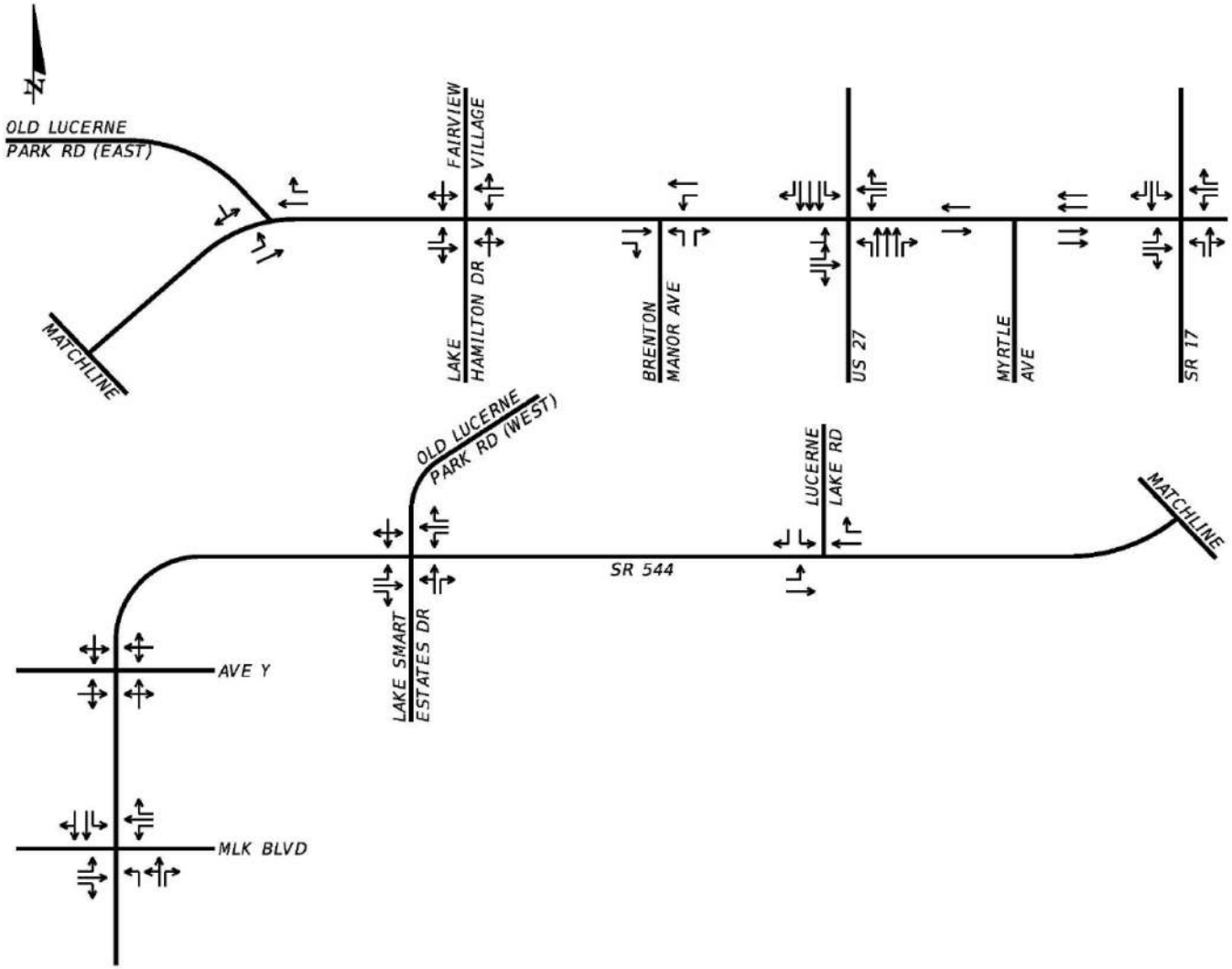


Table 2-4 Existing (2019) Peak Hour Intersection Operational Analysis Summary

Intersection	Movement	AM Peak Hour			PM Peak Hour		
		V/C Ratio	Average Delay	Level of Service	V/C Ratio	Average Delay	Level of Service
Martin Luther King Blvd (Signalized)	**NB LT**	0.59	43.1	D	0.52	37.9	D
	NB TH	0.71	47.8	D	0.83	52.2	D
	NB RT	0.25	6.8	A	0.23	2.5	A
	SB LT	0.08	40.1	D	0.08	42.3	D
	SB TH	0.95	69.2	E	0.91	63.1	E
	SB RT	0.95	69.2	E	0.91	63.1	E
	EB LT	0.85	56.1	E	0.77	45.9	D
	EB TH	0.86	63.0	E	0.91	66.6	E
	EB RT	0.64	7.8	A	0.50	6.6	A
	WB LT	0.71	47.6	D	0.75	58.6	E
	WB TH	0.82	57.0	E	0.61	48.6	D
	WB RT	0.82	57.0	E	0.61	48.6	D
	ALL	0.76	48.1	D	0.85	46.8	D
Avenue Y	**NB LT**	0.02	9.7	A	0.02	8.7	A
	SB LT	0.03	8.8	A	0.02	9.4	A
	EB LT	0.47	74.3	F	1.20	223.6	F
	EB TH	0.47	74.3	F	1.20	223.6	F
	EB RT	0.47	74.3	F	1.20	223.6	F
	WB LT	0.44	73.2	F	0.32	54.2	F
	WB TH	0.44	73.2	F	0.32	54.2	F
	WB RT	0.06	12.8	B	0.09	14.8	B
Old Lucerne Park Rd (West End)	NB LT	0.59	122.6	F	0.23	68.9	F
	NB TH	0.59	122.6	F	0.23	68.9	F
	NB RT	0.03	12.0	B	0.01	12.5	B
	SB LT	0.42	19.4	C	0.16	16.2	C
	SB TH	0.42	19.4	C	0.16	16.2	C
	SB RT	0.42	19.4	C	0.16	16.2	C
	EB LT	0.07	9.3	A	0.16	9.2	A
	WB LT	0.00	8.6	A	0.02	8.9	A
Lucerne Lake Rd	SB LT	0.07	20.0	C	0.06	18.5	C
	SB RT	0.07	14.0	B	0.05	12.5	B
	EB LT	0.04	9.8	A	0.02	9.1	A
Old Lucerne Park Rd (East End)	SB LT	0.69	39.7	E	0.58	32.0	D
	SB RT	0.69	39.7	E	0.58	32.0	D
	EB LT	0.00	10.6	B	0.02	9.6	A

Intersection	Movement	AM Peak Hour			PM Peak Hour		
		V/C Ratio	Average Delay	Level of Service	V/C Ratio	Average Delay	Level of Service
Lake Hamilton Dr	NB LT	0.70	51.0	F	0.87	101.4	F
	NB TH	0.70	51.0	F	0.87	101.4	F
	NB RT	0.70	51.0	F	0.87	101.4	F
	SB LT	0.01	13.5	B	0.05	91.0	F
	SB TH	0.01	13.5	B	0.05	91.0	F
	SB RT	0.01	13.5	B	0.05	91.0	F
	EB LT	0.00	9.1	A	0.00	9.5	A
	WB LT	0.15	10.3	B	0.17	10.5	B
Brenton Manor Ave	NB LT	1.51	475.2	F	0.95	189.4	F
	NB RT	0.24	18.4	C	0.13	17.4	C
	WB LT	0.26	11.2	B	0.05	10.0	B
US 27 (Signalized)	NB LT	0.83	63.0	E	0.79	75.5	E
	NB TH	0.68	31.4	C	0.64	34.1	C
	NB RT	0.15	16.3	B	0.19	13.7	B
	SB LT	0.59	60.6	E	0.70	68.1	E
	SB TH	0.74	39.6	D	0.69	35.4	D
	SB RT	0.98	55.2	E	0.77	24.1	C
	EB LT	0.86	56.2	E	0.87	65.0	E
	EB TH	0.46	34.7	C	0.55	44.2	D
	EB RT	0.31	22.2	C	0.43	36.2	D
	WB LT	0.39	23.9	C	0.40	31.0	C
	WB TH	0.85	63.7	E	0.84	74.1	E
	WB RT	0.47	30.3	C	0.38	33.7	C
	ALL	0.75	42.5	D	0.77	41.0	D
SR 17 (Signalized)	NB LT	0.23	14.4	B	0.19	14.4	B
	NB TH	0.59	26.4	C	0.60	28.0	C
	NB RT	0.59	26.4	C	0.60	28.0	C
	SB LT	0.19	13.9	B	0.23	14.6	B
	SB TH	0.47	24.7	C	0.56	27.9	C
	SB RT	0.24	14.6	B	0.33	13.7	B
	EB LT	0.50	21.3	C	0.31	15.9	B
	EB TH	0.39	25.3	C	0.52	27.0	C
	EB RT	0.26	18.4	B	0.20	11.6	B
	WB LT	0.21	14.6	B	0.17	14.0	B
	WB TH	0.71	33.5	C	0.40	24.6	C
	WB RT	0.38	18.4	B	0.19	14.9	B
	ALL	0.61	23.4	C	0.55	21.9	C

*Note: **Bold font** denotes SR 544 movements*

2.2.12 Physical or Operational Restrictions

There are no physical or operational restrictions along SR 544 within the project limits.

2.2.13 Traffic Data

Existing traffic count data was provided by FDOT District One. This data included traffic counts that were conducted specifically for this PD&E Study in October 2019 and information from previous studies conducted for District One. **Figure 2-6** illustrates the existing (2019) Average Annual Daily Traffic (AADT) volumes. Existing (2019) AM and PM Peak Hour intersection turning volumes are illustrated in **Figures 2-7** and **2-8**, respectively.

The percentage of the daily traffic volume that occurs in the AM and PM peak hours (i.e., the K-factor) was calculated for each location on SR 544 where existing traffic count data was available and is summarized in **Table 2-5**. The AM peak hour K-factors range from 5.9% to 9.0%, while the PM peak hour K-factors range from 6.3% to 8.3%. The overall average AM and PM peak hour K-factor values for the study corridor are 7.4% and 7.6%, respectively. A review of the K-factor information contained in the FDOT's 2019 Annual Average Daily Traffic Report indicates that a Standard K-factor value of 9.0% is associated with the SR 544 study corridor. This Standard K-factor value is considerably higher than the overall average corridor K-factors for both peak hours.

Figure 2-6 Existing AADT Volumes

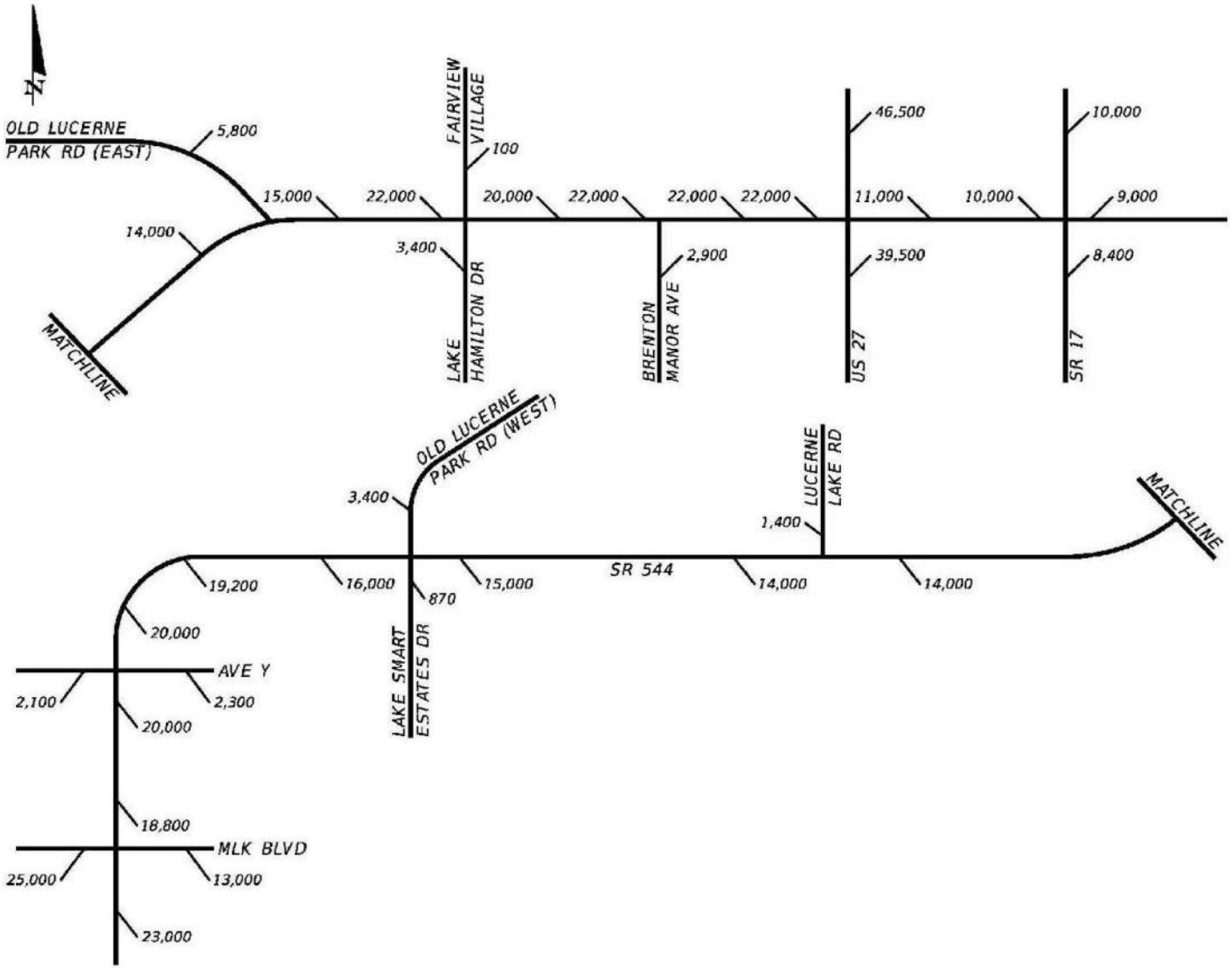


Figure 2-7 Existing AM Peak Hour Turning Movement Volumes

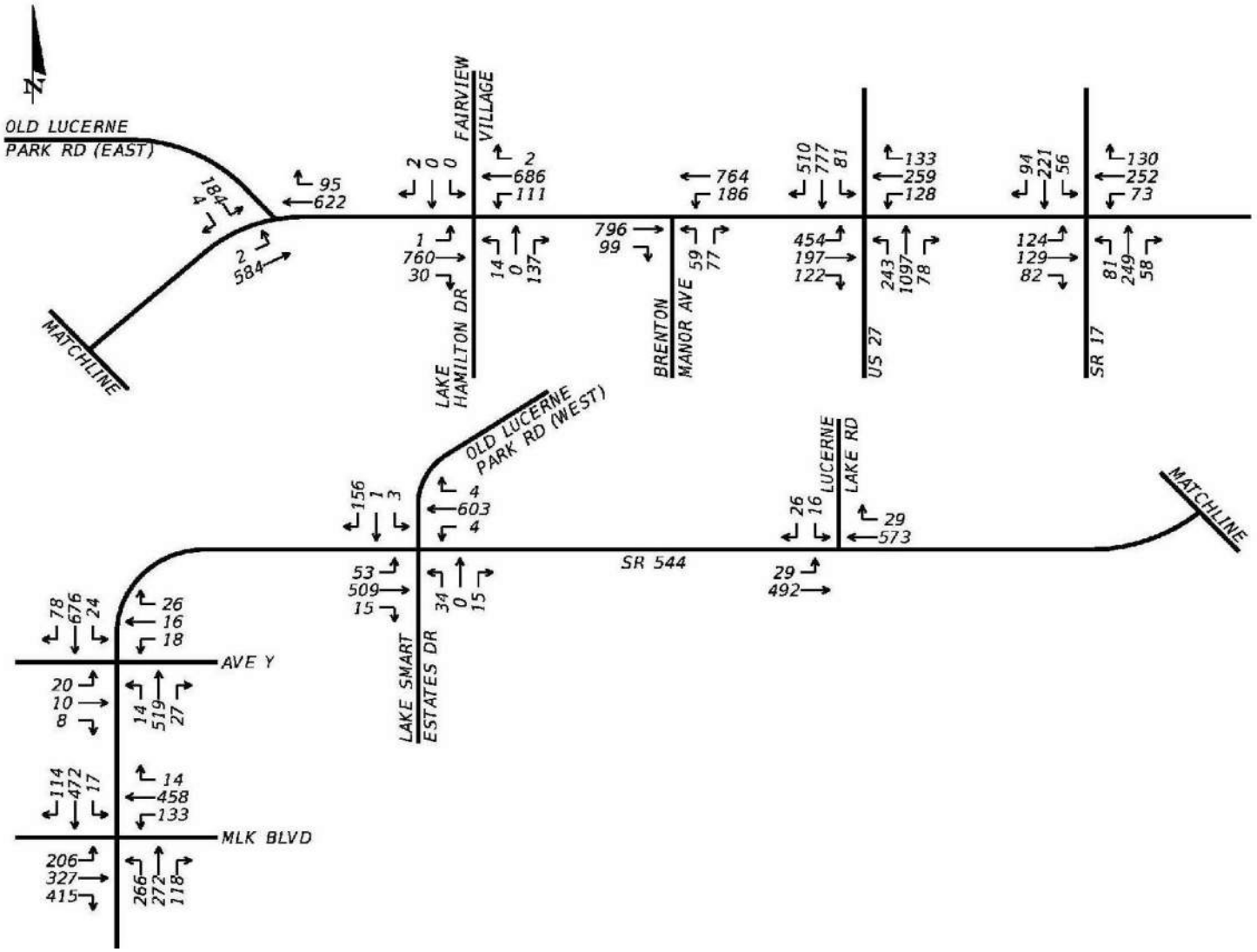


Figure 2-8 Existing PM Peak Hour Turning Movement Volumes

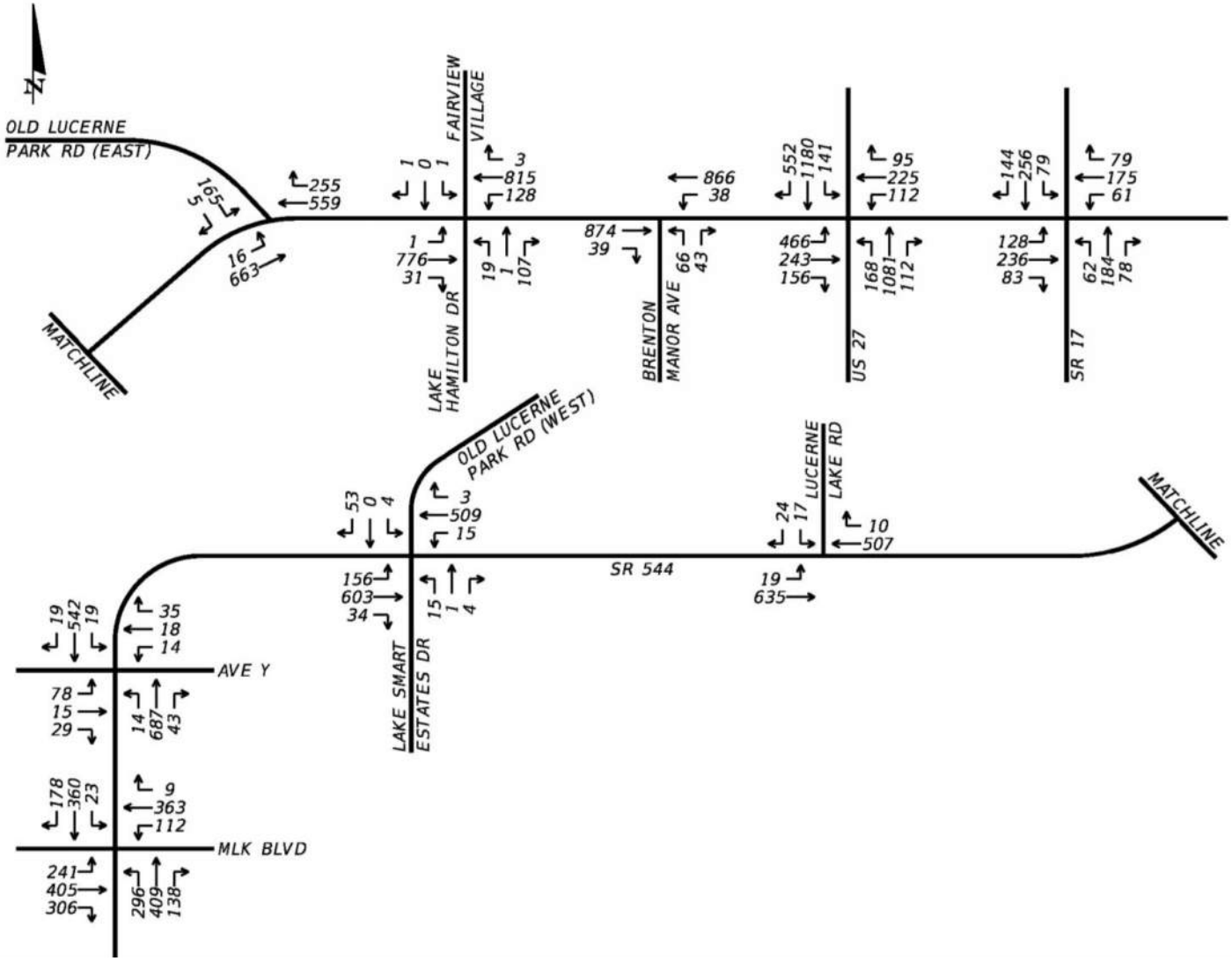


Table 2-5 Existing (2019) Peak Hour K-Factors

Roadway	Location	24-Hour Volume	AM Peak Hour Volume	K-Factor	PM Peak Hour Volume	K-Factor
SR 544	North of Martin Luther King Blvd [1]	17,212	1,065	6.2%	1,221	7.1%
	South of Ave Y [2]	19,748	N/A	N/A	1,253	6.3%
	North of Ave Y [2]	19,936	N/A	N/A	1,264	6.3%
	West of Old Lucerne Park Rd - west end [1]	16,214	1,270	7.8%	N/A	N/A
	East of Old Lucerne Park Rd - west end [1]	15,212	1,049	6.9%	N/A	N/A
	West of Lucerne Lake Rd	14,506	1,097	7.6%	1,163	8.0%
	East of Lucerne Lake Rd	14,608	1,088	7.4%	1,147	7.9%
	West of Old Lucerne Park Rd - east end [1]	18,070	1,068	5.9%	N/A	N/A
	East of Old Lucerne Park Rd - east end [1]	14,682	1,326	9.0%	N/A	N/A
	West of Lake Hamilton Dr/Fairview Village Entr	22,630	1,667	7.4%	1,795	7.9%
	East of Lake Hamilton Dr/Fairview Village Entr	20,472	1,468	7.2%	1,613	7.9%
	West of Brenton Manor Ave	23,035	1,684	7.3%	1,809	7.9%
	East of Brenton Manor Ave	23,127	1,786	7.7%	1,785	7.7%
	West of US 27	22,701	1,740	7.7%	1,777	7.8%
	East of US 27	10,954	854	7.8%	905	8.3%
	West of SR 17	10,500	746	7.1%	811	7.7%
	Average			**7.4%**		**7.6%**

(1) 2018 values; (2) 2016 values

The percentage of the two-way peak hour volume that occurs in the peak direction during the AM and PM peak hours (i.e., the D-factors) was also calculated for each location. These D-factors are summarized in **Table 2-6**. The predominant travel directions are westbound/southbound in the AM peak hour and northbound/eastbound in the PM peak hour. During the AM peak hour, the westbound/southbound D-factor ranges from 51.78% to 59.61% and the overall average corridor D-factor is equal to 53.46%. During the PM peak hour, the northbound/eastbound D-factor ranges from 50.36% to 63.69% and the overall average corridor D-factor is equal to 53.69%.

Table 2-6 Existing (2019) AM and PM Peak Hour D-Factors

Roadway	Location	AM Peak Hour				PM Peak Hour			
		Two-Way Volume	Peak Dir Volume	D-Factor	Peak Dir	Two-Way Volume	Peak Dir Volume	D-Factor	Peak Dir
SR 544	North of Martin Luther King Blvd [1]	1,065	568	53.33%	SB	1,221	665	54.46%	NB
	South of Ave Y [2]	N/A	N/A	N/A	N/A	1,253	789	62.97%	NB
	North of Ave Y [2]	N/A	N/A	N/A	N/A	1,264	805	63.69%	NB
	West of Old Lucerne Park Rd - west end [1]	1,270	757	59.61%	WB	N/A	N/A	N/A	N/A
	East of Old Lucerne Park Rd - west end [1]	1,049	584	55.67%	WB	N/A	N/A	N/A	N/A
	West of Lucerne Lake Rd	1,097	587	53.51%	WB	1,163	642	55.20%	EB
	East of Lucerne Lake Rd	1,088	590	54.23%	WB	1,147	640	55.80%	EB
	West of Old Lucerne Park Rd - east end [1]	1,068	553	51.78%	WB	N/A	N/A	N/A	N/A
	East of Old Lucerne Park Rd - east end [1]	1,326	687	51.81%	*EB*	N/A	N/A	N/A	N/A
	West of Lake Hamilton Dr/Fairview Village Entr	1,667	883	52.97%	*EB*	1,795	927	51.64%	*WB*
	East of Lake Hamilton Dr/Fairview Village Entr	1,468	782	53.27%	WB	1,613	820	50.84%	*WB*
	West of Brenton Manor Ave	1,684	877	52.08%	*EB*	1,809	914	50.53%	*WB*
	East of Brenton Manor Ave	1,786	931	52.13%	WB	1,785	899	50.36%	EB
	West of US 27	1,740	978	56.21%	WB	1,777	928	52.22%	*WB*
	East of US 27	854	509	59.60%	WB	905	481	53.15%	EB
	West of SR 17	746	418	56.03%	WB	811	437	53.88%	EB
	Average			53.46%	WB/SB			53.69%	NB/EB

Roadway	Location	AM Peak Hour				PM Peak Hour			
		Two-Way Volume	Peak Dir Volume	D-Factor	Peak Dir	Two-Way Volume	Peak Dir Volume	D-Factor	Peak Dir
Martin Luther King Blvd	West of SR 544	1,803	957	53.08%	EB	1,806	961	53.21%	EB
Martin Luther King Blvd	East of SR 544	1,076	610	56.69%	WB	1,059	571	53.92%	EB
Ave Y	West of SR 544	N/A	N/A	N/A	N/A	126	78	61.90%	EB
Ave Y	East of SR 544	N/A	N/A	N/A	N/A	137	73	53.28%	EB
Old Lucerne Park Rad (west end)	North of SR 544	208	153	73.56%	SB	N/A	N/A	N/A	N/A
Lake Smart Estates Dr	South of SR 544	65	46	70.77%	NB	N/A	N/A	N/A	N/A
Lucerne Lake Rd	North of SR 544	97	56	57.73%	NB	70	41	58.57%	SB
Old Lucerne Park Rd (east end)	North of SR 544	270	178	65.93%	SB	N/A	N/A	N/A	N/A
Lake Hamilton Dr	South of SR 544	303	155	51.16%	SB	280	155	55.36%	SB
Fairview Village Entr	North of SR 544	3	2	66.67%	SB	6	4	66.67%	NB
Brenton Manor Ave	South of SR 544	412	279	67.72%	SB	181	107	59.12%	NB
US 27	North of SR 544	2,994	1,650	55.11%	NB	3,490	1,862	53.35%	SB
US 27	South of SR 544	2,414	1,389	57.54%	NB	2,768	1,413	51.05%	SB
SR 17	North of SR 544	857	493	57.53%	NB	851	469	55.11%	SB
SR 17	South of SR 544	749	380	50.73%	NB	709	392	55.29%	SB

(1) 2018 values
(2) 2016 values

The AM and PM peak hour truck percentages were calculated for each individual movement at the nine PD&E Study intersections based on the peak hour turning movement count data. The peak hour truck volumes and percentages are summarized in **Table 2-7.**

Table 2-7 Existing (2019) AM and PM Peak Hour Truck Volumes and Percentages

Intersection	Movement	AM Peak Hour (7:15 - 8:15)			PM Peak Hour (4:45 -5:45)		
		Total Volume	Truck Volume	Truck %	Total Volume	Truck Volume	Truck %
Martin Luther King Blvd	NB LT	269	7	2.6%	299	0	0.0%
	NB TH	275	11	4.0%	413	3	0.7%
	NB RT	119	1	0.8%	139	0	0.0%
	NB APPROACH	663	19	2.9%	851	3	0.4%
	SB LT	17	7	41.2%	23	0	0.0%
	SB TH	436	10	2.3%	353	3	0.8%
	SB RT	115	12	10.4%	180	15	8.3%
	SB APPROACH	568	29	5.1%	556	18	3.2%
	WB LT	134	5	3.7%	113	2	1.8%
	WB TH	462	10	2.2%	366	6	1.6%
	WB RT	14	2	14.3%	9	0	0.0%
	WB APPROACH	610	17	2.8%	488	8	1.6%
	EB LT	208	12	5.8%	243	13	5.3%
	EB TH	330	7	2.1%	409	9	2.2%
	EB RT	419	6	1.4%	309	3	1.0%
	EB APPROACH	957	25	2.6%	961	25	2.6%
Avenue Y [(1)]	NB LT	12	0	0.0%	13	0	0.0%
	NB TH	447	39	8.7%	735	17	2.3%
	NB RT	23	1	4.3%	41	0	0.0%
	NB APPROACH	482	40	8.3%	789	17	2.2%
	SB LT	23	0	0.0%	18	0	0.0%
	SB TH	692	36	5.2%	423	24	5.7%
	SB RT	36	2	5.6%	18	0	0.0%
	SB APPROACH	751	38	5.1%	459	24	5.2%
	WB LT	17	0	0.0%	13	0	0.0%
	WB TH	15	0	0.0%	17	0	0.0%
	WB RT	25	1	4.0%	34	1	2.9%
	WB APPROACH	57	1	1.8%	64	1	1.6%
	EB LT	19	2	10.5%	36	2	5.6%
	EB TH	10	1	10.0%	14	0	0.0%
	EB RT	8	0	0.0%	28	0	0.0%
	EB APPROACH	37	3	8.1%	78	2	2.6%

Intersection	Movement	AM Peak Hour (7:15 - 8:15)			PM Peak Hour (4:45 -5:45)		
		Total Volume	Truck Volume	Truck %	Total Volume	Truck Volume	Truck %
Old Lucerne Park Rd (West End)	NB LT	32	0	0.0%	N/A	N/A	N/A
	NB TH	0	0	0.0%	N/A	N/A	N/A
	NB RT	14	0	0.0%	N/A	N/A	N/A
	NB APPROACH	46	0	0.0%	N/A	N/A	N/A
	SB LT	3	0	0.0%	N/A	N/A	N/A
	SB TH	1	0	0.0%	N/A	N/A	N/A
	SB RT	149	4	2.7%	N/A	N/A	N/A
	SB APPROACH	153	4	2.6%	N/A	N/A	N/A
	WB LT	4	0	0.0%	N/A	N/A	N/A
	WB TH	576	30	5.2%	N/A	N/A	N/A
	WB RT	4	0	0.0%	N/A	N/A	N/A
	WB APPROACH	584	30	5.1%	N/A	N/A	N/A
	EB LT	51	4	7.8%	N/A	N/A	N/A
	EB TH	448	26	5.8%	N/A	N/A	N/A
	EB RT	14	0	0.0%	N/A	N/A	N/A
	EB APPROACH	513	30	5.8%	N/A	N/A	N/A
Lucerne Lake Rd	SB LT	16	11	68.8%	17	8	47.1%
	SB RT	25	9	36.0%	24	8	33.3%
	SB APPROACH	41	20	48.8%	41	16	39.0%
	WB TH	562	13	2.3%	497	22	4.4%
	WB RT	18	15	83.3%	10	6	60.0%
	WB APPROACH	580	28	4.8%	507	28	5.5%
	EB LT	28	11	39.3%	19	6	31.6%
	EB TH	482	17	3.5%	623	18	2.9%
	EB APPROACH	510	28	5.5%	642	24	3.7%
Old Lucerne Park Rd (East End)[(2)]	SB LT	174	13	7.5%	126	8	6.3%
	SB RT	4	0	0.0%	4	0	0.0%
	SB APPROACH	178	13	7.3%	130	8	6.2%
	WB TH	549	43	7.8%	480	31	6.5%
	WB RT	90	8	8.9%	219	5	2.3%
	WB APPROACH	639	51	8.0%	699	36	5.2%
	EB LT	2	1	50.0%	12	0	0.0%
	EB TH	513	40	7.8%	537	35	6.5%
	EB APPROACH	515	41	8.0%	549	35	6.4%
Lake Hamilton Dr	NB LT	14	1	7.1%	19	1	5.3%
	NB TH	0	0	0.0%	1	0	0.0%
	NB RT	134	6	4.5%	105	2	1.9%
	NB APPROACH	148	7	4.7%	125	3	2.4%

Intersection	Movement	AM Peak Hour (7:15 - 8:15)			PM Peak Hour (4:45 -5:45)		
		Total Volume	Truck Volume	Truck %	Total Volume	Truck Volume	Truck %
	SB LT	0	0	0.0%	1	0	0.0%
	SB TH	0	0	0.0%	0	0	0.0%
	SB RT	2	0	0.0%	1	0	0.0%
	SB APPROACH	2	0	0.0%	2	0	0.0%
	WB LT	109	0	0.0%	125	4	3.2%
	WB TH	673	44	6.5%	799	29	3.6%
	WB RT	2	0	0.0%	3	0	0.0%
	WB APPROACH	784	44	5.6%	927	33	3.6%
	EB LT	1	0	0.0%	1	0	0.0%
	EB TH	745	53	7.1%	761	32	4.2%
	EB RT	29	1	3.4%	30	2	6.7%
	EB APPROACH	775	54	7.0%	792	34	4.3%
Brenton Manor Ave	NB LT	58	5	8.6%	65	2	3.1%
	NB RT	75	5	6.7%	42	0	0.0%
	NB APPROACH	133	10	7.5%	107	2	1.9%
	WB LT	182	3	1.6%	37	0	0.0%
	WB TH	749	43	5.7%	849	33	3.9%
	WB APPROACH	931	46	4.9%	886	33	3.7%
	EB TH	780	60	7.7%	857	43	5.0%
	EB RT	97	4	4.1%	38	1	2.6%
	EB APPROACH	877	64	7.3%	895	44	4.9%
US 27	NB LT	238	5	2.1%	165	8	4.8%
	NB TH	1,075	80	7.4%	1,060	78	7.4%
	NB RT	76	6	7.9%	110	1	0.9%
	NB APPROACH	1,389	91	6.6%	1,335	87	6.5%
	SB LT	79	13	16.5%	138	10	7.2%
	SB TH	762	88	11.5%	1,157	62	5.4%
	SB RT	500	31	6.2%	541	25	4.6%
	SB APPROACH	1,341	132	9.8%	1,836	97	5.3%
	WB LT	125	11	8.8%	110	7	6.4%
	WB TH	254	9	3.5%	221	9	4.1%
	WB RT	130	13	10.0%	93	9	9.7%
	WB APPROACH	509	33	6.5%	424	25	5.9%
	EB LT	445	31	7.0%	457	23	5.0%
	EB TH	193	16	8.3%	238	5	2.1%
	EB RT	120	9	7.5%	153	17	11.1%
	EB APPROACH	758	56	7.4%	848	45	5.3%

Intersection	Movement	AM Peak Hour (7:15 - 8:15)			PM Peak Hour (4:45 -5:45)		
		Total Volume	Truck Volume	Truck %	Total Volume	Truck Volume	Truck %
SR 17	NB LT	79	9	11.4%	61	6	9.8%
	NB TH	244	6	2.5%	180	5	2.8%
	NB RT	57	2	3.5%	76	3	3.9%
	NB APPROACH	380	17	4.5%	317	14	4.4%
	SB LT	55	5	9.1%	77	0	0.0%
	SB TH	217	10	4.6%	251	6	2.4%
	SB RT	92	14	15.2%	141	6	4.3%
	SB APPROACH	364	29	8.0%	469	12	2.6%
	WB LT	72	3	4.2%	60	1	1.7%
	WB TH	247	16	6.5%	172	9	5.2%
	WB RT	127	8	6.3%	77	2	2.6%
	WB APPROACH	446	27	6.1%	309	12	3.9%
	EB LT	122	13	10.7%	125	3	2.4%
	EB TH	126	20	15.9%	231	6	2.6%
	EB RT	80	7	8.8%	81	4	4.9%
	EB APPROACH	328	40	12.2%	437	13	3.0%

(1) Turning movement count data was not available for the 7:15 to 8:15 a.m. time period. The 8:00 to 9:00 a.m. time period was used for this location.
(2) Turning movement count data was not available for the 4:45 to 5:45 p.m. time period. The 4:00 to 5:00 p.m. time period was used for this location.

Table 2-8 summarizes the peak hour volumes and the peak 15-minute volumes used to calculate the existing intersection peak hour factors (PHF's). The AM PHF's range from approximately 0.86 to approximately 0.96, with an overall average corridor value of approximately 0.91. The PM PHF's range from approximately 0.93 to approximately 0.98, with an average overall corridor value of approximately 0.96. It should be noted that several of the PHF's had to be estimated because existing traffic count data was not available for several intersections for the 7:15 AM to 8:15 AM and/or 4:45 PM to 5:45 PM time period.

Table 2-8 Existing (2019) Intersection Peak Hour Factors

Intersection (Year)	AM Peak Hour (7:15 to 8:15 a.m.)			PM Peak Hour (4:45 to 5:45 p.m.)			PHF Ratio [1]
	Total Volume	Peak 15-Minute Volume	PHF	Total Volume	Peak 15-Minute Volume	PHF	
Martin Luther King Blvd (2018)	2,800	802	0.873	2,856	756	0.944	1.082
Avenue Y NE (2019) [2]	1,436	412	0.872	1,513	407	0.929	1.066
Old Lucerne Park Rd - west end (2018) [3]	1,297	359	0.903	1,297	340	0.954	1.056
Lucerne Lake Rd (2019)	1,141	309	0.923	1,190	304	0.979	1.060
Old Lucerne Park Rd - east end (2018) [4]	1,332	369	0.902	1,663	436	0.953	1.056
Lake Hamilton Dr (2019)	1,709	456	0.937	1,846	480	0.961	1.026
Brenton Manor Ave (2019)	1,941	524	0.926	1,888	494	0.955	1.032
US 27 (2019)	3,997	1,044	0.957	4,469	1,139	0.981	1.025
SR 17 (2019)	1,518	439	0.864	1,532	403	0.950	1.099
Average			**0.906**			**0.956**	1.056

(1) PHF Ratio = (PM PHF)/(AM PHF); (2) The AM and PM peak hour values are the estimated 2019 values; (3) The PM peak hour values are the estimated 2018 values; (4) The PM peak hour values are the estimated 2019 values.

2.2.14 Roadway Operational Conditions

The existing conditions (2019) peak hour roadway segment LOS analyses were conducted using the two-lane highway module of the HCS. As previously discussed, the peak hour truck percentages and the overall average corridor PHF's were calculated based on the peak hour intersection turning movement counts. The design speed was assumed to be five mph higher than the posted speed limit and was used as the estimated base free flow speed. The no-passing zone percentages summarized in **Table 2-9** were used to conduct the existing conditions two-lane highway segment analyses. With two exceptions, all of the roadway segments were analyzed as Class I highway segments. Class I two-lane highways are daily commuter routes and/or primary connectors of major traffic generators and serve mostly long-distance trips or provide the connections between facilities that serve long distance trips. Drivers expect to travel at relatively high speeds on this type of two-lane highway. The segment of SR 544 between Martin Luther King Boulevard and Avenue Y was analyzed as a Class III two-lane highway segment. Class III two-lane highways are highways serving moderately developed areas where local traffic often mixes with long distance through traffic. This type of two-lane highway has a higher density of unsignalized roadside access points and is often accompanied by a reduced speed limit. This segment of SR 544 has a posted speed limit of 35 mph and approximately 40 access points. The easternmost portion of SR 544 from

Peninsular Drive to SR 17 is a four-lane undivided roadway and therefore, was analyzed as a multilane highway.

Table 2-9 Existing No-Passing Lengths and Percentages

Segment		Total Segment Length (feet)	Northbound/ Eastbound No-Passing Length (feet)	Northbound/ Eastbound % No-Passing	Southbound/ Westbound No-Passing Length (feet)	Southbound/ Westbound % No-Passing
From	To					
Martin Luther King Blvd	Avenue Y NE	2,513	670	26.7%	967	38.5%
Avenue Y NE	Speed Limit Change	4,005	4,005	100.0%	4,005	100.0%
Speed Limit Change	Old Lucerne Park Rd (west end)	4,337	4,337	100.0%	4,337	100.0%
Old Lucerne Park Rd (west end)	Lucerne Lake Rd	8,105	8,105	100.0%	8,105	100.0%
Lucerne Lake Rd	Speed Limit Change	5,967	5,967	100.0%	5,967	100.0%
Speed Limit Change	Old Lucerne Park Rd (east end)	2,909	2,909	100.0%	2,909	100.0%
Old Lucerne Park Rd (east end)	Lake Hamilton Dr	1,008	1,008	100.0%	1,008	100.0%
Lake Hamilton Dr	Benton Manor Ave	2,666	2,666	100.0%	2,666	100.0%
Benton Manor Ave	US 27	1,119	1,119	100.0%	1,119	100.0%
US 27	Speed Limit Change	4,830	1,981	41.0%	4,133	85.6%
Speed Limit Change	Peninsular Dr	2,482	898	36.2%	845	34.0%
Peninsular Dr	SR 17	2,056	0	0.0%	0	0.0%
Martin Luther King Blvd	SR 17	41,997	33,665	80.2%	36,061	85.9%

Five of the eight roadway segments have a constant speed limit throughout the entire segment. The average peak hour directional volumes were calculated for each of these segments and used to conduct the analyses. Two different speed limits are posted within each of the following roadway segments:

- Between Avenue Y and Old Lucerne Park Road (west) – 45 mph and 55 mph
- Between Lucerne Lake Road and Old Lucerne Park Road (east) – 50 mph and 55 mph
- Between US 27 and SR 17 – 45 mph and 55 mph

These three segments were further subdivided and separate analyses were conducted using the different posted speed limits. As stated previously, a multilane highway segment analysis was conducted for the portion of SR 544 between Peninsular Drive and SR 17. **Table 2-10** summarizes the existing (2019) roadway segment operational analysis results for each travel direction including the average travel speed, percent of free flow speed, percent time-spent-following, and LOS. The percent time-spent-following is the average percentage of the time that vehicles must travel in platoons behind slower vehicles due to the inability to pass.

All roadway segments are operating at LOS E or better during both peak hours. At LOS E, demand is approaching capacity and passing on Class I highways becomes extremely difficult. On Class III highways, speed is less than two-thirds of the free flow speed. In the AM peak hour, five segments are operating at LOS D or better for both travel directions. In the PM peak hour, four segments are operating at LOS D or better for both travel directions. The four-lane undivided segment between Peninsular Drive and SR 17 is currently operating at LOS A in both travel directions during both peak hours. It should be noted that the percent of free flow speed and the percent time-spent-following are not calculated for multilane highway segments because LOS for this type of roadway is defined based on density (i.e., passenger cars per mile per lane), which is a measure of the proximity of vehicles to each other in the traffic stream.

The existing conditions (2019) peak hour signalized intersection LOS analyses were conducted using the SYNCHRO software and the analysis results are summarized in **Table 2-11**Table 2-11. The Martin Luther King Boulevard intersection and the US 27 intersection are currently operating at LOS D overall during both the AM and PM peak hours. In addition, all the individual movements at these two intersections operate at LOS E or better during both peak hours. The SR 17 intersection is currently operating at LOS C overall during both peak hours and all of the individual movements are operating at LOS C or better.

The existing conditions (2019) peak hour unsignalized intersection LOS analyses was conducted using the unsignalized intersection module of the HCS and the analysis results are also summarized in **Table 2-11**Table 2-11. All of the SR 544 left-turn movements at the unsignalized intersections are operating at LOS B or better during both peak hours; however, many of the cross-street left-turn and through movements are operating at LOS F during one or both peak hours.

Table 2-10 Existing (2019) Peak Hour Roadway Segment Operational Analysis Summary

AM Peak Hour													
From	**To**	**No. of Lanes**	**Posted Speed**	**NB/EB Volume**	**NB/EB ATS (1)**	**NB/EB % FFS (2)**	**NB/EB PTSF (3)**	**NB/EB LOS (4)**	**SB/WB Volume**	**SB/WB ATS (1)**	**SB/WB % FFS (2)**	**SB/WB PTSF (3)**	**SB/WB LOS (4)**
Martin Luther King Blvd	Avenue Y	2	35	526	19.7	65.7%	68.6%	E	653	19.7	65.7%	77.7%	E
Avenue Y	Speed Limit Change	2	45	565	36.0	73.9%	73.2%	E	778	35.5	72.7%	84.4%	E
Speed Limit Change	Old Lucerne Park Rd (west end)	2	55	577	44.5	77.4%	73.6%	D	793	43.9	76.4%	85.2%	E
Old Lucerne Park Rd (west end)	Lucerne Lake Rd	2	55	524	47.8	80.6%	73.0%	D	606	47.4	80.0%	78.8%	D
Lucerne Lake Rd	Speed Limit Change	2	55	508	47.7	80.8%	72.1%	D	602	47.2	80.0%	79.1%	D
Speed Limit Change	Old Lucerne Park Rd (east end)	2	50	586	40.7	77.2%	76.1%	D	626	40.6	76.9%	79.1%	D
Old Lucerne Park Rd (east end)	Lake Hamilton Dr	2	50	780	38.1	73.0%	84.3%	E	710	38.2	73.2%	80.6%	E
Lake Hamilton Dr	Brenton Manor Ave	2	50	896	34.2	68.5%	87.2%	E	812	34.3	68.6%	84.2%	E
Brenton Manor Ave	US 27	2	50	823	33.8	67.3%	84.2%	E	981	33.7	67.0%	88.9%	E
US 27	Speed Limit Change	2	55	355	49.8	84.8%	57.0%	C	519	48.2	82.1%	75.9%	D
Speed Limit Change	Peninsular Dr	2	45	345	39.9	83.1%	58.3%	E	473	40.6	82.5%	68.9%	D
Peninsular Dr	SR 17	4	45	335	46.9	N/A	N/A	A	426	45.6	N/A	N/A	A

PM Peak Hour													
From	To	No. of Lanes	Posted Speed	NB/EB Volume	NB/EB ATS (1)	NB/EB % FFS (2)	NB/EB PTSF (3)	NB/EB LOS (4)	SB/WB Volume	SB/WB ATS (1)	SB/WB % FFS (2)	SB/WB PTSF (3)	SB/WB LOS (4)
Martin Luther King Blvd	Avenue Y	2	35	702	19.4	64.7%	76.5%	E	573	19.5	65.0%	70.9%	E
Avenue Y	Speed Limit Change	2	45	800	35.7	73.2%	83.6%	E	580	36.3	74.5%	72.5%	E
Speed Limit Change	Old Lucerne Park Rd (west end)	2	55	793	44.4	77.3%	83.7%	E	577	45.0	78.3%	72.5%	D
Old Lucerne Park Rd (west end)	Lucerne Lake Rd	2	55	634	47.4	80.0%	78.4%	D	529	48.0	81.0%	71.8%	D
Lucerne Lake Rd	Speed Limit Change	2	55	653	47.0	79.7%	80.3%	E	517	47.7	80.9%	70.5%	D
Speed Limit Change	Old Lucerne Park Rd (east end)	2	50	679	40.7	77.2%	79.4%	D	564	41.1	77.8%	72.6%	D
Old Lucerne Park Rd (east end)	Lake Hamilton Dr	2	50	818	37.7	72.2%	83.4%	E	825	37.7	72.1%	83.7%	E
Lake Hamilton Dr	Brenton Manor Ave	2	50	899	34.0	68.1%	85.7%	E	939	34.0	68.0%	86.9%	E
Brenton Manor Ave	US 27	2	50	891	34.4	68.5%	85.2%	E	925	34.4	68.4%	86.7%	E
US 27	Speed Limit Change	2	55	496	49.4	84.0%	70.3%	D	432	48.8	83.1%	66.1%	D
Speed Limit Change	Peninsular Dr	2	45	471	39.6	82.5%	68.2%	E	407	40.9	83.1%	62.6%	D
Peninsular Dr	SR 17	4	45	446	45.6	N/A	N/A	A	381	46.9	N/A	N/A	A

(1) ATS = Average travel speed (miles/hour); (2) % FFS = Percent free-flow speed; (3) PTSF = Percent time-spent-following; (4) LOS = Level of service; N/A = Not applicable (These values are not estimated for multilane highways. Level of service is based on density.)

Table 2-11 Existing (2019) Peak Hour Intersection Operational Analysis Summary

Intersection	Movement	AM Peak Hour			PM Peak Hour		
		V/C Ratio	Average Delay	Level of Service	V/C Ratio	Average Delay	Level of Service
Martin Luther King Blvd (Signalized)	**NB LT**	0.59	43.1	D	0.52	37.9	D
	NB TH	0.71	47.8	D	0.83	52.2	D
	NB RT	0.25	6.8	A	0.23	2.5	A
	SB LT	0.08	40.1	D	0.08	42.3	D
	SB TH	0.95	69.2	E	0.91	63.1	E
	SB RT	0.95	69.2	E	0.91	63.1	E
	EB LT	0.85	56.1	E	0.77	45.9	D
	EB TH	0.86	63.0	E	0.91	66.6	E
	EB RT	0.64	7.8	A	0.50	6.6	A
	WB LT	0.71	47.6	D	0.75	58.6	E
	WB TH	0.82	57.0	E	0.61	48.6	D
	WB RT	0.82	57.0	E	0.61	48.6	D
	ALL	0.76	48.1	D	0.85	46.8	D
Avenue Y	**NB LT**	0.02	9.7	A	0.02	8.7	A
	SB LT	0.03	8.8	A	0.02	9.4	A
	EB LT	0.47	74.3	F	1.20	223.6	F
	EB TH	0.47	74.3	F	1.20	223.6	F
	EB RT	0.47	74.3	F	1.20	223.6	F
	WB LT	0.44	73.2	F	0.32	54.2	F
	WB TH	0.44	73.2	F	0.32	54.2	F
	WB RT	0.06	12.8	B	0.09	14.8	B
Old Lucerne Park Rd (West End)	NB LT	0.59	122.6	F	0.23	68.9	F
	NB TH	0.59	122.6	F	0.23	68.9	F
	NB RT	0.03	12.0	B	0.01	12.5	B
	SB LT	0.42	19.4	C	0.16	16.2	C
	SB TH	0.42	19.4	C	0.16	16.2	C
	SB RT	0.42	19.4	C	0.16	16.2	C
	EB LT	0.07	9.3	A	0.16	9.2	A
	WB LT	0.00	8.6	A	0.02	8.9	A
Lucerne Lake Rd	SB LT	0.07	20.0	C	0.06	18.5	C
	SB RT	0.07	14.0	B	0.05	12.5	B
	EB LT	0.04	9.8	A	0.02	9.1	A
Old Lucerne Park Rd (East End)	SB LT	0.69	39.7	E	0.58	32.0	D
	SB RT	0.69	39.7	E	0.58	32.0	D
	EB LT	0.00	10.6	B	0.02	9.6	A

Intersection	Movement	AM Peak Hour			PM Peak Hour		
		V/C Ratio	Average Delay	Level of Service	V/C Ratio	Average Delay	Level of Service
Lake Hamilton Dr	NB LT	0.70	51.0	F	0.87	101.4	F
	NB TH	0.70	51.0	F	0.87	101.4	F
	NB RT	0.70	51.0	F	0.87	101.4	F
	SB LT	0.01	13.5	B	0.05	91.0	F
	SB TH	0.01	13.5	B	0.05	91.0	F
	SB RT	0.01	13.5	B	0.05	91.0	F
	EB LT	0.00	9.1	A	0.00	9.5	A
	WB LT	0.15	10.3	B	0.17	10.5	B
Brenton Manor Ave	NB LT	1.51	475.2	F	0.95	189.4	F
	NB RT	0.24	18.4	C	0.13	17.4	C
	WB LT	0.26	11.2	B	0.05	10.0	B
US 27 (Signalized)	NB LT	0.83	63.0	E	0.79	75.5	E
	NB TH	0.68	31.4	C	0.64	34.1	C
	NB RT	0.15	16.3	B	0.19	13.7	B
	SB LT	0.59	60.6	E	0.70	68.1	E
	SB TH	0.74	39.6	D	0.69	35.4	D
	SB RT	0.98	55.2	E	0.77	24.1	C
	EB LT	0.86	56.2	E	0.87	65.0	E
	EB TH	0.46	34.7	C	0.55	44.2	D
	EB RT	0.31	22.2	C	0.43	36.2	D
	WB LT	0.39	23.9	C	0.40	31.0	C
	WB TH	0.85	63.7	E	0.84	74.1	E
	WB RT	0.47	30.3	C	0.38	33.7	C
	ALL	0.75	42.5	D	0.77	41.0	D
SR 17 (Signalized)	NB LT	0.23	14.4	B	0.19	14.4	B
	NB TH	0.59	26.4	C	0.60	28.0	C
	NB RT	0.59	26.4	C	0.60	28.0	C
	SB LT	0.19	13.9	B	0.23	14.6	B
	SB TH	0.47	24.7	C	0.56	27.9	C
	SB RT	0.24	14.6	B	0.33	13.7	B
	EB LT	0.50	21.3	C	0.31	15.9	B
	EB TH	0.39	25.3	C	0.52	27.0	C
	EB RT	0.26	18.4	B	0.20	11.6	B
	WB LT	0.21	14.6	B	0.17	14.0	B
	WB TH	0.71	33.5	C	0.40	24.6	C
	WB RT	0.38	18.4	B	0.19	14.9	B
	ALL	0.61	23.4	C	0.55	21.9	C

Note: Bold font denotes SR 544 movements

2.2.15 *Managed Lanes*

There are no managed lanes or toll facilities along SR 544 or any other roads within the project limits.

2.2.16 Crash Data

Two sets of crash data were provided by FDOT District One. Both Crash Analysis Reporting System (CARS) and Signal Four Analytics data for January 1, 2014, to December 31, 2019, were analyzed. There was a total of 829 crashes that occurred within the SR 544 study corridor during the six-year period from 2014 through 2019. There were two fatal crashes resulting in two fatalities and 274 injury crashes resulting in 446 injuries. The remaining 553 crashes were property damage only crashes. Rear-end crashes and left turn/angle crashes are the most frequently occurring crash types, accounting for approximately 67% of the total crashes. Approximately 72% of the crashes occurred during daylight conditions and approximately 15% occurred during dark lighted conditions. Approximately 82% of the crashes occurred on dry surface conditions while approximately 13% occurred on wet surface conditions. The largest number of crashes were associated with the three existing signalized intersections. The US 27 intersection had 205 crashes, followed by the Martin Luther King Boulevard intersection (168 crashes) and the SR 17 intersection (80 crashes). Approximately 55% of the total crashes occurred at these three intersections.

The nine major intersections had a total of 565 crashes and 310 injuries. This represents approximately 68% of the total crashes and approximately 70% of the total injuries for the entire study corridor. The total number of crashes at these nine intersections increased each year between 2014 and 2018, followed by a decrease in 2019. In addition, the number of crashes occurring at the SR 17 intersection has continued to increase through 2019. The total number of injuries at these nine intersections has decreased each year between 2016 and 2019; however, the SR 17 intersection experienced a significant increase in injuries in 2019. It should also be noted that one of the two fatalities that occurred within the SR 544 study corridor, occurred at the US 27 intersection. This pedestrian fatality occurred in 2016. Although rear-end crashes were the most frequently occurring crash type at most of these intersections, left turn/angle crashes were the predominant crash type at both the Avenue Y and Old Lucerne Park Road (west end) intersections.

There were also six bicycle crashes and five pedestrian crashes that occurred within the SR 544 study corridor. More detailed analyses of crash data is provided in the Project Traffic Analysis Report (PTAR).

2.2.17 Railroad Crossings

There are no railroad crossings within the project limits.

2.2.18 Drainage

Topography along the project is generally hilly with flat areas surrounding the water bodies. Existing ground elevations vary between 125 feet and 220 feet along the roadway corridor, with the highest elevations occurring at the beginning and end of the project limits. All elevations mentioned in this report are in reference to the North American Vertical Datum of 1988 (NAVD) unless otherwise stated. Where information was available only in the National Geodetic Vertical Datum of 1929 (NGVD), it was converted to NAVD using the conversion NAVD = NGVD – 0.88 feet. SR 544 does not traverse any Outstanding Florida Waters (OFW)s. It traverses three different water body IDs (WBIDs) and ultimately outfalls to an additional six nearby WBIDs, which have all been reviewed for impairments. Please refer to **Table 2-12** for more information. There are seventeen existing cross drains underneath SR 544 and one bridge within the project limits, allowing for the conveyance of offsite and onsite runoff to flow beneath the road toward its historical path. The cross drains include two major conveyances – one 12-foot by12-foot concrete box culvert that is traversed by boat traffic and one 26-foot-wide bridge culvert. The size and geometry of all cross drains and bridges have been estimated from the FDOT straight line diagram (dated 8/23/2021), 1-foot LiDAR contours, existing plans, and during field reconnaissance but should be verified during design. Please refer to **Table 2-13** for a summary of existing cross drains and bridges.

Table 2-12 Summary of WBIDs and Impairments

WBID	Waterbody Name	Impaired	Limiting Nutrients
1504B	Lake Hamilton Drain	No	N/A
1488U	Lake Conine	No	N/A
1488A	Lake Smart	Yes	TN
14882	Lake Fannie	No	N/A
1504	Lake Hamilton Outlet	No	N/A
15041	Lake Hamilton	Yes*	N/A
1500A	Lake Hamilton Canal	No	N/A
15002	Middle Lake Hamilton	No	N/A
15102	Lake Butler	No	N/A

*Lake Hamilton was delisted from the Comprehensive Verified List in the 2020-2022 delist cycle due to ongoing restoration activities of the Lake Hamilton Chain of Lakes Pollutant Reduction Plan.

Table 2-13 Summary of Existing Cross Drains and Bridges

Structure No.	Station	Description	Remarks
CD-1	35+67	Single 36″ RCP	
CD-2	46+53	Single 36″ RCP	
CD-3	61+81	Single 30″ RCP	
CD-4	70+74	Single 24″ RCP	
CD-5	75+15	12′ x 12′ CBC	Canal connecting Lake Smart to Lake Conine
CD-6	86+68	Single 30″ RCP	
CD-7	120+14	Double 30″ RCP	
CD-8	133+61	Single 36″ RCP	
CD-9	154+93	Single 54″ RCP	
CD-10	183+65	Single 36″ RCP	
CD-11	187+13	Single 48″ RCP	
CD-12	233+56	Single 36″ RCP	
CD-13	252+10	Triple 24″ RCP	
Bridge	289+31	100′ Bridge	Lake Henry Canal
CD-14	296+21	Single 30″ RCP	
CD-15	348+10	26′ Bridge Culvert	Lake Hamilton Creek
CD-16	365+13	Single 30″ RCP	
CD-17	389+17	Single 15″ RCP	

Existing Drainage Basins

Basin 1A

Basin 1A begins at Martin Luther King Boulevard (station 04+80) and continues north to station 13+84. Runoff from SR 544 is collected in curb inlets, which discharge north to ditches located in Basin 1. There is no permitted stormwater treatment system for this basin. This is an open basin that outfalls to Lake Conine.

Basin 1

Basin 1 begins at station 13+84 and continues north to the high point over CD-5 (station 75+00), which is a navigable box culvert connecting Lake Conine with Lake Smart. From the beginning of the basin to Avenue Y (station 29+00), runoff from SR 544 is collected in curb inlets which discharge north to roadside ditches that collect runoff throughout the remainder of the basin. There is no permitted stormwater treatment system for this basin. There are five cross drains located within the basin limits. CD-1 through CD-4 convey stormwater from the east side of SR

544 to the wetlands and Lake Conine located on the west side. CD-5 is a 12-foot by 12-foot concrete box culvert that connects Lake Conine with Lake Smart. This is an open basin that outfalls to Lake Conine.

Basin 2

Basin 2 begins at station 75+00 and continues northwest to a high point at station 106+50. Runoff from SR 544 is collected in roadside ditches. There is no permitted stormwater treatment system for this basin. There is one cross drain located within the basin limits, CD-6, which conveys stormwater from the west side of SR 544 to Lake Smart. This is an open basin that outfalls to Lake Smart.

Basin 3

Basin 3 begins at station 106+50 and continues northwest to a high point at station 155+00. Runoff from SR 544 is collected in roadside ditches. There is no permitted stormwater treatment system for this basin. There are three cross drains located within the basin limits. CD-7 and CD-8 convey stormwater from the south side of SR 544 to wetlands along the south side. CD-9 conveys stormwater from the north side of SR 544 into Lake Fannie. This is an open basin that outfalls to Lake Fannie.

Basin 4

Basin 4 begins at station 155+00 and continues west to a high point just west of Lakeside Landing Boulevard (station 218+50). Runoff from SR 544 is collected in roadside ditches. A portion of the intersection of SR 544 and Lucerne Loop Road is treated in a stormwater pond located at the northeast corner of the intersection and permitted under Permit No. 12706.003. The remainder of this basin is not treated. There are two cross drains located within the basin limits, CD-10 and CD-11, which convey stormwater from the north side of SR 544 into Lake Fannie. This is an open basin that outfalls to Lake Fannie.

Basin 5

Basin 5 begins at station 218+50 and continues northwest to the bridge over Lake Henry Canal (station 289+00). Runoff from SR 544 is collected in roadside ditches. There is no permitted stormwater treatment system for this basin. There are two cross drains located within the basin limits, CD-12 and CD-13, which convey stormwater from the north side of SR 544 into wetlands along the south side. This is an open basin. From the beginning of the basin limits to Old Lucerne Park Road, the ditches drain to the wetlands and from Old Lucerne Park Road to the end of the basin, they drain directly into Lake Henry Canal. Both the wetlands and the canal outfall to Lake Hamilton.

Basin 6

Basin 6 begins at station 289+00 and continues west to a high point at station 314+10. Runoff from SR 544 is collected in roadside ditches which drain to an existing depressional area located on the north side of the road at approximately station 295+50. This depressional area is not a permitted stormwater retention pond and is the subject of a flooding complaint logged by FDOT in 2015. The complaint indicates that the depression is intended to drain to the north into the Lake Henry Canal through a series of ditches, but that lack of maintenance has caused the ditches and depression to become overgrown and a private road has cut off the natural drainage path, resulting in the depression overtopping into nearby properties instead. The study concluded that FDOT was not contributing to the flooding issue. There is one cross drain located within the basin limits, CD-14, which conveys stormwater from the south side of SR 544 into the depression. Currently, this basin functions as a closed basin with stormwater collecting in the depressional area; however, it is intended to operate as an open basin that outfalls to the Lake Henry Canal and into Lake Hamilton.

Basin 7

Basin 7 begins at station 314+10 and continues west to US 27 (station 331+50). Along the north side of SR 544, runoff is directed into roadside ditches, while along the south side of SR 544, curb and gutter are present and collect runoff in curb inlets. SR 544 drains to a permitted dry detention pond (the ditches on the north are collected in a ditch bottom inlet and routed to the pond) that is located to the south of SR 544 in between the South State Bank and the Race Trac. The pond was originally permitted under Southwest Florida Water Management District (SWFWMD) Permit No. 10159.004 in 2013 (a modification to previous permits that were never constructed) in a temporary location to accommodate runoff from intersection improvements conducted by FDOT and to mitigate flooding that had been caused by the developer of the site filling in an existing depressional area without constructing their new stormwater pond. In 2021, a permit modification was issued under Permit No. 10159.008 for the development of the parcel into a commercial truck parking site, which includes the permanent relocation of the FDOT stormwater pond further south within the same parcel. As of the date of this report, the parcel is currently under construction. This is a closed basin and the relocated FDOT pond will not have an outfall structure.

Basin 8

Basin 8 begins at station 331+50 and continues west to the high point over CD-15 (station 348+00). Along the south side of SR 544, stormwater runoff is collected in roadside ditches. From the beginning of the basin to approximately station 336+50, stormwater runoff to the north side of SR 544 is collected in curb inlets, and for the remainder of the basin, it is collected in roadside ditches. Basin 8 encompasses the limits of an existing basin, Basin 10, which was permitted under

Permit No. 23431.000 and contains a dry treatment swale system (Pond 10). This swale system will be eliminated by the proposed intersection improvements at SR 544 and US 27. A portion of Basin 8 overlaps the existing Basin 1, which was also permitted under Permit No. 23421.000 but is treated through compensation in another basin and does not contain its own treatment system. The remainder of Basin 8 does not have a permitted treatment system. There are no cross drains located within this basin, however, the bridge culvert CD-15 is located at the basin divide. CD-15 conveys the Lake Hamilton Creek underneath SR 544. This is an open basin that outfalls to Lake Hamilton Creek.

Basin 8A

Basin 8A covers the portion of US 27 located south of Basin 8 that will be impacted by the proposed intersection improvements at SR 544 and US 27. The basin is approximately 540 feet long, but no station numbers have been assigned to US 27. Stormwater is collected in roadside ditches that drain south to Lake Hamilton Creek. There are no cross drains located within this basin. This is an open basin that outfalls to Lake Hamilton Creek.

Basin 9

Basin 9 begins at station 348+00 and continues west to Lake Hamilton Drive (station 374+00). Runoff from SR 544 is collected in roadside ditches. There is no permitted stormwater treatment system for this basin. There is one cross drain within the basin limits (excluding the bridge culvert at the basin divide), CD-16, which conveys stormwater from the south side of SR 544 to the ditch on the north side. This is an open basin that outfalls to Lake Hamilton Creek.

Basin 10

Basin 10 begins at station 374+00 and continues west to the end of the project at SR 17 (station 424+50). From the beginning of the basin to approximately station 393+00, runoff from SR 544 is collected in roadside ditches. For the remainder of the basin, runoff is collected in curb inlets which discharge into the ditches at the west end of the basin. There is no permitted stormwater treatment system for this basin. There is one cross drain within the basin limits, CD-17, which conveys stormwater from the south side of SR 544 to Lake Butler. This is an open basin that outfalls to Lake Butler.

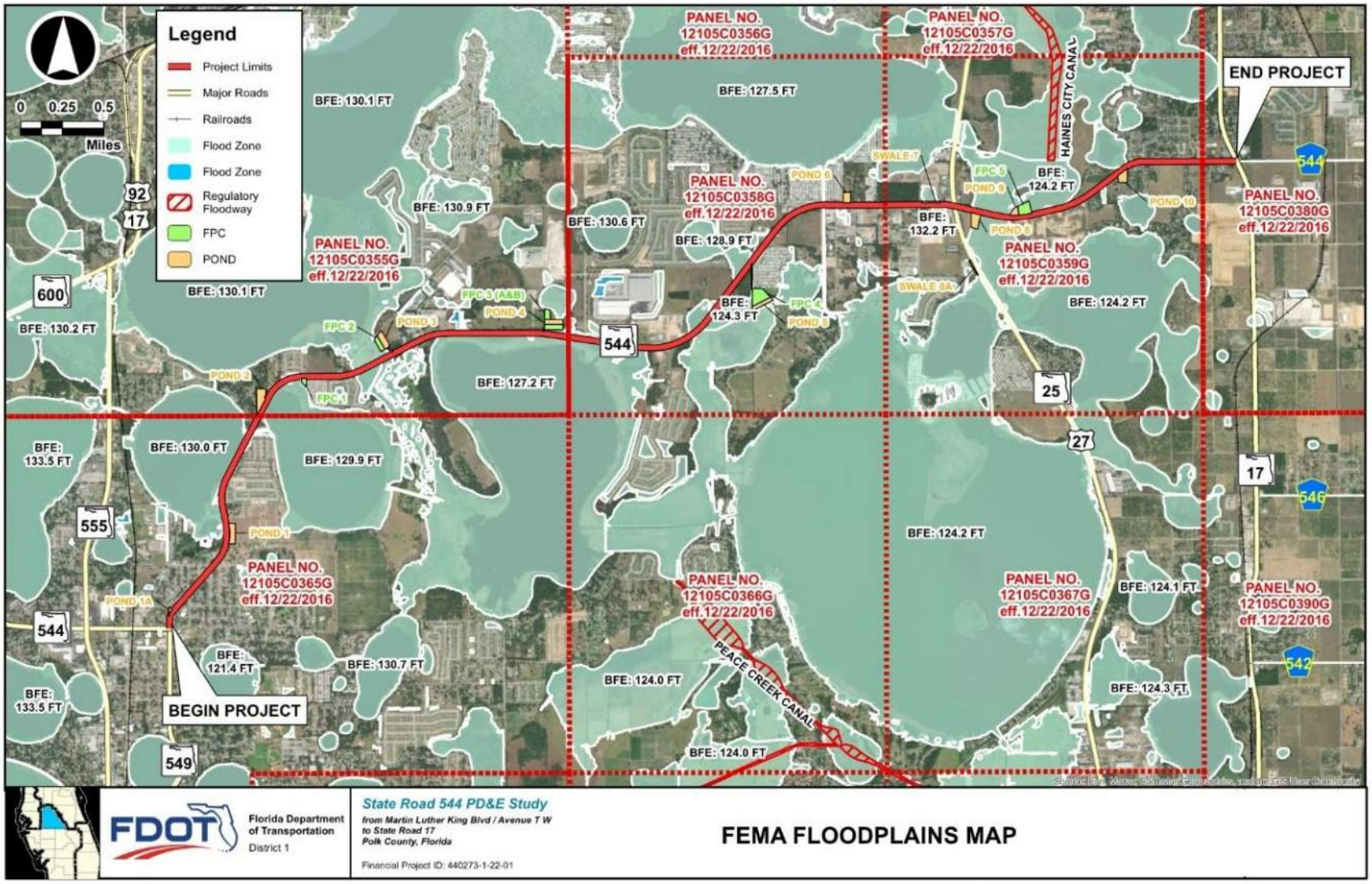
Floodplains/Floodways

According to the Federal Emergency Management Agency (FEMA), the relevant Flood Insurance Rate Map (FIRM) panel numbers are 12105C0365G, 12105C0355G, 12105C0358G, 1210C0359G, and 12105C380G, dated 12/22/2016.

According to the FEMA FIRMs, portions of the project intersect Zone AE of the 100-year floodplain. These areas are associated with the various lakes in the region and have a 1% probability of

flooding every year. Predicted flood water elevations range from 124.2 feet to 132.2 feet NAVD across the project limits, varying by lake. There are no federally regulated floodways within the project limits. FEMA floodplains information is provided on **Figure 2-9.**

Figure 2-9 FEMA Floodplains Map



2.2.19 Lighting

There are no continuous roadway lighting systems in place. Light poles are present intermittently along the corridor from Martin Luther King Boulevard to Avenue Y (maintained by the City of Winter Haven) and between LaVista Drive and SR 17 (maintained by Haines City). There are also streetlights at the US 27 intersection with SR 544 which are maintained by Haines City.

2.2.20 Utilities

Ten Utility Agency/Owners (UAO) have been identified within the project area through a Sunshine 811 Design Ticket and utility coordination efforts. There are numerous existing utilities within the project corridor including overhead and underground electric, water and wastewater mains, gas mains, and communication lines. All of the utility providers and operators were contacted on December 5, 2019, and were provided aerial maps of the project for review. Based on the aerial maps, UAOs were asked to assist in locating and identifying their existing and planned facilities within the area of study. Details of the UAOs contacted on the project and a description of the facilities identified within the corridor are summarized in **Table 2-14.**

Table 2-14 Existing Utilities Summary

UAO	Facilities
Century Link Winter Garden	• Buried fiber optic along the south of SR 544 at US 27 and crosses to the north of SR 544 0.25 miles east of US 27 to Peninsular Drive where the fiber crosses back to the south of SR 544 and continues until SR 17.
Century Link / Level 3 Communications	• (3) 1.25-inch HDPE conduit buried facilities cross SR 544 on the south side of Martin Luther King Boulevard and on the west side of US 27 Highway.
City of Haines City	• 16" WM on east of US 27 Hwy turns east along the north side of SR 544 from US 27 to just west of Circle Four Drive. • 10" WM runs down the north side of Scenis Drive. • From Scenis Drive to 5th Street S there is a 10" water main along the north side of SR 544. • From 5th Street S to SR 17 Hwy there is a 6" water main along the north side of SR 544. • 4" FM along the south side of SR 544 from just west of Circle Four Drive to La Vista Drive. • 6" WM runs on the west side of La Vista Drive. • Gravity sewer turns into a 4" FM that runs on the east of La Vista Drive. • 6" WM runs on the west side of Circle Four Drive. • 2" WM and Gravity sewer runs down the east side of Myrtle Ave, turns down the south side of SR 544 to Peninsular Drive.

UAO	Facilities
	• 8" FM from Peninsular Drive to 5th Street S. • 6" WM on the west and 8" FM on the east of 5th Street S • Gravity Sewer from Crest Dr to SR 17 Hwy along the south of SR 544.
City of Winter Haven Utilities	• Gravity sewer along the south side of SR 544 from 1st Street North to Ware Avenue NE. The gravity sewer picks up again at 4th Street NE to Avenue Y NE. • Gravity sewer is present along the north side of SR 544 at Winter Haven Boulevard for 520 feet. • Gravity sewer is present along the north side of SR 544 from Lucerne Loop Road NE for 830 feet. • Gravity sewer is present on the north side of SR 544 from Jacaranda Avenue to the Family dollar at Old Lucerne Park Road. • Gravity sewer runs around the RaceTrac at the south west corner of SR 544 and US 27. • 6 inch water main runs along the north side of SR 544 from Martin Luther King Drive to Avenue Y NE • At second street north, a 14" main begins on the south of SR 544 until the Winter Haven Fire Department Station 2 where the main transitions to 16 inches. • At Lucerne Loop Road NE, the 16" WM transitions to a 12" WM on the south side of SR 544 until US 27 • At Lucerne Loop Road NE the water main is 12 inches until Centerstate Bank, where the main is 8 inches until the main ends at SR 27. • 8 inch water main on the north side of SR 544 from Old Lucerne Park Road for 400 feet. • 16 inch force main along the north of SR 544 from Martin Luther King Boulevard to Avenue V. • A 20 inch force main runs along the north side of SR 544 from Avenue Y NE to Old Lucerne Park Road, where the main transitions to 12 inches and ends at Jacaranda Avenue. • An 8 inch force main starts along the north side of SR 544 from Old Lucerne Park Road to just west of Hideaway Lane, where the force main transitions to 10 inches and ends at US 27. • A 2 inch force main starts at Unnamed Street and ends just west of US 27 • 20 inch reuse runs along the south of SR 544 from Avenue Y to the Lakeside Landings Development. • City Fiber runs from Avenue Y to US 27 on the north side of SR

UAO	Facilities
	544.
Duke Energy Distribution	• 12.4 kV 3 phase overhead electric lines along SR 544 from Old Lucerne Park Road to SR 17.
Duke Energy Transmission	• Osprey transmission line proposed on south side of SR 544
Florida Public Utilities	• No Response
Frontier Communications	• Buried fiber lines west of SR 544 from Martine Luther King Boulevard and on both sides of SR 544 from Maxine's Barber Shop to 0.25 miles past Lakeside Landings neighborhood entrance, where the north side of the fiber ends. The north side of SR 544 has buried fiber again at Old Lucerne Park Road, and fiber on both sides of SR 544 continue until the southern fiber ends at US 27. • At US 27, the buried fiber line on the north side of SR 544 continues and the buried fiber line on the south side of SR 544 ends • At Lake Hamilton Drive, the buried fiber line crosses SR 544 from the north to south side until Crest Drive where buried fiber continues on the north and south side of SR 544 until the end of the project area.
Spectrum	• No Response
Sprint	• 4-2 inch buried fiber optic conduits along the south side of SR 544 from US 27 for 950 feet, where the line crosses to the north side of SR 544 and remains until crossing back to the south side of SR 544 just west of SR 17.
Tampa Electric Company	• Overhead feeder along the north side of SR 544 from Martin Luther King Drive to Old Lucerne Park Road. • From Old Lucerne Park Road to just west of US 27 there is overhead non-feeder along the south side of SR 544.

2.2.21 Soils and Geotechnical Data

Based on a review of the Polk County Soil Survey published by the United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS), there are twenty-four soil-mapping units noted within the project limits. A detailed soil survey map is shown as **Figure 2-10.**

Based upon the USDA-NRCS Soil Surveys for Polk County, sandy soils occasionally underlain by silty to clayey (loam) soils are reported along the majority of the project corridor to depths of 80 inches below the natural ground surface. Some areas along the project corridor are expected to contain organic material/muck.

In general, the sandy soils are suitable for supporting proposed roadway embankments after proper subgrade preparation including removal and replacement of unsuitable materials. Areas along the project corridor where shallow groundwater conditions, clay soils, and muck may impact the project are detailed in **Table 2-15**.

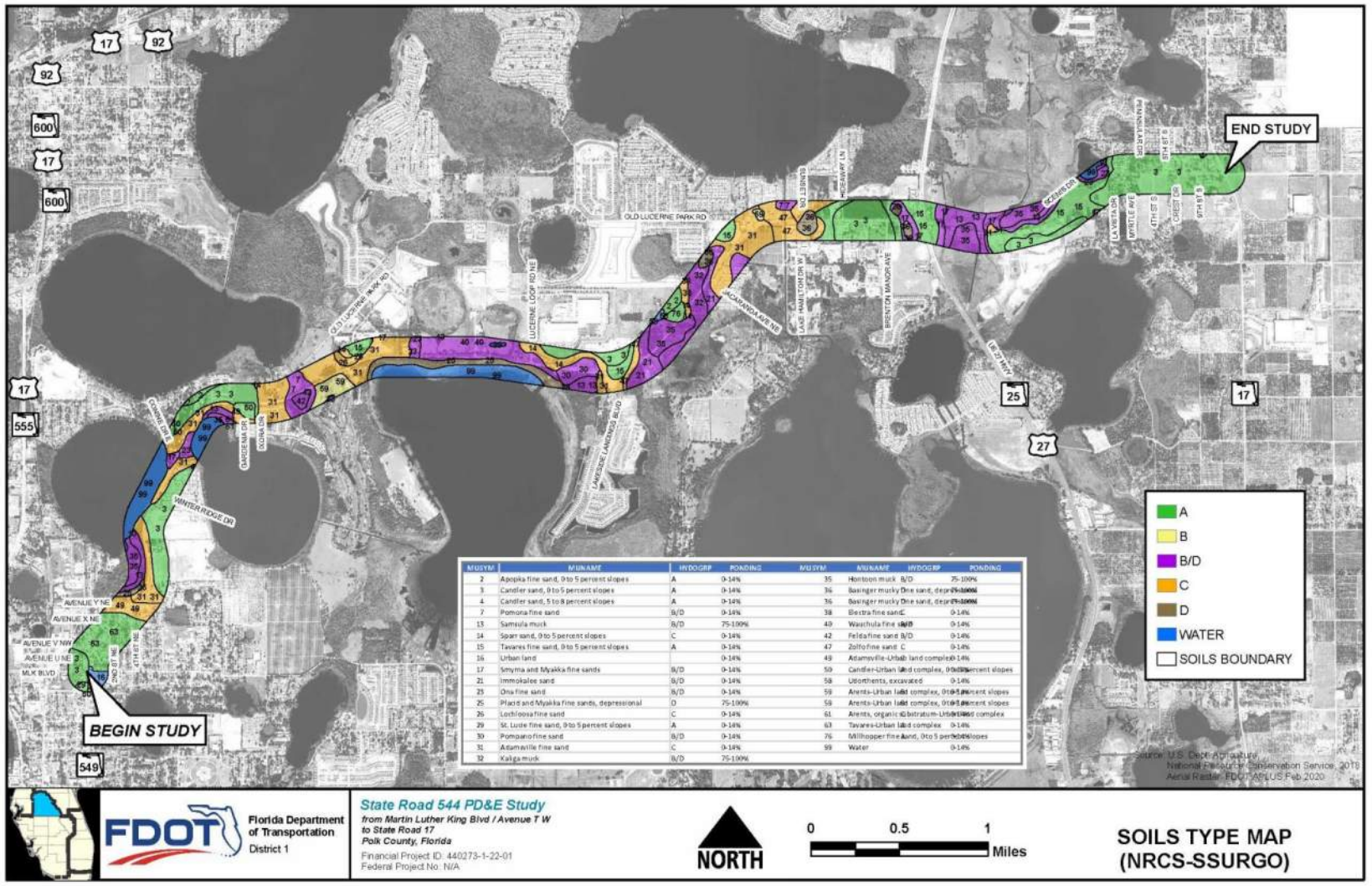
Table 2-15 Polk County USDA NRCS Soil Survey Information

Map No.	Soil Name	Hydrologic Soil Group	Depth to High Water Table (ft)*	Typical Soil Types (Profile from Ground Surface to depth of approximately 80 inches)
3	Candler Sand	A	> 6.0	Sand
7	Pomona Fine Sand	A/D	0.5-1.5, 0.0-1.0	Fine Sand to Sand to Fine Sand to Fine Sandy Loam to Loamy Sand
13	Samsula Muck	A/D	+2.0-0.0	Muck to Sand
14	Sparr Sand	A/D	1.5-3.5	Sand to Sandy Clay Loam
15	Tavares Fine Sand	A	3.5-6.0	Fine Sand
16	Urban Land	Data not provided for Urban Land		
17	Smyrna and Myakka Fine Sands	A/D	0.5-1.5, 0.0-1.0	Fine Sand
21	Immokalee Sand	B/D	0.5-1.5, 0.0-1.0	Sand
23	Ona-Ona, wet, Fine Sand	B/D	0.5-1.5,0.0-1.5	Fine Sand
25	Placid and Myakka Fine Sands	A/D	+2.0-0.0	Fine Sand

Map No.	Soil Name	Hydrologic Soil Group	Depth to High Water Table (ft)*	Typical Soil Types (Profile from Ground Surface to depth of approximately 80 inches)
26	Lochloosa Fine Sand	C	2.5-5.0	Fine Sand to Sandy Clay Loam
30	Pompano Fine Sand	A/D	0.0-0.5	Fine sand
31	Adamsville Fine Sand	A/D	1.5-3.5	Fine Sand
32	Kaliga Muck	C/D	+2.0-0.0	Muck to Fine Sandy Loam to Sandy Clay Loam
35	Hontoon Muck	A/D	+2.0-0.0	Muck to Sandy Loam
36	Basinger mucky Fine Sand	A/D	+2.0-0.0	Mucky Fine Sand to Fine Sand
40	Wauchula Fine Sand	C/D	0.5-1.5, 0.0-1.0	Fine Sand to Sandy Clay Loam to Fine Sandy Loam
42	Felda Fine Sand	A/D	0.0-1.0	Fine Sand to Sandy Clay Loam to Sandy Loam
47	Zolfo Fine Sand	A	1.5-3.5	Fine Sand
49	Adamsville-Urban Land Complex	A	2.0-3.5	Fine Sand
50	Candler-Urban Land Complex	A	>6.0	Sand
59	Arents-Urban Land Complex	A	1.5-3.0	Sand
63	Tavares-Urban Land Complex	A	3.5-6.0	Fine Sand
76	Millhopper Fine Sand	A	3.5-6.5	Fine Sand to Sandy Clay Loam

*Depth to High Water Table is also commonly known as the depth to the Seasonal High Groundwater Table.

Figure 2-10 NRCS-SSURGO Soils Map



MUSYM	MUNAME	HYDGRP	PONDING	MUSYM	MUNAME	HYDGRP	PONDING
2	Apopka fine sand, 0 to 5 percent slopes	A	0-14%	35	Hontoon muck	B/D	75-100%
3	Candler sand, 0 to 5 percent slopes	A	0-14%	36	Basinger mucky fine sand, depr		75-100%
4	Candler sand, 5 to 8 percent slopes	A	0-14%	36	Basinger mucky fine sand, depr		75-100%
7	Pomona fine sand	B/D	0-14%	38	Electra fine sand	C	0-14%
13	Samsula muck	B/D	75-100%	40	Wauchula fine sand	B/D	0-14%
14	Sparr sand, 0 to 5 percent slopes	C	0-14%	42	Felda fine sand	B/D	0-14%
15	Tavares fine sand, 0 to 5 percent slopes	A	0-14%	47	Zolfo fine sand	C	0-14%
16	Urban land		0-14%	49	Adamsville-Urban land complex		0-14%
17	Smyrna and Myakka fine sands	B/D	0-14%	50	Candler-Urban land complex, 0 to 5		percent slopes
21	Immokalee sand	B/D	0-14%	58	Udorthents, excavated		0-14%
25	Ona fine sand	B/D	0-14%	59	Arents-Urban land complex, 0 to 5		percent slopes
25	Placid and Myakka fine sands, depressional	D	75-100%	59	Arents-Urban land complex, 0 to 5		percent slopes
26	Lochloosa fine sand	C	0-14%	61	Arents, organic substratum-Urb		complex
29	St. Lucie fine sand, 0 to 5 percent slopes	A	0-14%	63	Tavares-Urban land complex		0-14%
30	Pompano fine sand	B/D	0-14%	76	Millhopper fine sand, 0 to 5 per		slopes
31	Adamsville fine sand	C	0-14%	99	Water		0-14%
32	Kaliga muck	B/D	75-100%				

2.2.22 Aesthetics Features

On SR 544 from Martin Luther King Boulevard north to Avenue Y through the Florence Villa neighborhood there is decorative pedestrian-level street lighting on both sides of the road in addition to conventional street lighting. A bench and trash receptacle are located in the northwest corner of the 1st Street intersection. Decorative stamped asphalt crosswalks have been installed across 2nd Street, Ware Avenue, Avenue X/Cedie Street, and 4th Street.

2.2.23 Traffic Signs

There are minimal overhead traffic signs throughout the study limits. At the intersection of SR 544 and Martin Luther King Boulevard, there are overhead mast arm-mounted lane control signs in the northbound direction. Just south of Avenue U, there are overhead span wire-mounted route signs and a lane use sign. At the intersection of SR 544 and US 27, there are overhead span wire-mounted U-turn prohibition signs for the left turn lanes in the eastbound direction. At the intersection of SR 544 and SR 17, there are overhead mast arm-mounted "Left Turn Yield on Flashing Yellow Arrow" signs in all directions. There are also overhead span wire-mounted 15 mile per hour school zone signs with flashers adjacent to the Alta Vista Elementary School for SR 544 eastbound and westbound traffic at the beginning of the school zone pavement markings in each direction.

2.2.24 Noise Walls and Perimeter Walls

There are no existing noise walls along SR 544 within the project limits. There are four residential developments that have perimeter walls along SR 544 including Lake Point Landing, Lakeside Ranch, LaVista, and Bella Viva.

2.2.25 Intelligent Transportation Systems (ITS)/Transportation System Management and Operations (TSM&O) Features

There are no Intelligent Transportation Systems (ITS) or Transportation System Management and Operations (TSM&O) features along SR 544 within the project limits.

2.3 Existing Bridges and Structures

There are two bridges and one large non-bridge culvert within the project limits:

- SR 544 over Conine-Smart Canal (Non-Bridge Culvert)
- SR 544 over Lake Hamilton Canal (Bridge No. 160021)
- SR 544 over Lake Hamilton Creek (Bridge No. 160147)

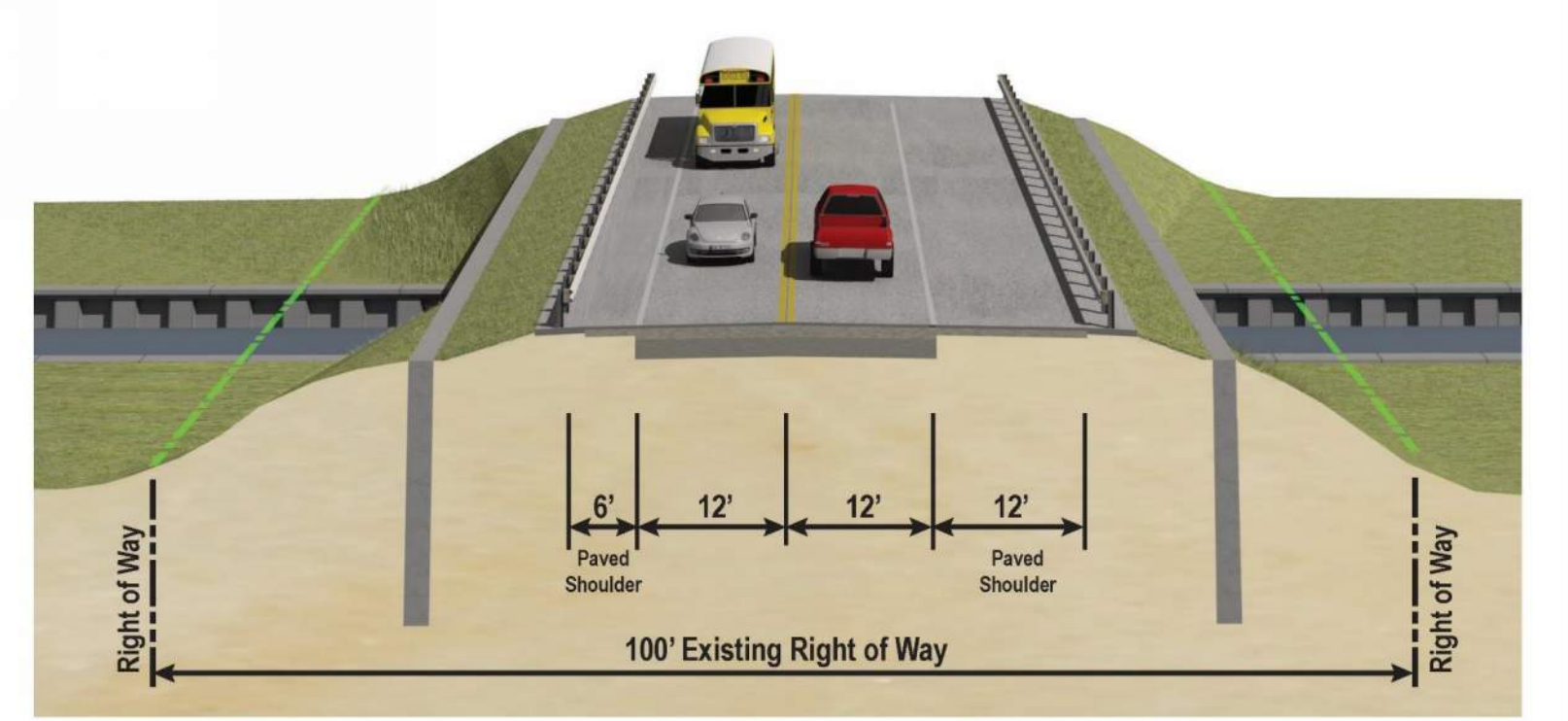
A detailed description of each structure is provided below.

SR 544 over Conine-Smart Canal (Non-Bridge Culvert)

The existing non-bridge culvert under SR 544 connecting Lake Conine (west of SR 544) to Lake Smart (east of SR 544) was built in 1965 and extended to both the east and west in 2003. The roadway typical section atop the culvert consists of an undivided paved roadway with two 12-foot lanes with 5-foot paved shoulders and W-beam guardrail along the outside shoulders. While partial 2003 design plans were available for review, the original culvert plans were unavailable at the time of this report. The existing bridge typical section over the Lake Conine-Smart Canal is shown in **Figure 2-11.**

The original portion of the culvert was constructed in 1965 and consists of a single-barrel concrete box culvert with approximate dimensions of 12′-0″ x 12′-0″ x 48′-0″ (Span x Rise x Length; Note: Length approximated from 2003 drainage structures cross section sheet). The original culvert and corresponding section of the canal under SR 544 are orientated perpendicular to the centerline of SR 544, while the western leg (Lake Conine connector) and eastern leg (Lake Smart connector) of the canal are skewed at two different angles beyond the limits of the culvert.

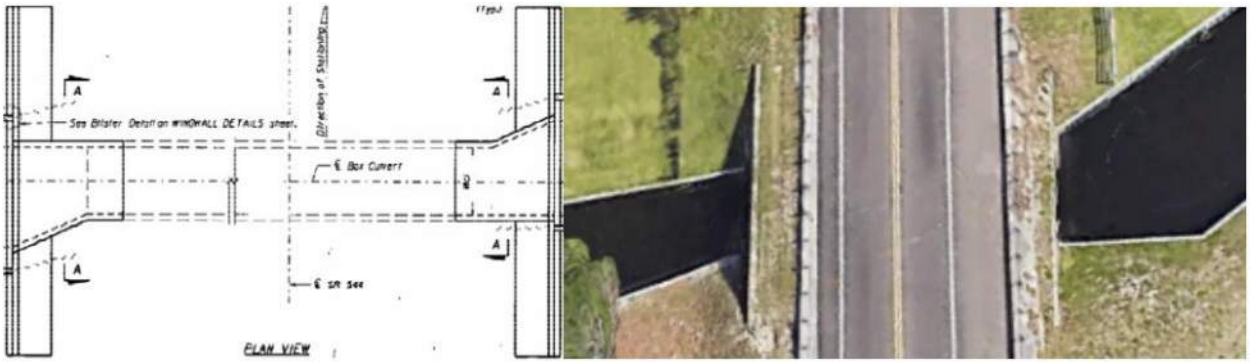
Figure 2-11 Existing Bridge Typical Section – Lake Conine Canal



When the culvert was extended to the east and west in 2003, the span dimensions for the extended portions varied due to the skewed alignment of the western and eastern canals (see **Figure 2-12** below). For the extended culvert sections, the span at the west side ranges from approximately 12’-0” minimum to 15’-1” maximum, while the span at the east side ranges from approximately 12’-0” minimum to 20’-8” maximum. The total lengthened culvert is approximately 67'-0' long. The canal is under the jurisdiction of the Lake Region Lakes Management District (LRLMD). Additionally, as shown in **Figure 2-12** below, the Conine-Smart Canal has bulkhead walls under the jurisdiction of the LRLMD along the canal length between Lake Conine and Lake Smart.

The Lake Conine Boat Ramp is located on the southwest side of the culvert and provides a public boat ramp. Recreational boat traffic utilizes the canal to navigate between Lake Conine and Lake Smart. From discussions with LRLMD, sight distances for boat traffic have been an issue in the past due to the unique geometry of the culvert and the differing alignments of the canal legs to the east and west of the culvert.

Figure 2-12 Plan View and Aerial View of SR 544 Culvert at Conine-Smart Canal



SR 544 over Lake Hamilton Canal (Bridge No. 160021)

The existing bridge carrying SR 544 over the Lake Hamilton Canal (Bridge No. 160021) was built in 1964 and widened to each side in 2000. The existing bridge is on a horizontal curve and a variable reverse crown. Lake Hamilton Canal is under the jurisdiction of the SWFWMD.

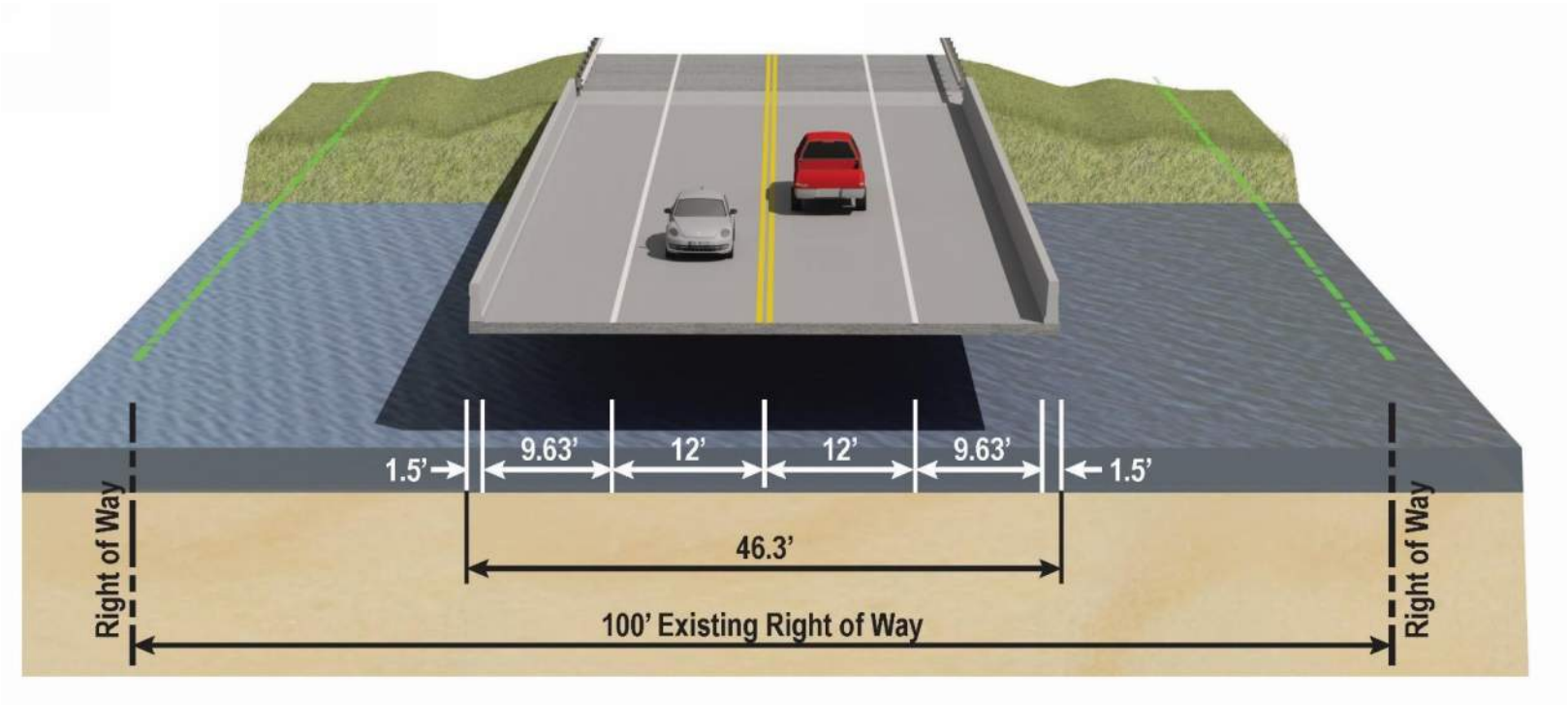
While the original 1964 bridge design plans were available for review, the widening plans were unavailable at the time of this report. Information for the widened portion of the bridge was obtained from a sketch included in the load rating calculations on file with the FDOT District 1 and District 7 Structures Maintenance Office. These calculations also noted that bridge widening plans were not available. The existing bridge is approximately 46'-5" wide providing for two

undivided 12'-0" lanes with 9'-8" outside shoulders and 1'-6 1/2" wide F-shape concrete traffic railings (32" tall). The bridge is comprised of three equal spans of 30'-0" (measured at the centerline of construction along a horizontal curve at Spans 1 and 2, and along a partial curve & tangent at Span 3 for an overall bridge length of 90'-0". The existing bridge typical section over Lake Hamilton Canal is shown in **Figure 2-13.**

The bridge superstructure utilizes a simply-supported 17 inch thick cast-in-place concrete flat slab cast along both a horizontal curve and tangent section. The bridge substructure utilizes cast-in-place concrete bents (Bents 1 through 3 placed radially to curve, Bent 4 placed normal to tangent). The sand-cement protected spill-through abutments are supported by steel H-piles (HP 10x42), while the intermediate bents are supported by 18inch-square precast/prestressed concrete piles. The existing bents have unique geometry due to variable deck slopes and unique roadway geometry (horizontal curve terminates within Span 3). At the intermediate bents, the top of the caps are stepped, while the bottom of the caps are sloped. The end bent caps are also stepped along the top, but utilize a combination of sloped and level surfaces along the bottom of the cap. One unidentified conduit is attached along the north side of the bridge. The open scuppers from the original bridge were plugged during the widening, and stormwater currently flows to the outside shoulder along the low side of the horizontal curve (south side of the bridge), then to a concrete flume located on the southwest corner of the western approach slab.

Based on the most recent Bridge Inspection Report (BIR) (July 2022), the bridge is in good condition with a sufficiency rating of 89.5. The sufficiency rating provides a method for evaluating highway bridge data by calculating multiple factors, including structural condition, bridge geometry, and traffic considerations, to obtain a numeric value indicative of bridge sufficiency to remain in service. The rating value varies between 0 and 100, indicating whether a bridge may need repair or replacement. A rating of 80 or less indicates rehabilitation is most likely needed, while a rating of 50 or less indicates complete replacement is most likely needed. Based on the current load rating calculation on file (performed in 2015), the bridge is at, or above, legal loads and posting is not required.

Figure 2-13 Existing Bridge Typical Section – Lake Hamilton Canal



SR 544 over Lake Hamilton Creek (Bridge No. 160147)

The existing SR 544 over Lake Hamilton Creek culvert (Bridge No. 160147) was built in 1965 with no widenings or major repairs to date. The bridge culvert is a double-barrel concrete box culvert with each barrel measuring 10'-0" x 8'-0" x 63'-0" (Span x Rise x Length). Partial 1965 plans were available for review and contained FDOT Standards for double skewed culverts. The culvert has wingwalls at all four corners of the structure. Lake Hamilton Creek is under the jurisdiction of the SWFWMD.

Based on the most recent BIR (July 2022), the bridge is in good condition with a sufficiency rating of 96.3.

It should be noted that the most recent BIR noted a health index of 34.95 (out of 100). Although the sufficiency rating is typically used for evaluation, the health index can be used as a performance indicator. The health index is a tool that measures the overall condition of a bridge and typically includes about 10 to 12 different elements that FDOT evaluates. A lower health index means more work would be required to improve the bridge to an ideal condition. A health index below 85 generally indicates that some repairs are needed, although it does not mean the bridge is unsafe. A low health index may also indicate that replacing the bridge would be more economical than repairing it. Based on the most recent BIR, a load rating was performed in 2010 which indicated the bridge was at, or above, legal loads and did not require posting.

Based on the roadway typical section in the original design plans, the concrete box culvert constructed in 1965 replaced an older single-span concrete bridge located to the south of the culvert. The older single-span bridge was located approximately 35 feet to the south, measured from the centerline of construction of SR 544 to the coping of the single-span bridge. Based on the field review, the superstructure of the older bridge was removed; however, it is unclear if the substructure was partially or completely removed. The presence of partially removed substructure elements (e.g. piles) could conflict with a potential widening of the existing culvert and should be addressed during the design phase. **Table 2-16** provides a summary of existing structures within the project area.

Table 2-16 Existing Structures Summary

	Structure Name	SR 544 over Conine-Smart Canal (Non-Bridge	SR 544 over Lake Hamilton Canal	SR 544 over Lake Hamilton Creek
Structure Information	Bridge Number	N/A	160021	160147
	Overall Structure Length	67.0' (measured along centerline of culvert/canal)	90.0' (measured along centerline of construction)	63.0' (measured along centerline of culvert/canal)
	No. of Spans	1 Cell	3 Spans	2 Cells
	Span Length(s)	Varies, 12.0' Min. to 20.7' Max.	30', 30', 30'	10', 10'
	Deck Width	N/A	46.4' Out-to-Out	N/A
	Superstructure Type	Concrete Box	Cast-in-Place Flat Slab	Concrete Box Culvert
	Sufficiency Rating	N/A	89.5	96.3
	Year Built	1965	1964	1965
	Year Widened	2003	2000	N/A
NBI Ratings	Open/Posted/Closed (41)	N/A	A, Open, No restriction	A, Open, No restriction
	Posting (70)	N/A*	5, At/Above Legal Loads	5, At/Above Legal Loads
	Deck (58)	N/A	7, Good	N/A
	Superstructure (59)	N/A	7, Good	N/A
	Substructure (60)	N/A	7, Good	N/A
	Channel (61)	N/A	7, Minor Damage	7, Minor Damage
	Culvert (62)	N/A	N/A	6, Deterioration
	Scour Critical (113)	N/A	5, Stable w/in footing	8, Stable Above Footing

**Based on field review, non-bridge culvert not currently posted for load*

2.4 Existing Environmental Features

Protected Species and Habitat

Ecologists familiar with Florida's protected species and natural habitats conducted general field surveys and species-specific surveys from October 2019 through December 2022 as part of the Study. The field surveys were performed utilizing pedestrian surveys conducted during daylight hours over multiple seasons to document the presence or evidence of protected species utilizing the study area. Species-specific surveys included Audubon's crested caracara, Everglade snail kite, Florida bonneted bat, sand skink, and blue-tailed mole skink. The species-specific surveys were conducted in accordance with the survey protocols outlined by the United States Fish and Wildlife Service (USFWS). Species-specific survey methodologies were submitted to USFWS for approval before the surveys were conducted. The ecologists also documented habitat types and predominant plant species, including general wetland limits, during the field reviews. Listed species occurrences and habitat within the SR 544 Study Area are shown in **Figure 2-14**.

A total of 55 protected species have the potential to occur in the SR 544 Study Area, according to the information obtained during the preliminary data collection. These include the 13 avian, 3 mammal, 5 reptile, and 33 plant species shown on **Table 2-17**. Ecologists determined a species' potential occurrence in the study area based on its habitat preferences and distributions, existing site conditions, historical data, and field survey results. The likelihood of occurrence was rated as no, low, moderate, high, or observed. Definitions for the likelihood of occurrence are provided below:

- No – Species with a no likelihood of occurrence are those species that are known to occur in Polk County but have specialized habitat requirements that do not occur in the project area.
- Low – Species with a low likelihood of occurrence are those species that are known to occur in Polk County, limited habitat occurs within the project site, but there are no known adjacent populations, limited dispersal abilities, and the species has not been observed or documented within the site.
- Moderate – Species with a moderate likelihood of occurrence are those species that are known to occur in Polk County, for which suitable habitat occurs within the project site, but there are no positive indications to verify presence, and the species has not been observed in or documented within the site.
- High – Species with a high likelihood of occurrence are those species that are known to occur in Polk County, are suspected in the project area based on the existence of suitable habitat within the project site, are known to occur adjacent to the site, or have been previously documented in the project vicinity.
- Observed – the species has been observed during this evaluation.

Table 2-17 Protected Species with Potential to Occur in the SR 544 Study Area

Scientific Name	Common Name	Status	Effect Determination
Birds			
Ammodramus savannarum floridanus	Florida Grasshopper Sparrow	FE	NO EFFECT
Aphelocoma coerulescens	Florida Scrub-jay	FT	NO EFFECT
Athene cunicularia floridana	Burrowing Owl	ST	NAEA
Egretta caerulea	Little Blue Heron	ST	NAEA
Egretta tricolor	Tricolored Heron	ST	NAEA
Falco sparverius paulus	Southeastern American Kestrel	ST	NAEA
Grus canadensis pratensis	Florida Sandhill Crane	ST	NAEA

Scientific Name	Common Name	Status	Effect Determination
Haliaeetus leucocephalus	Bald Eagle	BGEPA/MGTA	--
Laterallus jamaicensis jamaicensis	Eastern Black Rail	FT	MANLAA
Mycteria americana	Wood Stork	FT	MANLAA
Platalea ajaja	Roseate Spoonbill	ST	NAEA
Polyborus plancus audubonii	Audubon's Crested Caracara	FT	MANLAA
Rostrhamus sociabilis plumbeus	Everglade Snail Kite	FE	MANLAA
Mammals			
Eumops floridanus	Florida Bonneted Bat	FE	NO EFFECT
Perimyotis subflavus	Tricolored Bat	C	--
Ursus americanus floridanus	Florida Black Bear	M	--
Reptiles			
Drymarchon corais couperi	Eastern Indigo Snake	FT	MANLAA
Eumeces egregious lividus	Blue-tailed Mole Skink	FT	MALAA
Gopherus polyphemus	Gopher Tortoise	ST	NAEA
Pituophis melanoleucus mugitis	Florida Pine Snake	ST	NAEA
Neoseps reynoldsi	Sand Skink	FT	MALAA
Plants			
Bonamia grandiflora	Florida Bonamia	FT/SE	NO EFFECT
Calamintha ashei	Ashe's Savory	ST	NAEA
Calopogon mutliflorus	Many-flowered Grass-pink	ST	NAEA
Carex chapmanni	Chapman's sedge	ST	NAEA
Centosema Arenicola	Sand Butterfly Pea	SE	NAEA
Chionanthus pygmaeus	Pygmy Fringe-tree	FE	NO EFFECT
Clitoria fragrans	Pigeon Wings	FT/SE	NO EFFECT
Coelorachis tuberculosa	Piedmont Jointgrass	ST	NAEA
Coleataenia abscissa	Cutthroatgrass	SE	NAEA
Conradia brevifolia	Short-leaved Rosemary	FE	NO EFFECT

Scientific Name	Common Name	Status	Effect Determination
Plants Continued			
Crotalaria avonensis	Avon Park Harebells	FE	NO EFFECT
Dicerandra frutescens	Scrub Mint	FE	NO EFFECT
Eriogonum longifolium	Scrub Buckwheat	FT/SE	NO EFFECT
Hartwrightia floridana	Hartwrightia	ST	NAEA
Hypericum cumulicola	Highlands Scrub Hypericum	FE	NO EFFECT
Illicium parviflorum	Star Anise	SE	NAEA
Lechea cernua	Nodding Pinweed	ST	NAEA
Liatris ohlingerae	Florida Blazing Star	FE	NO EFFECT
Lupinus aridorum	Scrub Lupine	FE	NO EFFECT
Matelea floridana	Florida Spiny-pod	SE	NAEA
Nemasylis floridana	Celestial Lily	SE	NAEA
Nolina atopocarpa	Florida Beargrass	ST	NAEA
Nolina brittoniana	Britton's Beargrass	FE	NO EFFECT
Paronychia chartacea	Papery Witlow-wort	FT/SE	NO EFFECT
Polygala lewtonii	Lewton's Polygala	FE	NO EFFECT
Polygonella basiramia	Wireweed (Florida Jointweed)	FE	NO EFFECT
Polygonella myriophylla	Sandlace (Small's Jointweed)	FE	NO EFFECT
Prunus geniculate	Scrub Plum	FE	NO EFFECT
Pteroglossaspis ecristata	Giant Orchid	ST	NAEA
Salix floridana	Florida Willow	SE	NAEA
Warea amplexifolia	Clasping Warea	FE	NO EFFECT
Warea carteri	Carter's Mustard (Cater's Warea)	FE	NO EFFECT
Ziziphus celata	Florida Ziziphus	FE	NO EFFECT

MALAA = May Affect, Likely to Adversely Affect, **MANLAA** = May Affect, Not Likely to Adversely Affect, **NAEA** = No Adverse Effect Anticipated, **NEA** = No Effect Anticipated, **FE** = Federally Endangered, **FT** = Federally Threatened **SE** = State Endangered, **ST** = State Threatened, **M** = Managed, **C** = Candidate, **BGEPA** = Bald and Golden Eagle Protection Act, **MGTA** = Migratory Bird Treaty Act

Federally Listed Species and Designated Critical Habitat

The study area is located within or partially within the USFWS Consultation Area (CA) of Audubon's crested caracara, Everglade snail kite, Florida bonneted bat, Florida grasshopper sparrow, Florida scrub-jay, sand skink and, blue-tailed mole skink, and Lake Wales Ridge Plants. A consultation area is intended to identify the geographical landscape where each federally listed species is most likely to occur. Portions of the study area also fall within five wood stork Core Foraging Areas (CFA)s, which include suitable foraging areas important to the reproductive success of known wood stork nesting colonies. The existing habitats in the study area may also support other federally protected and Endangered Species Act (ESA) candidate species including the eastern black rail, eastern indigo snake, and tricolored bat (a candidate species). No Critical Habitat designated for listed species occurs within the SR 544 study area.

Federally Listed Plants

The Lake Wales Ridge is the remnant of an ancient dune system that runs north and south through Florida's peninsula. The entire study area occurs within the USFWS Lake Wales Ridge Plants CA. According to the Florida Natural Areas Inventory (FNAI) and USFWS, 19 federally listed plants have the potential to occur within the study area (**Table 2-17**). These include the endangered Avon Park harebells, Britton's beargrass, Carter's mustard, clasping warea, Florida ziziphus, Highlands scrub hypericum, Lewton's polygala, pygmy fringe tree, sandlace, scrub blazingstar, scrub lupine, scrub mint, scrub plum, short-leaved rosemary, and wireweed; and the threatened Florida bonamia, scrub pigeon wings, scrub buckwheat, and papery Whitlow-wort.

The Lake Wales Ridge Plants are restricted to sandy habitats maintained by periodic fire, such as scrub, high pine, turkey oak barrens, and sandhill. These habitats do not occur within the project area, including pond sites. The right-of-way is mowed and maintained, minimizing the ability for these species to grow in these areas. The proposed pond sites do not contain the scrub habitats to support these species. According to FNAI, none of these species have been documented within the project area. No federally listed plants were observed during the field surveys, however FDOT will conduct appropriately timed surveys for listed plant species during design and permitting. Because there is no suitable habitat and no documented occurrences, the proposed project will have "**no effect"** on federally listed plants.

State Listed Species

The FWC maintains the list of animals designated as federally endangered, federally threatened, state threatened, or species of special concern. While the USFWS has primary responsibility for federally endangered or threatened species in Florida, the Florida Fish and Wildlife Conservation Commission (FWC) works as a cooperating agency to help conserve these species and other imperiled species found in the state. Some listed and non-listed species are considered managed

species because of the well-developed programs that address their species' conservation, management, or recovery. The FWC has developed a comprehensive management plan and species action plans for the state's 57 state-listed species (FWC 2016).

Other Protected Species or Habitats

The analysis also noted species that are not state or federally listed but are protected under various other environmental acts.

The bald eagle was removed from the ESA in 2007 and Florida's Endangered and Threatened Species list in 2008; however, it remains protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. One active nest was observed approximately 95 feet from the existing roadway, however, after documenting the nest as active for several years from 2019 through 2022 the nest was discovered to have been destroyed during Hurricane Ian in September 2022. An eagle nest survey will be conducted during design and permitting to confirm the status of the nest.

The Florida black bear was removed from Florida's Endangered and Threatened Species list in 2012; however, it remains protected under Chapter 68A-4.009 F.A.C., the Florida Black Bear Conservation Plan. The study area is located in the occasional range of the South-Central Bear Management Unit (BMU). The most current FWC data for the Florida black bear was reviewed and documents only four historical occurrences within a one-mile buffer of the SR 544 roadway (**Figure 2-14**). No recent bear activity has been recorded in the corridor. No impacts to the Florida black bear are anticipated as a result of this project based on the lack of suitable habitat, including connectivity to suitable habitat, and bear utilization within the project area.

The southern fox squirrel was removed from Florida's Endangered and Threatened Species list in 2018; however, it remains protected under Chapter 68A-4.001, 68A-1.004. and 68A-29.002(1)c F.A.C. Ecologists observed suitable habitat for the southern fox squirrel which primarily occurs within the proposed pond sites and adjacent pastures containing pines and oaks. No individuals or nests were observed during the field survey. Pre-construction surveys will be conducted to adhere to the components of the Imperiled Species Management Plan (ISMP) and permitting guidelines; therefore, the project will have no impact on the southern fox squirrel.

Figure 2-14 Protected Species and Habitat

Wetlands and Surface Waters

Wetlands and other surface waters with the potential to be affected by the proposed project were identified within the study area (**Figure 2-15**). The following section includes a brief description of each wetland type and other surface water within the study area. **Table 2-18** provides details identifying each wetland including the wetland number, NWI, FLUCFCS classification, and a brief description.

Table 2-18 Wetlands and Other Surface Waters in the SR 544 Study Area

WETLAND ID	FLUCFCS	NWI	DESCRIPTION
WL 1	644	PEM1C	Emergent Aquatic Vegetation
WL 2	630	PFO7C/ PSS3B	Wetland Forested Mixed
WL 3	630	PFO7C/ PSS3B	Wetland Forested Mixed
WL 4	630/641/644	PEM1F/PEM1G	Wetland Forested Mixed/Freshwater Marshes/Emergent Aquatic Vegetation
WL 5	630/641/644	PFO6F/PFO7F/PEM1F	Wetland Forested Mixed/Freshwater Marshes/Emergent Aquatic Vegetation
WL 6	630/640/643	PFO7B/PFO1C/PAB4Hx/PSS1F	Wetland Forested Mixed/Freshwater Marshes/Wet Prairies
WL 7	643	PEM1Cd	Wet Prairies
WL 8	615/641	PEM1F	Stream and Lake Swamps/Freshwater Marshes
WL 9	630/641/643	PEM1Cd/PFO2F	Wetland Forested Mixes/Freshwater Marshes/Wet Prairies
WL 10	643	PEM1Cd	Wet Prairies
WL11	653	PEM1F	Intermittent Ponds
WL 12	653	PUBHx	Intermittent Ponds
WL 13	630/641	PFO7B/PEM1F	Wetland Forested Mixed/Freshwater Marshes
WL 14	630	PFO7C/PFO6F	Wetland Forested Mixed
WL 15	641	PFO6F/PSSF	Freshwater Marshes
WL 16	615/641	PEM1C	Freshwater Marshes
WL 17	644	L1UBH	Emergent Aquatic Vegetation
WL 18	618/630	PFO3A	Willow and Elderberry/Wetland Forested Mixed

WETLAND ID	FLUCFCS	NWI	DESCRIPTION
WL 19	615	PFO1/3C	Stream and Lake Swamps
WL 20	615	PFO1/3C	Stream and Lake Swamps
WL 21	615/644	PFO1/3C/PEM1F/PFO6F/PFO7C	Stream and Lake Swamps/Emergent Aquatic Vegetation
SW 1	510	R5UBFx	Streams and Waterways
SW 2	530	N/A	Reservoirs
SW 3A	510	L1UBHx	Streams and Waterways
SW 3B	510	L1UBHx	Streams and Waterways
SW 4	520	L1UBH	Lakes
SW 5	510	PUBCx	Streams and Waterways
SW 6	520	L1UBH	Lakes
SW 7	510	R5UBFx	Streams and Waterways
SW 8	510	PUBCx	Streams and Waterways
SW 9	510	PUBCx	Streams and Waterways
SW 10A	510	R2UBHx	Streams and Waterways
SW 10B	510	R2UBHx	Streams and Waterways
SW 11	510	PUBCx	Streams and Waterways
SW 12	510	PUBCx	Streams and Waterways
SW 13	510	PUBCx	Streams and Waterways
SW 14	530	PUBCx	Reservoirs
SW 15	530	PUBCx	Reservoirs
SW 16	530	PEM1F	Reservoirs
SW 17A	510	R2UBHx	Streams and Waterways
SW 17B	510	R2UBHx	Streams and Waterways
SW 18	510	R5UBFx	Streams and Waterways
SW 19	510	PUBCx	Streams and Waterways
SW 20	510	PUBCx	Streams and Waterways
SW 21	530	PUBCx	Reservoirs
SW 22	510	R5UBFx	Streams and Waterways
SW 23	510	R5UBFx	Streams and Waterways
SW 24	530	PUBHx	Reservoirs
SW 25	510	R5UBFx	Streams and Waterways
SW 26	510	R5UBFx	Streams and Waterways
SW 27	510	R5UBFx	Streams and Waterways
SW 28	530	PUBHx	Reservoirs
SW 29	510	PUBCx	Streams and Waterways
SW 30	510	PUBCx	Streams and Waterways
SW 31	510	PUBCx	Streams and Waterways

WETLAND ID	FLUCFCS	NWI	DESCRIPTION
SW 32	520	L1UBH	Lakes
SW 33	510	R5UBH	Streams and Waterways
SW 34	530	PEM1Cx	Reservoirs
SW 35	510	R5UBFx	Streams and Waterways

Figure 2-15 Wetlands and Other Surface Waters

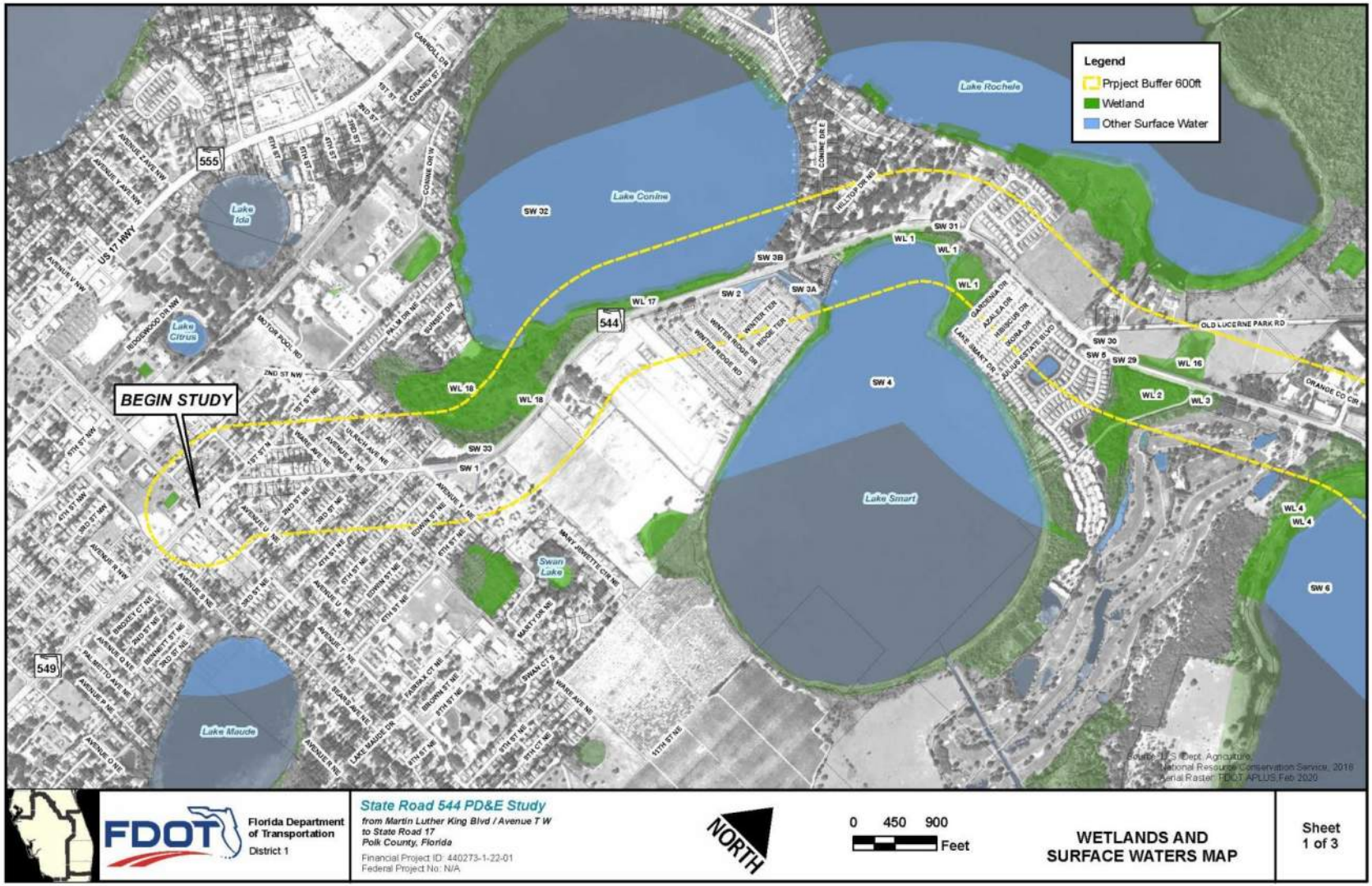


Figure 2-15 Wetlands and Other Surface Waters (Cont.)

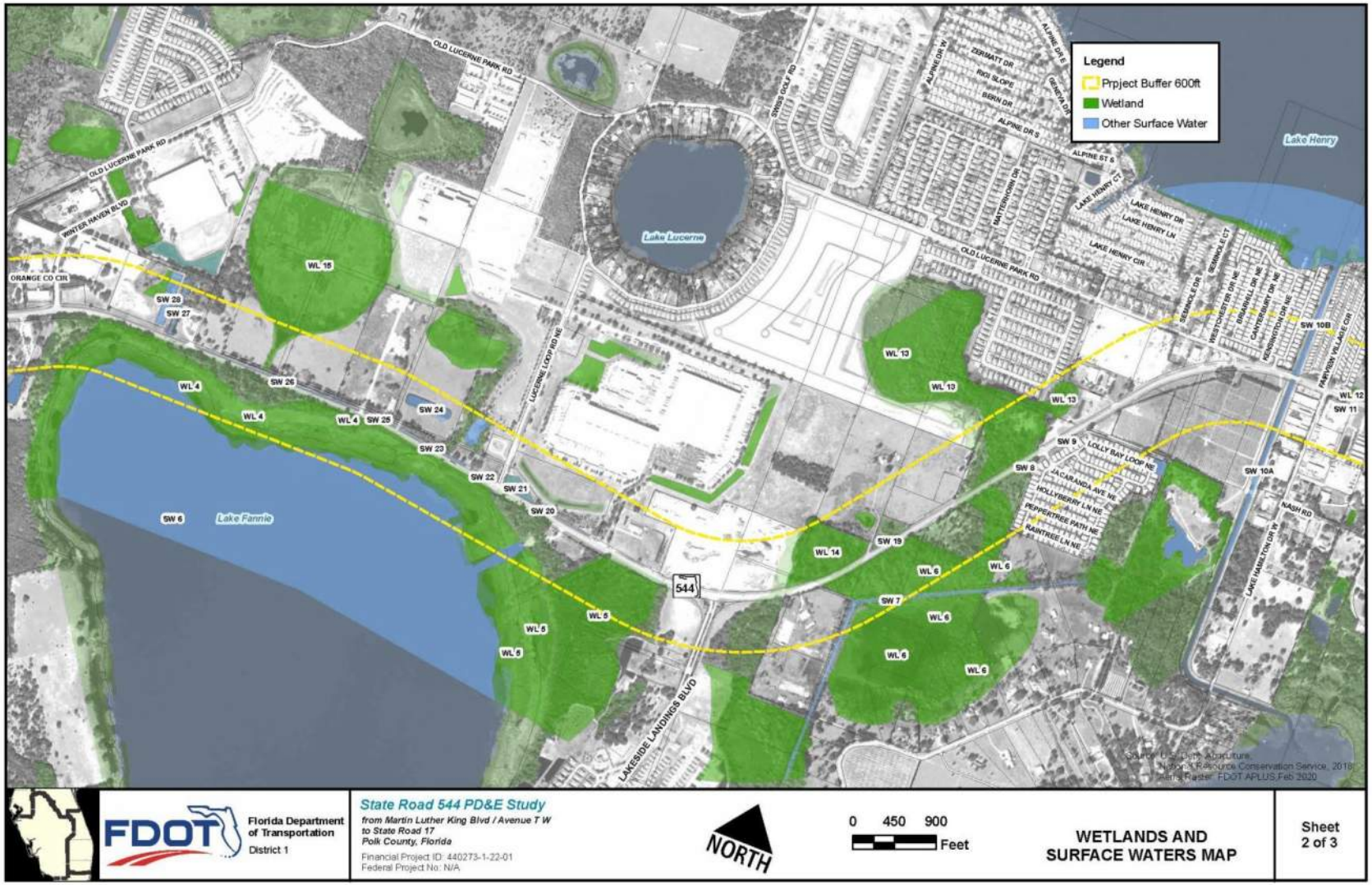
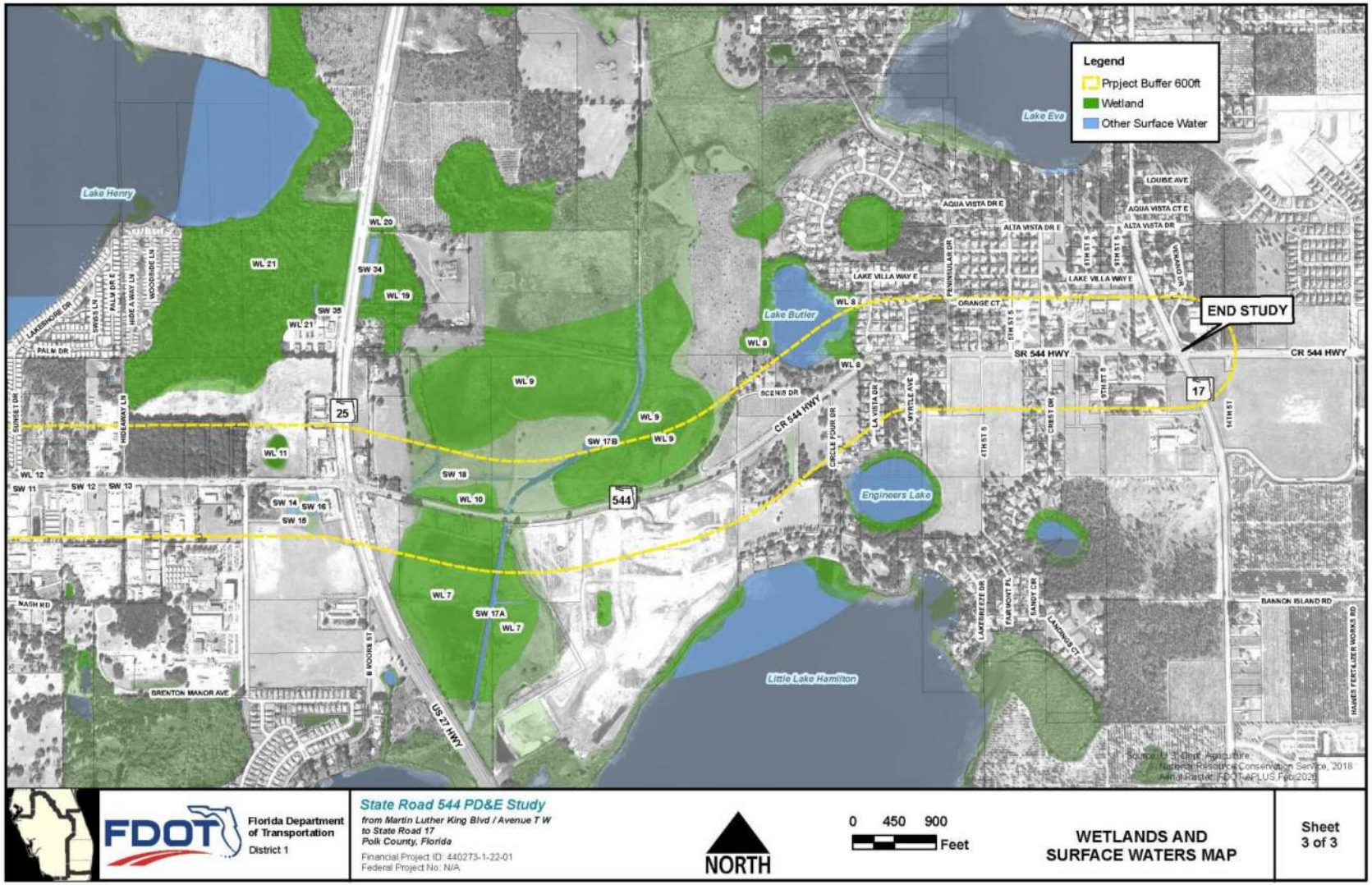


Figure 2-15 Wetlands and Other Surface Waters (Cont.)



Contamination

A Contamination Screening Evaluation Report (CSER) was conducted to identify potential contamination sites within the project limits, including the associated floodplain compensation and stormwater management sites and the following buffer distances as recommended by FDOT: 500 feet from the right-of-way line for petroleum, drycleaners, and non-petroleum sites; 1,000 feet from the right-of-way line for non-landfill solid waste sites; and ½ mile from the ROW line for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), known also as Superfund, National Priority List (NPL), or landfill sites. For each potential contamination site identified, a Contamination Risk Potential Rating (CRPR) of No, Low, Medium, or High was assigned.

Of the 39 sites investigated, the following risk ratings have been applied: 3 "High" rating sites, 6 "Medium" rating sites, and 30 "Low/No" rating sites for potential contamination concerns.

Sites receiving a CRPR of Medium or High are as follows:

- **SITE 2: BIG M MART (CITGO)**
  - **Risk Rating: HIGH**
  - The subject site is a retail gasoline station located at 128 Martin Luther King Boulevard Northeast on the southeast corner of the intersection of Martin Luther King Boulevard Northeast and First Street North in Winter Haven, Polk County, Florida. The facility layout consists of a single-story building, situated on the east side of the property, which operates as a convenience store. A canopy exists west of the facility building and covers three, typical, dispenser islands. The current tank field is located south of the canopy and consists of one 10,000-gallon and one 12,000-gallon unleaded gasoline and diesel Underground Storage Tanks (UST)s.

- **Site 6: CASTELGAS LLC/ PRONTO STATION LLC (Winter Haven Chevron)**
  - **Risk Rating: MEDIUM**
  - The subject site is a retail gasoline station located at 2100 1st Street North, on the northeast corner of the intersection of Martin Luther King Boulevard Northeast and First Street North in Winter Haven, Polk County, Florida. The facility layout consists of a single-story building, situated on the east side of the property, which operates as a convenience store. A canopy exists west of the facility building and covers four typical dispenser islands. The current tank field is located south of the building and consists of one 24,000-gallon unleaded gasoline and diesel UST installed and in service since April 2005.

- **SITE 7: WASHINGTON GARAGE**
  - **Risk Rating: Medium**
  - The property was a former auto repair site located at 2101 1st Street N. The site covers multiple parcels located west of SR 544 (Lucerne Park Road) and 1st Street N north of Avenue U NW and south of Avenue V NW in Winter Haven, Polk County, Florida. On September 12, 2006, the FDEP conducted a very limited soil assessment which indicated that Total Recoverable Petroleum Hydrocarbons (TRPH) and lead concentrations exceeded the Residential Soil Cleanup Target Levels (RSCTLS). Staff from the FDEP visited the site on July 1st, 2013, and found a vacant, undeveloped lot. Upon further consideration related to the limited nature of the preliminary shallow soil assessment and because the property is currently a vacant, undeveloped lot, FDEP determined that no further assessment will be required. Therefore, the FDEP closed the files on this case on September 10, 2013.

- **Site 8: BP #610 TWIN BROTHERS FOOD MART**
  - **Risk Rating: MEDIUM**
  - The subject site is a retail gasoline station located at 2433 Lucerne Park Road, northwest of SR 544 (Lucerne Park Road) and east of Cedie Street NE in Winter Haven, Polk County, Florida. The facility layout consists of a single-story building, situated on the north end of the property, which operates as a convenience store. A canopy exists south of the facility building and covers two typical dispenser islands. The current tank field is located south of the canopy and consists of one 20,000-gallon unleaded gasoline and diesel UST installed and in service since December 2007.

- **Site 20: GIANT OIL #121**
  - **Risk Rating: High**
  - The subject site is a retail gasoline station located at 5900 Lucerne Park Road and Old Lucerne Park Road in Winter Haven, Polk County, Florida. The facility layout consists of a single-story building situated on the west end of the property, which operates as a convenience store. A canopy exists east of the facility building and covers three typical dispenser islands. The current tank field is located east of the canopy, situated in the same area

as the former tank field, and consists of two 15,000-gallon USTs holding unleaded gasoline and diesel installed and in service since July 2009.

- **Site 28: RACETRAC #2343/ STAR ENTERPRISE/ TEXACO #242031370**
  - **Risk Rating: MEDIUM**
  - The former Sunshine Food Mart No. 199 was a retail gas station and convenience store located at 32886 US 27 on the southwest corner of SR 544 (Lucerne Park Road) and US 27 in Haines City, Polk County, Florida. The original set of USTs was installed in 1987 and removed in 2004. A new set of USTs was installed in 2004 in the same location as the original set of USTs. The USTs were removed on 2015. There were two prior reported petroleum discharges at this site; one on December 30, 1988 and one on January 6, 2004. A SRCO was issued by the FDEP on April 18, 2000 for the 1988 discharge and a SRCO was issued by the FDEP on April 19, 2006 for the 2004 discharge. In 2014, site demolition activities and storage tank system removal were conducted including removal of the site building. Site redevelopment for the new RaceTrac gas station and convenience store began in June 2016 with the facility opening in November 2016. Three 20,000-gallon USTs were installed in July 2016.

- **SITE 29: MARATHON-LUCERN #136**
  - **Risk Rating: HIGH**
  - The subject site is a retail gasoline station and convenience store located at 32940 US 27 on the northwest corner of SR 544 (Lucerne Park Road) and US 27 in Haines City, Polk County, Florida. The fuel dispensers are located east of the building and the UST area is located east of the two southern most dispensers. The site is paved with asphalt and concrete, and the dispensers are covered by a canopy. The site formally had six USTs installed in 1979 and 1988. The USTs were removed in 1995. The FDEP database reports that the site has two 10,000-gallon USTs installed in 1995.

- **SITE 38 A & B: Bridge Number 160021 and Bridge Bumber 106147**
  - **Location: 3 Individual Locations**
  - **Risk Rating: Medium**

  There are two numbered bridges along the project corridor: Bridge No. 160021 (Lake Henry/Hamilton Canal) located between Brentwood Drive and W Lake Hamilton Drive (28.080799, -81.662323); and Bridge No. 106147 (SR 544 Over

Lake Hamilton) east of US Hwy 27 (28.079705, -81.644214). These bridges present the risk of contamination involvement through the potential presence of ACMs and/or RCRA-regulated metals in the paints or MBCs. Therefore, these bridges and/or bridge culverts present a medium risk for contamination impacts and will require additional testing. One bridge culvert is located over the Conine-Smart Canal; however, is not recommended for testing.

- **SITE 39 A-K: Adjacent Agricultural Lands**
  - **Location: Several Locations**
  - **Risk Rating: Medium**

  The agricultural lands immediately adjacent to the project present the risk of contamination involvement through the potential presence of residual contaminants including herbicides, pesticides, and insecticides. Agricultural lands adjacent to DOT projects have been known to pose a challenge during construction phase due to unidentified residual contaminants during the planning and development phase. Therefore, the agricultural lands located adjacent to the project pose a medium risk for contamination impacts.

Table 2-19 Adjacent Agricultural Lands

Site	Approximate Location	Parcel Number(s)
39 A	East of SR 544, to the north of Avenue Y NE	26-28-16-000000-032040
		26-28-16-000000-013020
		26-28-16-000000-031060
		26-28-16-000000-031050
39 B	North of SR 544, to the west of Old Lucerne Park Road	26-28-09-530000-000011
39 C	North/west of SR 544, to the south of Jacaranda Avenue	26-28-01-521000-332001
		26-28-01-521000-331002
39 D	North and south of SR 544, at Old Lucerne Park Road	26-28-01-521000-203002
		26-28-01-521000-203003
		26-28-01-521000-182003
		26-28-01-521000-181001
		26-28-01-521000-180001

Site	Approximate Location	Parcel Number(s)
		26-28-01-521000-203001
		26-28-01-521000-182001
39 E	North of SR 544, west of Brenton Manor Avenue	27-28-06-821500-000010
		27-28-06-821500-000040
		27-28-06-821000-005010
		27-28-06-821500-000050
		27-28-06-821000-006010
39 F	West of US HWY 27, to the north of SR 544	27-27-31-000000-042020
39 G	East of US Hwy 27, to the north of SR 544	27-28-06-000000-013070
39 H	North and south of SR 544, between Scenic Drive and La Vista Drive	27-28-05-000000-013070
		27-28-05-817000-002010
		27-28-05-000000-013010
		27-28-05-820517-000010
39 I	South of SR 544, at 4th Street	27-28-05-819000-000010
		27-28-04-814000-000010
39 J	South of SR 544, between Crest Drive and 8th Street S	27-28-04-815000-000070
		27-28-04-812500-000010
39 K	Adjacent to SR 544 at SR 17	27-28-04-815032-000011
		27-28-04-815032-000012
		27-27-32-800000-000051
		27-27-32-800000-000041
		27-27-32-800000-000061

For those sites with a risk rating of "Medium" or "High", the District Contamination Impact Coordinator (DCIC) will coordinate on further actions that must be taken to best address the contamination issue. This may include determining if the Florida Department of Environmental Protection (FDEP)/FDOT Memorandum of Understanding (MOU) applies to any sites, conducting

Level II activities or recommending Level III or remedial activities, notes on the plans, design modifications and/or special provisions prior to or during construction.

Cultural Resources

A Cultural Resource Assessment Survey (CRAS) was prepared to locate and identify any cultural resources within the project Area of Potential Effects (APE) and to assess their significance in terms of eligibility for listing in the National Register of Historic Places (NRHP). As defined in 36 CFR Part § 800.16(d), the APE is the "geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." The archaeological APE was defined as the footprint of construction including pond sites. The historical APE includes the footprint of construction and immediately adjacent parcels where resources within 200-feet of the existing right-of-way were surveyed. In addition, the historical APE included resources within 100-feet of the proposed pond sites. The archaeological and historical/architectural field surveys were conducted between March and June 2023.

Archaeological background research indicated that three archaeological sites have been recorded within the APE and four within one-half mile. Sites within the APE include 8PO04797 (Homer's Grove Site), a single artifact site (today referred to as an archaeological occurrence [AO]), 8PO05426 (Whittaker Site) a low-density Pre-Contact artifact scatter, and 8PO05407 (Lake Tracey Canal), a historic earthwork dating to the American Boom Times (1921-1929). Sites within one-half mile include 8PO04798 (Hochberg Hammock) a single artifact site, 8PO07085 (Chris' Last Site) a lithic scatter, 8PO08107 (Bellaviva C Site) a lithic scatter, and 8PO06533 (Lake Rochelle Site). The two single artifact sites have not been evaluated by the State Historic Preservation Officer (SHPO), but the five other archaeological sites were determined ineligible for listing in the NRHP by the SHPO. Based on a review of the relevant site information for environmentally similar areas within Polk County and the surrounding region, the archeological APE was considered to have variable archaeological potential. As a result of the survey, including the excavation of 84 shovel tests placed in the pond sites and 134 shovel tests within the project corridor, no Pre-Contact period or historic archaeological sites were discovered and no evidence of 8PO04797 (Homer's Grove Site) or 8PO05426 (Whittaker Site) were found within the APE. The Lake Tracey Canal (8PO05407) is within the APE, but no testing was deemed necessary given that it is a canal. However, one AO was found; it is not considered a site and is not NRHP eligible.

Historical/Architectural field survey resulted in the identification of 108 historic resources within the APE. This includes 100 newly identified historic resources, seven extant previously recorded historic resources, and an unrecorded segment of the Peace Creek Drainage Canal. These 108 historic resources include: 98 buildings constructed between ca. 1895 and 1977, three building complex resource groups, one historic district, one designed historic landscape, three linear resources, and two bridges. Furthermore, the field survey revealed that two previously recorded historic resources are no longer extant. SHPO concurrence was received on August 21, 2023 and is provided in the project folder.

In addition, the Florence Citrus Growers Association Historic District (8PO09983) was newly identified during the survey.

As a result, a CRAS Addendum (December 2024) was also prepared that included additional historic context in order to determine the eligibility of the District. The CSR evaluated a Colonial Revival style building located at 2208 Peninsular Drive (8PO03077), a Craftsman style building located at 128 Scenic Highway (8PO03079), the Alta Vista Elementary School (8PO10093) building complex resource group with two contributing resources (8PO10094 and 8PO10095), and the Florence Citrus Growers Association Historic District (8PO09983) with 11 contributing resources (8PO09999, 8PO10000, 8PO10005, 8PO10007 – 8PO10012, 8PO10014, 8PO10015). Potential effects to these historic properties were evaluated in accordance with the provisions of Section 106 of the National Historic Preservation Act of 1966 (Public Law 89-665, as amended), as implemented by 36 Code of Federal Regulations [CFR] Part 800 ("Protection of Historic Properties," revised January 2004), and Chapter 267, Florida Statutes.

The FDOT has applied the Criteria of Adverse Effect found in 36 CFR Part 800.5 to the 17 historic properties determined eligible or that appear eligible for listing in the NRHP located within the project APE. Based on the proposed undertaking, the findings presented here indicate that the Preferred Alternative within the study Segments 1 and 8 will have No Adverse Effect to the Colonial Revival style building (8PO03077), the Craftsman style building (8PO03079), the Alta Vista Elementary School (8PO10093) building complex resource group with two contributing resources (8PO10094 and 8PO10095), and the Florence Citrus Growers Association Historic District (8PO09983) with 11 contributing resources (8PO09999, 8PO10000, 8PO10005, 8PO10007 – 8PO10012, 8PO10014, 8PO10015). No historic properties are located within Segments 2 through 7 from north of Avenue Y to LaVista Drive.

Recreation Areas

Three recreation areas exist along SR 544 within the project limits. These include the Lake Conine Wetland Restoration Park which is a joint project between the City of Winter Haven (official with jurisdiction), Polk County, SWFMWD and Florida Department of Environmental Protection. The Lake Conine boat ramp is located on the north side of SR 544, west of the Lake Conine Canal and the Lake Fannie Boat Ramp is on the south side of SR 544, east of Lucerne Loop Road, both are owned and managed by the Lake Region Lakes Management District.

Section 4(f) Resources

Seven Section 4(f) resources are present along SR 544 within the project limits and are listed in **Table 2-20**.

Table 2-20 Section 4(f) Resources

Resource Name	Facility Type	Property Classification	Owner/Official with Jurisdiction	Recommended Outcome	OEM SME Action
Lake Conine Boat Ramp and Fishing Pier	Public Parks and Recreation Areas	Park/Rec Area	The Lake Region Lakes Management District	Exception/Exemption	Determination 10-03-2024
Lake Conine Recreation Area	Public Parks and Recreation Areas	Park/Rec Area	City of Winter Haven Natural Resources	No Use	Determination 05-07-2024
Lake Fannie Boat Ramp and Fishing Pier	Public Parks and Recreation Areas	Park/Rec Area	The Lake Region Lakes Management District	No Use	Determination 05-07-2024
Florence Citrus Growers Association Historic District (8PO09983)	Historic District	Historic Site	State Historic Preservation Officer (SHPO)	de minimis	Concurrence Pending
2208 Peninsular Drive (8PO03077)	Single Family Residence	Historic Site	State Historic Preservation Officer (SHPO)	de minimis	Concurrence Pending
128 Scenic Highway (8PO03079)	Single Family Residence	Historic Site	State Historic Preservation Officer (SHPO)	de minimis	Concurrence Pending
Alta Vista Elementary School (8PO10093)	Elementary School	Historic Site	State Historic Preservation Officer (SHPO)	de minimis	Concurrence Pending

It was determined that there will be no acquisition of land from the Lake Fannie Boat Ramp and Pier or the Lake Conine Recreation Area. There will be no occupation of the resources on a

temporary or permanent basis, and no proximity impacts to the resources. While no impacts to the resources are anticipated, FDOT is required to document the Section 4(f) Resource and suggests a No Use designation. This means that while this property exists adjacent to the project area, the proposed project has no use of the property within the meaning of Section 4(f). Coordination and concurrence with both OWJ's are included in the project file.

Due to the proposed roadway improvements to SR 544, the grade of the road will need to be raised approximately one to two feet based on limited existing LiDAR information, which will require that the existing driveway/access road into the Lake Conine Boat Ramp and Pier be regraded to connect to the proposed roadway improvements. No additional R/W will be acquired due to this improvement; however, a temporary construction easement (TCE) will be required in order to reconstruct the existing driveway to tie to existing grades. Access will be maintained during construction. The reconstruction of the driveway/access road will align with the proposed roadway widening and will not require a change in ownership of the land. Construction activities will have a temporary impact on the resource. The Temporary Traffic Control Plans (TTCP) will include details and notes stating that access to the boat ramp is to be maintained during construction. A Section 4(f) Exemption was submitted to the Lake Region Lakes Management District and approved on October 6, 2023.

A determination of de minimis was given for the Colonial Revival style building located at 2208 Peninsular Drive (8PO03077), a Craftsman style building located at 128 Scenic Highway (8PO03079), the Alta Vista Elementary School (8PO10093) building complex resource group with two contributing resources (8PO10094 and 8PO10095), and the Florence Citrus Growers Association Historic District (8PO09983) with 11 contributing resources (8PO09999, 8PO10000, 8PO10005, 8PO10007 – 8PO10012, 8PO10014, 8PO10015). A concurrence letter of these findings was submitted to the SHPO and approved on December 10, 2024.

3.0 FUTURE CONDITIONS

3.1 Future Conditions Considerations

Future Context Classification and Future Land Use

The proposed improvements to SR 544 are not expected to result in any changes to future land use or context classification within the project limits. Future land uses for Haines City, Winter Haven, and Polk County are illustrated in **Figure 3-1**.

Opening Year (2025) and Design Year (2045) AADT Volumes

This section summarizes the development of the opening year (2025) and design year (2045) AADT volumes for the SR 544 PD&E Study corridor. The first step in the development of the design year (2045) AADT volumes involved conducting a subarea validation of the Base Year (2010) District One Regional Planning Model (D1RPM). The next step in the development of the design year (2045) AADT volumes involved conducting a series of travel demand model runs using the 2040 D1RPM. The revisions to the base year (2010) D1RPM model network that were made during the subarea model validation were incorporated into the 2040 D1RPM and the following four alternatives were coded and run:

• No-Build Alternative – Existing laneage on SR 544 from Martin Luther King Boulevard to SR 17

• Build Alternative No. 1 – Four-lane divided roadway on SR 544 from Martin Luther King Boulevard to SR 17

• Build Alternative No. 2 – Four-lane divided roadway on SR 544 from Avenue Y to SR 17 and a two-lane undivided roadway from Martin Luther King Boulevard to Avenue Y

• Build Alternative No. 3 – Four-lane divided roadway on SR 544 from north of Avenue Y to SR 17, a two-lane undivided roadway from Martin Luther King Boulevard to north of Avenue Y and a new four-lane divided roadway connecting Martin Luther King Boulevard (west of SR 544) and SR 544 (north of Avenue Y)

Figure 3-1 Future Land Use Map

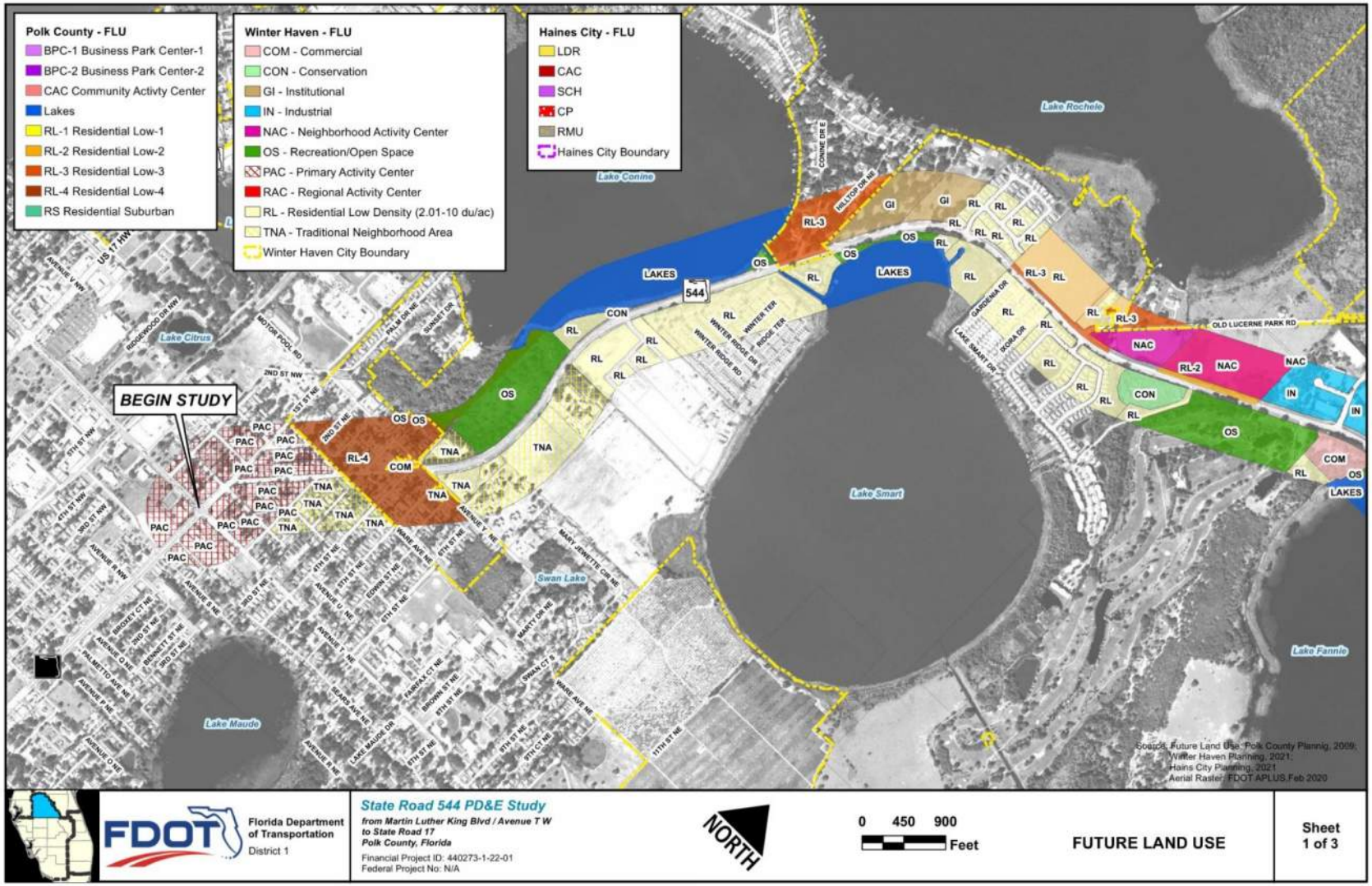


Figure 3-1 Future Land Use Map, continued

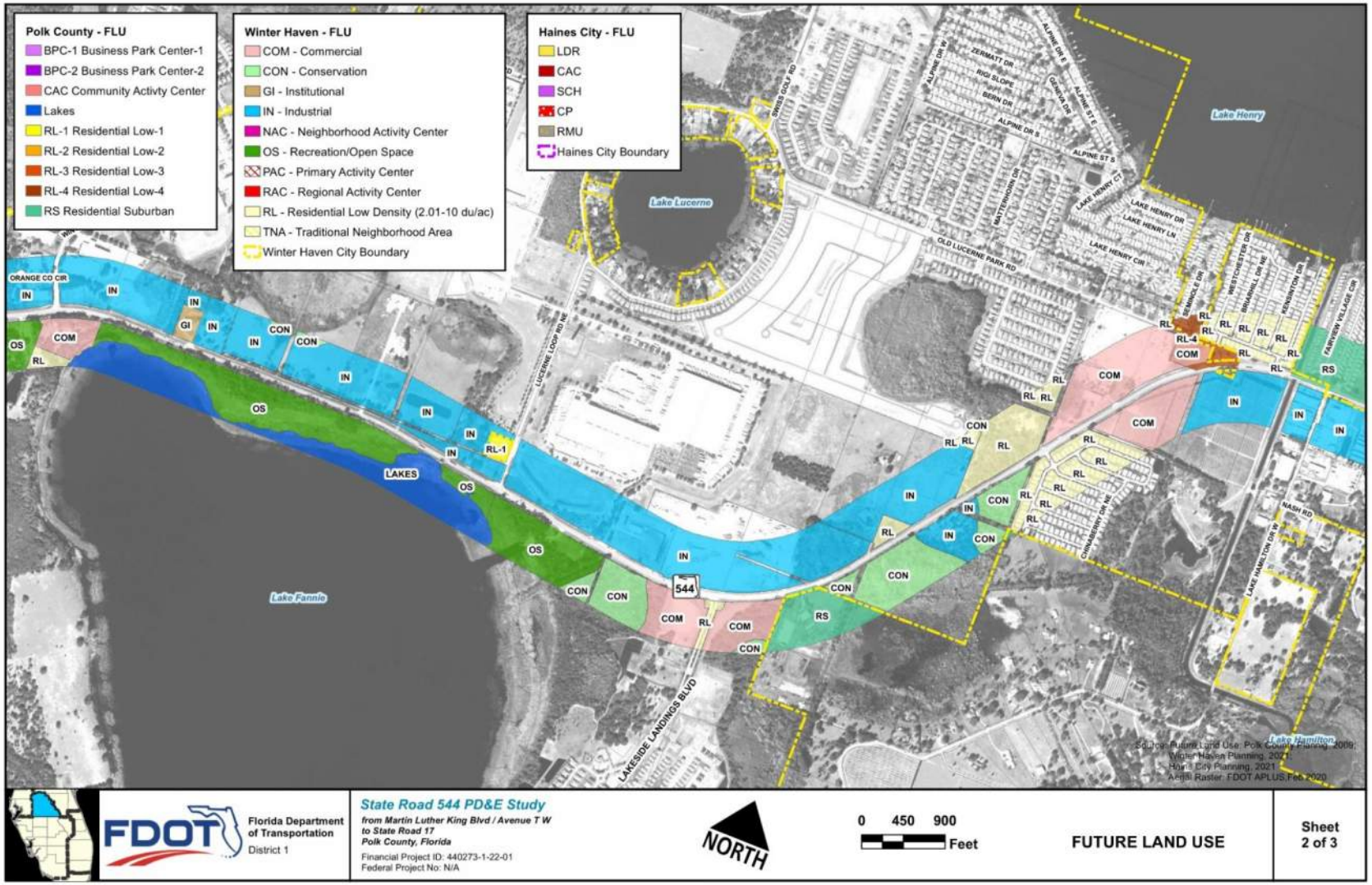
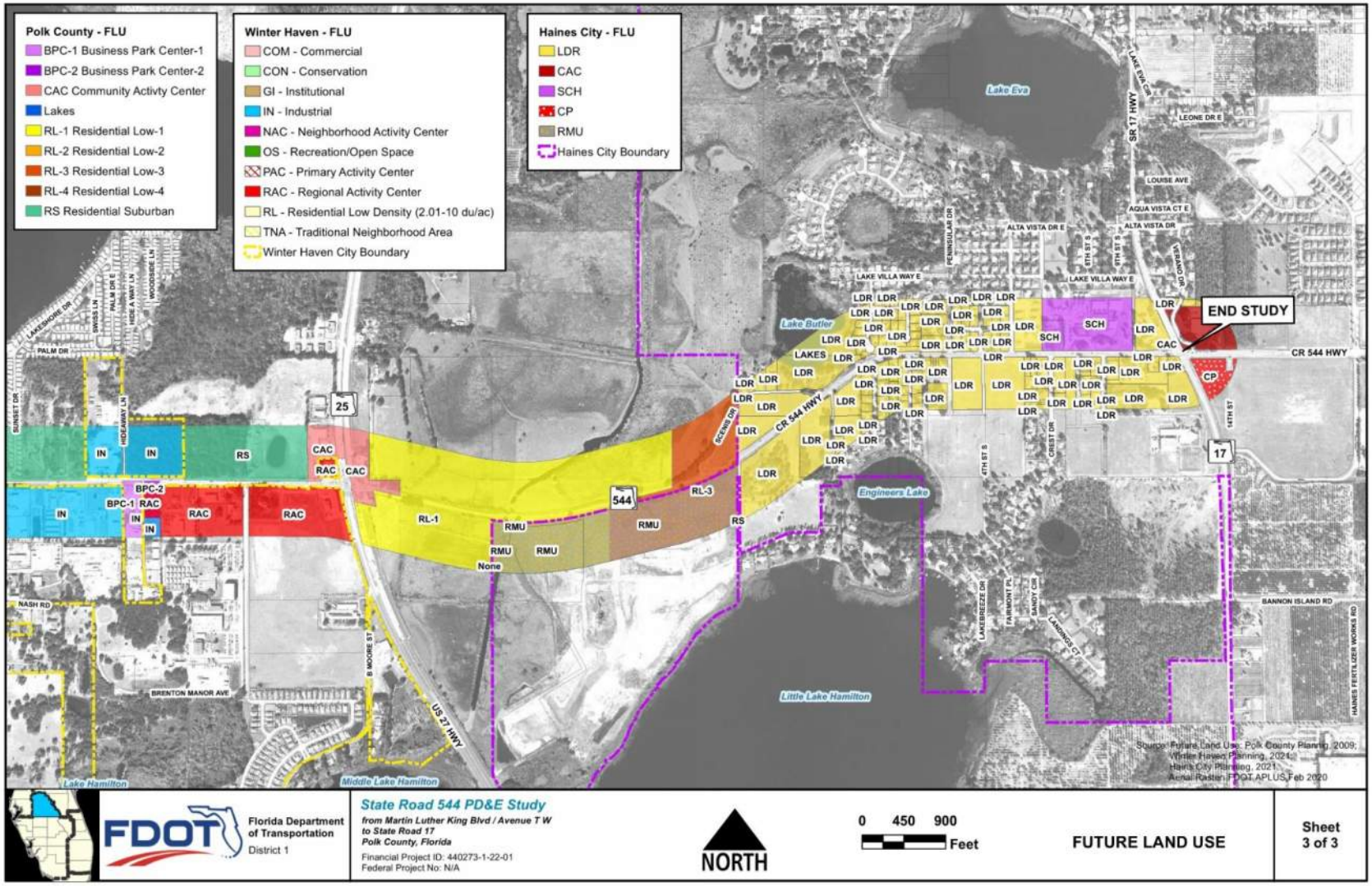


Figure 3-1 Future Land Use Map, continued



The No-Build Alternative was modeled to document the need for additional capacity (i.e., lanes) within the SR 544 study corridor. Build Alternative No. 1 was modeled because the Polk TPO's Adopted 2040 Long Range Transportation Plan (LRTP) includes the four-laning of SR 544 from Martin Luther King Boulevard to SR 17 as a cost-feasible highway improvement.

Build Alternative No. 2 was modeled to evaluate the impact of not four-laning the portion of SR 544 from Martin Luther King Boulevard to Avenue Y. The existing right-of-way in this portion of the study corridor is only 50 feet and the construction of a four-lane roadway will require additional right-of-way and result in impacts to some of the existing residential land uses in the Florence Villa community. Finally, Build Alternative No. 3 was modeled to assess the impact of constructing a four-lane bypass around the Florence Villa Community. The 2040 AADT volumes obtained from the Build Alternative No. 2 travel demand model run provide an initial indication as to whether the southernmost portion of the SR 544 study corridor is expected to operate overcapacity without the four-laning. Similarly, the 2040 AADT volumes obtained from the Build Alternative No. 3 travel demand model run provide an initial indication as to whether the construction of a new bypass roadway is expected to divert enough vehicles from the southernmost portion of the SR 544 study corridor to allow the existing roadway to operate at an acceptable LOS.

Following the development of the projected traffic for the three Build Alternatives, further assessment of the three alternatives resulted in the decision to no longer consider the four-laning of SR 544 through the Florence Villa neighborhood (Build Alternative 1) due to extensive residential relocations that would result or the option to consider a new four-lane bypass roadway around the Florence Villa neighborhood (Build Alternative 3) because the benefits did not outweigh the disadvantages.

The opening year (2025) AADT volumes were derived by interpolating between the existing (2019) and design year (2045) AADT volumes. The 2025 AADT volumes for the No Build and Build Alternative 2 are graphically illustrated in **Figure 3-2** and **Figure 3-3**. The 2045 AADT volumes for the No Build and Build Alternative 2 are graphically illustrated in **Figure 3-4** and **Figure 3-5.**

Figure 3-2 Opening Year (2025) AADT Volumes - No Build Alternative

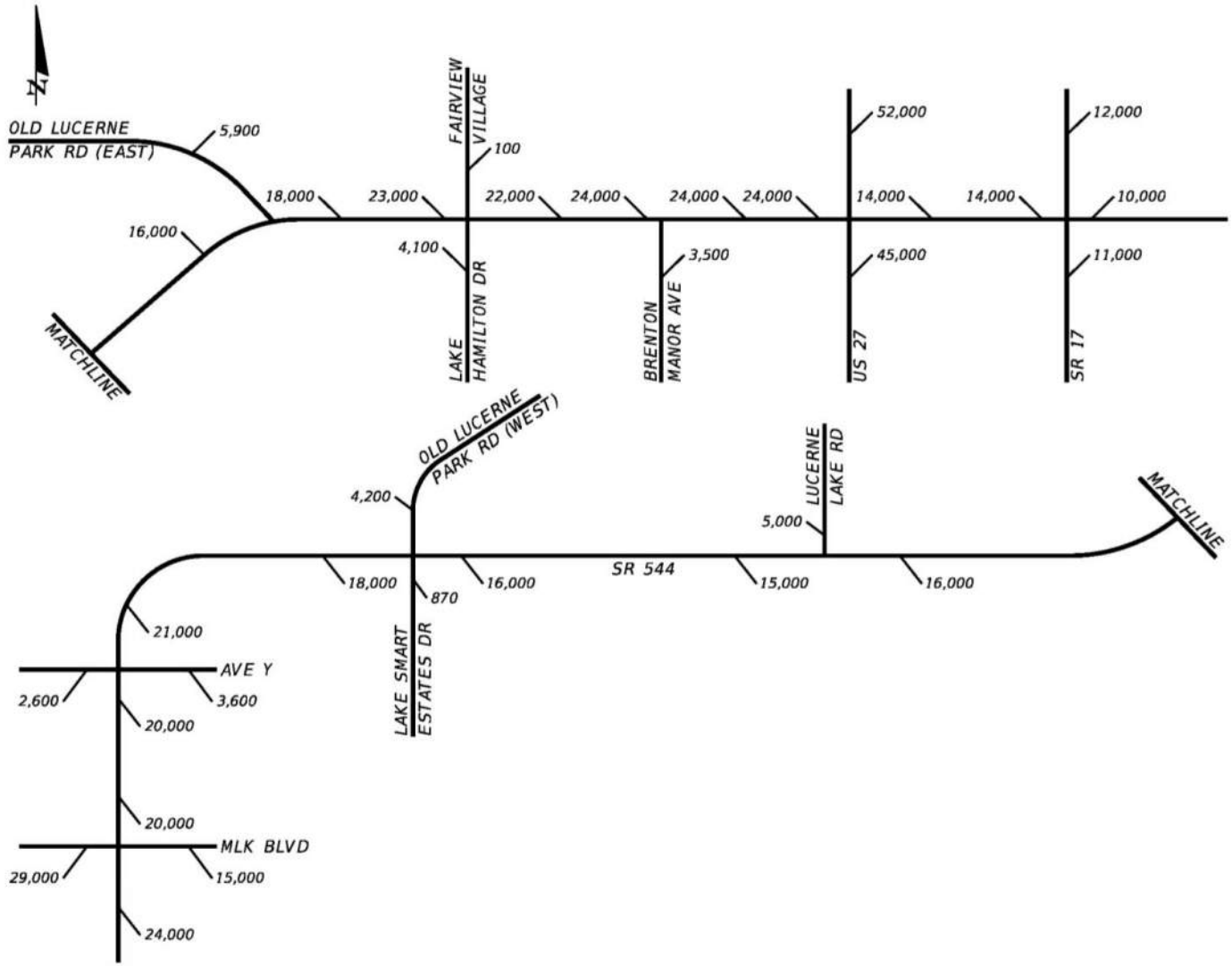


Figure 3-3 Opening Year (2025) AADT Volumes - Build Alternative 2

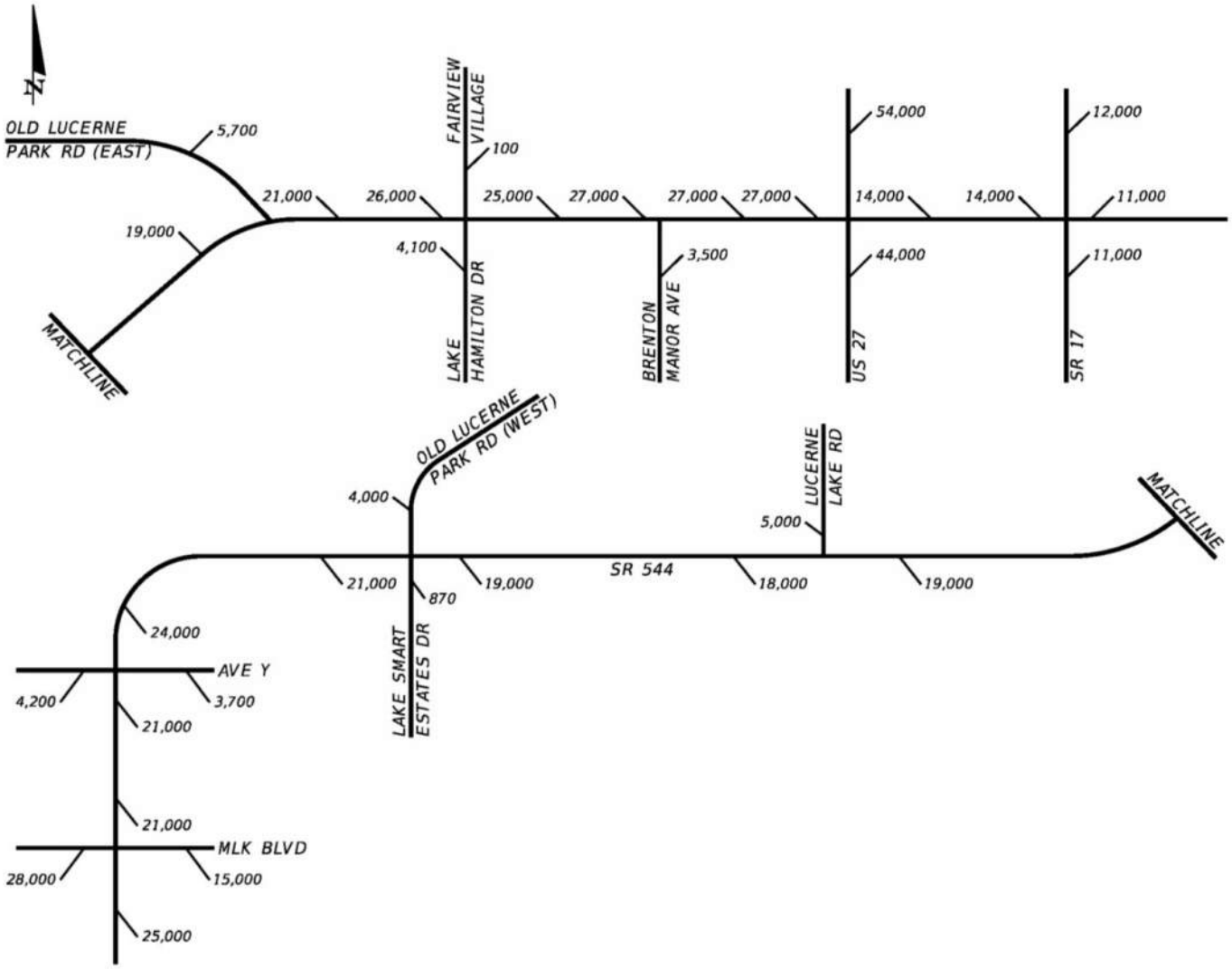


Figure 3-4 Design Year (2045) AADT Volumes – No Build Alternative

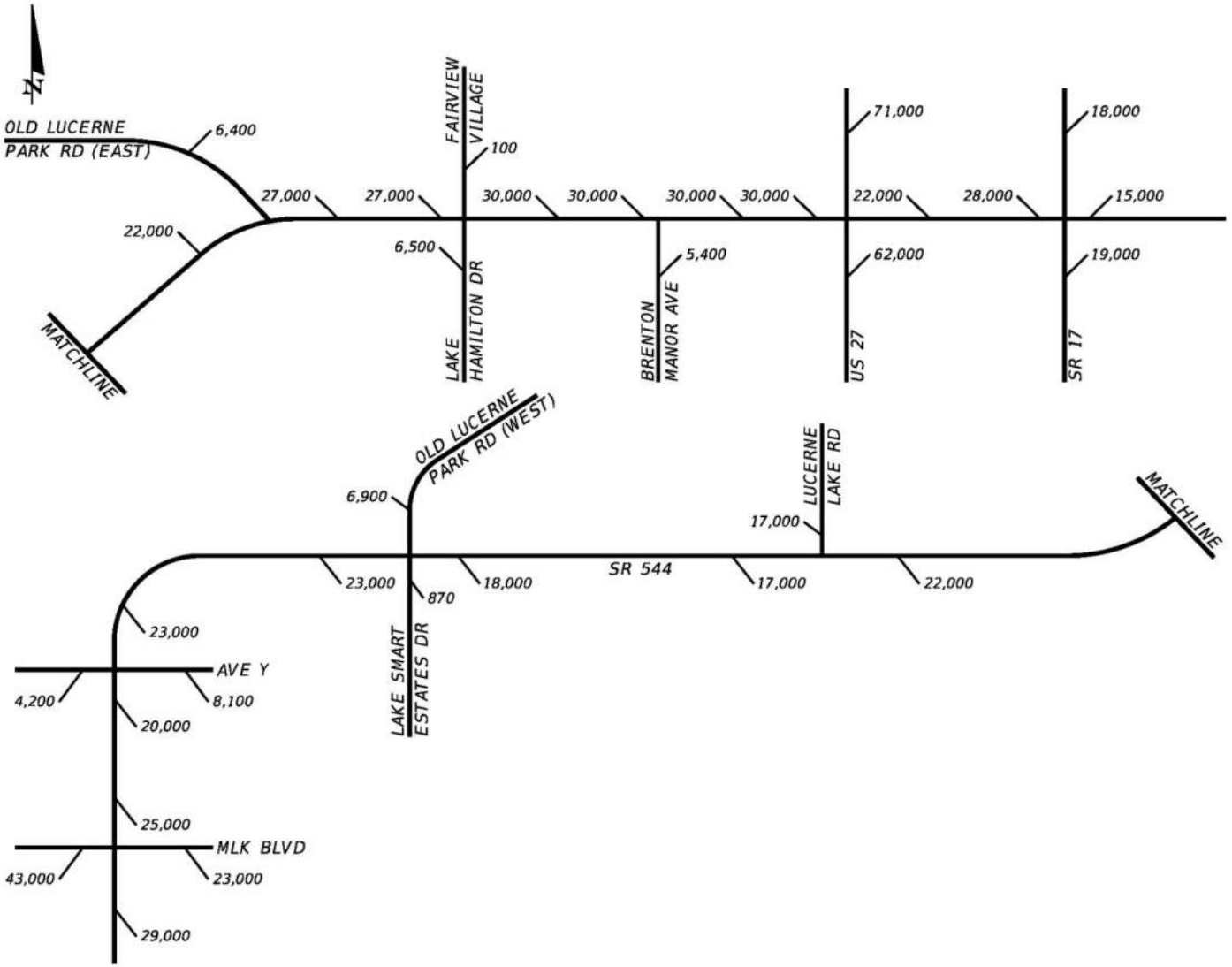
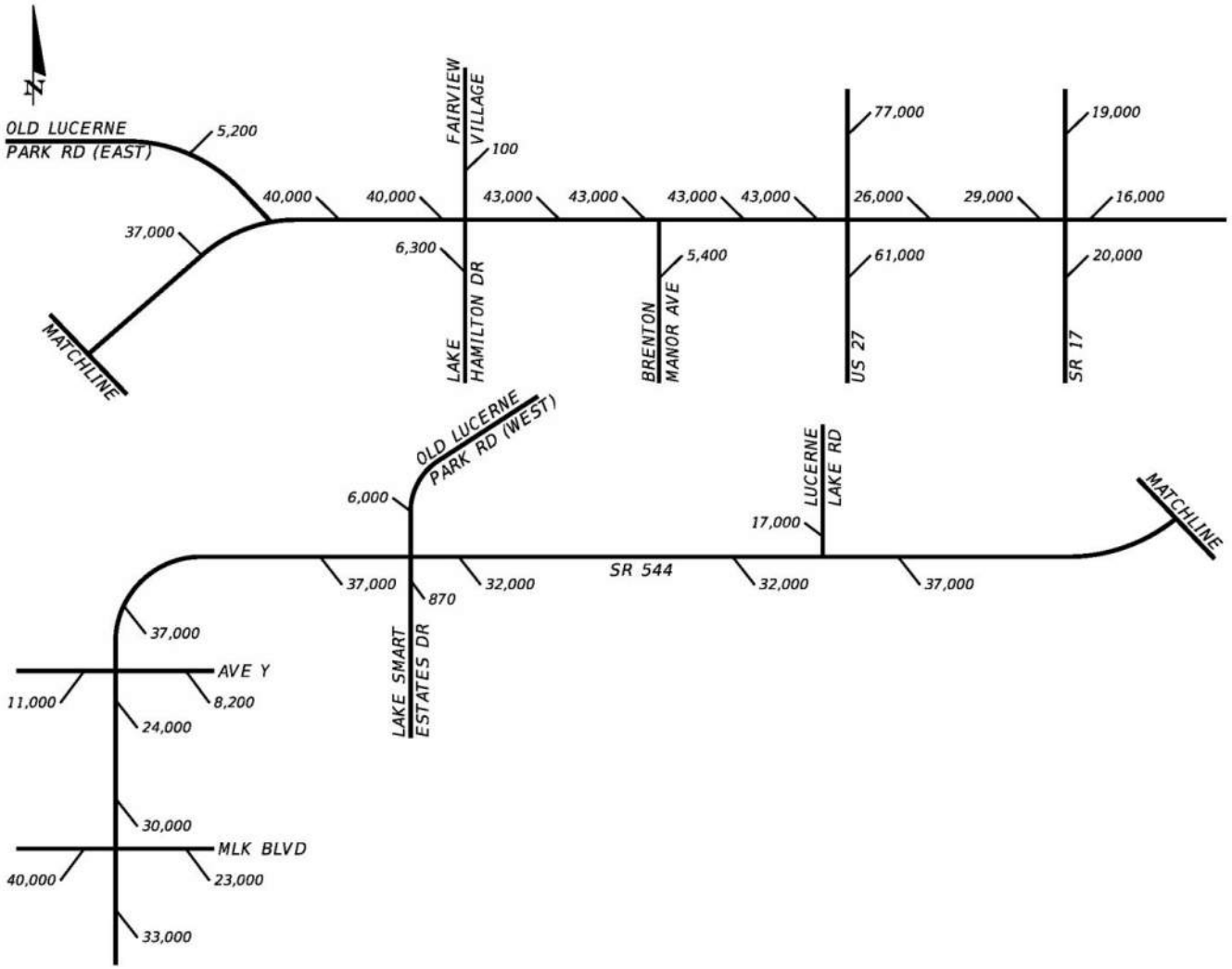


Figure 3-5 Design Year (2045) AADT Volumes – Build Alternative 2



K-factor, D-factor, and T-factor

The K-factor that is used for this study is 9.0%. This value is the Standard K-factor for urbanized areas, as well as areas that are transitioning to urbanized areas, and represents the percentage of the AADT volume that occurs during the typical weekday peak hour. The study corridor is located within the urbanized portion of Polk County. It should be noted that a Standard K-factor of 9.0% is significantly higher than the existing peak hour K-factors associated with SR 544.

The overall average D-factor for the study corridor was calculated to be approximately 53.5% in the AM peak hour and approximately 53.7% in the PM peak hour. A review of the FDOT's Historical AADT Report for the telemetered (permanent) count station on SR 544 west of Old Lucerne Park Road – east end (FDOT Count Station No. 160275) indicates the 2019 D-factor is 52.9% for this location. This D-factor value represents the median D-factor of the 200 highest volume hours for the entire year and compares favorably to the overall average peak hour D-factors for the entire study corridor. In addition, the average D-factor for this permanent count station location over the ten-year period from 2010 to 2019 is approximately 53.1%. Consequently, a D-factor value equal to 53.0% was used for this study.

The 2025 and 2045 daily percentages are lower than the 2019 daily percentages at all six locations. Although truck volumes are expected to increase over the 26-year period from 2019 to 2045, the increase in passenger vehicles is expected to be greater than the increase in trucks as a result of the significant amount of passenger vehicle trips that will be generated by the future residential, commercial and office land uses projected to occur within the study corridor. This will result in lower future year daily and peak hour truck percentages (compared to the existing percentages). The average yearly percentage increase in daily truck volumes over the 26-year period from 2019 to 2045 was subsequently calculated and these average yearly growth rates are also provided in **Table 3-1**. The average yearly growth rates range between 2.2% per year and 4.1% per year, with an average value equal to approximately 2.8% per year. Based on the results of this daily truck volume forecasting methodology, the following daily truck percentages (T-factors) were recommended and approved by District One for use in the SR 544 PD&E Study:

Opening Year (2025)

- 7.4% from Martin Luther King Boulevard to US 27
- 12.9% from US 27 to SR 17

Design Year (2045)

- 6.0% from Martin Luther King Boulevard to US 27
- 10.8 % from US 27 to SR 17

Table 3-1 Design Year (2045) and Opening Year (2025) Daily Truck Volumes & Percentages

	Build Alternative No. 1 (2045)			Existing (2019)			2019 - 2045	Build Alternative No. 1 (2025)		
Location	AADT	Truck AADT	Daily Truck %	AADT	Truck AADT	Daily Truck %	% Incr/Year	AADT	Truck AADT	Daily Truck %
North of MLK Blvd	43,000	2,700	6.3%	18,800	1,300	6.9%	4.1%	24,000	1,600	6.7%
South of Conine Dr	40,000	2,400	6.0%	19,200	1,500	7.6%	2.3%	24,000	1,700	7.1%
East of Winter Haven Blvd	33,000	1,900	5.8%	14,000	1,200	8.6%	2.2%	18,000	1,400	7.8%
West of Old Lucerne Park Rd (east end)	38,000	2,200	5.8%	14,000	1,400	9.7%	2.2%	20,000	1,600	8.0%
West of Hide-A-Way Ln	44,000	2,800	6.4%	21,000	1,600	7.6%	2.9%	26,000	1,900	7.3%
Average			6.0%			8.1%	2.8%			7.4%
West of Circle 4 Dr	26,000	2,800	10.8%	11,000	1,500	13.3%	3.3%	14,000	1,800	12.9%

Opening Year (2025) and Design Year (2045) No-Build Alternative Roadway Segment Levels of Service

Tables 3-2 and 3-3 summarizes the opening year (2025) No-Build Alternative roadway segment LOS analysis results. With one exception, all of the two-lane undivided segments of SR 544 are projected to operate at LOS E for the peak travel direction during the AM peak hour. Only the portion of SR 544 from the west end of Old Lucerne Park Road to Lucerne Lake Road is projected to operate at LOS D during the AM peak hour. In addition, seven of the eleven two-lane undivided segments are also projected to operate at LOS E for the off-peak travel direction. Similarly, only one of the two-lane undivided segments is not projected to operate at LOS E for the peak travel direction during the PM peak hour. The 55-mph segment located east of US 27 is projected to operate at LOS D for both the peak and off-peak travel directions. Seven of the eleven two-lane undivided segments are also projected to operate at LOS E for the off-peak travel direction. The four-lane undivided segment between Peninsular Drive and SR 17 is projected to operate at LOS A for both travel directions during both peak hours. It should be noted the existing posted speed for the portion of SR 544 from Martin Luther King Boulevard to Avenue Y is 35 mph. The lowest speed the HCS two-lane highway software allows the user to enter is 45 mph. Consequently, the base free flow speed needed to be manually modified and the average travel speed and percent free flow speed calculations needed to be conducted manually.

Tables 3-4 and 3-5 summarizes the results of the design year (2045) No-Build Alternative roadway segment LOS analysis. The entire two-lane undivided portion of SR 544 is projected to operate at LOS E for both travel directions during both peak hours. The four-lane undivided segment between Peninsular Drive and SR 17 is projected to operate at LOS B for both travel directions during both peak hours. These results document the need to widen SR 544 from Martin Luther King Boulevard to Peninsular Drive prior to the design year.

Table 3-2 Opening Year (2025) No-Build Alternative AM Peak Hour Roadway Segment Analysis Summary

AM Peak Hour													
From	**To**	**No. of Lanes**	**Posted Speed**	**NB/EB Volume**	**NB/EB ATS (1)**	**NB/EB % FFS (2)**	**NB/EB PTSF (3)**	**NB/EB LOS (4)**	**SB/WB Volume**	**SB/WB ATS (1)**	**SB/WB % FFS (2)**	**SB/WB PTSF (3)**	**SB/WB LOS (4)**
Martin Luther King Blvd	Avenue Y	2	35	626	18.1	60.3%	73.0%	E	753	18.1	60.3%	78.9%	E
Avenue Y	Speed Limit Change	2	45	666	34.9	71.6%	77.5%	E	852	34.5	70.9%	86.5%	E
Speed Limit Change	Old Lucerne Park Rd (west end)	2	55	655	43.5	75.6%	77.1%	D	877	43.0	74.8%	86.9%	E
Old Lucerne Park Rd (west end)	Lucerne Lake Rd	2	55	589	47.1	79.4%	75.1%	D	670	46.8	79.0%	80.0%	D
Lucerne Lake Rd	Speed Limit Change	2	55	602	46.4	78.6%	74.8%	D	732	46.0	77.9%	82.4%	E
Speed Limit Change	Old Lucerne Park Rd (east end)	2	50	665	39.6	75.1%	78.1%	E	734	39.4	74.8%	82.4%	E
Old Lucerne Park Rd (east end)	Lake Hamilton Dr	2	50	869	36.7	70.3%	85.7%	E	846	36.8	70.4%	85.1%	E
Lake Hamilton Dr	Brenton Manor Ave	2	50	986	32.8	65.7%	88.4%	E	941	32.9	65.7%	87.8%	E
Brenton Manor Ave	US 27	2	50	913	32.5	64.7%	86.5%	E	1,091	32.4	64.5%	90.8%	E
US 27	Speed Limit Change	2	55	476	48.2	82.0%	66.0%	D	651	46.9	79.8%	80.4%	E
Speed Limit Change	Peninsular Dr	2	45	504	38.9	78.9%	68.7%	E	631	37.6	78.3%	76.9%	E
Peninsular Dr	SR 17	4	45	531	46.9	N/A	N/A	A	610	45.6	N/A	N/A	A

Table 3-3 Opening Year (2025) No-Build Alternative PM Peak Hour Roadway Segment Analysis Summary

PM Peak Hour													
From	To	No. of Lanes	Posted Speed	NB/EB Volume	NB/EB ATS (1)	NB/EB % FFS (2)	NB/EB PTSF (3)	NB/EB LOS (4)	SB/WB Volume	SB/WB ATS (1)	SB/WB % FFS (2)	SB/WB PTSF (3)	SB/WB LOS (4)
Martin Luther King Blvd	Avenue Y	2	35	786	17.9	59.7%	80.2%	E	665	17.9	59.7%	74.8%	E
Avenue Y	Speed Limit Change	2	45	858	34.8	71.3%	85.3%	E	678	35.1	72.0%	77.3%	E
Speed Limit Change	Old Lucerne Park Rd (west end)	2	55	872	43.4	75.5%	86.4%	E	652	43.9	76.3%	75.9%	D
Old Lucerne Park Rd (west end)	Lucerne Lake Rd	2	55	685	47.0	79.3%	80.1%	E	588	47.3	79.8%	74.5%	D
Lucerne Lake Rd	Speed Limit Change	2	55	785	45.8	77.6%	83.2%	E	612	46.3	78.5%	74.1%	D
Speed Limit Change	Old Lucerne Park Rd (east end)	2	50	764	39.6	75.1%	82.4%	E	645	40.0	75.7%	76.5%	E
Old Lucerne Park Rd (east end)	Lake Hamilton Dr	2	50	920	36.5	69.8%	86.1%	E	885	36.5	69.9%	85.1%	E
Lake Hamilton Dr	Brenton Manor Ave	2	50	1,018	32.5	64.9%	88.9%	E	1,020	32.5	64.9%	89.1%	E
Brenton Manor Ave	US 27	2	50	1,027	32.8	65.2%	88.7%	E	1,001	32.8	65.2%	88.4%	E
US 27	Speed Limit Change	2	55	638	47.8	81.3%	76.3%	D	538	47.5	80.8%	71.6%	D
Speed Limit Change	Peninsular Dr	2	45	645	38.5	78.2%	76.4%	E	555	37.6	78.4%	70.2%	E
Peninsular Dr	SR 17	4	45	652	45.6	N/A	N/A	A	571	46.9	N/A	N/A	A

(1) ATS = Average travel speed (miles/hour); (2) % FFS = Percent free-flow speed; (3) PTSF = Percent time-spent-following; (4) LOS = Level of service; N/A = Not applicable

Table 3-4 Design Year (2045) No-Build Alternative AM Peak Hour Roadway Segment Analysis Summary

AM Peak Hour													
From	To	No. of Lanes	Posted Speed	NB/EB Volume	NB/EB ATS (1)	NB/EB % FFS (2)	NB/EB PTSF (3)	NB/EB LOS (4)	SB/WB Volume	SB/WB ATS (1)	SB/WB % FFS (2)	SB/WB PTSF (3)	SB/WB LOS (4)
Martin Luther King Blvd	Avenue Y	2	35	960	13.0	43.3%	86.0%	E	1,087	13.0	43.3%	88.1%	E
Avenue Y	Speed Limit Change	2	45	1,001	30.6	62.7%	88.5%	E	1,097	30.5	62.6%	90.2%	E
Speed Limit Change	Old Lucerne Park Rd (west end)	2	55	917	39.5	68.7%	86.0%	E	1,158	39.4	68.4%	91.3%	E
Old Lucerne Park Rd (west end)	Lucerne Lake Rd	2	55	808	44.2	74.5%	83.2%	E	884	44.1	74.4%	85.8%	E
Lucerne Lake Rd	Speed Limit Change	2	55	916	40.9	69.4%	86.2%	E	1,166	40.8	69.1%	91.5%	E
Speed Limit Change	Old Lucerne Park Rd (east end)	2	50	931	35.2	66.7%	86.7%	E	1,093	35.1	66.5%	90.4%	E
Old Lucerne Park Rd (east end)	Lake Hamilton Dr	2	50	1,167	31.2	59.8%	91.0%	E	1,299	31.1	59.6%	93.3%	E
Lake Hamilton Dr	Brenton Manor Ave	2	50	1,284	27.6	55.1%	93.1%	E	1,374	27.4	54.9%	94.2%	E
Brenton Manor Ave	US 27	2	50	1,214	27.8	55.4%	92.3%	E	1,458	27.5	54.7%	95.5%	E
US 27	Speed Limit Change	2	55	878	42.0	71.5%	84.2%	E	1,089	41.5	70.7%	89.8%	E
Speed Limit Change	Peninsular Dr	2	45	1,031	31.0	62.9%	88.0%	E	1,155	29.8	62.0%	90.1%	E
Peninsular Dr	SR 17	4	45	1,184	46.9	N/A	N/A	B	1,221	45.6	N/A	N/A	B

Table 3-5 Design Year (2045) No-Build Alternative PM Peak Hour Roadway Segment Analysis Summary

PM Peak Hour													
From	To	No. of Lanes	Posted Speed	NB/EB Volume	NB/EB ATS (1)	NB/EB % FFS (2)	NB/EB PTSF (3)	NB/EB LOS (4)	SB/WB Volume	SB/WB ATS (1)	SB/WB % FFS (2)	SB/WB PTSF (3)	SB/WB LOS (4)
Martin Luther King Blvd	Avenue Y	2	35	1,066	13.4	44.7%	87.3%	E	972	13.4	44.7%	85.6%	E
Avenue Y	Speed Limit Change	2	45	1,052	31.2	64.0%	89.1%	E	1,003	31.2	64.1%	87.8%	E
Speed Limit Change	Old Lucerne Park Rd (west end)	2	55	1,133	40.0	69.5%	90.8%	E	901	40.2	69.8%	85.1%	E
Old Lucerne Park Rd (west end)	Lucerne Lake Rd	2	55	858	44.7	75.5%	84.6%	E	782	44.8	75.6%	81.8%	E
Lucerne Lake Rd	Speed Limit Change	2	55	1,227	40.5	68.7%	92.0%	E	926	40.8	69.1%	85.7%	E
Speed Limit Change	Old Lucerne Park Rd (east end)	2	50	1,049	35.9	68.0%	89.1%	E	914	36.0	68.2%	85.4%	E
Old Lucerne Park Rd (east end)	Lake Hamilton Dr	2	50	1,258	32.1	61.4%	92.5%	E	1,134	32.2	61.6%	90.4%	E
Lake Hamilton Dr	Brenton Manor Ave	2	50	1,416	27.5	55.0%	94.6%	E	1,289	27.6	55.3%	92.7%	E
Brenton Manor Ave	US 27	2	50	1,480	27.5	54.7%	95.4%	E	1,254	27.8	55.2%	92.5%	E
US 27	Speed Limit Change	2	55	1,109	42.0	71.5%	88.8%	E	891	41.8	71.1%	84.9%	E
Speed Limit Change	Peninsular Dr	2	45	1,223	30.7	62.2%	91.0%	E	1,048	29.5	61.4%	87.8%	E
Peninsular Dr	SR 17	4	45	1,336	45.6	N/A	N/A	B	1,205	46.9	N/A	N/A	B

(1) ATS = Average travel speed (miles/hour); (2) % FFS = Percent free-flow speed; (3) PTSF = Percent time-spent-following; (4) LOS = Level of service; N/A = Not applicable

No-Build Alternative Intersections

The future conditions No-Build Alternative peak hour signalized, and unsignalized intersection LOS analyses were conducted using the SYNCHRO software and the unsignalized intersection module of the HCS, respectively.

Opening Year (2025) and Design Year (2045) No-Build Alternative Intersection Levels of Service

Table 3-6 summarizes the opening year (2025) No-Build Alternative intersection LOS analysis results. Two of the three existing signalized intersections (i.e., Martin Luther King Boulevard and US 27) are projected to operate at LOS E overall during the AM and PM peak hours. Although there are several individual movements that are projected to operate at LOS F during one of the two peak hours, all of the movements are projected to operate with v/c ratios less than 1.00. The SR 17 signalized intersection is projected to operate at LOS C overall during both peak hours. All of the unsignalized left-turn movements from SR 544 are projected to operate at LOS B or better; however, five of the six unsignalized intersections have cross street movements that are projected to operate at LOS F during one or both peak hours. In addition, some of the cross-street movements at the Avenue Y, Lake Hamilton Drive and Brenton Manor Avenue intersections are projected to have v/c ratios greater than 1.00.

Table 3-7 summarizes the design year (2045) No-Build Alternative intersection LOS analysis results. Two of the three existing signalized intersections (i.e., Martin Luther King Boulevard and US 27) are projected to operate at LOS F overall during the AM and PM peak hours. In addition, many of the individual movements are projected to have v/c ratios greater than 1.00. The SR 17 signalized intersection is projected to operate at LOS E overall during both peak hours and three individual movements are projected to have v/c ratios greater than 1.00. All of the unsignalized left-turn movements from SR 544 are projected to operate at LOS C or better; however, all six unsignalized intersections have cross street movements that are projected to operate at LOS F during one or both peak hours. In addition, almost all of the unsignalized cross street movements are projected to have v/c ratios greater than 1.00. These results document the need for intersection improvements prior to the design year at all nine locations that were analyzed.

Table 3-6 Opening Year (2025) No-Build Peak Hour Intersection Analysis Summary

Intersection	Movement	AM Peak Hour			PM Peak Hour		
		V/C Ratio	Average Delay	Level of Service	V/C Ratio	Average Delay	Level of Service
Martin Luther King Blvd (Signalized)	**NB LT**	0.79	62.2	E	0.69	50.6	D
	NB TH	0.87	70.2	E	0.98	82	F
	NB RT	0.28	4.8	A	0.26	4.6	A
	SB LT	0.07	41.4	D	0.08	45.6	D
	SB TH	0.98	77.9	E	0.97	73.4	E
	SB RT	0.98	77.9	E	0.97	73.4	E
	EB LT	0.93	72.3	E	0.97	80.0	E
	EB TH	0.89	64.7	E	0.97	81.4	F
	EB RT	0.64	10.5	B	0.57	12.3	B
	WB LT	0.86	75.8	E	0.86	79.5	E
	WB TH	0.94	76.6	E	0.84	66.5	E
	WB RT	0.94	76.6	E	0.84	66.5	E
	ALL	0.90	61.1	E	0.95	63.9	E
Avenue Y	**NB LT**	0.02	9.8	A	0.02	9.0	A
	SB LT	0.06	9.2	A	0.07	9.8	A
	EB LT	1.37	283.6	F	1.08	173.3	F
	EB TH	1.37	283.6	F	1.08	173.3	F
	EB RT	1.37	283.6	F	1.08	173.3	F
	WB LT	1.15	300.6	F	2.19	699.4	F
	WB TH	1.15	300.6	F	2.19	699.4	F
	WB RT	0.02	12.7	B	0.08	14.8	B
Old Lucerne Park Rd (West End)	NB LT	0.90	254.5	F	0.36	119.2	F
	NB TH	0.90	254.5	F	0.36	119.2	F
	NB RT	0.03	12.3	B	0.01	12.8	B
	SB LT	0.60	28.2	D	0.39	27.6	D
	SB TH	0.60	28.2	D	0.39	27.6	D
	SB RT	0.60	28.2	D	0.39	27.6	D
	EB LT	0.11	9.6	A	0.22	9.7	A
	WB LT	0.00	8.7	A	0.02	9.0	A
Lucerne Lake Rd	SB LT	0.36	28.8	D	0.53	35.9	E
	SB RT	0.18	15.9	C	0.16	14.2	B
	EB LT	0.12	11.1	B	0.08	10.1	B
Old Lucerne Park Rd (East End)	SB LT	0.86	65.5	F	0.77	51.4	F
	SB RT	0.86	65.5	F	0.77	51.4	F
	EB LT	0.01	10.0	A	0.04	10.0	B
Lake Hamilton Dr	NB LT	1.50	321.7	F	1.75	454.9	F
	NB TH	1.50	321.7	F	1.75	454.9	F

Intersection	Movement	AM Peak Hour			PM Peak Hour		
		V/C Ratio	Average Delay	Level of Service	V/C Ratio	Average Delay	Level of Service
	NB RT	1.50	321.7	F	1.75	454.9	F
	SB LT	0.01	15.3	C	0.09	179.9	F
	SB TH	0.01	15.3	C	0.09	179.9	F
	SB RT	0.01	15.3	C	0.09	179.9	F
	EB LT	0.00	9.6	A	0.00	9.8	A
	WB LT	0.19	11.2	B	0.22	11.4	B
Brenton Manor Ave	NB LT	2.21	838.4	F	1.76	539.5	F
	NB RT	0.27	20.5	C	0.24	21.7	C
	WB LT	0.29	12.1	B	0.09	10.9	B
US 27 (Signalized)	NB LT	0.98	108.3	F	0.77	79.5	E
	NB TH	0.79	44.0	D	0.85	52.0	D
	NB RT	0.16	18.5	B	0.22	25.6	C
	SB LT	0.8	98.8	F	0.78	79.1	E
	SB TH	0.73	49.3	D	0.97	63.1	E
	SB RT	0.75	35.8	D	0.71	30.5	C
	EB LT	0.97	92.1	F	0.87	71.6	E
	EB TH	0.57	55.1	E	0.64	52.9	D
	EB RT	0.21	25.0	C	0.28	24.9	C
	WB LT	0.58	40.6	D	0.52	35.5	D
	WB TH	0.98	104.8	F	0.84	79.7	E
	WB RT	0.79	42.6	D	0.23	31.3	C
	ALL	0.85	56.4	E	0.87	55.2	E
SR 17 (Signalized)	NB LT	0.39	16.7	B	0.34	16.4	B
	NB TH	0.77	39.1	D	0.58	30.4	C
	NB RT	0.77	39.1	D	0.58	30.4	C
	SB LT	0.19	14.4	B	0.20	14.8	B
	SB TH	0.54	29.5	C	0.62	31.8	C
	SB RT	0.24	14.7	B	0.31	15.8	B
	EB LT	0.69	32.4	C	0.53	22.5	C
	EB TH	0.49	31.4	C	0.71	38.2	D
	EB RT	0.26	17.2	B	0.26	16.6	B
	WB LT	0.2	16.8	B	0.22	16.6	B
	WB TH	0.85	51.2	D	0.64	35.9	D
	WB RT	0.24	17.3	B	0.14	15.5	B
	ALL	0.85	30.2	C	0.66	26.6	C

*Note: **Bold font** denotes SR 544 movements*

Table 3-7 Design Year (2045) No-Build Peak Hour Intersection Analysis Summary

Intersection	Movement	AM Peak Hour V/C Ratio	AM Peak Hour Average Delay	AM Peak Hour Level of Service	PM Peak Hour V/C Ratio	PM Peak Hour Average Delay	PM Peak Hour Level of Service
Martin Luther King Blvd (Signalized)	**NB LT**	1.30	190.8	F	1.13	124.5	F
	NB TH	1.31	194.1	F	1.32	196.3	F
	NB RT	0.39	11.5	B	0.30	6.8	A
	SB LT	0.13	42.5	D	0.11	46.2	D
	SB TH	1.49	260.8	F	1.41	225.8	F
	SB RT	1.49	260.8	F	1.41	225.8	F
	EB LT	1.81	403.5	F	1.72	364.7	F
	EB TH	1.61	316.9	F	1.50	267.8	F
	EB RT	0.93	45.2	D	0.84	33.7	C
	WB LT	1.00	109.8	F	1.10	136.5	F
	WB TH	1.41	232.2	F	1.56	297.2	F
	WB RT	1.41	232.2	F	1.56	297.2	F
	ALL	1.38	229.2	F	1.40	215.0	F
Avenue Y	**NB LT**	0.02	10.5	B	0.02	9.7	A
	SB LT	0.17	10.7	B	0.24	11.7	B
	EB LT	*	**	F	*	**	F
	EB TH	*	**	F	*	**	F
	EB RT	*	**	F	*	**	F
	WB LT	*	**	F	*	**	F
	WB TH	*	**	F	*	**	F
	WB RT	0.61	28.4	D	0.34	20.7	C
Old Lucerne Park Rd (West End)	NB LT	23.10	13,864.9	F	2.27	1,551.1	F
	NB TH	23.10	13,864.9	F	2.27	1,551.1	F
	NB RT	0.04	14.0	B	0.02	13.8	B
	SB LT	2.06	537.3	F	2.96	998.6	F
	SB TH	2.06	537.3	F	2.96	998.6	F
	SB RT	2.06	537.3	F	2.96	998.6	F
	EB LT	0.27	11.7	B	0.46	12.8	B
	WB LT	0.01	9.3	A	0.02	9.4	A
Lucerne Lake Rd	SB LT	3.47	1,212.8	F	3.89	1,374.7	F
	SB RT	0.61	29.6	D	0.54	23.1	C
	EB LT	0.55	22.7	C	0.34	14.5	B
Old Lucerne Park Rd (East End)	SB LT	1.93	480.7	F	1.73	397.9	F
	SB RT	1.93	480.7	F	1.73	397.9	F
	EB LT	0.04	12.6	B	0.13	12.0	B
Lake Hamilton Dr	NB LT	*	**	F	*	**	F
	NB TH	*	**	F	*	**	F
	NB RT	*	**	F	*	**	F
	SB LT	*	**	F	*	**	F
	SB TH	*	**	F	*	**	F
	SB RT	*	**	F	*	**	F
	EB LT	0.00	11.8	B	0.00	10.6	B
	WB LT	0.34	14.6	B	0.42	16.9	C
Brenton Manor Ave	NB LT	7.62	3,707.6	F	10.13	4,596.0	F
	NB RT	0.39	30.7	D	0.81	79.6	F
	WB LT	0.38	15.0	B	0.23	14.4	B
US 27 (Signalized)	NB LT	1.26	190.9	F	0.91	101.5	F
	NB TH	1.36	201.2	F	1.37	210.8	F
	NB RT	0.32	21.1	C	0.42	30.7	C
	SB LT	1.49	292.8	F	1.24	183.8	F
	SB TH	1.31	187.1	F	1.62	316.5	F
	SB RT	0.92	52.0	D	0.82	38.1	D
	EB LT	1.19	154.8	F	1.18	148.2	F
	EB TH	0.91	80.4	F	1.02	97.6	F
	EB RT	0.30	26.8	C	0.42	29.5	C
	WB LT	1.60	318.7	F	1.48	272.4	F
	WB TH	1.30	202.9	F	1.06	120.5	F
	WB RT	0.69	52.5	D	0.37	34.6	C
	ALL	1.22	168.1	F	1.24	194.7	F
SR 17 (Signalized)	NB LT	1.18	136.9	F	1.07	104.7	F
	NB TH	0.91	64.1	E	0.75	47.5	D
	NB RT	0.91	64.1	E	0.75	47.5	D
	SB LT	0.36	30.3	C	0.34	26.4	C
	SB TH	0.93	82.1	F	0.97	84.8	F
	SB RT	0.55	31.1	C	0.62	30.9	C
	EB LT	1.12	120.9	F	1.05	100.5	F
	EB TH	0.68	40.1	D	0.88	56.4	E
	EB RT	0.46	17.3	B	0.52	20.8	C
	WB LT	0.28	22.7	C	0.54	33.6	C
	WB TH	1.08	111.2	F	1.02	95.6	F
	WB RT	0.28	30.7	C	0.19	30.3	C
	ALL	1.05	72.2	E	1.04	62.8	E

Note: Bold font denotes SR 544 movements

* *The v/c ratio is infinite because the capacity for this movement is zero.*

** *The average vehicle delay cannot be calculated because the v/c ratio is infinite.*

Build Alternative Roadway Segments

The future conditions peak hour roadway segment LOS analyses was conducted for Build Alternative No. 2 using the multi-lane highway module of the HCS.

Opening Year (2025) and Design Year (2045) Build Alternative No. 2 Roadway Segment Levels of Service

Table 3-8 summarizes the opening year (2025) Build Alternative No. 2 roadway segment LOS analysis results. The two-lane divided typical section for SR 544 between Martin Luther King Boulevard and Avenue Y is projected to operate at LOS E in both travel directions during both peak hours. The average travel speeds for Build Alternative No. 2 are estimated to be approximately eight to nine mph lower than the average travel speeds for Build Alternative No.1 for this portion of SR 544. The four-lane divided typical sections between Avenue Y and SR 17 are projected to operate at LOS B or better in both travel directions during both peak hours. **Table 3-9** summarizes the design year (2045) Build Alternative No. 2 roadway segment LOS analysis results. The two-lane divided typical section for SR 544 between Martin Luther King Boulevard and Avenue Y is projected to operate at LOS E in both travel directions during both peak hours. The average travel speeds for Build Alternative No. 2 are estimated to be approximately 15 to 16 mph lower than the average travel speeds for Build Alternative No. 1 for this portion of SR 544. The four-lane divided typical sections between Avenue Y and SR 17 are projected to operate at LOS D or better in both travel directions during both peak hours and a majority of this portion of SR 544 is projected to operate at LOS C or better.

Table 3-8 Opening Year (2025) Build Alternative No. 2 Peak Hour Roadway Segment Analysis Summary

AM Peak Hour											
From	To	No. of Lanes	Design Speed	NB/EB Volume	NB/EB ATS [1]	NB/EB Density[2]	NB/EB LOS [3]	SB/WB Volume	SB/WB ATS [1]	SB/WB Density [2]	SB/WB LOS [3]
Martin Luther King Blvd	Avenue Y	2D*	35	670	17.3	N/A	E	801	17.1	N/A	E
Avenue Y	Old Lucerne Park Rd (west end)	4D	45	802	41.6	11.0	A	1,029	42.6	13.8	B
Old Lucerne Park Rd (west end)	Lucerne Lake Rd	4D	45	727	42.8	9.7	A	810	42.8	10.8	A
Lucerne Lake Rd	Old Lucerne Park Rd (east end)	4D	45	768	42.6	10.3	A	889	42.1	12.0	B
Old Lucerne Park Rd (east end)	Lake Hamilton Dr	4D	45	999	41.8	13.6	B	988	41.8	13.5	B
Lake Hamilton Dr	Brenton Manor Ave	4D	45	1,112	40.6	15.6	B	1,083	40.6	15.2	B
Brenton Manor Ave	US 27	4D	45	1,035	40.6	14.5	B	1,231	40.6	17.3	B
US 27	SR17	4D	45	531	42.1	7.5	A	664	41.8	9.4	A
PM Peak Hour											
From	To	No. of Lanes	Design Speed	NB/EB Volume	NB/EB ATS [1]	NB/EB Density[2]	NB/EB LOS [3]	SB/WB Volume	SB/WB ATS [1]	SB/WB Density [2]	SB/WB LOS [3]
Martin Luther King Blvd	Avenue Y	2D*	35	834	16.9	N/A	E	705	17.2	N/A	E
Avenue Y	Old Lucerne Park Rd (west end)	4D	45	1,022	41.6	13.3	B	793	42.6	10.1	A
Old Lucerne Park Rd (west end)	Lucerne Lake Rd	4D	45	826	42.8	10.4	A	725	42.8	9.2	A
Lucerne Lake Rd	Old Lucerne Park Rd (east end)	4D	45	928	42.6	11.8	B	775	42.1	10.0	A
Old Lucerne Park Rd (east end)	Lake Hamilton Dr	4D	45	1,064	41.8	13.8	B	1,032	41.8	13.3	B
Lake Hamilton Dr	Brenton Manor Ave	4D	45	1,161	40.6	15.5	B	1,146	40.6	15.3	B
Brenton Manor Ave	US 27	4D	45	1,173	40.6	15.6	B	1,129	40.6	15.0	B
US 27	SR17	4D	45	682	42.1	8.9	A	580	41.8	7.7	A

* Two-Way Center Left-Turn Lane

[1] ATS = Average Travel Speed (miles/hour)

[2] Density (passenger cars/mile/lane)

[3] LOS = Level of Service

Table 3-9 Design Year (2045) Build Alternative No. 2 Peak Hour Roadway Segment Analysis Summary

AM Peak Hour											
From	To	No. of Lanes	Design Speed	NB/EB Volume	NB/EB ATS [1]	NB/EB Density [2]	NB/EB LOS [3]	SB/WB Volume	SB/WB ATS [1]	SB/WB Density [2]	SB/WB LOS [3]
Martin Luther King Blvd	Avenue Y	2D*	35	1,150	10.1	N/A	E	1,293	9.9	N/A	E
Avenue Y	Old Lucerne Park Rd (west end)	4D	45	1,572	41.6	20.9	C	1,837	42.6	23.8	C
Old Lucerne Park Rd (west end)	Lucerne Lake Rd	4D	45	1,403	42.8	18.1	C	1,495	42.8	19.3	C
Lucerne Lake Rd	Old Lucerne Park Rd (east end)	4D	45	1,506	42.6	19.5	C	1,806	42.1	23.7	C
Old Lucerne Park Rd (east end)	Lake Hamilton Dr	4D	45	1,731	41.8	22.9	C	1,917	41.8	25.4	C
Lake Hamilton Dr	Brenton Manor Ave	4D	45	1,829	40.6	24.9	C	1,987	40.6	27.0	D
Brenton Manor Ave	US 27	4D	45	1,743	40.6	23.7	C	2,064	40.6	28.1	D
US 27	SR17	4D	45	1,150	42.1	15.5	B	1,298	41.8	17.7	B
PM Peak Hour											
From	To	No. of Lanes	Design Speed	NB/EB Volume	NB/EB ATS [1]	NB/EB Density [2]	NB/EB LOS [3]	SB/WB Volume	SB/WB ATS [1]	SB/WB Density [2]	SB/WB LOS [3]
Martin Luther King Blvd	Avenue Y	2D*	35	1,274	10.4	N/A	E	1,145	10.6	N/A	E
Avenue Y	Old Lucerne Park Rd (west end)	4D	45	1,775	41.6	22.6	C	1,506	42.6	18.8	C
Old Lucerne Park Rd (west end)	Lucerne Lake Rd	4D	45	1,471	42.8	18.2	C	1,379	42.8	17.1	B
Lucerne Lake Rd	Old Lucerne Park Rd (east end)	4D	45	1,805	42.6	22.5	C	1,553	42.1	19.6	C
Old Lucerne Park Rd (east end)	Lake Hamilton Dr	4D	45	1,883	41.8	23.9	C	1,722	41.8	21.9	C
Lake Hamilton Dr	Brenton Manor Ave	4D	45	2,035	40.6	26.6	D	1,840	40.6	24.1	C
Brenton Manor Ave	US 27	4D	45	2,113	40.6	27.6	D	1,810	40.6	23.7	C
US 27	SR17	4D	45	1,380	42.1	17.7	B	1,161	41.8	15.0	B

* *Two-Way Center Left-Turn Lane*

[1] *ATS = Average Travel Speed (miles/hour)*

[2] *Density (passenger cars/mile/lane)*

[3] *LOS = Level of Service*

Build Alternative Intersections

Based on the direction provided by the District One District Environmental Management Office (DEMO), all of the future year Build Alternative intersection analyses were conducted as part of the FDOT's Intersection Control Evaluation (ICE) process. The ICE memos for each of the nine project intersections are included in **Appendix A**.

4.0 DESIGN CONTROLS & CRITERIA

4.1 Design Controls

The design concepts for SR 544 adhere to FDOT standards. Guiding documents considered include:

- Manual on Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways, State of Florida.
- Florida Design Manual, Florida Department of Transportation
- A Policy on Geometric Design of Highways and Streets, AASHTO
- A Policy on the Design of Urban Highways and Arterial Streets, AASHTO
- Drainage Manual, Florida Department of Transportation
- Manual on Uniform Traffic Control Devices, Federal Highway Administration
- Roadway and Traffic Design Standards, Florida Department of Transportation
- Standard Plans for Road Construction FY 2019-2020, Florida Department of Transportation
- Highway Capacity Manual, Transportation Research Board
- Quality/Level of Service Handbook, Florida Department of Transportation

Through coordination with the District One Planning Studio, direction was received to include 12-foot outside travel lanes and 11-foot inside travel lanes. In addition, the decision was made to include wide sidewalks and shared-use paths rather than on-street bike lanes. **Table 4-1** includes the design criteria for the proposed roadway improvements.

4.2 Design Criteria

Design criteria used to develop the proposed alternatives are provided in **Table 4-1.**

Table 4-1 Roadway Design Criteria

Subject C4: Urban General	Design Speed = 35 mph Curbed Roadway C4: Urban General	Design Speed = 45 mph Curbed Roadway C3R/C3C: Suburban Residential/Commercial	Reference FDM[1]
Typical Section Elements			
Minimum Lane Widths	10 ft.	11 ft.	Table 210.2.1
Minimum Two Way Left Turn Lanes	11 ft.	N/A	Table 210.2.1
Median Widths	15.5 ft.	22 ft.	Table 210.3.1
Lane Cross Slopes	-0.02 (2 Lane Typical) -0.02, -0.02 (4 Lane Typical)	-0.02, -0.02 (4 Lane Typical) -0.02, -0.02, -0.03 (6 Lane Typical)	Figure 210.2.1
Minimum Border Width	12 ft.	14 ft.	Table 210.7.1
Minimum Clear Zone	14 ft.	24 ft.	Table 215.2.1 & Section 215.2.3
Minimum Lateral Offset	Light Pole (Travel Lane) = 1.5 ft.	Light Pole (Travel Lane) = 4 ft.	Table 215.2.2 Section 215.2.4
	Signal Poles = 1.5 ft.	Signal Poles = 4 ft.	
	Aboveground Fixed Utilities = 1.5 ft.	Aboveground Fixed Utilities = 4 ft.	
	Trees = 1.5 ft.	Trees = 4 ft.	
Minimum Canal Lateral Offset	40 ft. min.	40 ft. min.	Section 215.3.2
Front Slope			Table 215.2.3
	1:2 or to Suit Property Owner,	1:2 or to Suit Property Owner,	
	Not Flatter than 1:6	Not Flatter than 1:6	
Back Slope	1:2 or to Suit Property Owner,	1:2 or to Suit Property Owner,	Table 215.2.3
	Not Flatter than 1:6	Not Flatter than 1:6	

Subject C4: Urban General	Design Speed = 35 mph Curbed Roadway C4: Urban General	Design Speed = 45 mph Curbed Roadway C3R/C3C: Suburban Residential/Commercial	Reference FDM[1]
Pedestrian/Bicycle Facilities			
Sidewalk Width	6 ft.	6 ft.	Table 222.2.1
Minimum Vertical Clearance Over Walkway	7 ft.	7 ft.	Section 222.2.1.2
Maximum Sidewalk Grade (When Not Adjacent to Roadway)	5%	5%	Section 222.2.1.3
Maximum Sidewalk Cross Slope	2%	2%	Section 222.2.1.3
Bicycle Lane Width	N/A, See Shared Used Path	N/A, See Shared Used Path	Section 223.2.1.1 Bicycle and Pedestrian Facility Decision Tree for District One Projects
Horizontal Geometrics			
Maximum Deflection (Without Horizontal Curve)	2° 00' 00"	1° 00' 00"	Section 210.8.1
Desired Length of Horizontal Curve (Based on Design Speed)	525 ft.	675 ft.	Table 210.8.1
Desired Length of Horizontal Curve (Based on Deflection)	1° = 900 ft. 2° = 800 ft. 3° = 700 ft. 4° = 600 ft. 5° = 500 ft.	1° = 900 ft. 2° = 800 ft. 3° = 700 ft. 4° = 600 ft. 5° = 500 ft.	Table 210.8.1
Minimum Curve Length	400 ft.	400 ft.	Table 210.8.1
Superelevation	e_{max} = 0.05	e_{max} = 0.05	Section 210.9 & Table 210.9.2
Maximum Degree of Curve (D)	14° 15' 00"	8° 15' 00"	Table 210.9.2

Subject C4: Urban General	Design Speed = 35 mph Curbed Roadway C4: Urban General	Design Speed = 45 mph Curbed Roadway C3R/C3C: Suburban Residential/Commercial	Reference FDM[1]
Roadway Transitions • Merging Taper = L • Shifting Taper = L/2 • Shoulder Taper = L/3	L = (WxS^2)/60	L = WS	Section 210.2.5
Vertical Geometrics			
Maximum Grade	4% - Controlled by Truck Volumes	4% - Controlled by Truck Volumes	Table 210.10.1
Minimum Grade	0.30%	0.30%	Section 210.10.1.1
Maximum Change in Grade Without Vertical Curve	0.90%	0.70%	Table 210.10.2
Minimum VPI Spacing	250 ft.	250 ft.	Section 210.10.1.1
Vertical Curves	L = KA A = l g_1 - g_2 l L_{min} = 105 ft. Crest K_{min} = 47 Crest L_{min} = 105 ft. Sag K_{min} = 49 Sag	L = KA A = l g_1 - g_2 l L_{min} = 135 ft. Crest K_{min} = 98 Crest L_{min} = 135 ft. Sag K_{min} = 79 Sag	Table 210.10.3 & 210.10.4
Stopping Sight Distance (min) (Grade ≤ 2%) (Upgrade & Downgrade)	250 ft.	360 ft.	Table 210.11.1
Vertical Clearance (Overhead DMS)	19.5 ft.	19.5 ft.	Section 210.10.3
Vertical Clearance (Sign Structure)	17.5 ft.	17.5 ft.	Section 210.10.3
Vertical Clearance (Signal)	17.5 ft.	17.5 ft.	Section 210.10.3

Subject C4: Urban General	Design Speed = 35 mph Curbed Roadway C4: Urban General	Design Speed = 45 mph Curbed Roadway C3R/C3C: Suburban Residential/Commercial	Reference FDM[1]
Access Classification			
Access Class	7 (Both Median Types)	5 (Restrictive)	Table 201.4.2
Connection Spacing	125 ft	245 ft.	Table 201.4.2
Median Opening Spacing (Directional)	330 ft.	660 ft.	Table 201.4.2
Median Opening Spacing (Full)	660 ft.	1320 ft.	Table 201.4.2
Signal Spacing	1320 ft.	1320 ft.	Table 201.4.2
Shared Use Path			
Width of Pavement	12 ft.(Standard) 10 ft. (Min. where there is limited RW) 8 ft. (Min. - for short distances in constrained conditions)	12 ft.(Standard) 10 ft. (Min. where there is limited RW) 8 ft. (Min. - for short distances in constrained conditions)	Section 224.4 Bicycle and Pedestrian Facility Decision Tree for District One Projects
Maximum Cross Slope	2%	2%	Section 224.5
Minimum Cross Slope Transition Length	75 ft.	75 ft.	Section 224.5
Maximum Grade	5%	5%	Section 224.6
Horizontal Clearance	4 ft.	4 ft.	Section 224.7
Vertical Clearance	10 ft. Standard 8 ft. Constrained	10 ft. Standard 8 ft. Constrained	Section 224.8
Design Speed ≤4% Downgrade >4% Downgrade	 18 mph 30 mph	 18 mph 30 mph	Section 224.9

Subject **C4: Urban General**	**Design Speed = 35 mph** **Curbed Roadway** **C4: Urban General**	**Design Speed = 45 mph** **Curbed Roadway** **C3R/C3C: Suburban Residential/Commercial**	**Reference** **FDM[1]**
Minimum Radii 18 mph, 2% 18 mph, -2% 30 mph, -2% 30 mph, -2%	 74 ft. 86 ft. 261 ft. 316 ft.	 74 ft. 86 ft. 261 ft. 316 ft.	Table 224.10.1
Minimum (Flat) Stopping Sight Distance	134 ft.	134 ft.	Table 224.10.2
Minimum Length of Vertical Curve S>L S<L	 L = 2S - (900/A) $L = AS^2/900$	 L = 2S - (900/A) $L = AS^2/900$	Section 224.11

References:
1 -FDOT Design Manual (2021)

Definitions:

L = Length (ft.)

g = Grade (%)

W = Width of Lateral Transition ft.)

S = Design Speed (mph)

5.0 ALTERNATIVES ANALYSIS

5.1 No-Build (No-Action) Alternative

The No-Build Alternative assumes that no modifications or improvements will be implemented for the mainline of SR 544 other than routine maintenance. The primary advantages of the No-Build Alternative are that it does not directly require any capital or expenditure of state/federal transportation trust funds, and it produces no physical, natural, or social impacts. The No-Build Alternative will not meet the Purpose and Need of the project to enhance mobility and multi-modal access, support local economic development initiatives, and improve operational conditions to accommodate projected travel demand.

The No-Build Alternative will remain under consideration throughout the alternatives analysis and evaluation process.

Advantages

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

- No acquisition of right-of-way
- 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

Disadvantages

The potential disadvantages of the No-Build Alternative include:

- It is not consistent with the Polk County Transportation Planning Organization (Polk TPO) Momentum 2040 Long Range Transportation Plan (LRTP), where the widening is identified as cost-feasible 2019-2040
- Does not improve multi-modal mobility
- Results in reduced levels of service and increased traffic congestion
- The frequency of crashes may rise due to increased congestion
- Emergency vehicle access is degraded
- User costs are increased due to increased congestion

5.2 Transportation Systems Management and Operations (TSM&O) Alternative

TSM&O alternatives involve improvements designed to maximize the utilization and efficiency of the existing facility through improved system and demand management. The various TSM&O

options generally include traffic signal and intersection improvements, access management, and transit improvements. Additional through lanes are needed to accommodate the projected traffic volumes along SR 544 in the design year 2045 and to provide an acceptable roadway level of service which cannot be provided solely through the implementation of TSM&O improvements; however, the TSM&O strategies of access management and intersection improvements are included as part of the Build Alternatives for the corridor.

5.3 Multi-Modal Alternatives

A 10-foot-wide shared use path was evaluated for the project limits. In areas with right-of-way constraints an 8-foot-wide sidewalk was evaluated.

Multimodal alternatives considered as part of this study are consistent with the Polk TPO 2045 Momentum Long Range Transportation Plan (LRTP) Goals, Objectives, and Performance Targets. The inclusion of multimodal alternatives also helps to address the purpose and need for this project by providing enhanced mobility options and access to multimodal facilities.

5.4 Build Alternatives

The SR 544 study limits were broken down into eight evaluation segments based on existing land uses and development. The study segments are:

Segment 1 – Martin Luther King Boulevard to north of Avenue Y
Segment 2 – North of Avenue Y to east of Lake Conine Canal
Segment 3 – East of Lake Conine Canal to east of Old Lucerne Park Road (west)
Segment 4 – East of Old Lucerne Park Road (west) to east of Lucerne Loop Road
Segment 5 – East of Lucerne Loop Road to west of Lake Hamilton Canal
Segment 6 – West of Lake Hamilton Canal to west of Brenton Manor Drive
Segment 7 – West of Brenton Manor Drive to LaVista Drive
Segment 8 – LaVista Drive to SR 17

Segment 1 Build Alternatives

Because Florence Villa is a historic neighborhood with considerable multimodal activity and constrained right-of-way, different Build alternatives were considered for Segment 1 of the corridor from Martin Luther King Boulevard to north of Avenue Y than for the segments north of Avenue Y. Segment 1 alternatives include the following:

- A new four-lane bypass roadway around the west side of SR 544 between Martin Luther King Boulevard and Avenue Y, in lieu of widening SR 544
- A two-lane undivided roadway with 8-foot median islands at pedestrian crosswalks

- A three-lane roadway with a center two-way left turn lane
- A four-lane undivided roadway
- A five-lane roadway with a center two-way left turn lane

Bypass Roadway

Through working with the FDOT District One Planning Studio, a four-lane undivided roadway typical section with a minimum 74-foot right-of-way was used to develop the bypass corridor alignment. This typical section, presented as **Figure 5-1,** includes two through lanes in each direction with 11-foot inside lanes and 12-foot outside lanes. It also includes 8-foot-wide sidewalks located at the back of curb on both sides of the roadway.

A preliminary alignment to the west of Florence Villa was developed that begins at Martin Luther King. Boulevard from west of where the Chain of Lakes Trail crosses Martin Luther King Boulevard. It then heads north and begins to curve to the northeast in the area south of Lake Citrus and crosses the Chain of Lakes Trail on a northeastward alignment. It continues through the intersection of Avenue Y, 1st Street, and Motor Pool Road and then makes a turn to the east through the Lake Conine Restoration Area and connects with SR 544 north of Avenue Y. This alignment is depicted in **Figure 5-2**.

The four-lane bypass roadway was analyzed by using the District One Regional Planning Model (D1RPM) to forecast design year 2045 daily traffic volumes for three network alternatives. Alternative 1 was a four-lane widening on SR 544 throughout the project limits. Alternative 2 maintained two lanes on SR 544 from Martin Luther King Boulevard to Avenue Y and four lanes on SR 544 north of Avenue Y, without a bypass roadway. Alternative 3 maintained two lanes on SR 544 from Martin Luther King Boulevard to Avenue Y and four lanes on SR 544 north of Avenue Y but included the four-lane bypass roadway.

The modeling analysis demonstrated that with the implementation of a bypass road, design year traffic volumes on a two-lane SR 544 between Martin Luther King Boulevard and Avenue Y resulted in approximately half the volume of this same portion of a four-lane SR 544 without a bypass road. However, when compared to the alternative that maintains a two-lane roadway between Martin Luther King Boulevard and Avenue Y without a western bypass road, the bypass roadway is only projected to reduce the daily volumes by about 5,000 to 7,000 vehicles per day. This suggests that if SR 544 is not widened to four lanes between Martin Luther King Boulevard and Avenue Y, a large percentage of vehicles will find alternative routes, even in the absence of a bypass.

Figure 5-1 Four-Lane Undivided Typical Section

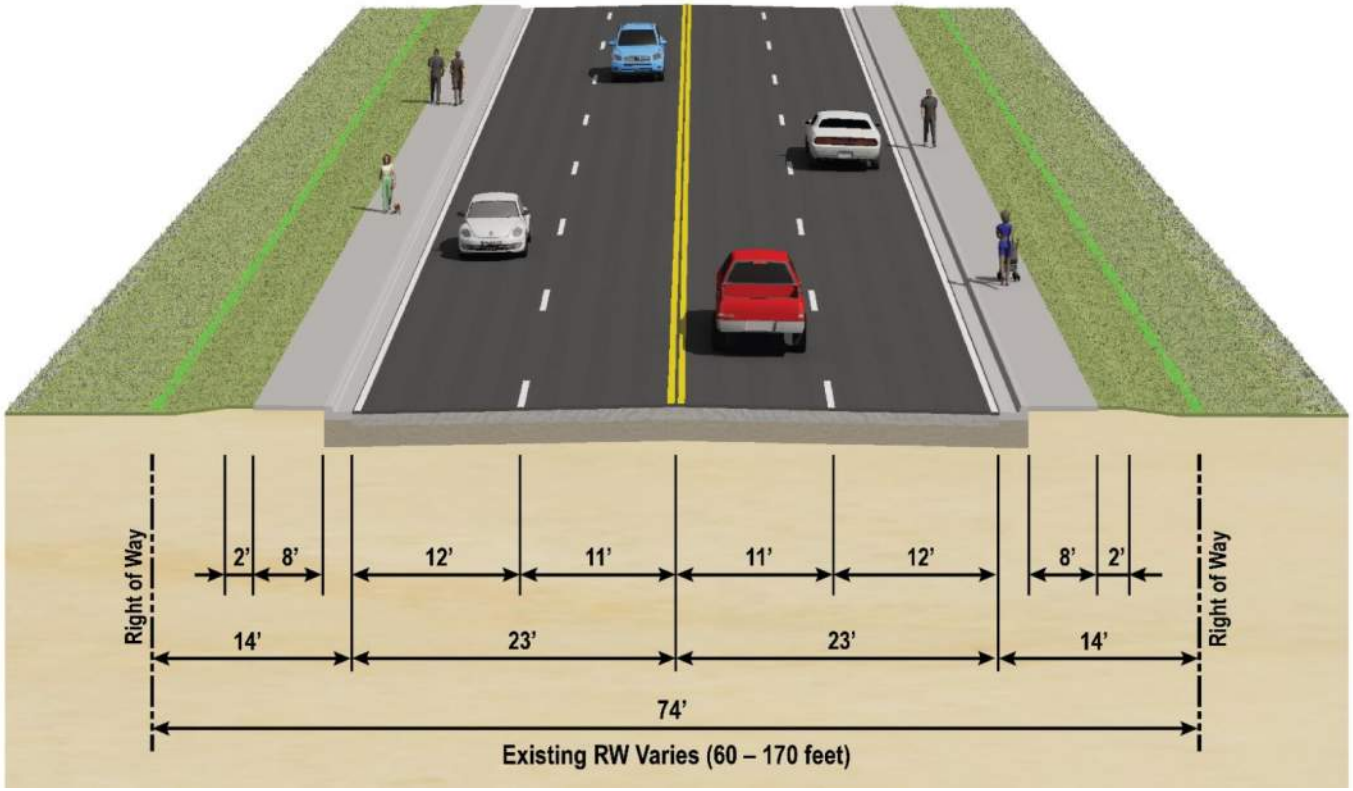
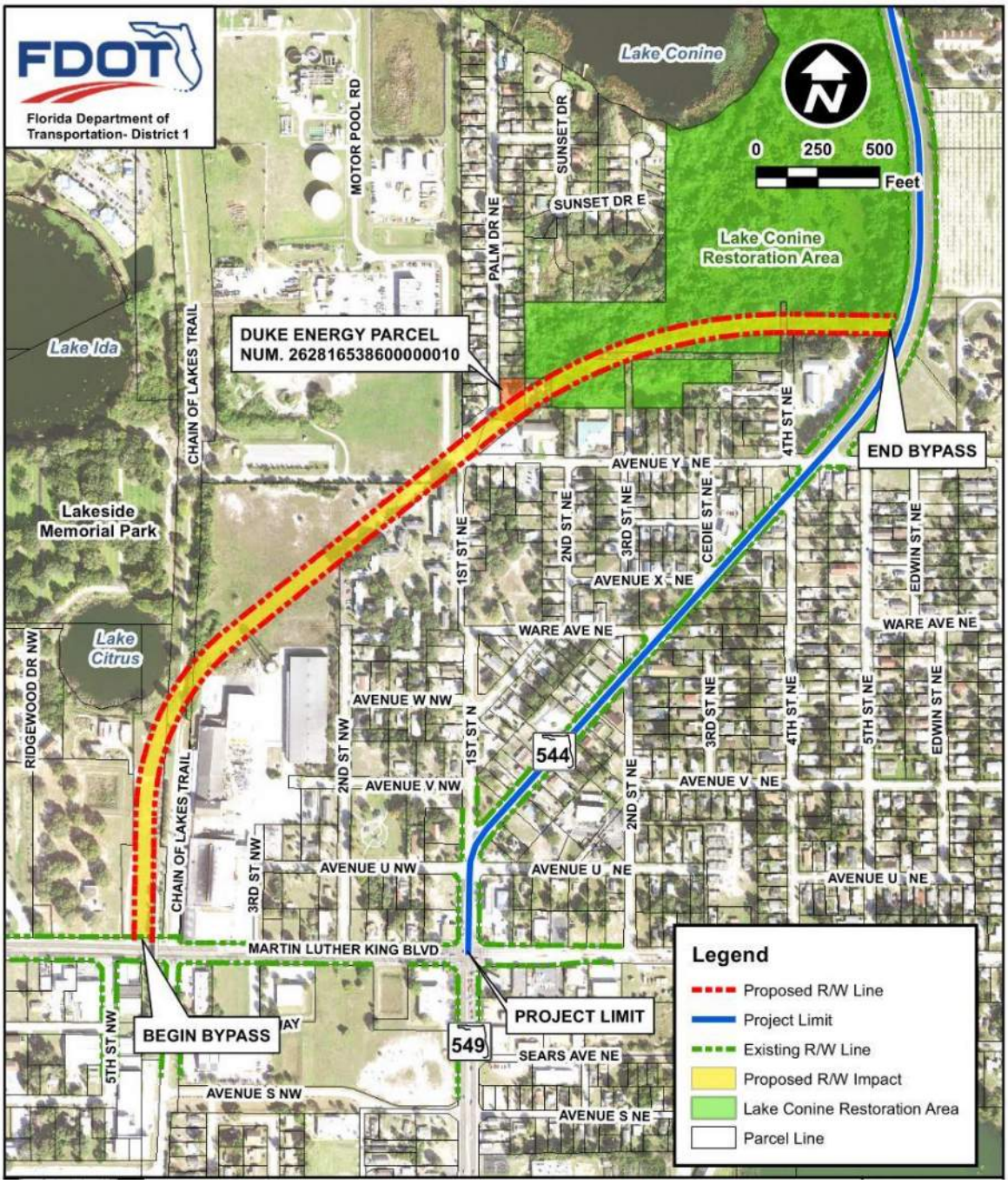


Figure 5-2 Preliminary Alignment



Advantages of the bypass roadway include removal of some traffic from SR 544 through the Florence Villa neighborhood and removal of some truck traffic from SR 544 through the Florence Villa neighborhood.

Disadvantages of the bypass roadway are:

- Impacts to eight parcels, including:
    a. Lake Conine Treatment Wetland Restoration Park
    b. New Bethel Missionary Baptist Church
    c. Duke Energy parcel
    d. TIITF/State of Florida property (adjacent to the Chain of Lakes Trail)
    e. Chain of Lakes Trail (TIITF)
- Residential / neighborhood impacts
- Impacts at the Chain of Lakes Trail crossing
- Creation of a new bypass roadway intersection at Martin Luther King Boulevard that would not meet minimum signal spacing criteria due to its proximity to the SR 544/Martin Luther King Boulevard intersection

A priority of this study is minimizing impacts to the historic Florence Villa neighborhood. For this reason, SR 544 through Florence Villa is considered constrained, and the Bypass Road alternative west of SR 544 was eliminated from further consideration. Since the need for additional roadway capacity remains, the new roadway identified in the Polk TPO Momentum 2045 LRTP as the Willowbrook Connector, an unfunded need, is needed. This new roadway is proposed to connect SR 544 and Martin Luther King Boulevard in a north-south alignment between Lake Smart and Lake Fannie near the Willowbrook Golf Course. This roadway will relieve traffic congestion on SR 544 between Old Lucerne Park Road (west) and Martin Luther King Boulevard, including through the Florence Villa neighborhood.

Two-lane undivided roadway with 8-foot median islands at pedestrian crosswalks

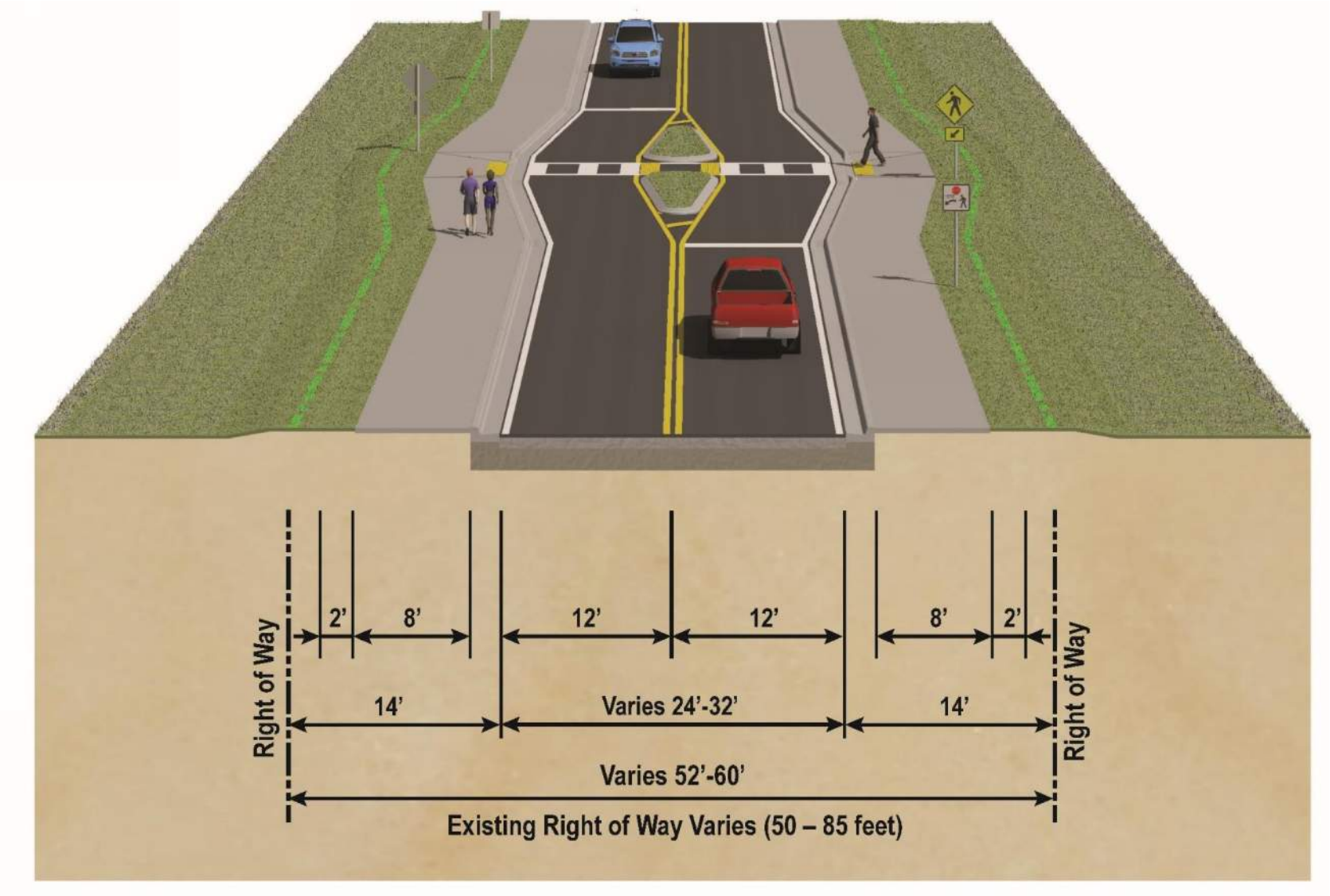
Due to the significant number of crashes that have occurred over the last six years between Martin Luther King Boulevard and Avenue Y, including designation by the Polk TPO as a High Crash Corridor, improving the overall safety of this area for all users (vehicles, bicyclists, pedestrians, and transit riders) is of the utmost importance. Minimizing right-of-way impacts to the historic Florence Villa neighborhood is also a priority. Therefore, an alternative that maintains a two-lane undivided roadway between Martin Luther King Boulevard and Avenue Y with two 12-foot lanes and 8-foot median islands at pedestrian crosswalks was evaluated.

While the two-lane undivided roadway alternative does not meet the stated project purpose and need related to capacity and transportation demand, it does enhance mobility options and multimodal access. The 8-foot median islands at crosswalk locations are intended to provide horizontal deflection to slow speeds through the Florence Villa neighborhood in addition to providing pedestrian refuge. Eight-foot-wide sidewalks located at the back of curb are included on both sides of the roadway. This typical section requires between 52 and 60 feet of right-of-way. The two-lane undivided roadway typical section is presented as **Figure 5-3.**

Further justification for consideration of maintaining a two-lane roadway between Martin Luther King Boulevard and north of Avenue Y is this area's inclusion in the City of Winter Haven's Transportation Concurrency Exception Area (TCEA), as mapped in the Transportation Element of the City of Winter Haven 2025 Comprehensive Plan. The purpose of the TCEA is to promote urban infill and redevelopment, downtown revitalization, and to exempt new development or redevelopment from meeting transportation level of service standards.

In addition, the new roadway identified in the Polk TPO Momentum 2045 LRTP as the Willowbrook Connector will relieve traffic congestion on SR 544 between Old Lucerne Park Road (west) and Martin Luther King Boulevard, including through the Florence Villa neighborhood, once funded and constructed.

Figure 5-3 Two-Lane Undivided with Median Islands Typical



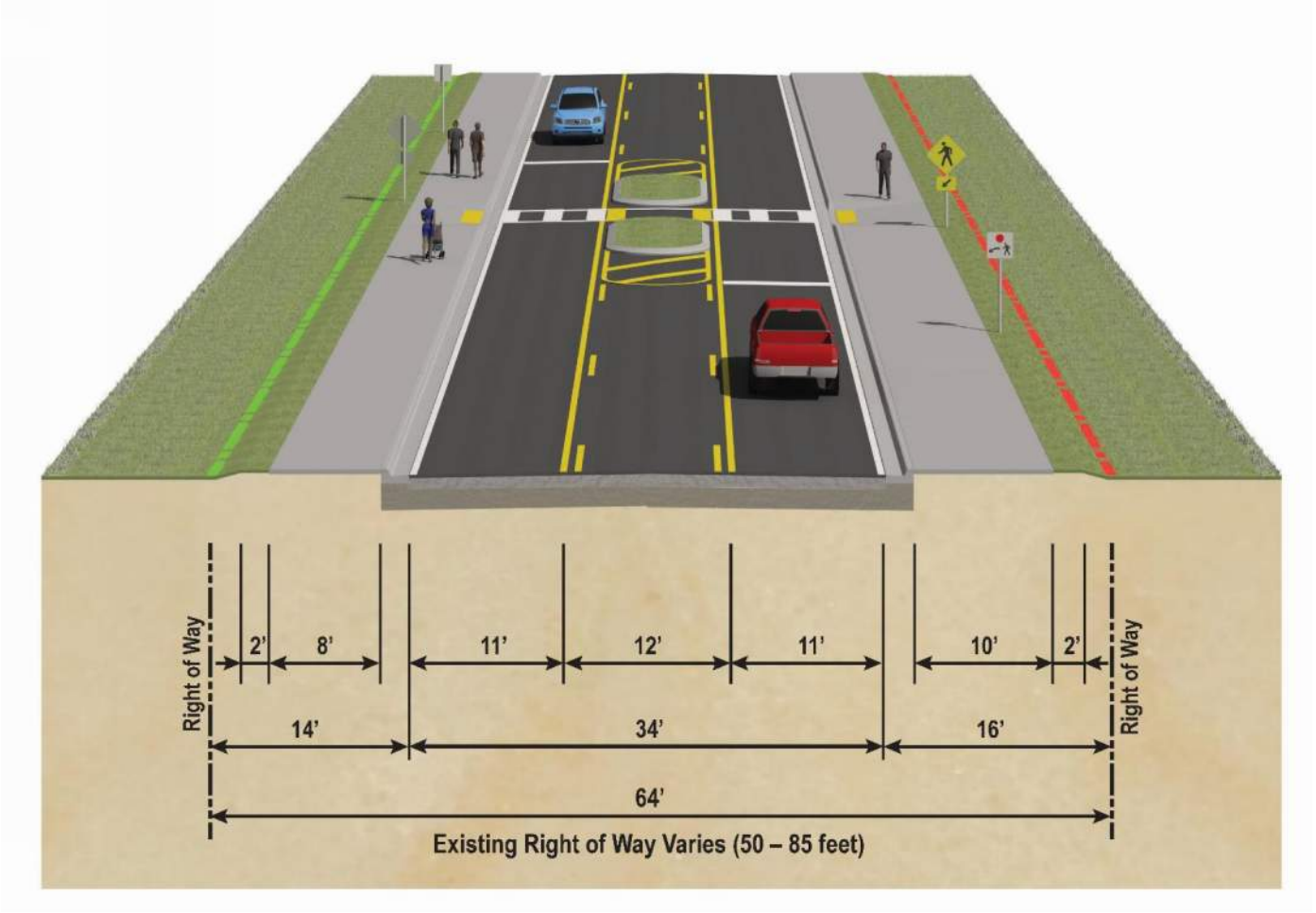
Three-lane roadway with center two-way left turn lane

A three-lane alternative between Martin Luther King Boulevard and Avenue Y was evaluated. This alternative includes two 11-foot travel lanes with one through lane in each direction plus a center 12-foot two-way left turn lane. This alternative includes an 8-foot-wide sidewalk located at the back of curb on the west side of the roadway and an 10-foot shared use path on the east side of the roadway. This typical section, depicted in **Figure 5-4**, requires 64 feet of right-of-way.

One of the benefits of this alternative is that the center two-way left turn lane provides an opportunity for vehicles turning left to move out of the flow of through vehicles, reducing braking and congestion for through vehicles and reducing rear-end crashes. This is supported by Polk TPO's Lucerne Park Road Complete Streets Action Plan which identified a pattern of high rates of rear-end crashes not at signalized intersections and suggested construction of a continuous left turn lane for turning vehicles to pull out of traffic flow as an applicable countermeasure.

This alternative provides some increase in capacity due to the introduction of the center turn lane but does not fully meet the stated purpose and need related to capacity and transportation demand. It does, however, enhance mobility options and multimodal access through the addition of the wide sidewalk and share use path on both sides of the roadway.

Figure 5-4 Three Lane Typical with Center Two-Way Left Turn Lane

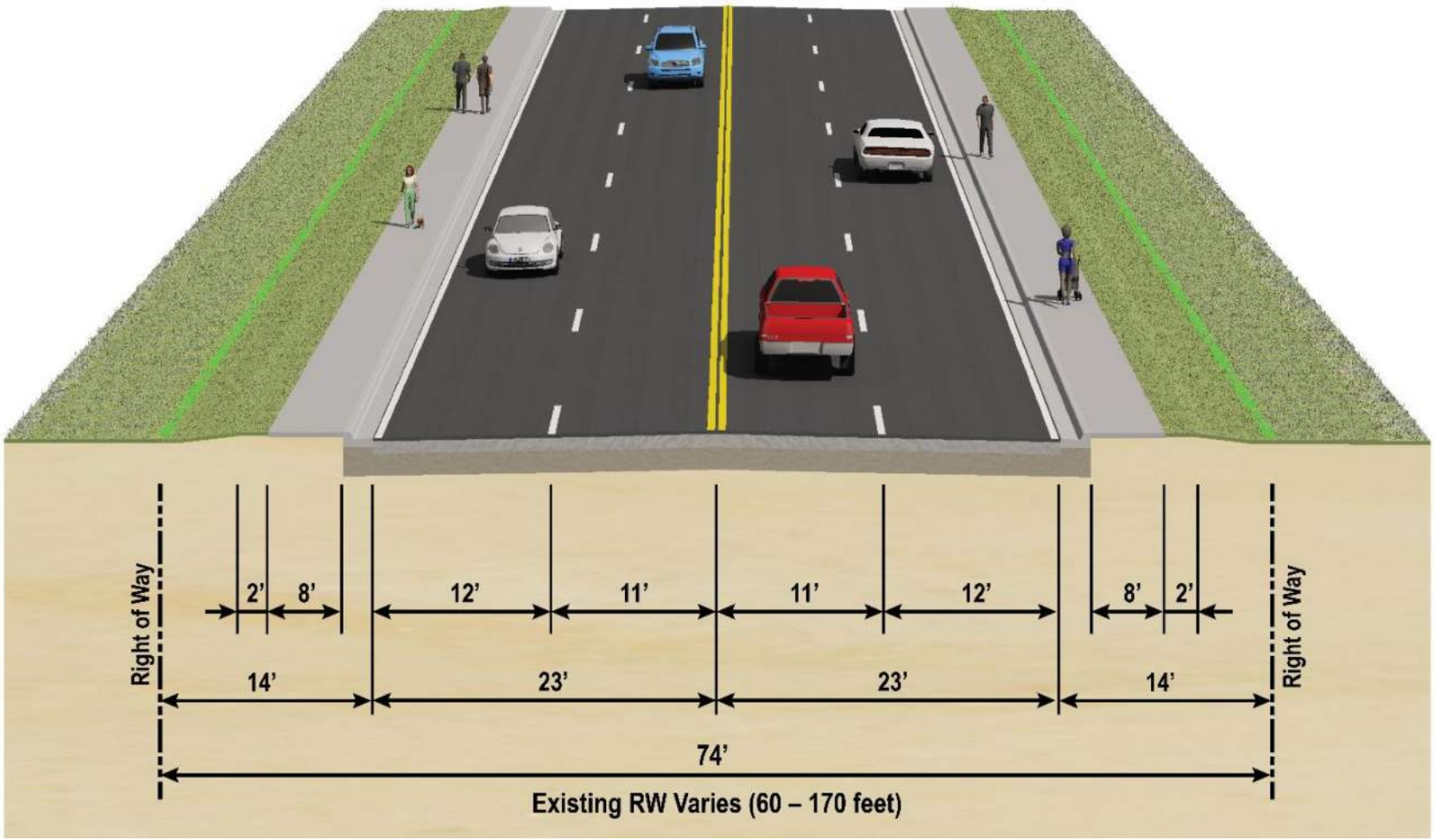


Four-lane Undivided Roadway

A four-lane undivided roadway was considered to accommodate the projected design year 2045 traffic volumes. The typical section is the same as that evaluated for the bypass roadway alternative, as shown in **Figure 5-5**. It includes two through lanes in each direction with 11-foot inside lanes and 12-foot outside lanes. It also includes 8-foot-wide sidewalks located at the back of curb on both sides of the roadway.

While this alternative meets the stated purpose and need to accommodate design year traffic demand, it requires pedestrians to cross 46 feet of travel lanes without any median refuge. In addition, no turn lanes are provided which would likely result in a high frequency of rear-end crashes. Lastly, this alternative would result in significant impacts to property through the Florence Villa community due to the minimum 74 feet of right-of-way required. For these reasons, this alternative was eliminated from further consideration.

Figure 5-5 Four Lane Undivided Typical

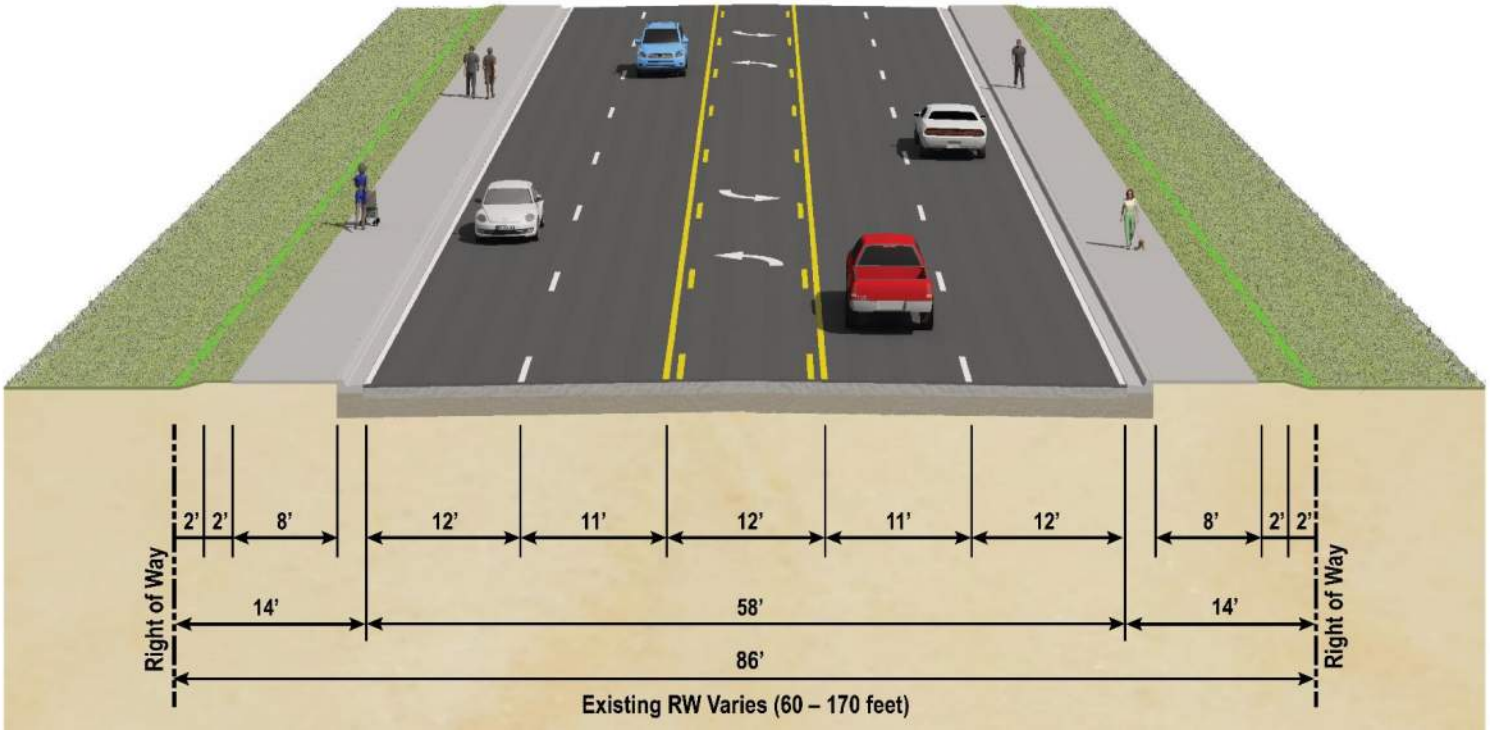


Five-lane Roadway with Center Two-lane Left Turn Lane

A five-lane roadway was also considered to accommodate the projected design year 2045 traffic volumes. This alternative includes two 11-foot inside through lanes, two 12-foot outside through lanes, and a 12-foot center two-way left turn lane. It also includes 8-foot-wide sidewalks located at the back of curb on both sides of the roadway. The typical section for this alternative is shown in **Figure 5-6**.

The advantages of this alternative are that it provides the vehicular capacity to accommodate design year 2045 traffic volumes, it allows for turning vehicles to move out of the flow of through traffic, and pedestrian refuge islands could be constructed within the center two-way left turn lane at crosswalk locations. However, it also has the greatest impact to property through the Florence Villa neighborhood due to the 86-foot right-of-way required. This alternative was eliminated from further consideration to minimize property impacts to the Florence Villa neighborhood.

Figure 5-6 Five-Lane Roadway with Center Two-Way Left Turn Lane Typical



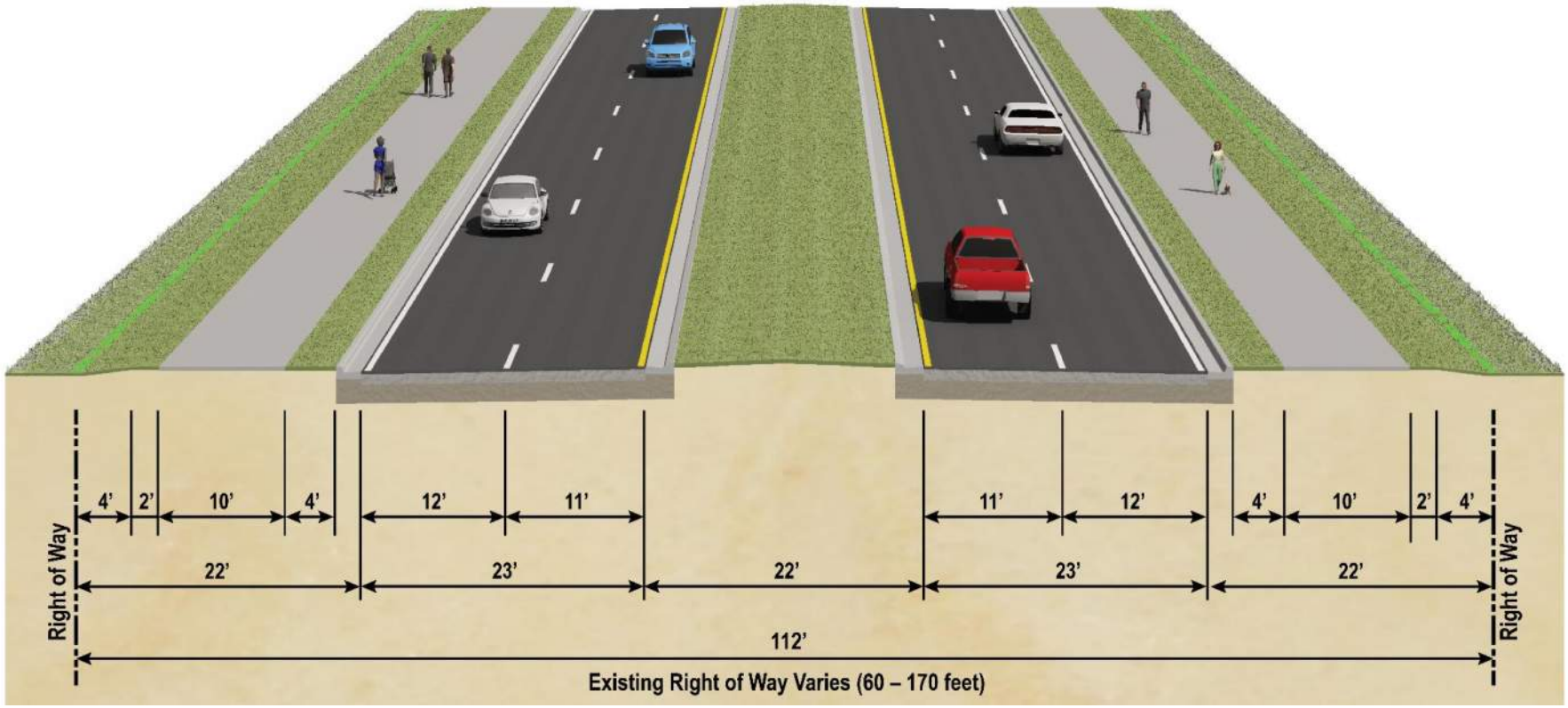
Segments 2-7 Build Alternatives

Between Avenue Y and LaVista Drive, build alternatives included different alignments with the same four-lane divided roadway. The typical section, depicted in **Figure 5-7**, includes two 11-foot inside through lanes, two 12-foot outside through lanes, and a 22-foot median. It also includes 10-foot shared-use paths on both sides of the roadway. This alternative requires a minimum of 112-feet of right-of-way.

The four-lane divided roadway alternative meets the purpose and need for the project by providing the roadway capacity to meet design year 2045 projected traffic volumes. It enhances mobility options and multi-modal access by providing shared-use paths on both sides of the roadway that can be used by both people walking and biking. It also supports economic development by providing the roadway capacity needed to support development and redevelopment.

For Segments 2 through 7 two alternatives have been evaluated. They are a left side widening and a right side widening.

Figure 5-7 Four-Lane Divided Typical



Segment 8 Build Alternatives

For Segment 8, from LaVista Drive to SR 17, five alternatives have been evaluated. They are a left side widening, a right side widening, and a centered widening, using the full four-lane divided typical section (**Figure 5-7**) plus an option to only add 8-foot-wide sidewalks to the existing road (**Figure 5-8**), and a minimized four lane divided typical section with centered widening (**Figure 5-9**).

Figure 5-8 Four-lane Typical with 8 Foot Sidewalks

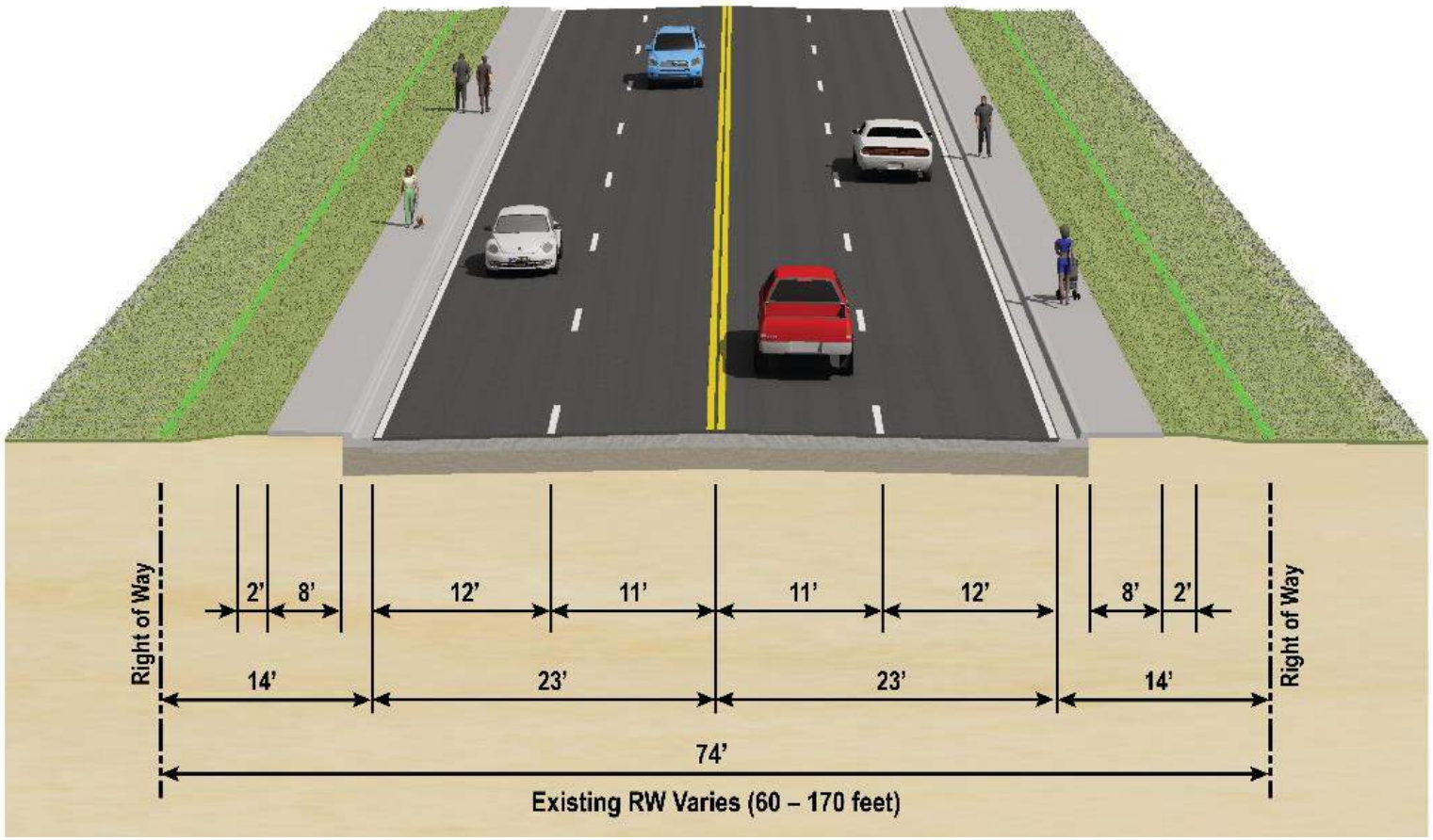
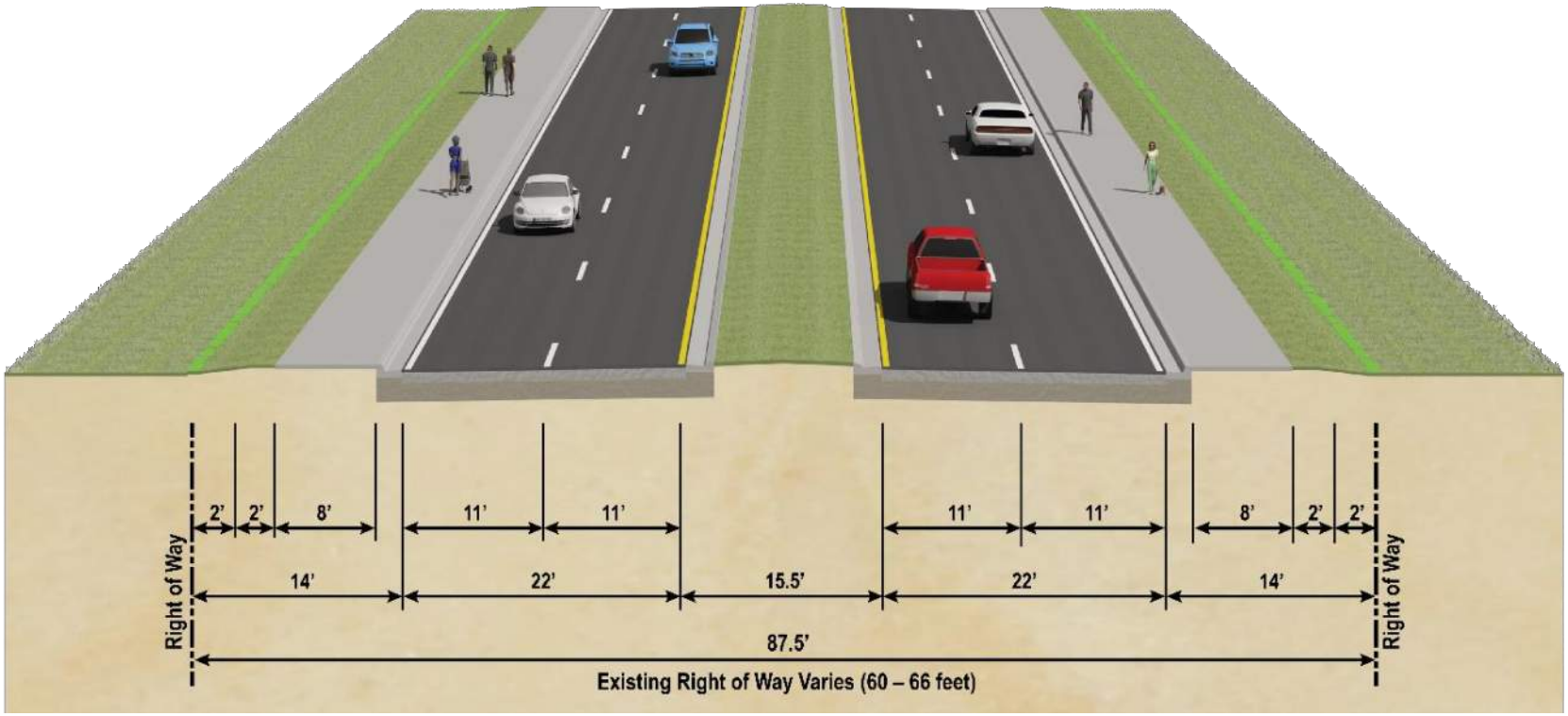


Figure 5-9 Minimized Four-Lane Divided Typical with 8 Foot Sidewalks



Intersection Build Alternatives

Each of the nine major intersections were evaluated for intersection configuration and type of control. This evaluation is documented in detail in the Intersection Control Evaluation (ICE) Technical Memorandum for the SR 544 PD&E Study. An overview of the types evaluated and recommendations for each intersection are summarized below.

Martin Luther King Boulevard Intersection

Martin Luther King Boulevard is currently a signalized intersection. Improvements being considered involve adding lanes to the north leg of the existing signalized intersection. This concept also includes a realignment of 1st Street to SR 544 through a city-owned parcel to move the northbound left turn lane onto 1st Street from SR 544 farther north.

The recommended ICE improvements for the Martin Luther King Boulevard intersection include the following:

- Provide an exclusive southbound right-turn lane on SR 544 just south of Avenue U;
- Increase the length of the existing southbound left-turn lane on SR 544;
- Convert the access at the Avenue U intersection to right-in/right-out only; and
- Realign the southern end of 1st Street NW to create a new T-intersection on SR 544 in the vicinity of Avenue V.

The ICE Tech memo also recommended that the Polk TPO amend their adopted 2045 LRTP to designate the portion of SR 544 from Martin Luther King Boulevard to Avenue Y as a constrained corridor and seek to develop a financially feasible new north/south corridor connecting SR 544 and Martin Luther King Boulevard to reduce the future traffic volumes on this constrained corridor.

Avenue Y Intersection

Several alternatives were evaluated for the Avenue Y intersection. These include a single-lane roundabout, a two-lane roundabout, a signalized intersection with single through lanes northbound and southbound, a signalized intersection with two through lanes northbound and southbound, a 65-foot diameter mini-roundabout, and a 90-foot diameter mini-roundabout. The two-lane roundabout and the signalized intersection with two through lanes northbound and southbound were evaluated to address the need for capacity. Other alternatives were developed to address the need to improve safety over the need for capacity.

The ICE Tech Memo recommended the implementation of a roundabout at the Avenue Y intersection to help vehicles transition from the 45 mph design speed/target speed proposed for SR 544 north of Avenue Y to the 35 mph design speed/target speed proposed for SR 544 south of Avenue Y. This speed control measure should increase the safety of the pedestrians and bicyclists that are crossing SR 544 at this location. A one-lane roundabout is projected to have the lowest number of fatal and injury crashes and the highest opening year and design year Safe

System for Intersections (SSI) scores of all the alternatives evaluated. Given the large number of pedestrians and bicyclists utilizing the portion of SR 544 south of Avenue Y, improving the overall safety of this area for all users (vehicles, bicyclists, and pedestrians) is extremely important.

Other important considerations are maintaining the integrity of the Florence Villa community and avoiding any potential Environmental Justice (EJ) issues by minimizing the impacts to this lower income minority neighborhood. Consequently, a 90-foot Inscribed Circle Diameter (ICD) mini-roundabout is recommended for the Avenue Y intersection.

Old Lucerne Park Road (West) Intersection

This intersection is currently unsignalized with stop signs on the minor street approaches. A signal and a roundabout were evaluated for the Old Lucerne Park Road (west) intersection. However, due to potential residential impacts, the realignment of Old Lucerne Park Road (west) to align with Vista Del Lago Drive was evaluated and a signal and roundabout were considered at this new four-leg intersection.

The ICE Tech Memo recommended the implementation of a two-lane roundabout is expected to help facilitate speed control in this area. Reduced vehicle speeds should provide additional safety benefits for the older driving population accessing SR 544 from the 55+ Lucerne Lakeside Mobile Home Park, as well as the westbound vehicles approaching the horizontal curve at Lake Rochelle Estates. The roundabout is also projected to have the lowest opening year and design year SSI scores of all the alternatives analyzed and is expected to result in very low design year peak hour vehicle delays. Consequently, the PD&E Study is recommending a roundabout for the Old Lucerne Park Road (west end) intersection. The PD&E Study is also recommending a realignment of the southern portion of this roadway to connect directly across from Vista del Lago Drive. This realignment will eliminate the need for any residential relocations

Lucerne Loop Road Intersection

This intersection which serves as access to the Walmart distribution center is currently unsignalized with a stop sign on the minor street approach and an overhead flashing beacon. A signal, a roundabout, and a continuous green T intersection concept were evaluated for this intersection.

The ICE Tech Memo recommended the implementation of a roundabout at the Lucerne Loop Road intersection. Although a roundabout would result in larger right-of-way impacts, it would also provide positive speed control and result in fewer fatal and injury crashes compared to a conventional signalized intersection. The current posted speed limit in this area is 55 mph; however, the proposed SR 544 typical section is based on a 45 mph design/target speed. A roundabout will help to facilitate slower vehicle speeds east and west of this intersection. A

roundabout is also projected to have a much higher SSI score compared to a conventional signalized intersection. The opening year and design year SSI scores for the roundabout are 87 and 75, respectively. The opening year and design year SSI scores for a conventional signalized intersection are 74 and 49, respectively. Consequently, a roundabout is recommended for the Lucerne Loop Road intersection at this time.

Old Lucerne Park Road (East) Intersection

This intersection is currently unsignalized with a stop sign on the minor street approach. A signal and a roundabout were evaluated for the Old Lucerne Park Road (east) intersection.

A Stage 2 ICE Tech Memo was completed for the Old Lucerne Park Road (east) intersection. The ICE Tech Memo recommended the implementation of a roundabout at the SR 544/Old Lucerne Park Road (east) intersection. A roundabout would provide positive speed control and result in a lower number of fatal and injury crashes as compared to a conventional signalized intersection. Although the current posted speed limit in the vicinity of this intersection is 50 mph, the proposed SR 544 typical section and horizontal alignment is based on a 45 mph target speed. A roundabout would help to facilitate slower vehicle speeds east and west of this intersection. A roundabout is estimated to have significantly higher SSI scores as compared to a conventional signalized intersection. Compared to the conventional signalized intersection, the roundabout has a B/C ratio equal to 3.96 and a NPV equal to $7,774,263. Consequently, a two-lane roundabout is the recommended intersection control strategy for the Old Lucerne Park Road (east) intersection.

Lake Hamilton Road Intersection

This intersection is currently unsignalized with stop signs on the minor street approaches. Several concepts were considered at this location since two mobile home park entrance roads on the north side of SR 544 do not align with Lake Hamilton Road. The signalized intersection concept includes the realignment and connection of the mobile home park entrance roads at a single location at Lake Hamilton Road. Other alternatives considered a directional median opening at Lake Hamilton Road with downstream U-turns and a traffic signal that does not allow through movements in the north-south direction (signalized R-cut).

The ICE Tech Memo recommended the signalized Thru-Cut intersection for the SR 544/Lake Hamilton Drive intersection for the PD&E phase only. This intersection control strategy eliminates the north/south through movements across the intersection, eliminates the need for trucks to make U-turn movements east and west of the intersection, avoids the situation where truck U-turn movements would be co-located with outbound left-turn movements made from the Hidden Cove 55+ residential community, and minimizes the total U-turn volumes. This control strategy also eliminates the need to acquire right-of-way in the northwest quadrant of the Hide-A-Way Lane intersection and has the second highest SSI scores of the four signalized alternatives. It

should be noted that a Benefit/Cost (B/C) analysis and a Net Present Value (NPV) analysis will be conducted during the Stage 2 final design ICE analysis. This analysis will be conducted for a conventional signalized intersection, a signalized Thru-Cut intersection and a signalized R-cut intersection.

The recommended PD&E improvement concept also includes a reconfiguration of the inbound and outbound access for the Fairview Village and Lakeside Ranch mobile home communities. The two separate entrance/exit roadways providing access to these residential communities are combined to provide one single entrance/exit. This single access point eliminates the two existing access points that are separated by a distance of approximately 110 feet. This will eliminate the need for eastbound SR 544 vehicles and northbound Lake Hamilton Drive vehicles that are destined for Lakeside Ranch to travel approximately 0.25 miles to the east of Lake Hamilton Drive and make a U-turn. This will also eliminate the need for southbound vehicles exiting Lakeside Ranch to cross two lanes on westbound SR 544 in approximately 50 feet to turn left onto Lake Hamilton Drive or make a U-turn to head east on SR 544.

Brenton Manor Avenue /US 27 Intersection

The Brenton Manor Avenue intersection is currently unsignalized with a stop sign on the Brenton Manor Avenue approach. Alternatives evaluated include a signal and a roundabout. The US 27 intersection is currently signalized. Alternatives evaluated for the US 27 intersection include a signal, a quadrant roadway in the northwest quadrant (NWQR), and a single point urban interchange (SPUI).

Due to the proximity of the Brenton Manor Avenue intersection to US 27 and the need to accommodate the anticipated queues between the two intersections, the alternatives evaluated for this intersection were dependent upon the alternatives for the US 27 intersection.

The ICE Tech Memo recommended intersection control strategy for the recommended SPUI for the US 27 intersection and a roundabout for the Brenton Manor Avenue Intersection. This recommendation is based on the following:

- The SPUI + roundabout alternative is expected to result in 103 fewer fatal and injury crashes as compared to the NWQR alternative.
- The SPUI + roundabout alternative is also projected to have lower vehicle delays than the NWQR and would not cause any delay for the through vehicles on US 27.
- The implementation of a SPUI at the SR 544/US 27 intersection would enhance the functionality of this SIS corridor and help to promote the efficient movement of freight within this portion of Polk County.

It is also recommended that a Stage 2 ICE analysis be conducted for these two intersections using updated information when the final design phase of the project is initiated.

SR 17 Intersection

The SR 17 intersection is currently signalized. This intersection was evaluated for a signal and a roundabout. Of particular concern for this intersection is the avoidance or minimization of any impacts to the US post office located in the northeast quadrant of the intersection. The alignment of SR 544 east of SR 17 requires widening to the south to avoid post office impacts. Both alternatives eliminate the eastbound left turn lane into the post office and instead create a U-turn further east.

The ICE Tech Memo recommended intersection control strategy for the SR 17 intersection is a signalized intersection. The roundabout alternative has larger right-of-way impacts than the signalized intersection and would result in several residential relocations. Since the signalized intersection is projected to have a lower number of injury and fatal crashes, will require a smaller amount of additional right-of-way, and will not require any widening on the east leg of the intersection (i.e., CR 544), it is the recommended intersection control strategy for the SR 17 intersection.

The ICE memos for each intersection are included as **Appendix A**.

5.5 Comparative Alternatives Evaluation

The Evaluation Matrix detailed in **Table 5-1** provides a comparative analysis of the No Build and Build roadway alternatives. **Table 5-2** provides a comparative analysis of the various intersections alternatives that were evaluated. The evaluation of the roadway and intersection alternatives was presented at the Alternatives Public Meeting on Tuesday, February 8, 2022.

Table 5-1 Roadway Alternatives Evaluation Matrix

Segment	No Build	Segment 1 - MLK Boulevard to North of Avenue Y	Segment 2 - North of Avenue Y to East of Lake Conine Canal	Segment 3 - East of Lake Conine Canal to East of Old Lucerne Park Road (west)	Segment 4 - East of Old Lucerne Park Road (west) to East of Lucerne Loop Road	Segment 5 - East of Lucerne Loop Road to West of Lake Hamilton Canal	Segment 6 - West of Lake Hamilton Canal to West of Brenton Manor	Segment 7 - West of Brenton Manor to LaVista Drive	Segment 8 - LaVista Drive to SR 17
Description		3 Lane Best Fit with Mini -Roundabout at Avenue Y	2R - Right Side Widening	3L - Left Side Widening with Roundabout at Old Lucerne Park Road (west) Realigned	4L - Left Side Widening with Roundabout at Lucerne Loop Road	5L - Left Side Widening with Roundabout at Old Lucerne Park Road (east)	6L - Left Side Widening	7R - Left/Right Side Widening with SPUI at US 27	8CM - Centered Minimized 4 Lane Widening
Property Impacts									
Parcels Impacted	0	34	9	13	3	25	17	30	33
Area of Impact (ac)	0	1.422	1.15	1.78	0.9	4.26	1.13	13.26	1.69
Residential Relocations	0	0	0	0	0	0	1	0	0
Business Relocations	0	3	0	0	0	1	1	2	0
Natural, Environmental & Physical Impacts									
Potential Impacts to Species	None	Low	High	Moderate	Moderate	High	Low	Moderate	Low
Potential Contamination Sites	None	8	0	0	0	1	0	6	0
Wetland Impacts (ac)	0	0.00	0.00	0.88	0.47	1.28	0.10	2.26	0.00
Surface Water Impacts (ac)	0	0.17	0.03	0.10	0.08	1.08	0.02	0.05	0.00
Floodplain Impacts (ac)	None	0.00	0.42	2.20	4.17	12.58	0.05	3.89	0.00
Public Parks Impacted	0	0	0	0	0	0	0	0	0
Potential Impacts to Archaeological / Historic Resources	None	Low / Moderate	Moderate / Low	Moderate / Low	Moderate / Low	Moderate / Low	Moderate / Moderate	Moderate / Moderate	Moderate / Moderate
Noise Impacts	None	18 residences, 3 churches	13 residences	46 residences	12 residences, 1 community pool	29 residences	7 residences	2 residences	40 residences ; 2 churches; 1 school
Estimated Costs in Millions (Present Day Costs)									
Design	No Cost	$1,809,000	$1,333,000	$1,489,000	$3,377,000	$2,471,000	$1,397,000	$13,269,000	$971,000
Roadway Right of Way	No Cost	$4,000,000	$571,000	$1,237,000	$490,000	$7,818,500	$1,518,500	$16,767,500	$3,725,000
Pond Right of Way	No Cost	$0	$0	$945,000	$2,536,000	$800,000	$545,000	$3,210,000	$0
Reimbursable Utility Relocation	No Cost	$100,000	$8,300	$0	$6,500	$2,029,850	$0	$1,620,000	$7,823,700
Non-Reimbursable Utility Relocation	No Cost	$2,374,100	$3,745,700	$3,072,600	$505,705	$2,877,280	$1,422,100	$2,811,000	$1,517,045
Wetland Mitigation	No Cost	$0	$0	$0	$63,450	$303,750	$13,500	$305,100	$0
Roadway Construction	No Cost	$12,061,500	$8,887,700	$9,929,500	$22,511,800	$16,476,300	$9,315,800	$61,385,000	$6,476,300
Construction Engineering & Inspection (Assumes 12% based on scale of projects)	No Cost	$1,447,000	$1,067,000	$1,192,000	$2,701,000	$1,977,000	$1,118,000	$10,073,000	$777,000
Total Cost	No Cost	$19,418,000	$11,867,000	$14,793,000	$31,686,000	$31,076,000	$13,363,000	$106,630,000	$19,773,000

Table 5-2 Intersections Evaluation Matrix

Segment	No Build	Avenue Y		Old Lucerne Park Road (west end)		Lake Lucerne Road / Lucerne Loop Road (Walmart)		Old Lucerne Park Road (east end)		US 27/Brenton Manor	
Description		Mini-Roundabout	Signal	Roundabout	Signal	Roundabout	Signal	Roundabout	Signal	Quadrant Roadway with Signal at Brenton Manor	Single Point Urban Interchange with Roundabout at Brenton Manor
Property Impacts											
Parcels Impacted	0	18	4	8	1	3	3	8	4	17	17
Area of Impact (ac)	0	0.65	0.33	0.44	0.2	0.9	0.38	0.8	0.18	7.76	6.86
Residential Relocations	0	0	1	1	0	0	0	0	0	0	0
Business Relocations	0	0	0	0	0	0	0	1	0	0	2
Natural, Environmental & Physical Impacts											
Potential Species Impacts	None	Low	Low	Low	Low	Moderate	Low	Low	Low	Moderate	Moderate
Potential Contamination Sites	None	1	1	1	1	0	0	0	0	3	3
Wetland Impacts (ac)	None	0.00	0.00	0.00	0.00	0.47	0.20	0.10	0.10	1.76	1.63
Suface Water Impacts (ac)	None	0.17	0.17	0.08	0.00	0.08	0.05	0.04	0.04	0	0
Floodplain Impacts (ac)	None	0.00	0.00	0.78	0.66	4.17	3.68	0.08	0.08	2.63	2.18
Public Parks Impacted	None	None	None	None	None	None	None	None	None	None	None
Potential Impacts to Cultural Resources	None	Low /Low	Low / Moderate	Moderate / Moderate	Moderate / Low	Moderate / Low	Moderate / Low	Moderate / Low	Moderate / Low	Moderate / Low	Moderate / Low
Noise Impacts	None	6 residences	6 residences	6 residences, 1 community pool	6 residences, 1 community pool	None	None	9 residences	7 residences	1 hotel pool	None
Estimated Costs in Millions (Present Day Costs)											
Design	No Cost	$151,000	$74,000	$166,000	$55,000	$161,000	$55,000	$163,000	$55,000	$655,000	$4,061,000
Right of Way	No Cost	$425,000	$1,780,000	$965,000	$125,000	$490,000	$325,000	$4,565,000	$990,000	$4,835,000	$9,835,000
Reimbursable Utility Relocation	No Cost	$100,000	$100,000	$0	$0	$6,500	$26,000	$25,800	$3,800	$74,100	$94,100
Non-Reimbursable Utility Relocation	No Cost	$347,000	$392,900	$798,900	$858,900	$505,700	$899,300	$359,600	$410,400	$669,900	$939,900
Wetland Mitigation	No Cost	$0	$0	$0	$0	$63,500	$27,000	$13,500	$13,500	$237,600	$220,100
Roadway Construction	No Cost	$1,008,400	$492,500	$1,109,300	$369,000	$1,074,700	$369,000	$1,085,900	$369,000	$4,367,100	$27,071,200
Construction Engineering & Inspection	No Cost	$101,000	$49,000	$111,000	$37,000	$107,000	$37,000	$109,000	$37,000	$437,000	$2,707,000
Total Cost	No Cost	$1,785,000	$2,496,000	$2,351,000	$586,000	$1,903,000	$839,000	$5,962,000	$1,468,000	$10,606,000	$43,988,000

5.6 Selection of the Preferred Alternative

Selection of the preferred alternative included the avoidance and minimization of impacts, project costs, input received from the public at the Alternatives Public Meeting held on February 8, 2022, and at the Public Hearing held on January 30, 2025, and input received from local stakeholders.

The roadway was divided into eight segments. The preferred alternative for Segment 1, from Martin Luther King Boulevard to north of Avenue Y, is the three-lane typical section with a best fit alignment. This alternative is slightly higher in cost than the two-lane best fit alignment but improves traffic operations over the two-lane alternative. At the Martin Luther King Boulevard intersection, an exclusive southbound right turn lane is proposed to be added to this signalized intersection. A mini-roundabout is proposed at the Avenue Y intersection as this option has a lower cost than a traffic signal and fewer impacts than a traditional roundabout or traffic signal.

In Segment 2, from north of Avenue Y to east of the Lake Conine Canal, the south side widening is the preferred alternative because it does not impact the Lake Conine Wetlands Restoration Park or the Lake Conine boat ramp and has a lower overall cost than the north side widening alternative.

In Segment 3, from east of the Lake Conine Canal to east of Vista Del Lago, the north side widening alternative is the preferred alternative as it involves no relocations compared to seven residential relocations for the south side widening alternative. It also has a lower overall cost than the south side widening alternative. The preferred option for the Old Lucerne Park Road (west end) intersection is the realignment of the road to the east to align with Vista Del Lago Drive with a roundabout. The roundabout will provide positive speed control and will result in a lower number of fatal and injury crashes when compared to a signalized intersection.

In Segment 4, from east of Vista Del Lago to east of Lucerne Loop Road, the north side widening alternative is the preferred alternative. It has a lower overall cost when compared to the south side widening alternative and does not impact the Duke Osprey transmission line that the south side widening alternative does. A roundabout is proposed at the Lucerne Loop Road intersection because it will provide positive speed control and will result in a lower number of fatal and injury crashes when compared to a signalized intersection.

In Segment 5, from east of Lucerne Loop Road to west of Old Lucerne Park Road (east end), the north side widening alternative is the preferred alternative. It has a lower cost than the south side widening alternative and will not impact the Duke Osprey transmission line. A roundabout is the preferred alternative at the Old Lucerne Park Road intersection because it will provide positive speed control, will have a lower number of fatal and injury crashes, and will accommodate U-turn movements better than the signalized intersection alternative.

In Segment 6, from east of Old Lucerne Park Road (east end) to west of Brenton Manor Avenue, the preferred alternative is the north side widening alignment. It will involve one residential and one business relocation where the south side widening alignment involves eight business relocations. The north side widening alternative has an overall lower cost than the south side widening alternative and will not impact the Duke Osprey transmission like the south side widening alternative will. At the Lake Hamilton Drive intersection, a traffic signal is proposed and will include the realignment of Sunrise Drive to connect to East Street at Lake Hamilton Drive.

In Segment 7, from west of Brenton Manor Avenue to LaVista Drive, the preferred alternative involves widening to the north side of the road west of US 27 and to the south side of the road east of US 27, primarily to avoid impacts to the Duke Osprey transmission line. A single point urban interchange is proposed at the US 27 intersection with a roundabout at the Brenton Manor Avenue intersection. The single point urban interchange has a higher initial cost than the quadrant roadway concept, but significantly lower number of fatal and injury crashes, resulting in a lower overall predicted lifecycle cost.

In Segment 8, from LaVista Drive to SR 17, the preferred alternative is the reduced 4 lane divided urban roadway with a centered alignment. This option provides a balance in cost and impacts while providing a median for pedestrian refuge and allowing for an access management plan without resulting in any residential or business relocations. The intersection with SR 17 is recommended to remain signalized and no improvements are proposed on the north, south or east legs of the intersection.

6.0 AGENCY COORDINATION & PUBLIC INVOLVEMENT

6.1 Agency Coordination

An Efficient Transportation Decision Making (ETDM) Preliminary Programming Screen was published in the Environmental Screening Tool (EST) on May 22, 2020. The purpose of the Programming Screen was to present the proposed project to federal, state, and local governments and agencies for their review. The Environmental Technical Advisory Team (ETAT) did not identify any substantial impacts to resources.

Small group meetings were held with the City of Winter Haven, the Florence Villa neighborhood, Alta Vista Elementary School, and the Polk TPO. Meeting minutes and additional information is available in the *Comments and Coordination Report* provided in the project file.

6.2 Public Involvement

Public involvement was conducted throughout the duration of the PD&E Study. The project included a webpage at swflroads.com/sr544lucerneparkroad, an Alternatives Public Meeting, and a Public Hearing. The following sections provide a summary of the public involvement activities. Additional information is available in the *Comments and Coordination Report*.

Small group meetings were held with local neighborhoods and Homeowners Associations to present the project and gather feedback. Meeting minutes and additional information is available in the *Comments and Coordination Report* provided in the project file. Meetings occurred on the following dates:

- Northeast W.H. Neighborhood Association, February 17, 2020, and June 21, 2021
- Brookhaven Village neighborhood, March 22, 2022

Alternatives Public Meeting

An Alternatives Public Meeting was held on Tuesday, February 8, 2022, at The Rock Church of Winter Haven, 2901 Lucerne Park Rd, Winter Haven, FL 33881. This public meeting was advertised in compliance with all federal and state requirements. A copy of the Title VI Civil Rights Act board was displayed, and a project handout and comment forms were given to each attendee. The purpose of the meeting was to present the initial alternatives being considered for the project. The meeting was held in an open house format. The public was invited to attend at any time between 5:30 p.m. and 7:00 p.m. Attendees had an opportunity to view a continuous looping presentation, a video of the intersection options, project displays, and other documentation. The presentation included information regarding the PD&E Study process, the alternatives being evaluated, a matrix, and other project-related information. Members of the project team were

available to discuss the project with attendees and answer questions. 126 people signed in at the Alternatives Public Meeting.

Notifications

The following notifications were distributed for the Alternatives Public Meeting:

- Notifications to elected officials were sent on January 11, 2022
- Notifications to appointed officials and other stakeholders were sent on January 11, 2022
- Notifications to property owners were sent on January 14, 2022
- A press release was distributed by FDOT's Public Information Office on February 8, 2022
- An advertisement was published in The Ledger – New Chief on January 25, 2022
- An advertisement was published in the Florida Administrative Register on February 8, 2022

Public Input

Thirty-four comment forms were submitted at the meeting, with an additional thirty-six comments received leading up to and following the public meeting, within the 10-day comment period. The majority of the attendees were in favor of the project, especially showing favor for traffic signals versus roundabouts. Many comments expressed wanting the project done as soon as possible, saying there are already safety concerns with the population living off SR 544 having many elderly residents. Several members of the public were concerned about noise levels. A copy of the Alternatives Public Meeting Summary is available under separate cover.

6.3 Public Hearing

To be completed following the public hearing.

7.0 PREFERRED ALTERNATIVE

7.1 Typical Sections

Below is a summary of the preferred alternative for each roadway segment and intersection. The signed and sealed Typical Section Package is provided in the project file.

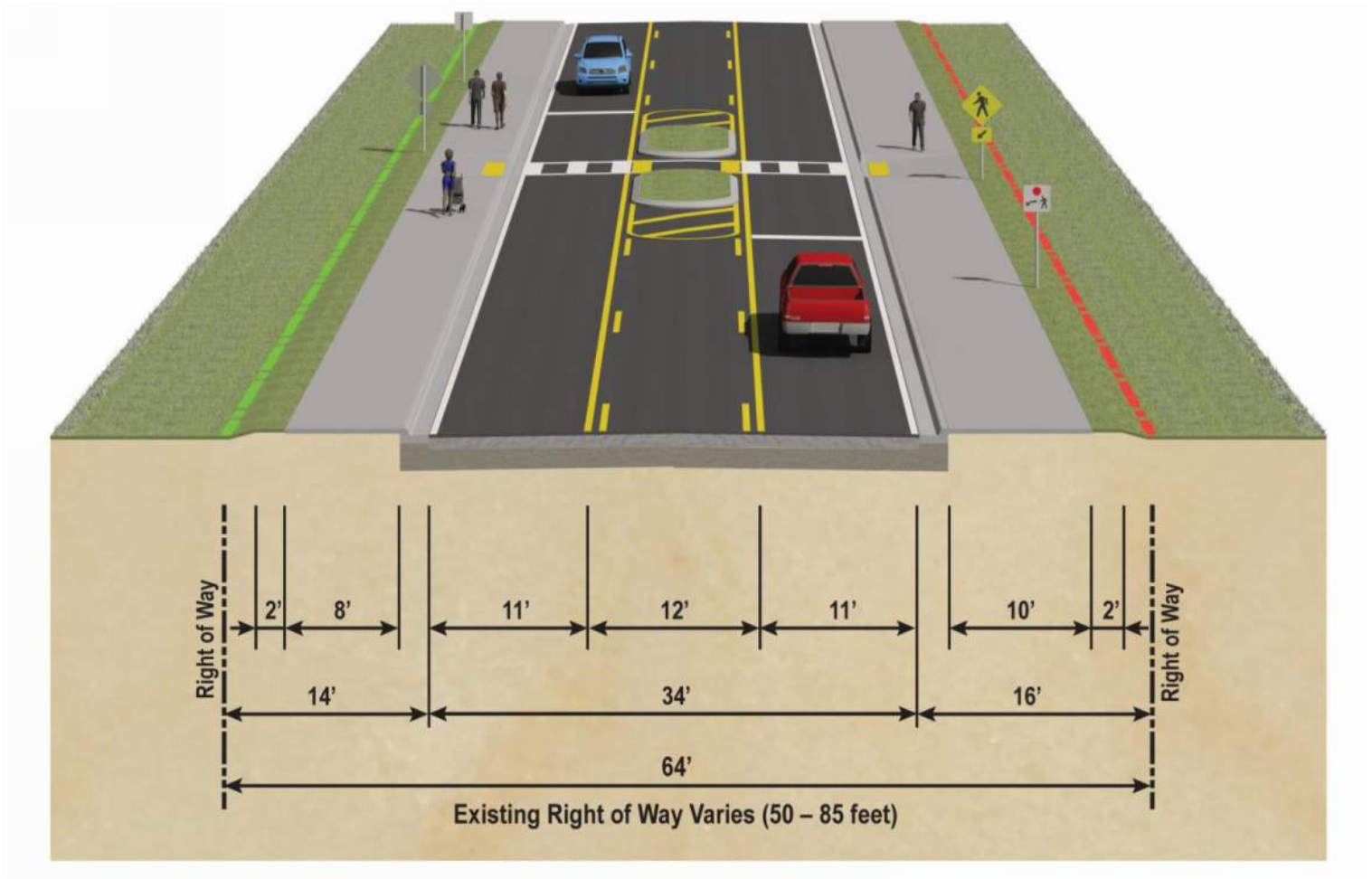
Segment 1 – Martin Luther King Boulevard to North of Avenue Y

The preferred typical section in Segment 1 is the three-lane typical section with a best fit alignment. It is slightly wider and will have minor right-of-way impacts (no residential relocations) than the two-lane alternative but will provide additional safety and capacity for turning vehicles with the center turn lane. **Figure 7-1** illustrates this typical section.

The preferred improvement at the Martin Luther King Boulevard intersection is to maintain the existing traffic signal but add a new southbound right turn lane at the intersection. Improvements also include realigning the 1st Street NW intersection with SR 544 farther away from the Martin Luther King Boulevard intersection.

The mini-roundabout with the 90-foot inscribed diameter is recommended at Avenue Y. This concept will minimize impacts to the residences, businesses, and church located at this intersection while providing an opportunity for an entrance feature to the historic Florence Villa neighborhood and speed control for vehicles entering the neighborhood.

Figure 7-1 Segment 1 Preferred Typical Section



Segment 2 – North of Avenue Y to East of Lake Conine Canal

The four-lane divided roadway is proposed with widening to the south side of the road. This alignment is recommended to avoid impacts to the Lake Conine Wetland Restoration Area and due to the proximity of the road to Lake Conine and wetlands along the lake. **Figure 7-2** illustrates the proposed four-lane divided roadway typical section for Segments 2 through 7.

Segment 3 – East of Lake Conine Canal to East of Old Lucerne Park Road (west end)

The four-lane divided roadway is proposed with widening to the north side of the road. This alignment is recommended to avoid impacts to existing residential developments on the south side of SR 544 and due to the proximity of the road to Lake Smart and wetlands along the lake.

The preferred concept at the Old Lucerne Park Road (west end) intersection is to realign Old Lucerne Park Road (west end) to align with Vista Del Lago Drive and to provide a roundabout at the intersection. The roundabout will help with speed control along SR 544 and improve safety when compared to the traffic signal option.

Segment 4 – East of Old Lucerne Park Road (west end) to East of Lucerne Loop Road

The four-lane divided roadway is proposed with centered widening. The existing road right-of-way can accommodate the proposed four-lane divided roadway in this segment.

The preferred improvement at the Lucerne Loop Road intersection is the roundabout. It will help with speed control along SR 544 and improve safety when compared to the traffic signal option.

Segment 5 – East of Lucerne Loop Road to East of Lake Hamilton Canal

The four-lane divided roadway is proposed with widening to the north side of the road. This alignment is recommended to avoid impacts to the Lake Region Lakes Management District boat ramp on the south side of the road and also to avoid impacts to the proposed Duke Energy transmission easement/poles on the south side of the road.

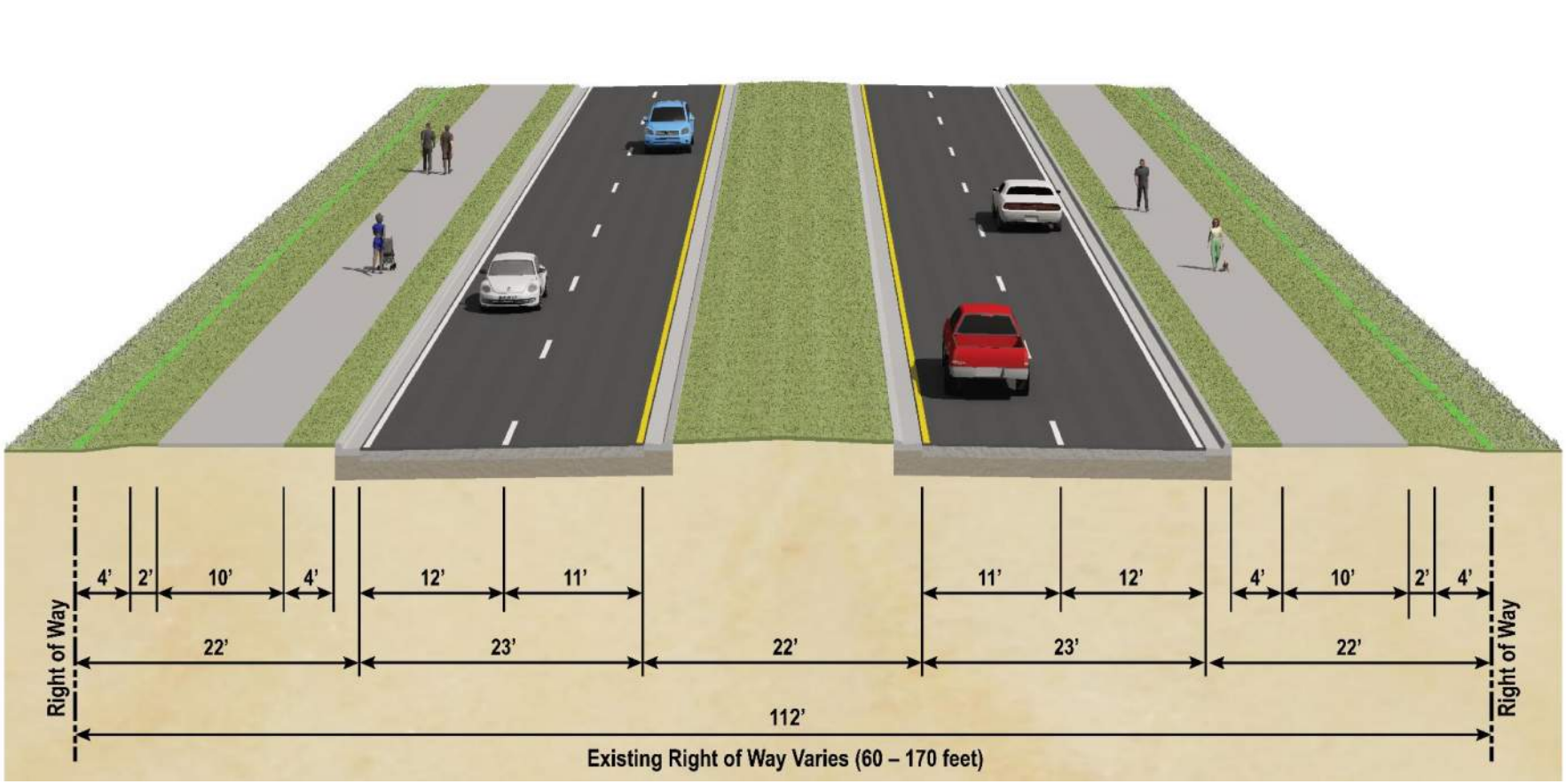
The preferred improvement at the Old Lucerne Park Road (east end) intersection is the roundabout. It will help with speed control on SR 544 and increase safety when compared to the traffic signal option at this skewed intersection.

Segment 6 – East of Lake Hamilton Canal to West of Brenton Manor Avenue

The four-lane divided roadway is proposed with widening to the north side of the road. This alignment is recommended to avoid impacts to the Duke Energy transmission easement/poles and existing commercial development on the south side of the road.

The signalized thru-cut alternative is recommended at the Lake Hamiliton Drive intersection. This option includes realigning the two internal roads for the developments on the north side of SR 544 so that they intersect SR 544 in a single location (north leg of the intersection).

Figure 7-2 Segment 2 through Segment 7 Preferred Typical Section



Segment 7 – West of Brenton Manor Avenue to LaVista Drive

The four-lane divided roadway is proposed with widening to the north side of the road west of US 27 and to the south side of the road east of US 27. This alignment is recommended to avoid impacts to Duke Energy transmission easement/poles that switch from the south side of the road to the north side of the road through the US 27 intersection.

The preferred intersection improvement at Brenton Manor Avenue is the roundabout. This intersection concept is paired with the recommended single point urban interchange at US 27.

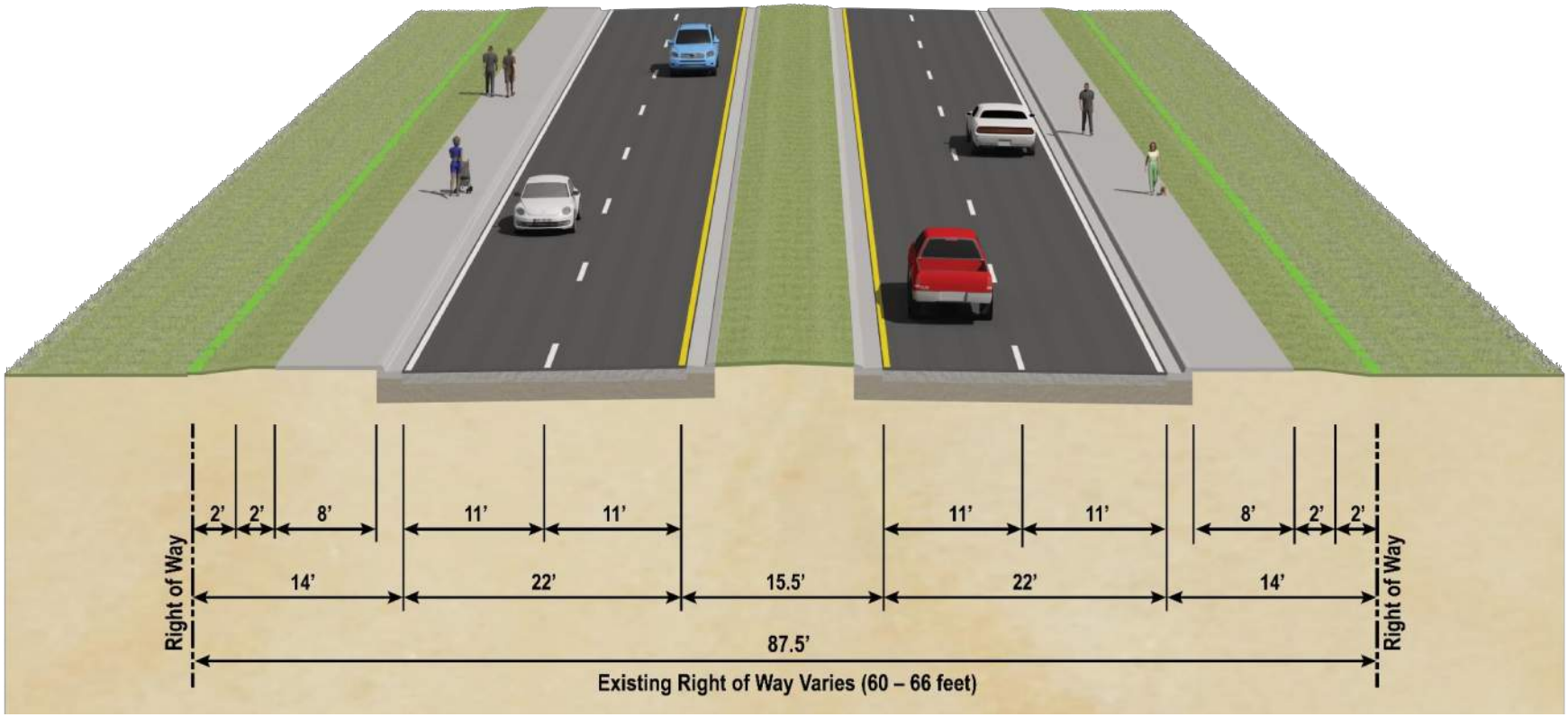
The single point urban interchange is the recommended improvement at the US 27 intersection due to the lower predicted life cycle crash costs with this concept compared to the northwest quadrant roadway with three signalized intersections.

Segment 8 – LaVista Drive to SR 17

The reduced four-lane divided roadway is proposed with centered widening through this segment. This alignment is recommended to minimize residential relocations through this segment of the project but provide access control with the raised median. **Figure 7-3** illustrates this typical section.

The preferred concept for the SR 17 intersection is a traffic signal with only improvements to the west leg of the intersection.

Figure 7-3 Segment 8 Preferred Typical Section



7.2 Access Management

The preferred typical section includes the addition of a grassed median from north of Avenue Y to SR 17. With the addition of this median, an access management plan was developed based on Access Management Class 5 criteria. The preferred access management plan is detailed in **Table 7-1** and is illustrated in the Preliminary Concept Plans shown in **Appendix B**.

Table 7-1 Access Management Plan Median Opening Spacing

SR 544 Proposed Access Management Plan (Access Class 5 & 7, Design Speed <45 mph)						
Connection	Station	Proposed Median Opening Type	Directional Openings		Full Openings	
			Proposed Directional Spacing (ft)	Distance Compared to Rule 14-97 (%)	Proposed Full Spacing (ft)	Distance Compared to Rule 14-97 (%)
Martin Luther King Boulevard	4+20	Full (Signalized)			620	47%
Avenue U	7+70	Restricted				
1st Street N	10+40	Full				
2nd Street NE	17+40	Unrestricted			1885	143%
Ware Avenue	19+70	Unrestricted				
Avenue X NE	22+40	Unrestricted				
Cedie Street NE	23+60	Unrestricted				
4th Street NE	27+15	Unrestricted				
Avenue Y NE	29+25	Full (Mini-Roundabout)				
Pentecostal Church of God Entrance	47+00	Full			1775	134%
Lake Smart Pointe	58+20	SB Directional	1120	170%	1900	144%
Winter Ridge Entrance	66+00	Full	780	118%		
Lake Conine Boat Ramp	73+00	Full			700	53%
Conine Drive E	77+60	Full			460	35%
The Rock of Winter Haven Church Entrance	86+90	Bi-Directional	930	141%	1860	141%

Rochelle Drive	96+20	Full	930	141%		
Azalea Drive	104+70	Bi-Directional	850	129%	3000	227%
Old Lucerne Park Road (west end)/ Lake Smart Estates Drive	113+20	Bi-Directional	850	129%		
Vista Del Lago Drive	126+20	Full (Two-Lane Roundabout)	1300	197%		
Bert Schulz Boulevard	142+40	Full			1620	123%
Winter Haven Fire Station Entrance	157+40	Full			1500	114%
Lucerne Loop Road	193+40	Full (Two-Lane Roundabout)			3600	273%
WalMart Distribution Entrance	206+80	Full			1340	102%
Lakeside Landings Boulevard	220+20	Full			1340	102%
Residential Driveway	229+60	SB Directional	940	142%	3960	300%
Residential Driveway	237+80	NB Directional	820	124%		
Jacaranda Avenue	259+80	Full	2200	333%		
Haines City Fire Protection Entrance	268+60	NB Directional	880	133%	2170	164%
Old Lucerne Park Road (east end)	281+50	Full (Two-Lane Roundabout)	1290	195%		
Lake Hamilton Drive W/Fairway Village Entrance	293+00	Full (Signalized Thru-Cut)	600	91%	1150	87%

StoreRight Self Storage Entrance	299+00	SB Directional			1330	101%
Hideaway Lane	306+30	Full	730	111%		
Guaranteed Transport Services Entrance	313+00	SB Directional	670	102%	1320	100%
Benton Manor Avenue	319+50	Full (Two-Lane Roundabout)	650	98%		
US 27	331+20	Full (Signalized - SPUI)			1170	89%
Bellaviva Entrance (new development)	364+30	Full	970	147%	3310	251%
Lake Hamilton Drive	374+00	Bi-Directional			2200	167%
Scenic Drive (east end)/ Circle 4 Drive	386+30	Full	1230	186%		
Peninsular Drive	400+40	Full			1410	107%
Crest Drive/Haines City Adult Day Care Center	411+20	Full			1080	82%
Alta Vista Elementary School (Bus Pick-Up/Drop-Off &Visitor Entrance Only)	415+60	NB Directional	440	67%	1380	105%
SR 17	425+00	Full (Signalized)	940	142%		

Changes to access are proposed at the following locations:

- Access to the Lake Smart Pointe neighborhood from Lake Smart Boulevard will be modified. Westbound vehicles will enter the neighborhood by utilizing the proposed directional median opening. Eastbound vehicles will have right in / right out access. A vehicle wishing to exit and head west will be required to exit eastbound (right out) and complete a U-turn at Winter Ridge Drive.
- Eastbound access to the Lake Point Landing neighborhood will remain. Westbound travel will require eastbound travel with the option to complete a U-turn at Conine Drive or at the access road for the Rock of Winter Haven church.
- Eastbound access to the Lucerne Lakeside neighborhood will remain. Westbound travel will require eastbound travel with the option to complete a U-turn at Old Lucerne Park Road.
- Eastbound access to the Lake Smart neighborhood will remain. Westbound travel will require eastbound travel with the option to complete a U-turn at Vista Del Lago Drive via the proposed roundabout.
- Eastbound access to the Willowbrook Golf Course will remain. Westbound travel will require eastbound travel with the option to complete a U-turn at Bert Schulz Boulevard.
- Eastbound access to the Lake Fannie Pier and Boat Ramp will remain. Westbound travel will require eastbound travel with the option to complete a U-turn at the Walmart Distribution access road.
- East of Lakeside Landings, eastbound access to residential property will remain. A westbound left turn lane is proposed. Westbound travel from the property will require eastbound travel with the option to complete a U-turn approximately 850-feet to the east.
- An eastbound left turn lane is provided

7.3 Right-of-Way

Additional right-of-way will be required along most of the project limits to accommodate the proposed roadway improvements and stormwater ponds.

There are six potential business relocations, and one potential residential displacement associated with the improvements to SR 544. A Conceptual Stage Relocation Plan (CSRP) was prepared (August 2023) and is provided in the project file.

7.4 Horizontal and Vertical Geometry

The preferred alternative horizontal alignment was developed to stay within the existing road right-of-way, which minimized impacts to residents, businesses, and the natural and social environment surrounding the corridor, and resulted in minimal right-of-way acquisition. The

proposed horizontal geometry alignment is shown in **Table 7-2**. Concept Plans showing the horizontal and vertical geometry are provided in **Appendix B**.

Table 7-2 Preferred Concept Horizontal Alignment

Segment	Bearing	POT/PI/PC/PRC//PT				Deflection Angle and Direction	Degree of Curve	Curve Radius	Curve Length	Super Elevation (ft/ft)
		POT	0+00.00							
Tangent 1	N 0° 01' 03" E									
Tangent 2	N 2° 18' 57" W					2° 20' 00" (LT)				
Tangent 3	Due North					2° 18' 57" (RT)				
Curve 1		PC	6+49.99	PT	10+49.99		10° 22' 34"	552.19	400.00	RC
Tangent 4	N 41° 30' 16" E									
Tangent 5	N 39° 30' 16" E					2° 00' 00" (RT)				
Tangent 6	N 41° 30' 16" E					2° 00' 00" (LT)				
Curve 2		PC	31+83.07	PT	43+36.07		4° 45' 03"	1206.00	1153.00	RC
Tangent 7	N 13° 16' 24" E									
Curve 3		PC	48+77.73	PT	58+97.69		4° 00' 04"	1432.00	532.69	RC
Tangent 8	N 27° 32' 11" E									
Tangent 9	N 26° 32' 11" E					1° 00' 00" (LT)				
Tangent 10	N 27° 32' 11" E					1° 00' 00" (RT)				

Segment	Bearing	POT/PI/PC/PRC//PT				Deflection Angle and Direction	Degree of Curve	Curve Radius	Curve Length	Super Elevation (ft/ft)
Curve 4		PC	87+80.55	PT	100+89.11		4° 45' 03"	1206.00	1308.56	RC
Tangent 11	N 89° 42' 16" E									
Curve 5		PC	111+32.89	PT	120+13.41		2° 59' 59"	1910.00	880.53	RC
Tangent 12	N 63° 17' 26" E									
Curve 6		PC	141+43.52	PT	150+29.98		2° 59' 59"	1910.00	886.46	RC
Tangent 13	N 89° 52' 57" E									
Curve 7		PC	175+38.71	PT	183+49.50		1° 00' 00"	5730.00	810.79	NC
Tangent 14	N 82° 00' 37" E									
Curve 8		PC	211+42.75	PT	235+74.10		02° 29' 59"	2292.00	2431.35	NC
Tangent 15	N 37° 12' 38" E									
Curve 9		PC	271+81.64	PT	289+05.43		2° 59' 59"	1910.00	1723.79	RC
Tangent 16	N 88° 55' 14" E									
Tangent 17	N 89° 55' 14" E					1° 00' 00" (RT)				
Curve 10		PC	323+48.65	PT	332+29.70		01° 30' 00"	3820.00	881.06	NC
Tangent 18	N 76° 51' 53" E									
Curve 11		PC	342+	PT	356+		01° 59'	2865.00	693.54	NC

Segment	Bearing	POT/PI/PC/PRC//PT				Deflection Angle and Direction	Degree of Curve	Curve Radius	Curve Length	Super Elevation (ft/ft)
			77.53		38.43		59"			
Tangent 19	N 75° 55' 10" E									
Curve 12		PC	365+43.18	PT	376+96.20		01° 59' 59"	2865.00	1153.02	NC
Tangent 20	N 52° 51' 38" E									
Curve 13		PC	389+85.69	PT	396+00.07		05° 59' 58"	955.00	614.39	RC
Tangent 21	N 89° 43' 17" E									
		POT	452+65.25							

The existing profile is relatively flat for long segments and would require saw toothing of the profile to provide appropriate gutter grade (0.30%). A vertical curve will need to be considered at the Lake Conine/Lake Smart canal for the proposed bridge. Along US 27, a vertical curve will also be developed due to the proposed SPUI intersection. During design, vertical geometry will need to be developed as the rural typical is being converted into an urbanized typical.

7.5 Design Variations and Design Exceptions

There are no Design Exceptions included in this PD&E Study. There is a Project Design Variation Memorandum that was developed for the omittance of bike lanes along segments of SR 544. The memo was submitted on 7/17/2023. The limits in which the variation apply to are listed below:

- MP 3.693 to MP 4.169
- MP 11.034 to MP 11.647

This design variation memo was created to eliminate additional right-of-way impacts due to the addition of 7-foot bike lanes per FDM. The proposed typical would include wider sidewalks to accommodate bicyclists and additional roadway features that would be incorporated during design to enhance overall safety. The memo is provided in **Appendix C**.

7.6 Multimodal Accommodations

The preferred typical section from Martin Luther King Boulevard to north of Avenue Y consists of three travel lanes and includes 8-foot-wide sidewalks on both sides of the roadway. From north of Avenue Y to LaVista Drive, the preferred typical section is a 4-lane divided roadway with a 10-foot-wide shared-use path located along both sides of the roadway. Due to right-of-way constraints, the shared-use path decreases to 8-feet-wide from LaVista Drive to SR 17. It was decided that due to the high speeds along SR 544, on-road bicycle lanes would not be considered.

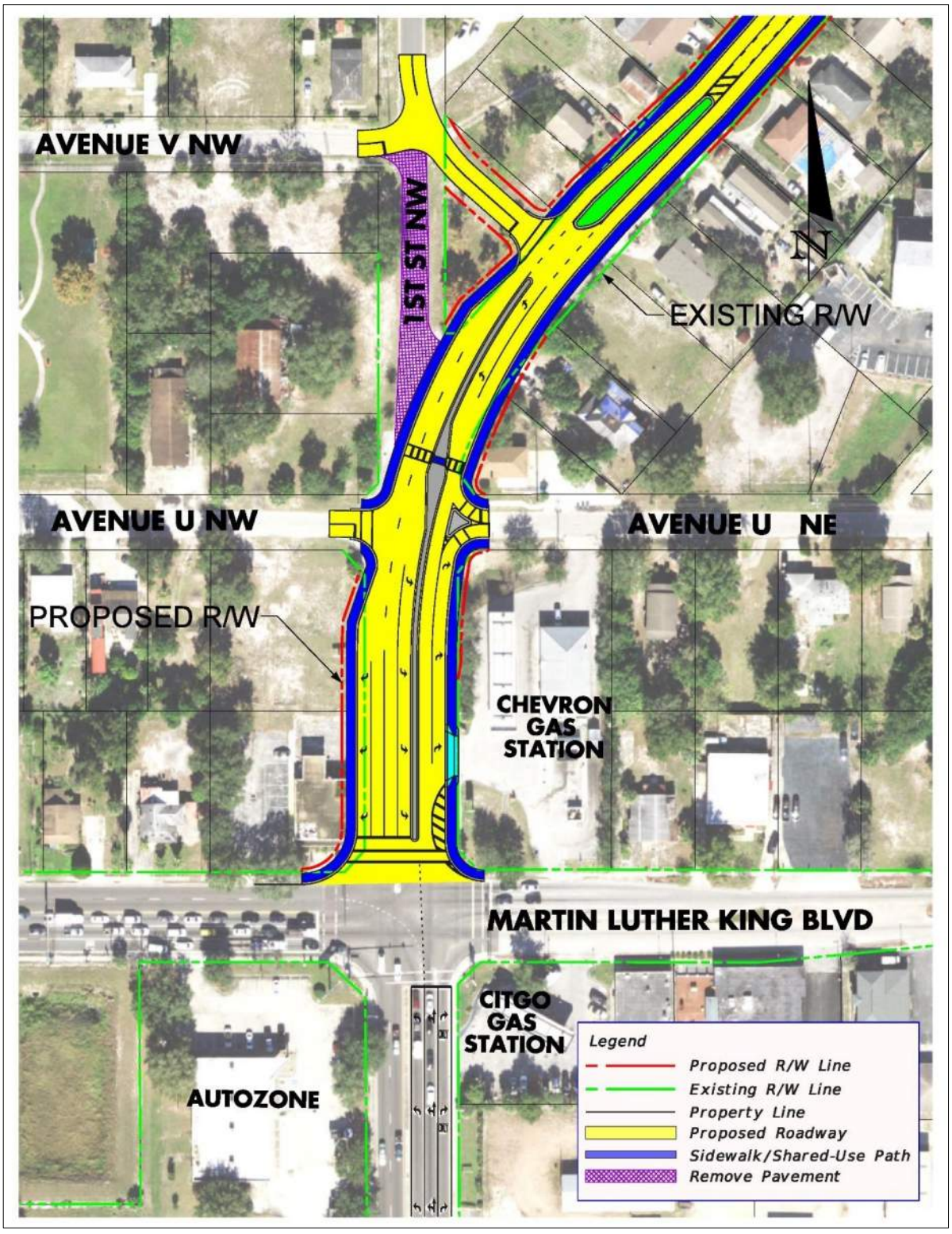
7.7 Intersection/ Interchange Concepts and Signal Analysis

The preferred alternatives proposed for the intersections are as follows:

Martin Luther King Boulevard is a four-legged intersection in the existing condition. The Preferred Alternative for this intersection **(Figure 7-4)** proposes to add a southbound right turn lane from SR 544 onto Martin Luther King Boulevard and extend the southbound left turn lane. The segment of 1st Street NW will be removed between Avenue U NW and Avenue V NW and will be realigned with SR 544.

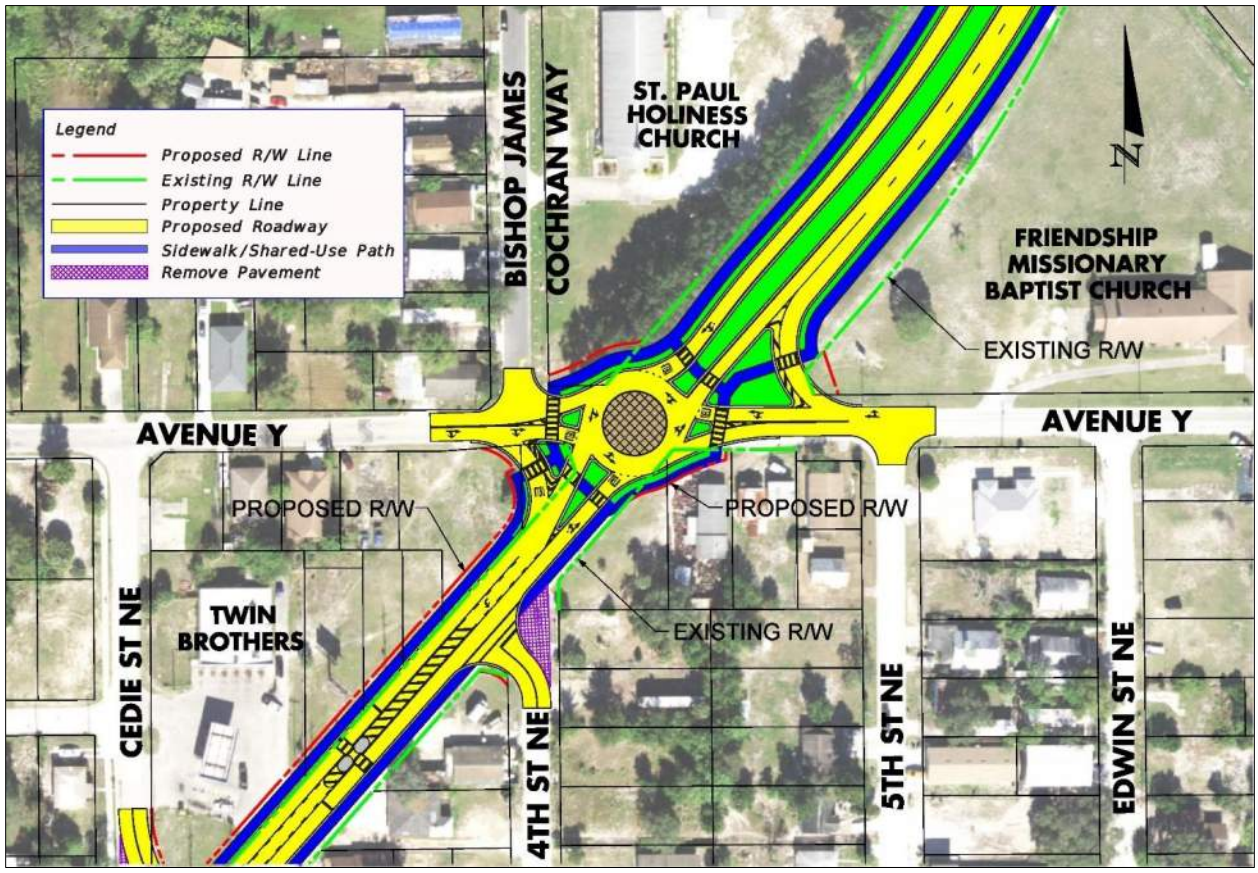
A concrete median will be added on SR 544 from Martin Luther King Boulevard to the new segment of 1st Street NW along with a median at Avenue Y NE creating a right-in/right-out with the option to make a U-turn movement at the realigned 1st Street NW.

Figure 7-4 Martin Luther King Boulevard Intersection Preferred Alternative



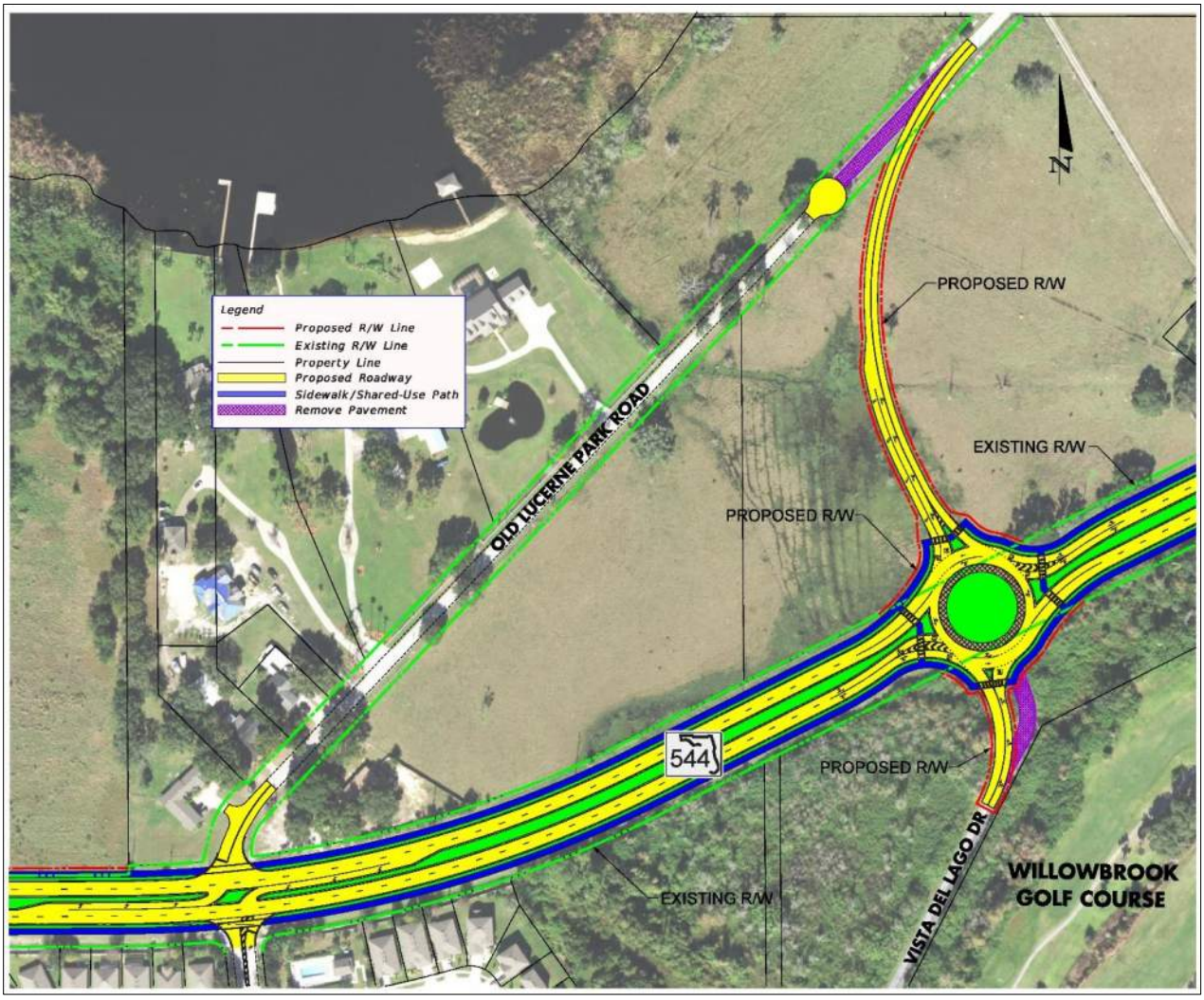
In its existing condition, the intersection at Avenue Y is a four-legged intersection. The Preferred Alternative **(Figure 7-5)** proposes a single-lane roundabout. The SR 544 and 4th Street NE intersection will also be realigned to improve sight distance and meet design criteria standards for the roundabout.

Figure 7-5 Avenue Y Intersection Preferred Alternative



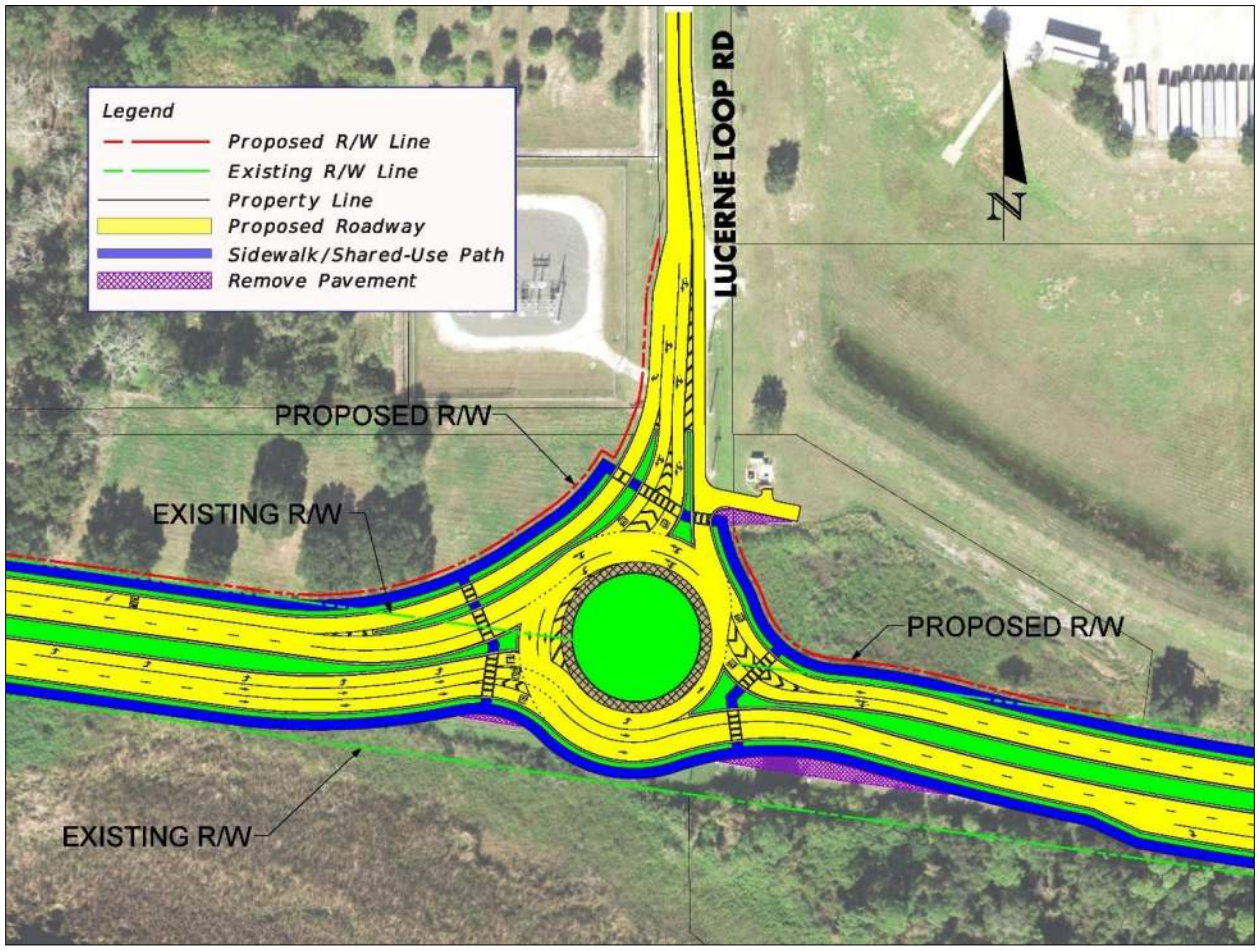
Old Lucerne Park Road/Lake Smart Estates Drive in its existing condition is a four-legged intersection. The Preferred Alternative, shown in **Figure 7-6**, proposes to close the existing northeast leg of Old Lucerne Park Road and realign the roadway at Vista Del Lago Drive with a two-lane roundabout.

Figure 7-6 Old Lucerne Park Road/Lake Smart Estates Drive Intersection Preferred Alternative



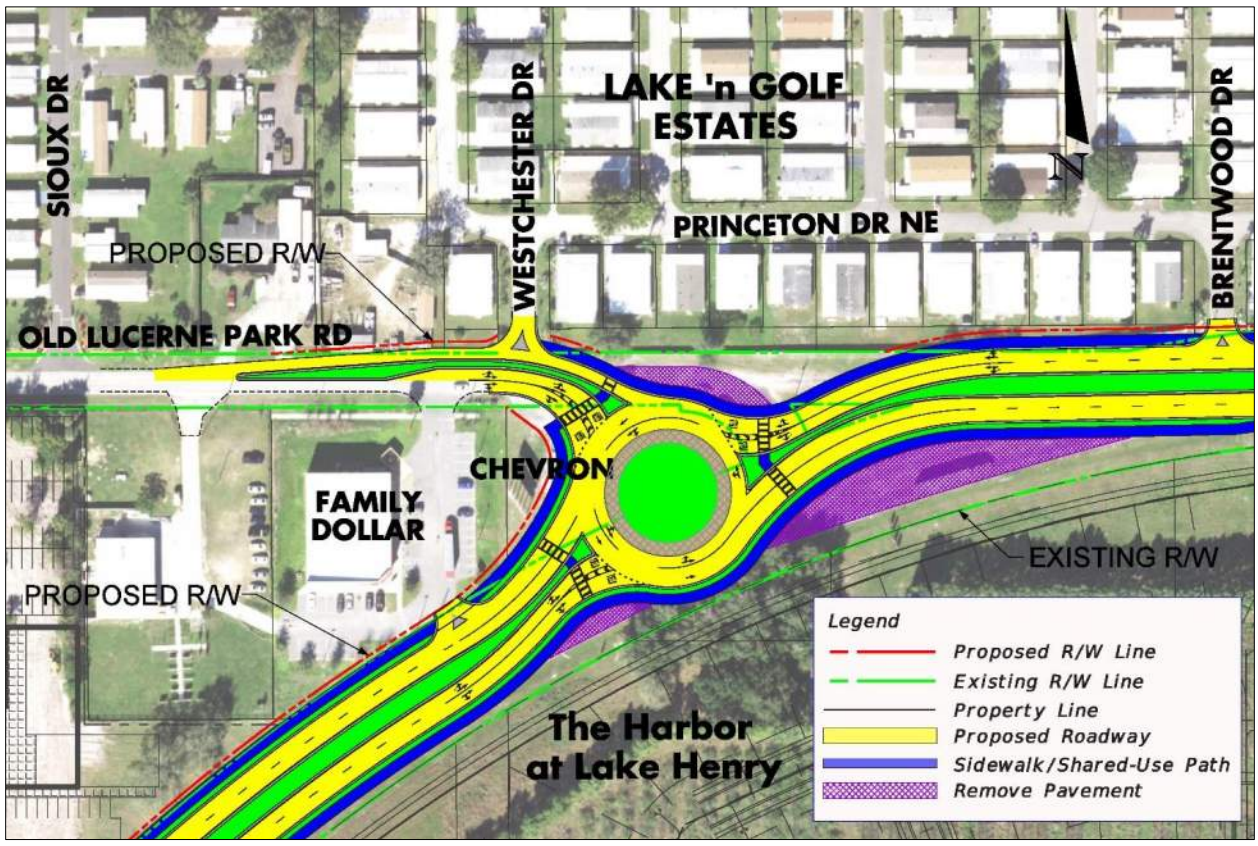
Lucerne Loop Road is a T-intersection to the north in its existing condition. The Preferred Alternative for this intersection proposes a two-lane roundabout with continuous eastbound movement along SR 544. A stand-alone, westbound right turn lane is also being proposed, as shown in **Figure 7-7**.

Figure 7-7 Lucerne Loop Road Intersection Preferred Alternative



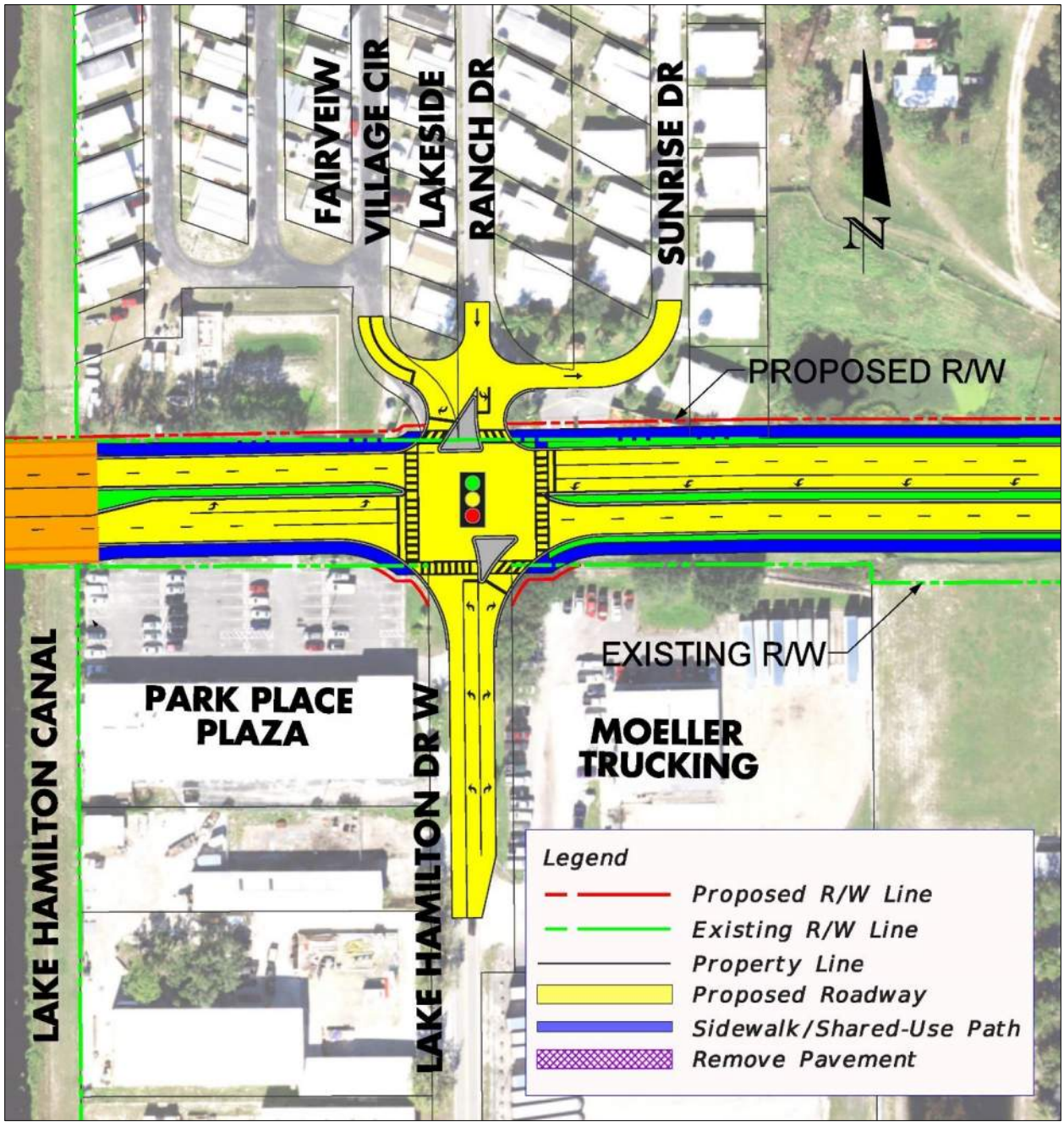
The Preferred Alternative for Old Lucerne Park Road proposes to go from the existing T-intersection to the north, to a three-legged roundabout, as shown in **Figure 7-8**.

Figure 7-8 Old Lucerne Park Road (East) Intersection Preferred Alternative



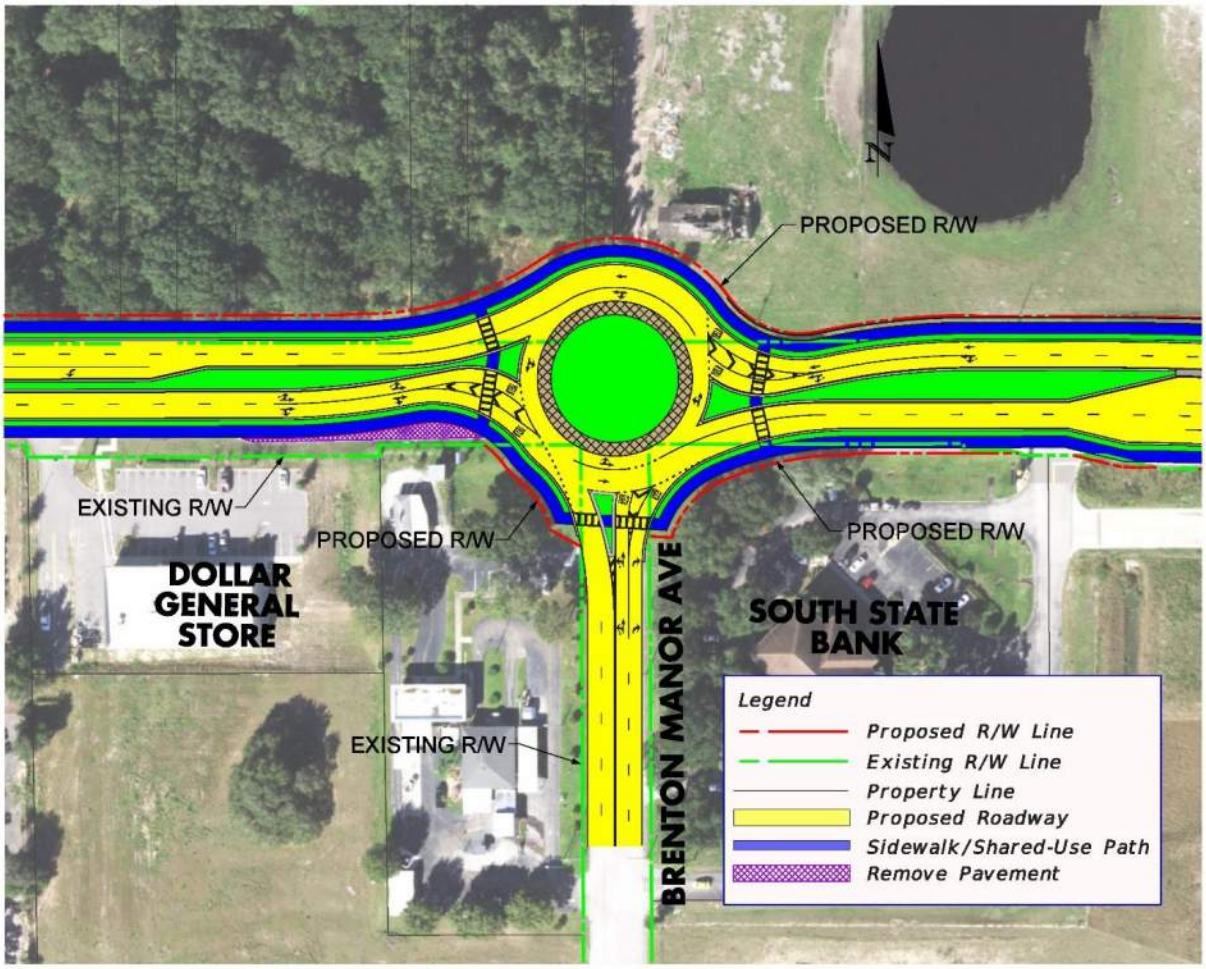
Lake Hamilton Drive will remain a four-legged intersection with the addition of a signal. The northbound travel lanes will be restriped to include left and right turn lanes. Fairview Village Circle, Lakeside Ranch Drive, and Sunrise Drive on the north side of SR 544 will be realigned with Lake Hamilton Drive, as shown on **Figure 7-9**.

Figure 7-9 Lake Hamilton Drive Intersection Preferred Alternative



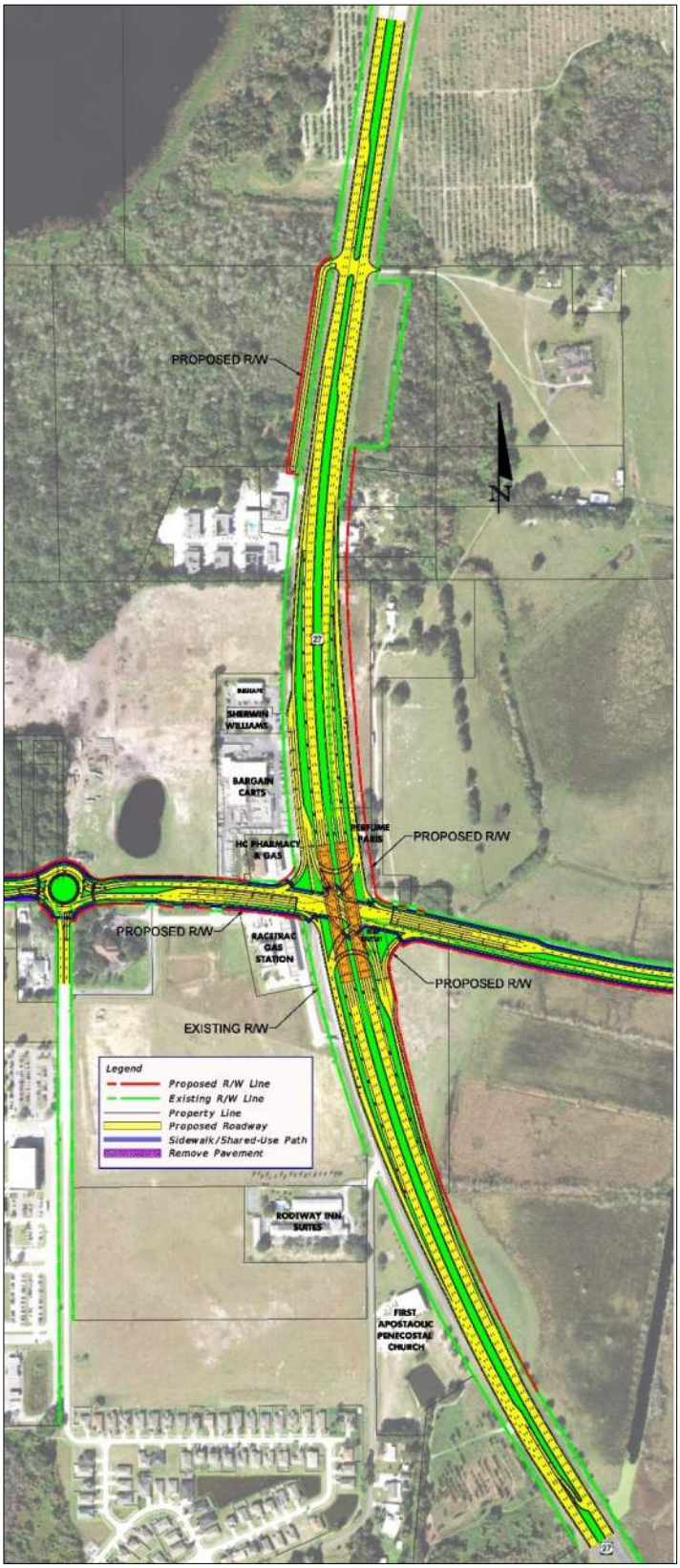
Brenton Manor Avenue in its existing condition is a T-intersection to the south. The proposed Preferred Alternative consists of a three-legged roundabout, as shown in **Figure 7-10**.

Figure 7-10 Brenton Manor Avenue Intersection Preferred Alternative



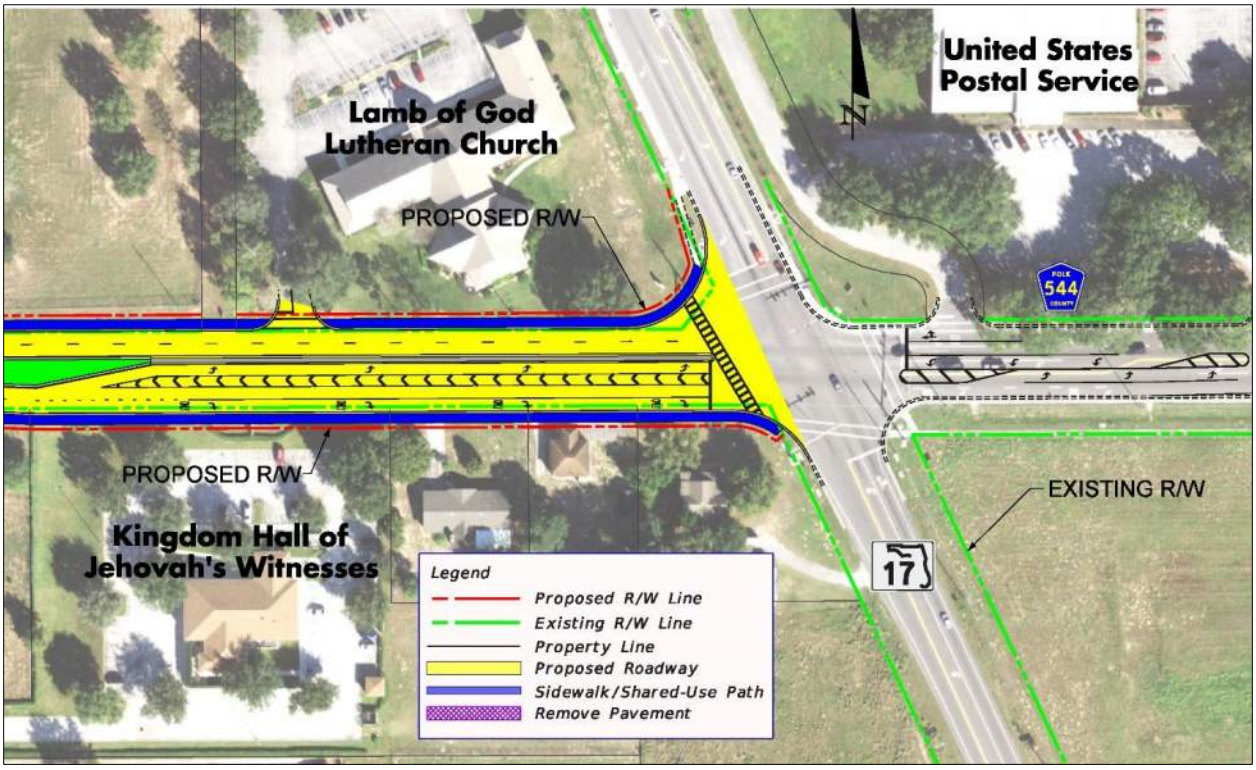
US 27 is currently a four-legged intersection. The proposed Preferred Alternative would bridge the north and southbound travel lanes along US 27 crossing over SR 544. At grade north and south bound lanes will be included for access to businesses and east/west travel along SR 544. In addition, travel lanes and left turn lanes will be added to the at grade SR 544 east and west bound lanes. The US 27 Intersection Preferred Alternative is shown on **Figure 7-11.**

Figure 7-11 US 27 Intersection Preferred Alternative



SR 17 will remain a four-legged intersection. A left turn lane will be added to SR 544 for northbound movements onto SR 17. A striped traffic separator will be added between the northbound left turn lane and the eastbound travel lane as shown on **Figure 7-12.**

Figure 7-12 SR 17 Intersection Preferred Alternative



7.8 Tolled Projects

SR 544 is not a tolled facility; therefore, a Preliminary Toll Siting Technical Memorandum was not prepared as part of this study.

7.9 Intelligent Transportation System and TSM&O Strategies

This study does not propose any Intelligent Transportation System (ITS) strategies. TSM&O strategies will be part of the preferred alternative but will not meet the purpose and need alone.

7.10 Landscape

Landscaping will be evaluated during the design phase.

7.11 Lighting

Lighting will be evaluated during the design phase.

7.12 Wildlife Crossings

Due to the lack of in-tact native habitats and regional connectivity, wildlife crossings were not considered for this project.

7.13 Permits

The following permits are anticipated for the proposed improvements to SR 544.

- A Section 404 Individual Permit is anticipated from the Florida Department of Environmental Protection (FDEP) due to the acreage of wetlands and surface water impacts.
- Due to the presence of suitable sank skink habitat within the project limits, a Biological Opinion (BO) may be required by the US Fish and Wildlife Service (FWS) if sand skinks and/or blue-tailed mole skinks are found to be present during the field survey.
- A National Pollutant Discharge Elimination System (NPDES) permit is required because the proposed project will disturb more than one acre of land, and the stormwater runoff will discharge to waters of the state. A Stormwater Pollution Prevention Plan (SWPPP) is required to be developed as part of the NPDES and implemented during construction.
- An Environmental Resource Permit (ERP) for a stormwater management plan and impacts to wetlands and other surface waters is anticipated.
- A 100% gopher tortoise survey should be completed during the design phase. If gopher tortoises and their burrows are located within 25 feet of construction activities, a gopher tortoise relocation permit must be obtained from the Florida Wildlife Conservation Commission (FWC). The number of gopher tortoise burrows located within 25 feet of the project footprint will determine the type of relocation permit that is needed.

7.14 Drainage and Stormwater Management Facilities

The stormwater runoff from the project limits will be collected and conveyed via curb and gutter to the proposed offsite detention ponds. The ponds will discharge at or near the same cross drains that carry the roadway runoff in the existing condition, or directly into canals or wetlands where appropriate. The proposed ponds have been sized to achieve the required water quality treatment and water quantity attenuation and serve as a budget tool for right-of-way estimation for the project to the Department.

There are currently twelve proposed drainage basins within the project limits. One pond site alternative has been identified and analyzed for each basin.

The onsite roadway basin areas draining to the ponds were determined to be the areas within the proposed right-of-way limits. The limits of the proposed basins begin and end at the same locations as the existing condition. Basin 1 was split into two smaller basins, Basin 1A and Basin 1.

Additionally, another basin (Basin 8A) was added to provide a pond alternative for minor improvements on US 27, south of the intersection with SR 544. Attenuation in the proposed ponds is provided in all basins. **Table 7-3** provides a summary of the proposed basin limits.

Table 7-3 Summary of Proposed Drainage Basins

Basin Name	From Station	To Station
1A	04+80	13+84
1	13+84	75+00
2	75+00	106+50
3	106+50	155+00
4	155+00	218+50
5	218+50	289+00
6	289+00	314+10
7	314+10	331+50
8	331+50	348+00
8A	N/A	N/A
9	348+00	374+00
10	374+00	424+50

7.15 Floodplain Analysis

From the available data, six Floodplain Impact Areas (FIAs) have been determined based on areas in which the 100-year floodplain lies within the proposed right-of-way. **Figure 7-13** illustrates the location of the FIAs. **Table 7-4** summarizes the estimated floodplain impact volume for each FIA.

For five of the FIAs identified, floodplain compensation sites were identified to provide cup for cup compensation. In the area of the remaining FIA, designated FIA "X", was determined that the floodplain shape is outdated and does not reflect real conditions. The floodplain is a small, isolated shape and since the development of this map, the entire basin has been redeveloped including new stormwater ponds. It is recommended that during the design phase, a Letter of Map Revision (LOMR) be obtained, or no-rise shown through floodplain modeling.

Floodplain impacts were quantified by identifying areas in which the floodplain will potentially be impacted by proposed roadway fill or pond berms. These areas were multiplied by an estimated average depth of impact to calculate an impact volume. The depth was calculated to be the lesser of either the difference between the floodplain elevation and the existing ground or the floodplain elevation and the Seasonal High Water Table (SHWT). It is estimated that the project will impact approximately 23.43 acre-feet of floodplain.

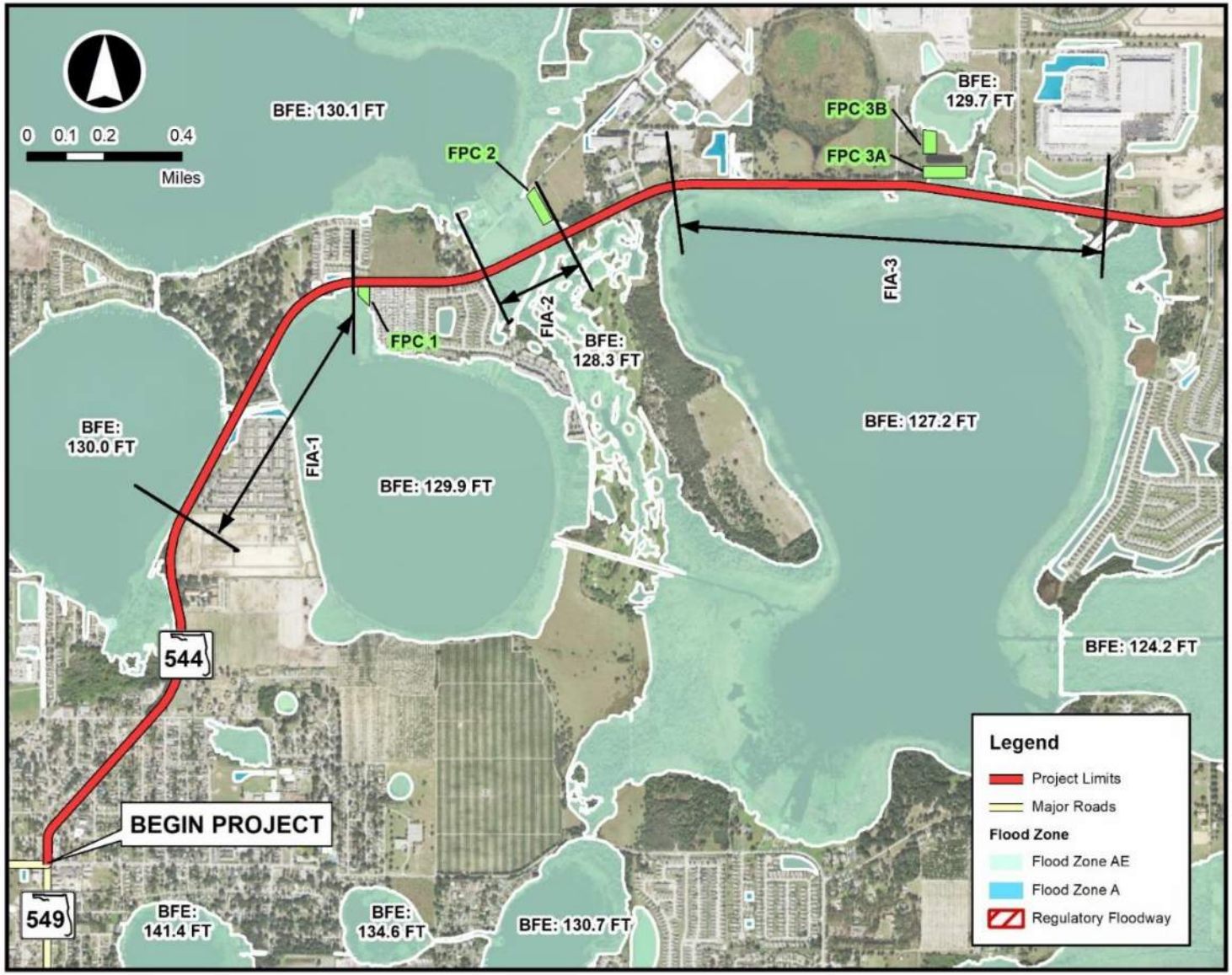
For the purpose of this study, a cup for cup approach was taken to provide the Department with right-of-way estimates for offsite floodplain compensation (FPC) sites for funding projections.

Compensation volumes were calculated to be the available volume between the Seasonal High Water Table (SHWT) of the proposed compensation site and the 100-year flood elevation of the FIA. The Floodplain Compensation (FPC) sites are shown in **Figure 7-13**. During the design phase, it is recommended that alternative approaches to traditional FPCs be considered. Alternative approaches include creating a floodplain model or coordinating with SWFWMD for new models that may become available within the project area.

Table 7-4 Summary of Floodplain Impacts and Compensation Areas

FIA	Estimated Impact Volume (ac-ft)	Estimated FPC Area Required (ac)
1	0.99	0.74
2	3.35	1.62
3	6.53	3.62
4	4.57	4.84
X	0.00	0.00
5	3.14	3.22

Figure 7-13 Floodplain Impact Area Map (FIA)



7.16 Bridge and Structure Analysis

The following design standards and specifications will be utilized for the design of all bridges on the project:

- FY 2023-24 FDOT Standard Plans for Road and Bridge Construction
- FY 2023-24 FDOT Standard Specifications for Road and Bridge Construction
- 2023 FDOT Design Manual
- 2023 FDOT Structures Manual
- 2023 FDOT Load Rating Manual
- American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications, Ninth Edition (2020) with 2021 Interims

The key design criteria used to establish the proposed bridge typical sections for this project are summarized in **Table 7-5** below.

Table 7-5 Bridge Typical Section Design Criteria

Design Element		Dimension	Reference
Minimum Lane Width, Bridge	Design Speed = 45 mph	11'-0"	FDM Tab. 210.2.1
	Design Speed = 65 mph	12'-0"	
Minimum Outside Shoulder Width, Bridge	Traffic Railing on Bridge, Curbed Approach Roadway	2'-6"	FDM Fig. 260.1.4
	Divided Arterial, Flush Shoulder on Approach Roadway, 3 or more Travel Lanes	10'-0"	
Minimum Inside Shoulder Width, Bridge	Raised Median on Bridge	1'-6"	FDM Fig. 260.1.4
	Divided Arterial, Flush Shoulder on Approach Roadway, 3 or more Travel Lanes	10'-0"	

Based on the proposed roadway typical section, the geometry of the existing structures, and age of the existing structures, replacement of the following three existing structures is recommended:

- SR 544 over Conine-Smart Canal (Existing Non-Bridge Culvert)
- SR 544 over Lake Hamilton Canal (Existing Bridge No. 160021)
- SR 544 over Lake Hamilton Creek (Existing Bridge No. 160147)

In addition, a new bridge is proposed at US 27 over SR 544. A summary of the proposed bridges at all four locations is detailed below.

SR 544 over Conine-Smart Canal

Based on the age and variable culvert width of the existing non-bridge culvert, replacement of the existing structure is recommended. The proposed structure is classified as a "bridge" based on the anticipated span length.

The proposed bridge typical section (**Figure 7-14**) consists of an 11-foot inside travel lane, a 12-foot outside travel lane, and a 10-foot-wide barrier separated shared use path in each direction. An additional 11-foot wide left-turn lane is provided in the northbound direction providing access to Conine Drive which is located just north of the bridge. Opposing traffic is separated by an 8-foot-wide concrete traffic separator (FDOT Standard Plans Index 520-020) with 1′-6″ wide inside shoulders, while the outside lanes utilize 2′-6″ wide outside shoulders.

A 1′-4″ wide x 36″ tall single-slope traffic railing (FDOT Standard Plans Index 521-427) separates the shared use paths from vehicular traffic. A 1′-0″ wide x 27″ tall concrete parapet with a pedestrian/bicycle bullet railing (FDOT Standard Plans Index 521-820 and 515-022) is used along the outside copings to protect pedestrians and cyclists from the drop-off hazard. The overall bridge width is 97′-8″ with the roadway crowned at 2% at the centerline of construction (left edge of NB turn lane).

The recommended bridge alternative is a single-span structure with an overall length of approximately 51-feet. A single-span bridge eliminates piles in the waterway which provides optimal horizontal clearance for both boat operations and sight distance when accounting for the skewed alignment of the two legs of the Conine-Smart Canal. The approximate bridge length is set by locating the end bents behind each existing bulkhead wall as shown in **Figure 7-15**. From discussions with the Region Lakes Management District (LRLMD), the District prefers a minimum horizontal clearance of 15-feet but would prefer greater clearance to allow for the passage of two small boats traversing the canal in opposing directions.

Figure 7-14 SR 544 Over Conine-Smart Canal Preferred Bridge Alternative

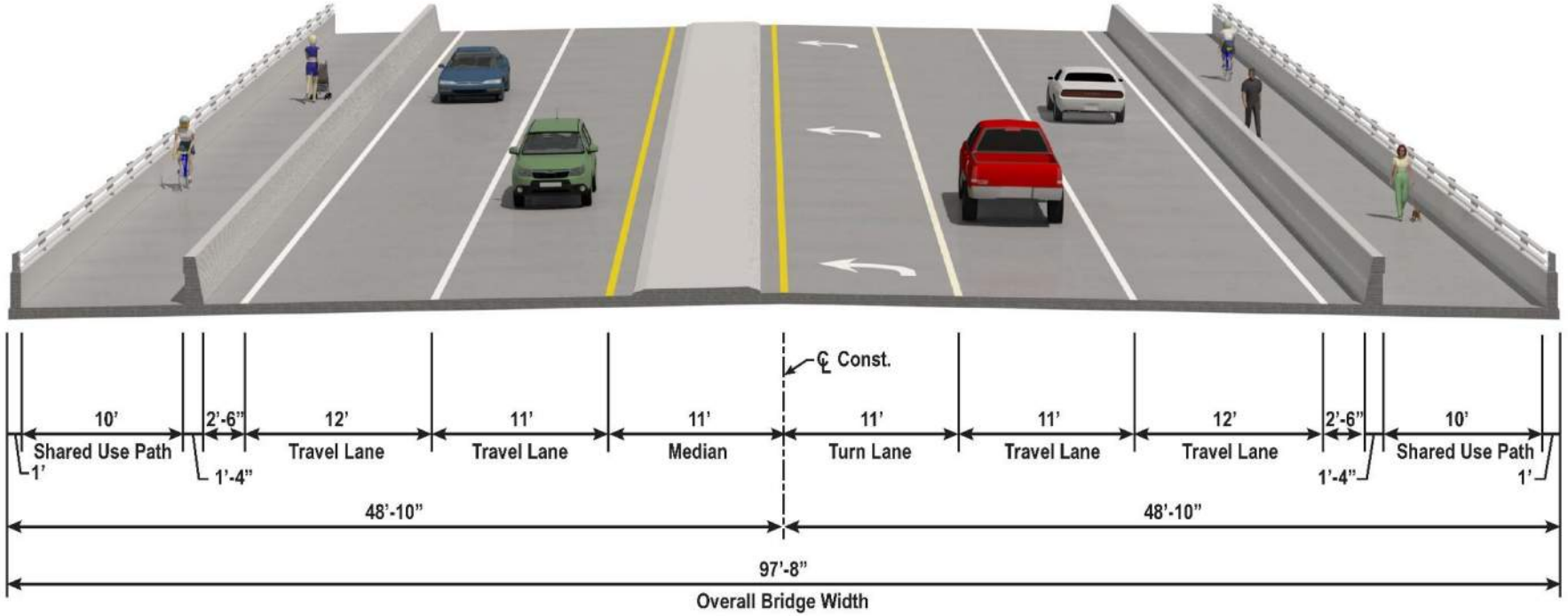
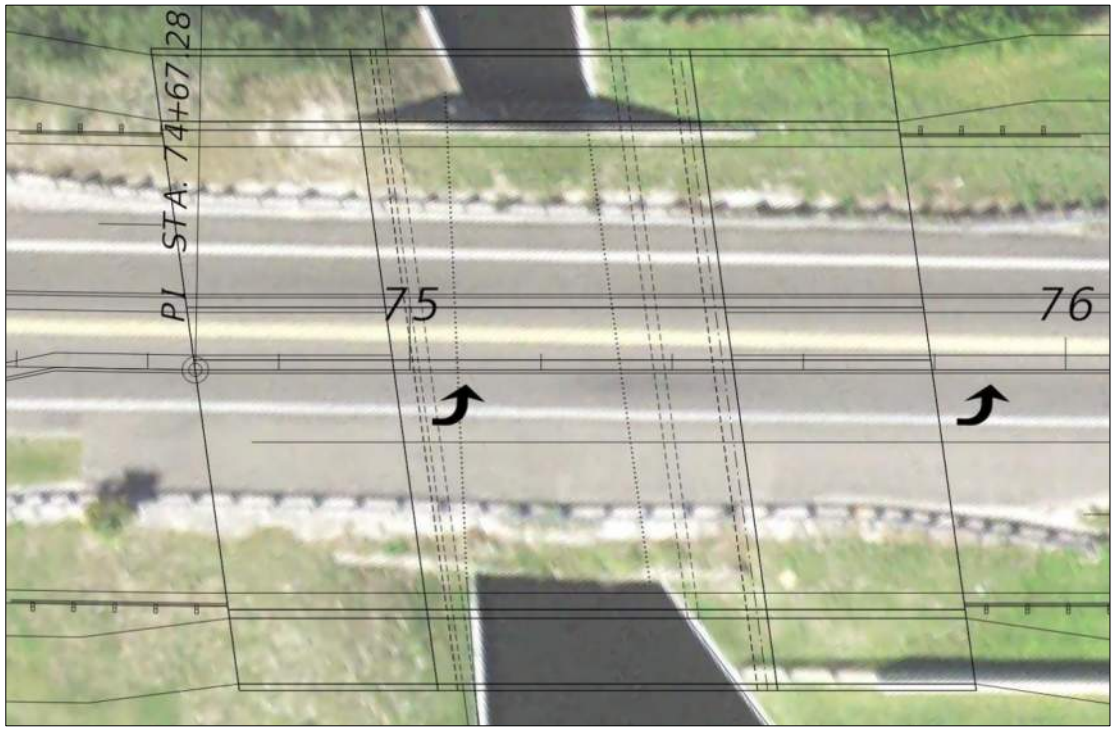


Figure 7-15 SR 544 Culvert at Conine-Smart Canal Bridge Length Schematic



The proposed superstructure consists of 15 inch Florida Slab Beams (FSBs) with a 6 inch cast-in-place concrete topping slab (FDOT Standard Plans Index 450-452) for a total structure depth of 1'-9" (Note: An additional 2 inch is added to this depth to allow for concrete build-up due to camber and vertical geometry, resulting in a depth of 1'-11" for establishing final vertical geometry). FSB's provide a shallower superstructure depth when compared to typical beam-slab bridges. In addition, FSB's eliminate the need for formwork below the structure which is required for cast-in-place concrete slab superstructures. Formwork below the deck can temporarily impact vertical clearances for boat traffic during construction.

The superstructure is supported by concrete pile bents along the canal banks. The proposed end bents require either a vertical abutment wall or a standalone bulkhead wall in front of each bent to replace the existing culvert sidewalls, which currently retain the approach roadways. In addition, the end bents will tie-in to the existing canal bulkhead walls located along both sides of the canal. Additional wall reconstruction may be required to eliminate "kinks" in the existing canal alignment and to reestablish a constant canal width at the proposed bridge. The design phase will require coordination with the LRLMD to establish the limits of the canal geometry and future limits of the LRLMD bulkhead walls.

To establish the minimum bottom of low member elevation, two minimum vertical clearance conditions are investigated:

- Navigation
- Lake Region Lakes Management District (LRLMD) preferred vertical clearance.

The Conine-Smart Canal is a navigable waterway; therefore, navigational clearance is required. Based on the FDOT Design Manual (FDM) 260.8.1, a minimum clearance of 6′-0″ above the control elevation is required for regulated/controlled lakes and canals. According to LRLMD, the control elevation of the canal is 127.57′ (NAVD 88; El. 128.5′ NGVD 29; Note: All converted NAVD 88 elevations are approximated using NOAA's online NGS Coordinate Conversion and Transformation Tool (NCAT)). The resulting minimum bottom of low member elevation is approximately 133.57′ (NAVD 88). Since the canal serves as an equalizer between the two controlled lakes and does not experience significant flows, the FDM criteria requiring 2′-0″ of drift clearance above the design flood stage to allow for debris passage (FDM 260.8.1) does not apply.

Based on discussions with the LRLMD, the District prefers a navigational clearance of 8'-0" above the "maximum desirable" water surface elevation which is equivalent to the control elevation of 127.57' (NAVD 88). This results in a minimum bottom of low member elevation of 135.57' (NAVD 88) which controls for design. Additionally, the LRLMD noted a preferred bottom of canal elevation of 124.07 (NAVD 88) with a desired elevation of 123.07′ (NAVD 88). Since the preferred alternative converts the existing structure from a 4-sided box culvert to an open-bottom slab bridge, this desired canal bottom elevation is attainable but requires further analysis during the design phase.

SR 544 over Lake Hamilton Canal

Based on the complex geometry of the existing bridge (as described in detail under the "Existing Conditions" section of this report), the age of the existing bridge, and the proposed changes to the horizontal geometry of SR 544 at this location, full replacement of the existing bridge is recommended.

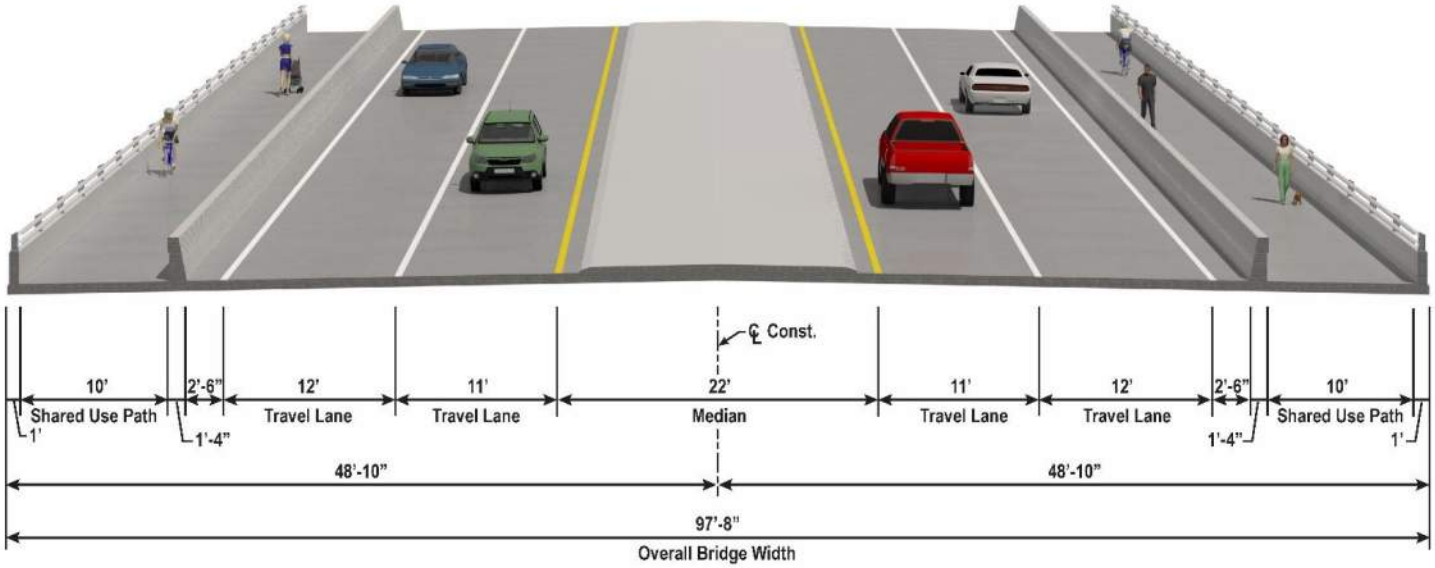
The proposed bridge typical section (**Figure 7-16**) consists of an 11′-0″ inside travel lane, a 12′-0″ outside travel lane and a 10′-0″ wide barrier separated shared use path in each direction. Opposing traffic is separated by a 19′-0″ wide concrete traffic separator with 1′-6″ wide inside shoulders, while the outside lanes utilize 2′-6″ wide outside shoulders.

A 1′-4″ wide x 36″ tall single-slope traffic railing (FDOT Standard Plans Index 521-427) separates the shared use path from vehicular traffic. A 1′-0″ wide x 27″ tall concrete parapet with a pedestrian/bicycle bullet railing (FDOT Standard Plans Index 521-820 and 515-022) is used along the outside copings to protect pedestrians and cyclists from the drop-off hazard. The overall bridge width is 97′-8″ with the roadway crowned at 2% at the centerline of construction.

The recommended bridge alternative is a 3-span structure with an overall length of approximately 98′. The proposed bridge length is established by offsetting the proposed begin/end bridge approximately 3′-0″ from the existing begin/end bridge to avoid conflicts between the proposed

and existing piles. The proposed superstructure consists of 12″ Florida Slab Beams (FSBs) with a 6″ cast-in-place concrete topping slab (FDOT Standard Plans Index 450-451) for a total structure depth of 1′-6″ (Note: An additional 2″ is added to this depth to allow for concrete build-up due to camber and vertical geometry, resulting in a depth of 1′-8″ for establishing final vertical geometry). FSB's provide a shallower superstructure depth when compared to typical beam-slab bridges. In addition, FSB's eliminate the need for formwork below the structure which are required for cast-in-place concrete slab superstructures. Formwork below the deck can temporarily impact drift clearance and vertical clearance for boat traffic during construction. An odd number of spans is chosen to eliminate a line of piles at the center of the canal and to provide a maximum horizontal clearance that corresponds to the maximum draft clearance for boat traffic. The superstructure is supported by concrete pile abutments along the canal banks and intermediate pile bents within the canal. The slopes in front of the abutments match the existing canal slopes and are protected by rubble riprap.

Figure 7-16 SR 544 Over Lake Hamilton Canal Preferred Bridge Alternative



To establish the minimum bottom of low member elevation, two minimum vertical clearance conditions are investigated:

- Navigation
- Drainage

Lake Hamilton Canal is a navigable waterway; therefore, navigational clearance is required. Per FDM 260.8.1, a minimum clearance of 6′-0″ above the control elevation is required for regulated/controlled lakes and canals. For drainage clearances, a minimum of 2′-0″ of drift clearance above the design flood stage is required to allow for the passage of debris (FDM 260.8.1). The design high water (DHW) elevation from the existing plans is 127.04′ (NAVD 88; 128.0′ NGVD 29; Note: All converted NAVD 88 elevations are approximated using NOAA's online NGS Coordinate Conversion and Transformation Tool (NCAT)). For purposes of this report, the control elevation matches the DHW elevation from the existing plans. The minimum bottom low member elevation for drift clearance is 129.07′ (NAVD 88), while the minimum bottom low member elevation for navigational clearance is 133.04′ (NAVD 88), with the latter controlling for design.

Note: The existing bridge has an unidentified conduit attached to the north side of the bridge that will require relocation as part of the bridge replacement.

SR 544 over Lake Hamilton Creek Bridge Culvert

Based on the age (58 years) and corresponding low health index (34.95) of the existing bridge, full replacement is recommended. Based on the proposed horizontal and vertical roadway geometry, which is similar to that of the existing roadway, the need for a conventional slab or girder bridge is not warranted. Therefore, a reinforced concrete box bridge-culvert (FDOT Standard Plans Index 400-289), of similar size to that of the existing bridge-culvert, is recommended for this location. Since the canal is a non-navigable waterway, the minimum navigational vertical clearances required by FDM 260.8.1 do not apply. In addition, per FDM 260.8.1, the minimum vertical drift clearance of 2′-0″ does not apply to culverts and bridge-culverts.

The ultimate dimensions (Span x Rise) will be established through a hydraulic analysis during the design phase but will most likely resemble the existing double barrel 10′-0″ x 8′-0″ (Span x Rise) culvert. The length of the proposed culvert measures approximately 105′ which provides for the ultimate roadway typical section. Additionally, drop-off hazard protection in accordance with FDM 215.3.3 is provided. Phased construction limits and possible dewatering requirements will be determined during the design phase.

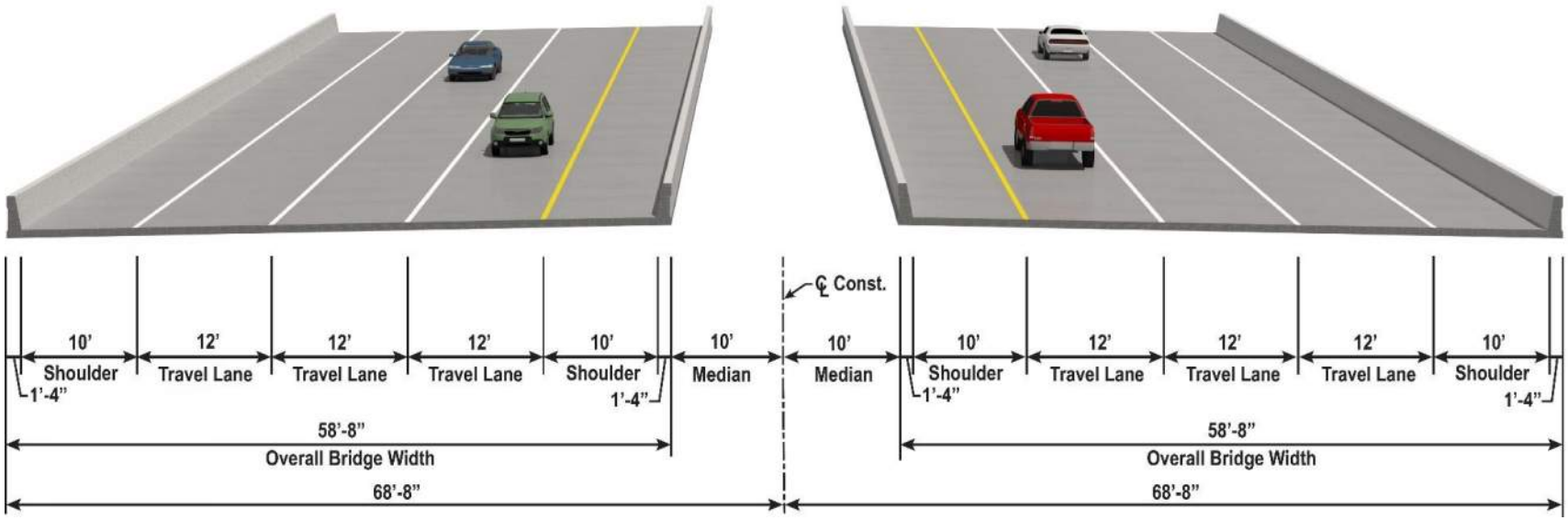
US 27 over SR 544

The existing intersection of US 27 at SR 544 is an at-grade intersection. The recommended alternative for this intersection is a Single Point Urban Interchange (SPUI) with US 27 spanning

over SR 544. Based on the anticipated geometry of SPUI at US 27 and SR 544, the resulting bridge will be a girder-slab bridge; however, due to several unknowns including span lengths and pier locations, it is unclear whether the bridge will utilize Florida-I beams or steel plate/box girders. Both the superstructure and substructure types will be determined during the design phase. For the purposes of this report, the bridge discussion is limited to typical section dimensions.

Based on the geometry of US 27, two separate bridges separated by a minimum of 20' (per FDM 260.5) is recommended. Each proposed bridge typical section (**Figure 7-17**) consists of three 12′-0″ travel lanes, 10′-0″ inside/outside shoulders, and 1′-4″ wide x 36″ tall single-slope traffic railings (FDOT Standard Plans Index 521-427) along each coping. The resulting overall bridge width measures 58′-8″ for each bridge.

Figure 7-17 US 27 Over SR 544 Preferred Bridge Alternative



7.17 Transportation Management Plan

The primary purpose of the Transportation Management Plan (TMP) will be to develop methods that will minimize construction activity-related traffic delays and crashes. The plans will outline strategies aimed at reducing congestion during construction utilizing several traffic management strategies. The TMP will include three components: the Temporary Traffic Control Plan (TTCP), the Transportation Operations Plan (TOP), and the Public Information Plan (PIP). The TTCP will include details on work zone areas and the proposed maintenance of motorists, pedestrians, and bicyclists. If detours are deemed necessary to accommodate construction activities, the detours will also be included in the TTCP. Work zone speeds will be evaluated and can be reduced if necessary. A lane closure analysis will be conducted to identify what times a lane may be closed during construction. Advance warning signs and Portable Changeable Message Signs (PCMS) will be utilized to aid in advising the public prior to and during construction. The TOP will include strategies to improve mobility, work zone access, and safety. Examples of such strategies that may be utilized for this project can be found in FDM Table 240.3.1. The PIP will detail the approach that will be utilized to disseminate project information to affected parties, the traveling public, and project stakeholders prior to and during construction.

7.18 Constructability

Construction of the preferred roadway alternative will be performed utilizing phased construction. In the first phase of construction, temporary pavement will need to be constructed on the east side of SR 544. Drainage ponds as well as storm water pipes will also be constructed in this phase. In the second phase of construction, traffic will be shifted onto the temporary pavement so that the west half of the new roadway can be constructed. In the third phase of construction, traffic will be maintained on the newly built half of the roadway, and construction on the east side will be completed. The fourth phase of construction will include final construction activities such as friction course and final pavement markings. At all major intersections (signalized/roundabouts), additional TTCP details will be developed, including sub-phases typically required to construct these more complex areas of the project. The US 27 interchange will require a complex TTCP design that will facilitate the construction of the Single Point Urban Interchange (SPUI). Additional detour sheets and special details will be developed detailing the construction sequencing and work zone impacts. Access will be maintained to existing residential development and businesses during construction. Pedestrians and bicyclists will also be accommodated as necessary throughout construction.

7.19 Construction Impacts

Construction of the proposed roadway improvements is not expected to have any significant noise or vibration impact. If sensitive land uses develop adjacent to the roadway prior to construction, increased potential for noise or vibration impacts could occur. It is anticipated that the application of the FDOT Standard Specifications for Road and Bridge Construction will minimize or eliminate potential construction noise and vibration impacts. However, should unanticipated noise or vibration issues arise during the construction process, the Project Engineer, in coordination with the District Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts. Construction activities may cause minor short-term air quality effects in the form of dust from earthwork and unpaved roads and smoke from open burning. These effects will be minimized by adherence to all state and local regulations and to the latest edition of the FDOT Standard Specifications for Road and Bridge Construction.

7.20 Special Features

There are no special features associated with this study.

7.21 Utilities

Due to the nature of the existing conditions throughout the project corridor, it is anticipated that the widening of State Road 544 will impact a large number of the existing utility facilities on the project. Mitigation measures will be taken during the design phase of the project to minimize impacts to the existing utilities to the fullest extent possible. **Table 7-6** identifies possible relocations to utilities and the estimated relocation cost.

Table 7-6 Potential Utility Impacts and Associated Costs

Company	Description of Impacts	Anticipated Relocation Cost
Century Link Winter Garden Ken Lutz ken.lutz@centurylink.com	• Buried fiber optic along the south of SR 544 at US 27 and crosses to the north of SR 544 0.25 miles east of US 27 to Peninsular Drive where the fiber crosses back to the south of SR 544 and continues until SR 17.	$927,000.00
Century Link / Level 3 Communications Ron Prario ron.prario@centurylink.com	• (3) 1.25-inch HDPE conduit buried facilities cross SR 544 on the south side of Martin Luther King Boulevard and on the west side of US 27 Highway.	$685,000.00

Company	Description of Impacts	Anticipated Relocation Cost
City of Haines City	• 16″ WM on east of US 27 Hwy turns east along the north side of SR 544 from US 27 to just west of Circle Four Drive. • 10″ WM runs down the north side of Scenis Drive. • From Scenis Drive to 5th Street S there is a 10″ water main along the north side of SR 544. • From 5th Street S to SR 17 Hwy there is a 6″ water main along the north side of SR 544. • 4″ FM along the south side of SR 544 from just west of Circle Four Drive to La Vista Drive. • 6″ WM runs on the west side of La Vista Drive. • Gravity sewer turns into a 4″ FM that runs on the east of La Vista Drive. • 6″ WM runs on the west side of Circle Four Drive. • 2″ WM and Gravity sewer runs down the east side of Myrtle Ave, turns down the south side of SR 544 to Peninsular Drive. • 8″ FM from Peninsular Drive to 5th Street S. • 6″ WM on the west and 8″ FM on the east of 5th Street S • Gravity Sewer from Crest Dr to SR 17 Hwy along the south of SR 544.	$2,800,000

Company	Description of Impacts	Anticipated Relocation Cost
City of Winter Haven Utilities Amin Hanhan ahanhan@mywinterhaven.com	• Gravity sewer along the south side of SR 544 from 1st Street North to Ware Avenue NE. The gravity sewer picks up again at 4th Street NE to Avenue Y NE. • Gravity sewer is present along the north side of SR 544 at Winter Haven Boulevard for 520 feet. • Gravity sewer is present along the north side of SR 544 from Lucerne Loop Road NE for 830 feet. • Gravity sewer is present on the north side of SR 544 from Jacaranda Avenue to the Family dollar at Old Lucerne Park Road. • Gravity sewer runs around the RaceTrac at the south west corner of SR 544 and US 27. • 6 inch water main runs along the north side of SR 544 from Martin Luther King Drive to Avenue Y NE • At second street north, a 14" main begins on the south of SR 544 until the Winter Haven Fire Department Station 2 where the main transitions to 16 inches. • At Lucerne Loop Road NE, the 16" WM transitions to a 12" WM on the south side of SR 544 until US 27 • At Lucerne Loop Road NE the water main is 12 inches until Centerstate Bank, where the main is 8 inches until the main ends at SR 27. • 8 inch water main on the north side of SR 544 from Old Lucerne Park Road for 400 feet. • 16 inch force main along the north of SR 544 from Martin Luther King Boulevard to Avenue V. • A 20 inch force main runs along the north side of SR 544 from Avenue Y	$22,000,000.00

Company	Description of Impacts	Anticipated Relocation Cost
	NE to Old Lucerne Park Road, where the main transitions to 12 inches and ends at Jacaranda Avenue. • An 8 inch force main starts along the north side of SR 544 from Old Lucerne Park Road to just west of Hideaway Lane, where the force main transitions to 10 inches and ends at US 27. • A 2 inch force main starts at Unnamed Street and ends just west of US 27 • 20 inch reuse runs along the south of SR 544 from Avenue Y to the Lakeside Landings Development. • City Fiber runs from Avenue Y to US 27 on the north side of SR 544.	
Duke Energy Distribution Mark R. Manner Mark.Manner@duke-energy.com	• 12.4 kV 3 phase overhead electric lines along SR 544 from Old Lucerne Park Road to SR 17.	$1,700,000.00
Duke Energy Transmission	• Osprey transmission line proposed on south side of SR 544	$5,250,000.00 (reimbursable)
Florida Public Utilities	• No Response	TBD
Frontier Communications Fred Valdes fred.n.valdes@ftr.com	• No Response	$3,400,000.00
	• Buried fiber lines west of SR 544 from Martine Luther King Boulevard and on both sides of SR 544 from Maxine's Barber Shop to 0.25 miles past Lakeside Landings neighborhood entrance, where the north side of the fiber ends. The north side of SR 544 has buried fiber again at Old Lucerne Park Road, and fiber on both sides of SR 544 continue until the southern fiber ends at US 27.	

Company	Description of Impacts	Anticipated Relocation Cost
	• At US 27, the buried fiber line on the north side of SR 544 continues and the buried fiber line on the south side of SR 544 ends • At Lake Hamilton Drive, the buried fiber line crosses SR 544 from the north to south side until Crest Drive where buried fiber continues on the north and south side of SR 544 until the end of the project area.	
Spectrum	• No Response	TBD
Sprint Jon Baker jon.baker@sprint.com	• 4-2 inch buried fiber optic conduits along the south side of SR 544 from US 27 for 950 feet, where the line crosses to the north side of SR 544 and remains until crossing back to the south side of SR 544 just west of SR 17.	$2,800,000.00
Tampa Electric Company Kim Bailey csadmin@tecoenergy.com	• Overhead feeder along the north side of SR 544 from Martin Luther King Drive to Old Lucerne Park Road. • From Old Lucerne Park Road to just west of US 27 there is overhead non-feeder along the south side of SR 544.	$4,100,000.00
	Total	**$46,540,751.00**

7.22 Cost Estimates

The total estimated cost for the selected improvements is $258,600,000. Construction costs were estimated using the FDOT Long Range Estimate (LRE) program. **Table 7-7** shows the estimated costs for the preferred improvements. The FDOT LRE construction costs are provided in **Appendix D**. Other impacts associated with the preferred alternative are included in **Table 5-1.**

Table 7-7 Estimated Costs of the Preferred Alternative

	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5	Segment 6	Segment 7	Segment 8
Construction	$13,300,000	$9,500,000	$11,700,000	$25,000,000	$19,000,000	$10,600,000	$64,500,000	$8,500,000
Design	$2,000,000	$1,500,000	$2,500,000	$3,000,000	$2,700,000	$1,600,000	$10,300,000	$900,000
Wetland Mitigation	$0	$0	$0	$63,500	$303,800	$13,500	$305,100	$0
Reimbursable Utility Relocation	$0	$0	$0	$600,000	$1,750,000	$750,000	$1,450,000	$700,000
CEI (12%)	$1,600,000	$1,100,000	$1,400,000	$3,000,000	$2,300,000	$1,300,000	$10,500,000	$1,000,000
ROW	$870,000	$830,000	$4,050,000	$3,800,000	$5,900,000	$2,250,000	$21,350,000	$4,830,000
Totals	$17,800,000	$13,000,000	$19,700,000	$35,500,000	$32,000,000	$16,500,000	$108,400,000	$16,000,000