

Final

Air Quality Report

Malabar Road (SR 514) PD&E Study
From East of Babcock Street (SR 507) to US 1
Brevard County, Florida

Financial Project ID: 430136-1-22-01
ETDM Project Number: 13026

April 2018

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January 2018

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Table of Contents

Section 1.0	Project Summary	1
1.1	Project Description	1
1.2	Existing Typical Sections	2
1.3	Recommended Alternative	6
Section 2.0	Air Quality Screening Model	10
2.1	Analysis Location.....	10
2.2	Site Conditions	10
2.3	Traffic Data.....	10
2.4	Results.....	12
2.5	State Implementation Plan (SIP) Conformity.....	12
Section 3.0	References	14

List of Tables

Table 2-1: Malabar Road/US 1 Intersection Opening Year Traffic Data.....	11
Table 2-2: Malabar Road/US 1 Intersection Design Year Traffic Data.....	11
Table 2-3: Malabar Road/US 1 Intersection Predicted CO Concentrations	13

List of Figures

Figure 1-1: Project Location Map.....	1
Figure 1-2: Existing Typical Section Locations	3
Figure 1-3: Existing Typical Section – Babcock Street to West of Enterprise Avenue.....	3
Figure 1-4: Existing Typical Section – West of Enterprise Avenue to West of Weber Road	4
Figure 1-5: Existing Typical Section – West of Weber Road to Marie Street	4
Figure 1-6: Existing Typical Section – Marie Street to US 1.....	5
Figure 1-7: Recommended Typical Section – Segment 1	6
Figure 1-8: Recommended Typical Section – Segment 2a	7
Figure 1-9: Recommended Typical Section – Segment 2b	8
Figure 1-10: Recommended Typical Section – Segment 3	9

List of Appendices

Appendix A: CO Florida 2012 Output Sheets

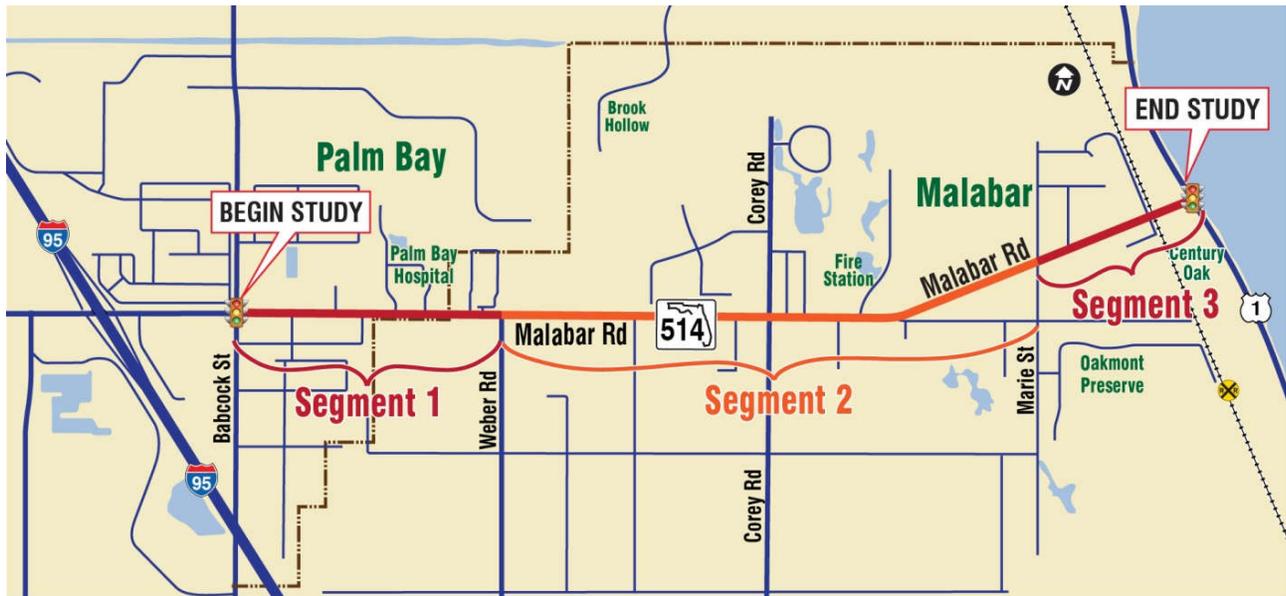
Section 1.0 Project Summary

The Florida Department of Transportation (FDOT), District Five, conducted a Project Development and Environment (PD&E) Study to evaluate improvements to Malabar Road (SR 514) in Brevard County, Florida. The study limits begin east of Babcock Street (SR 507) [milepost (MP) 3.102] and extend to US 1 (MP 6.742), a distance of 3.64 miles. The purpose of the study is to provide documented environmental and engineering analyses to determine the type, location, and conceptual design of roadway improvements to Malabar Road (SR 514).

1.1 Project Description

Malabar Road (SR 514) is an east-west urban minor arterial located in Brevard County that begins approximately 7.4 miles west of its interchange with I-95 and continues east to US 1, traversing the City of Palm Bay and the Town of Malabar. East of Babcock Street, the Malabar Road is primarily a two-lane, undivided rural roadway. There are two signalized intersections within the project limits: at Babcock Street (SR 507) and at US 1. Land use within the corridor includes commercial, conservation, recreation, and low-density residential development. The Florida Division of Emergency Management has designated Malabar Road (SR 514) as an evacuation route. There is also a Florida East Coast (FEC) rail crossing approximately 600 feet west of US 1. **Figure 1-1** represents the project location map.

Figure 1-1: Project Location Map



Three project segments were identified based on existing land use characteristics so appropriate context sensitive improvements can be identified and developed.

- Segment 1, from Babcock Street to Weber Road, is urban in nature with commercial land uses including the Life Center of Palm Bay and Palm Bay Hospital.
- Segment 2, from Weber Road to Marie Street, is less developed and more rural in nature, with the Malabar Scrub Sanctuary occupying a large portion of the lands abutting the roadway, some single-family homes on large parcels, the Malabar Disc Golf Park, Fern Creek Crossing Park, and some churches.
- Segment 3, like Segment 1, is more urban in nature, with smaller residential parcels, commercial land uses, downtown Malabar and Town Hall, the FEC railroad, and US 1 intersection.

Malabar Road (SR 514) is four-lanes from between Minton Road and Babcock Street (SR 507), after which it then transitions to a two-lane facility. Speed limits vary along the corridor, beginning at Babcock Street (SR 507) where it is 45 mph miles per hour (mph), transitioning to 55 mph just east of Weber Road, transitioning to 50 mph to east of Corey Road, then transitioning again to 45 mph west of Marie Street, and finally to 30 mph east of Marie Street to US 1. The existing right-of-way (ROW) width in the corridor varies: typically, 116 feet between Babcock Street (SR 507) and Enterprise Avenue, 83 feet from Enterprise Avenue to Weber Road, 66 feet from Weber Road to west of Marie Street feet, and 50 feet from west of Marie Street to US 1.

Roadway improvements to Malabar Road (SR 514) are identified in the *Town of Malabar Comprehensive Plan*¹ and the *City of Palm Bay Comprehensive Plan*², and are part of the Space Coast Transportation Planning Organization’s *2040 Long Range Transportation Plan*³. The project is being considered to accommodate projected future traffic demand (Design Year 2045) along Malabar Road. The No-Build Alternative is also under consideration, and will remain a viable alternative through the Public Hearing phase of the project.

1.2 Existing Typical Sections

Malabar Road (SR 514), within the project corridor, consists of four existing typical sections (**Figure 1-2**).

- **Babcock Street (SR 507) to West of Enterprise Avenue (MP 3.102 to MP 3.303)**

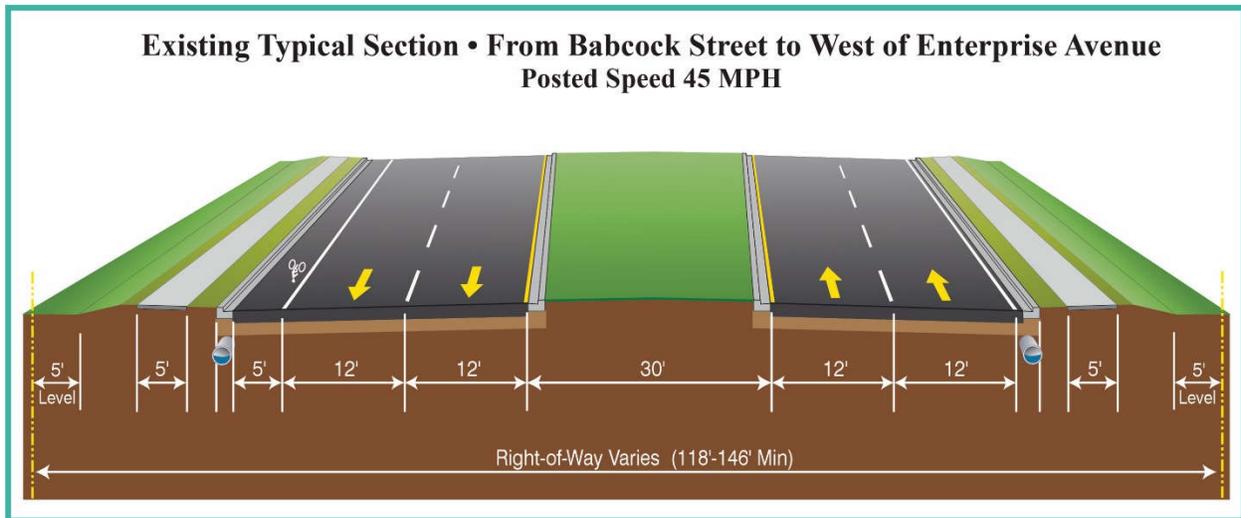
The intersection of Malabar Road (SR 514) and Babcock Street (SR 507), located within this segment, recently underwent intersection improvements and now contains four through lanes (two lanes in each direction, eastbound and westbound, respectively) along with turn lanes. The proposed improvements from this PD&E Study will tie into this recently improved intersection. Florida Power & Light Company (FP&L) has a distribution pole line on the north side of SR 514 from Babcock Street to Weber Road and continues east to US 1. FP&L also has a transmission pole line on south side of SR 514 from Babcock Street to 730 Malabar Road where it crosses over to north side of the roadway.

This typical section (**Figure 1-3**) consists of four 12-foot travel lanes separated by a 30-foot grass median. Two-foot curb and gutters exist on the inside and outside of the roadway. The posted speed limit is 45 mph. This is the only section within the study limits that contains sidewalks.

Figure 1-2: Existing Typical Section Locations



Figure 1-3: Existing Typical Section – Babcock Street to West of Enterprise Avenue

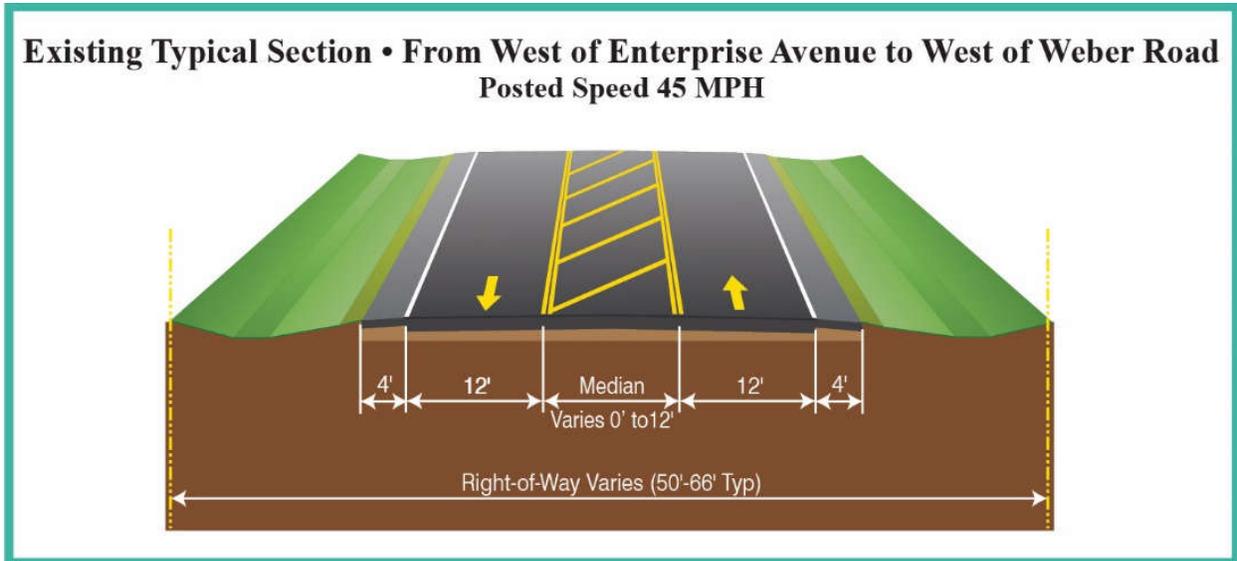


- **West of Enterprise Avenue to West of Weber Road (MP 3.303 to MP 4.087)**

This typical section (**Figure 1-4**) consists of two 12-foot travel lanes, a variable width painted median, shallow ditches and a 45-mph posted speed limit. This section contains four-foot paved shoulders, two-foot grass shoulders, and ditches on both sides of the road. From west of Enterprise Avenue to west of Weber Road, there are large concrete transmission poles on

the south side of the road just inside the ROW. The transmission poles switch to the north side 900 feet west of Weber Road.

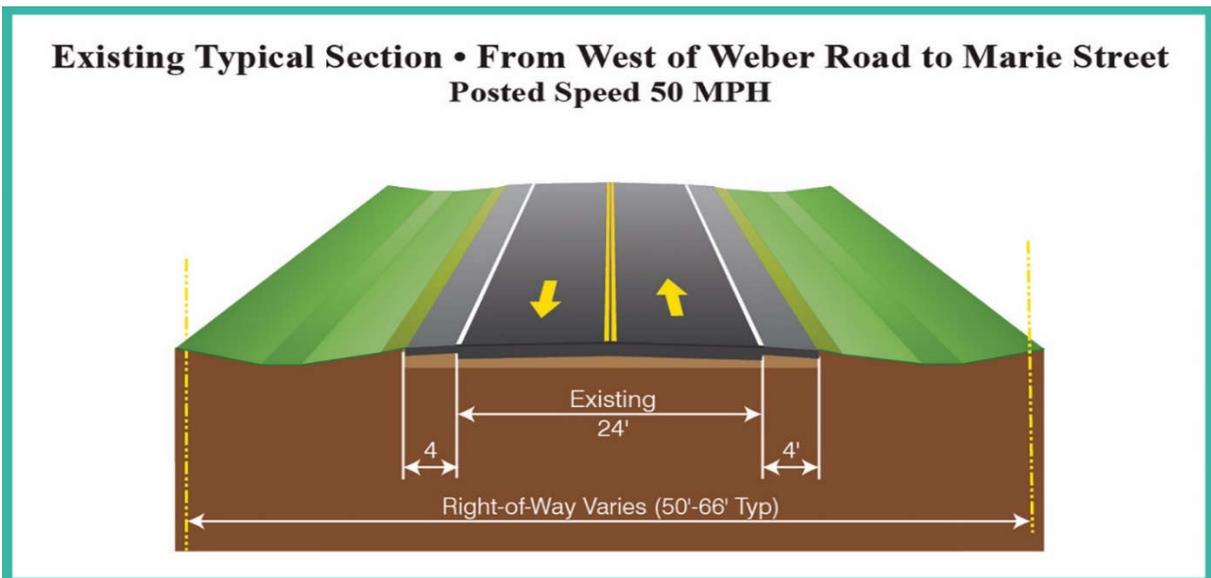
Figure 1-4: Existing Typical Section – West of Enterprise Avenue to West of Weber Road



- **West of Weber Road to Marie Street (MP 4.087 to MP 6.129)**

Comprising the majority of the corridor (over two miles), this typical section (**Figure 1-5**) also consists of two 12-foot travel lanes, no median, six-foot shoulders (four-foot paved), shallow ditches and a 50-mph posted speed limit. The large concrete transmission poles are the primary utility on the north side of the road just inside the ROW from Weber Road to Glatter Road, where they follow Glatter Road on the north side.

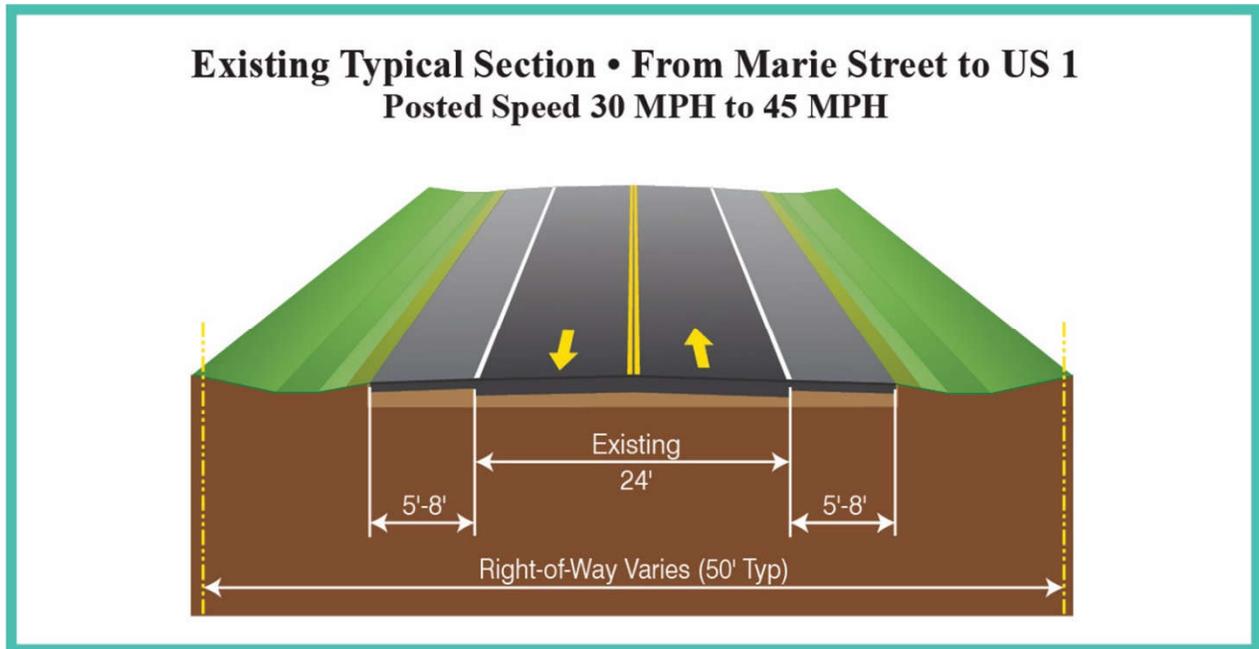
Figure 1-5: Existing Typical Section – West of Weber Road to Marie Street



- **Marie Street to US 1 (MP 6.129 to MP 6.742)**

Similar to the previous typical section, this typical section also consists of two 12-foot undivided travel lanes, but contains paved shoulders that vary between five-feet and eight-feet, gutter inlets on the south side of the road, and a 30 mph to 45 mph posted speed limit. The primary utility in this section of the road are wooden power poles on both sides of the road (**Figure 1-6**).

Figure 1-6: Existing Typical Section – Marie Street to US 1

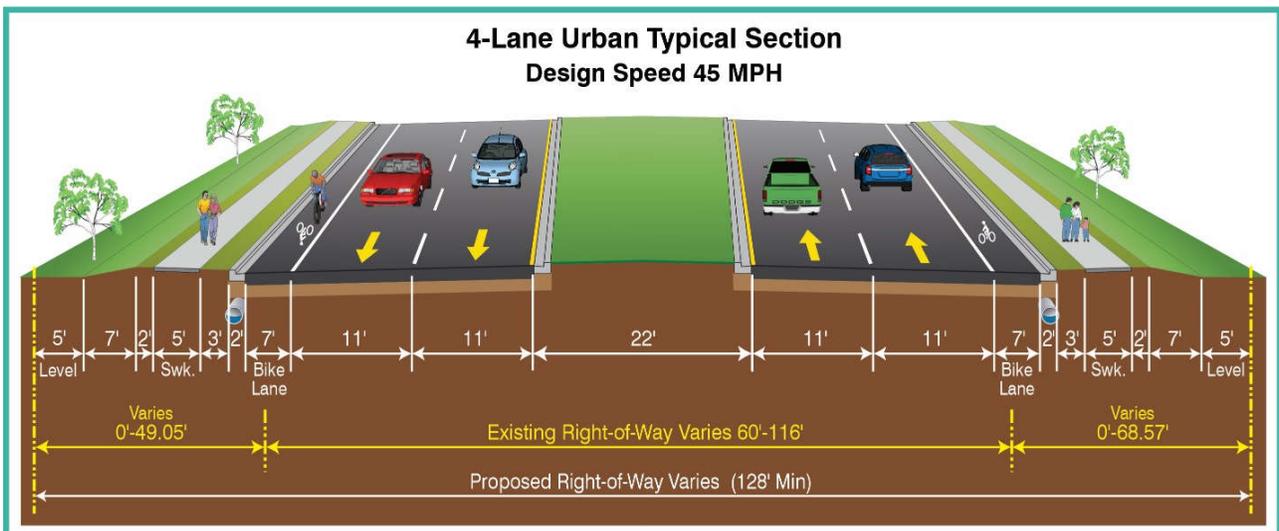


1.3 Recommended Alternative

The Recommended Alternative consists of four different typical sections that vary from west to east, as follows.

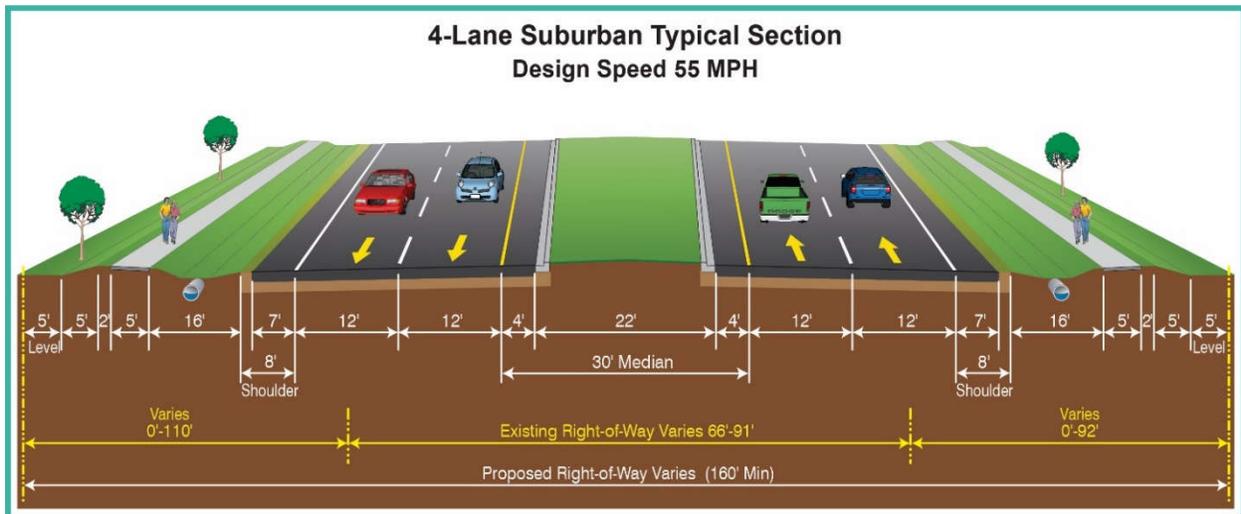
Segment 1: From East of Babcock Street (SR 507) to Weber Road. Beginning east of Babcock Street (SR 507), the Recommended Alternative includes a four-lane urban typical section (**Figure 1-7**), providing two 11-foot travel lanes, a seven-foot bicycle lane and five-foot sidewalk in each direction with a 45-mph design speed and posted speed limit. Travel lanes are separated by a 22-foot wide raised grass median. Drainage is handled by curb-and-gutter and a closed drainage system to route stormwater runoff to offsite ponds. The alignment is a best-fit approach, starting to the north of the existing alignment and then transitioning south just west of a proposed roundabout at Weber Road. This segment ties into the Babcock Street intersection which was the subject of an improvement project (FPID 237650-3) completed in 2013 to widen for new turn lanes, improve the existing turn lanes, add mast arm signalization, and install new street lighting.

Figure 1-7: Recommended Typical Section – Segment 1



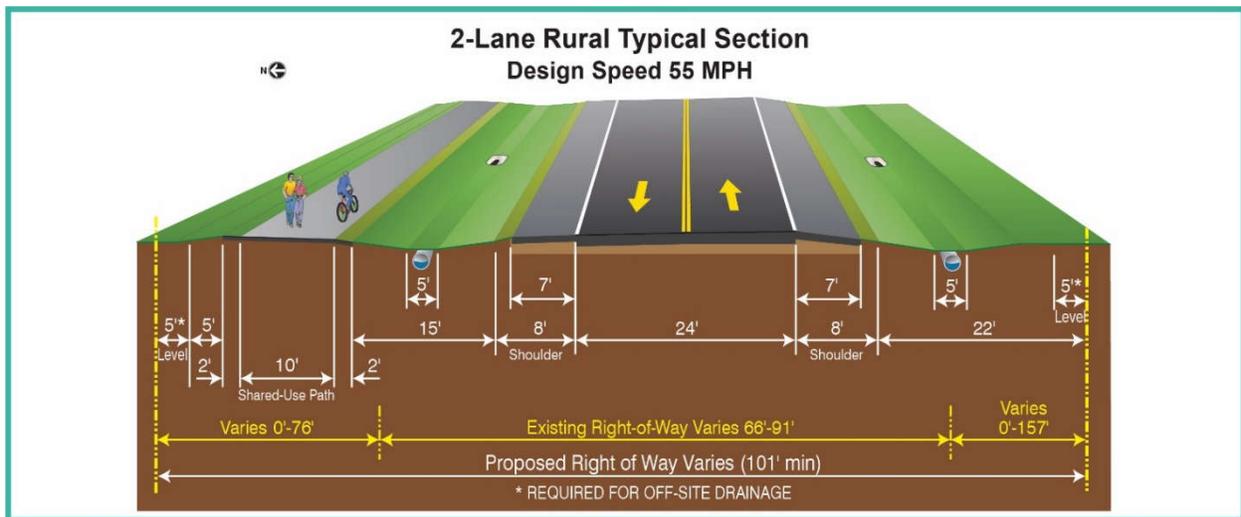
Segment 2a: From Weber Road to Corey Road. Just west of Weber Road, the Recommended Alternative transitions from a four-lane urban typical section to a four-lane suburban typical section (**Figure 1-8**). The four-lane suburban typical section provides two 12-foot travel lanes, an eight-foot shoulder (seven-foot paved which accommodates a bicycle lane), and a five-foot sidewalk in each travel direction. The design speed is 55 mph and the posted speed limit is 50 mph. Travel lanes are separated by a 30-foot wide median which includes a 22-foot raised grass area and two four-foot inside paved shoulders. Drainage swales/ditches are located on both sides of the roadway. Roundabouts are proposed at the Malabar Road (SR 514) intersections at Weber Road and Corey Road. The alignment is a best-fit concept. From west to east after the roundabout at Weber Road, the alignment shifts south then north to align with the proposed Corey Road roundabout. Additional right-of-way will be required from parcels on both sides of Malabar Road (SR 514) including approximately 0.38 acres from the Malabar Scrub Sanctuary and 0.02 acres from Fern Creek Crossing Park.

Figure 1-8: Recommended Typical Section – Segment 2a



Segment 2b: From Corey Road to Marie Street. East of the Corey Road intersection, the recommended alternative transitions from the four-lane suburban typical section into a two-lane rural roadway (**Figure 1-9**) including one 12-foot wide travel lane, an eight-foot shoulder (seven-foot paved which accommodates a bicycle lane) in each direction, and a 10-foot shared-use path along the north side of Malabar Road (SR 514), which provides a pedestrian and bicycle facility and connects the trailhead at Marie Street to the Malabar Community Park, the Malabar Scrub Sanctuary, and the Malabar Disc Golf Course Park. The design speed is 55 mph and the posted speed limit is 50 mph. The alignment is a best-fit concept. Between Corey Road and Shiflett Lane, parcels on both sides – with exception of the U.S. Post Office located on the north side – are impacted as the alignment transitions from a four-lane roadway to a two-lane roadway. Between Shiflett Lane and Marie Street the alignment has impacts to both the Malabar Scrub Sanctuary (0.34 acre) and Malabar Disc Golf Park (0.12 acre). The alignment shifts south of the existing roadway on the east side of the Disc Golf Park.

Figure 1-9: Recommended Typical Section – Segment 2b

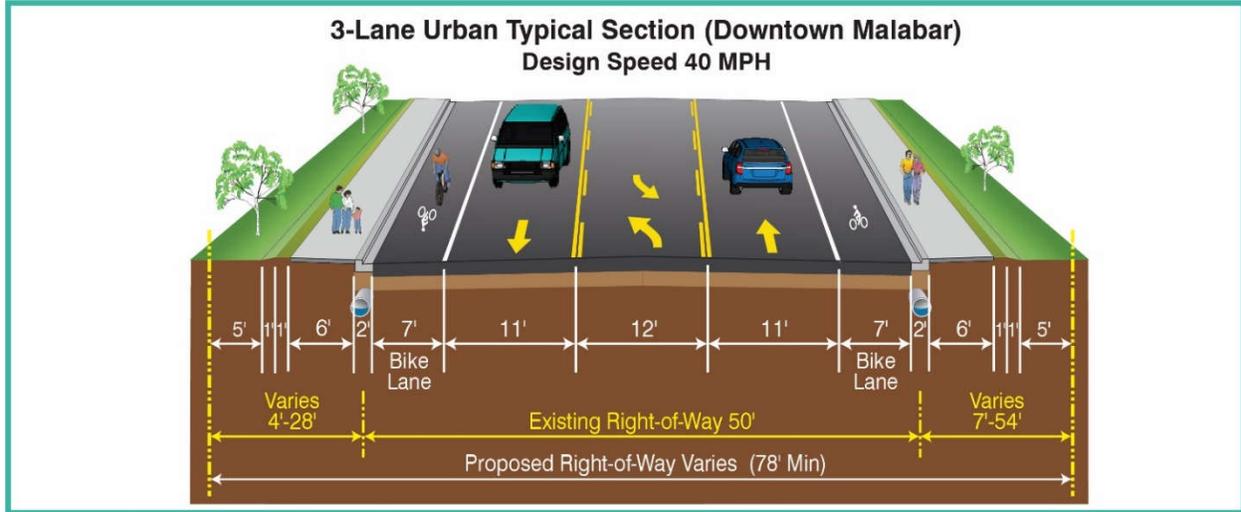


Segment 3: Marie Street to US 1. East of Marie Street, the typical section transitions into a three-lane urban typical section (**Figure 1-10**). The recommended typical section includes one 11-foot travel lane in each direction, a 12-foot center bi-directional left-turn lane, and seven-foot bicycle lanes and six-foot sidewalks in each direction. Drainage is handled by curb-and-gutter and a closed drainage system to route stormwater runoff to offsite ponds. The design speed is 40 mph with a 35-mph posted speed limit. A best-fit alignment is centered on the existing roadway location, with ROW acquisition from both sides of the roadway. Additional lanes are proposed at the US 1 intersection as warranted by the traffic forecasts.:

- A second northbound left turn lane and a second westbound lane receiving lane;
- A second eastbound left turn lane;

- Two northbound through lanes; the existing northbound signal bypass lane will be removed, and both northbound through lanes will be signal controlled.

Figure 1-10: Recommended Typical Section – Segment 3



Section 2.0 Air Quality Screening Model

An air quality analysis, specifically an analysis of carbon monoxide (CO) concentrations, was performed using methodology established in the FDOT *Project Development and Environment (PD&E) Manual*¹, Part 2, Chapter 19 (June 2017). CO levels were predicted using FDOT's screening model *CO Florida 2012*² (January 2012).

2.1 Analysis Location

Motor vehicle emissions are typically highest at intersections where operating speeds are slower and vehicles are delayed at traffic signals. A review of traffic data documented in the *SR 514 Design Traffic – Final Technical Memorandum*³ (March 2015) showed the Malabar Road/US 1 intersection as having the highest vehicle approach volumes. Therefore, the Malabar Road/US 1 intersection was evaluated as a worst-case scenario for air quality.

2.2 Site Conditions

CO Florida 2012 provides for a selection of an intersection type and default environmental/meteorological conditions by the FDOT District. The West Tee intersection configuration was selected as representative of the Malabar Road/US 1 intersection. District 5 was selected as the geographic region.

CO Florida 2012 also provides various land use options to simulate the effects of atmospheric conditions and account for background CO levels in the project area. A suburban land use was selected. The suburban land use includes a background CO concentration of 3.3 parts per million (ppm) for a 1-hour averaging time and 2.0 ppm for an 8-hour averaging time. The background concentration is added to the predicted CO emissions from vehicles operating at the Malabar Road/US 1 intersection.

2.3 Traffic Data

Traffic data used in the analysis of the Malabar Road/US 1 intersection are provided in **Tables 2-1 and 2-2**. The traffic data, taken from the *Draft Design Traffic Technical Memorandum*³ (March 2015), represent peak-hour conditions which are the worst-case scenarios. As indicated, the analysis was performed for opening year (2025) and design year (2045) No-Build and Build conditions. Vehicle approach speeds were set at the speed limit as directed by the *User's Guide to CO Florida 2012* (January 31, 2012).

Table 2-1: Malabar Road/US 1 Intersection Opening Year Traffic Data

Scenario	Intersection Approach	Peak-Hour Traffic Volume	Speed Limit (mph)
2025 No-Build	US1 Southbound Approach	1,633	45
	US1 Northbound Approach	1,137	45
	Malabar Road Eastbound Approach	856	30
2025 Build	US1 Southbound Approach	1,633	45
	US1 Northbound Approach	1,137	45
	Malabar Road Eastbound Approach	929	30

Table 2-2: Malabar Road/US 1 Intersection Design Year Traffic Data

Scenario	Intersection Approach	Peak-Hour Traffic Volume	Speed Limit (mph)
2045 No-Build	US1 Southbound Approach	2,422	45
	US1 Northbound Approach	1,798	45
	Malabar Road Eastbound Approach	1,051	30
2045 Build	US1 Southbound Approach	2,524	45
	US1 Northbound Approach	1,826	45
	Malabar Road Eastbound Approach	1,308	30

Receptor Locations

CO levels are highest near travel lanes where pollutants are emitted with concentrations decreasing as the distance from the road increases. As a worst-case condition, *CO Florida 2012* includes pre-built receptors located along the approach and departure lanes of an intersection. The pre-built receptors included in the screening model provide a comprehensive representation of near-road CO concentrations. The West Tee intersection configuration includes 17 pre-built receptor locations.

2.4 Results

The predicted CO concentrations are provided in **Table 2-3**. The highest predicted CO concentrations at the Malabar Road/US 1 intersection are 5.0 ppm for a 1-hour averaging time and 3.0 ppm for an 8-hour averaging time. All predicted CO concentrations for the No-Build and Build conditions in the opening year and design year are below the National Ambient Air Quality Standard (NAAQS) of 35 ppm for a 1-hour averaging time and the NAAQS of nine ppm for an 8-hour averaging time. The predicted 1-hour and 8-hour concentrations include a background CO level of 3.3 ppm and 2.0 ppm, respectively. Output sheets from *CO Florida 2012* are provided as Appendix A.

2.5 State Implementation Plan (SIP) Conformity

The project is in an area that has been designated as attainment for all of the National Ambient Air Quality Standards (NAAQS) under the criteria provided by the Clean Air Act. Therefore, the Clean Air Act conformity requirements do not apply to the project.

Greenhouse Gases

The project is expected to improve traffic flow by improving traffic operational improvements which should reduce operational greenhouse gas emissions.

Table 2-3: Malabar Road/US 1 Intersection Predicted CO Concentrations

Receptor Identification	Scenario							
	2025 No-Build		2025 Build		2045 No-Build		2045 Build	
	1-Hour ¹ (ppm)	8-Hour ² (ppm)						
R1	4.4	2.6	4.4	2.6	4.7	2.8	4.8	2.9
R2	4.4	2.6	4.4	2.6	4.7	2.8	4.8	2.9
R3	4.5	2.7	4.5	2.7	5.0	3.0	5.0	3.0
R4	4.4	2.6	4.4	2.6	4.7	2.8	4.8	2.9
R5	4.4	2.6	4.4	2.6	4.7	2.8	4.7	2.8
R6	4.3	2.6	4.3	2.6	4.7	2.8	4.7	2.8
R7	4.2	2.5	4.2	2.5	4.7	2.8	4.7	2.8
R8	4.3	2.6	4.3	2.6	4.7	2.9	4.8	2.9
R9	4.4	2.6	4.4	2.6	4.8	2.9	4.9	2.9
R10	4.6	2.8	4.6	2.8	4.9	2.9	4.9	2.9
R11	4.1	2.5	4.1	2.5	4.4	2.6	4.5	2.7
R12	4.0	2.4	4.0	2.4	4.1	2.5	4.1	2.5
R13	4.0	2.4	4.0	2.4	4.1	2.5	4.1	2.5
R14	4.1	2.5	4.1	2.5	4.3	2.6	4.4	2.6
R15	4.4	2.6	4.4	2.6	4.9	2.9	4.9	2.9
R16	4.2	2.5	4.2	2.5	4.6	2.8	4.6	2.8
R17	4.2	2.5	4.2	2.5	4.4	2.6	4.4	2.6

¹ Includes a background CO concentration of 3.3 ppm

² Includes a background CO concentration of 2.0 ppm

Section 3.0 References

1. *Project Development and Environment Manual*, Part 2, Chapter 19; Florida Department of Transportation; June 14, 2017.
2. *CO Florida 2012*; Florida Department of Transportation; January 2012.
3. *Draft Design Traffic Technical Memorandum*; GMB Engineers and Planners; March 2015.

APPENDIX A

CO FLORIDA 2012 OUTPUT SHEETS

CO Florida 2012 - Results
Wednesday, August 16, 2017

Project Description

Project Title Malabar Road PD&E
Facility Name Malabar Road from SR 507 to US 1
User's Name Atkins
Run Name Opening Year (2025) No-Build
FDOT District 5
Year 2025
Intersection Type West Tee
Speed Arterial 30 mph
Approach Traffic Arterial 1633 vph

Environmental Data

Temperature 47.8 °F
Reid Vapor Pressure 13.3 psi
Land Use Suburban
Stability Class D
Surface Roughness 108 cm
1 Hr. Background Concentration 3.3 ppm
8 Hr. Background Concentration 2.0 ppm

Results

(ppm, including background CO)

Receptor	Max 1-Hr	Max 8-Hr
1	4.4	2.6
2	4.4	2.6
3	4.5	2.7
4	4.4	2.6
5	4.4	2.6
6	4.3	2.6
7	4.2	2.5
8	4.3	2.6
9	4.4	2.6
10	4.6	2.8
11	4.1	2.5
12	4.0	2.4
13	4.0	2.4
14	4.1	2.5
15	4.4	2.6
16	4.2	2.5
17	4.2	2.5

*****PROJECT PASSES*****
NO EXCEEDANCES OF NAAQ STANDARDS ARE PREDICTED

CO Florida 2012 - Results
 Wednesday, August 16, 2017

Project Description

Project Title Malabar Road PD&E
 Facility Name Malabar Road from SR 507 to US 1
 User's Name Atkins
 Run Name Opening Year (2025) Build
 FDOT District 5
 Year 2025
 Intersection Type West Tee
 Speed Arterial 30 mph
 Approach Traffic Arterial 1633 vph

Environmental Data

Temperature 47.8 °F
 Reid Vapor Pressure 13.3 psi
 Land Use Suburban
 Stability Class D
 Surface Roughness 108 cm
 1 Hr. Background Concentration 3.3 ppm
 8 Hr. Background Concentration 2.0 ppm

Results

(ppm, including background CO)

Receptor	Max 1-Hr	Max 8-Hr
1	4.4	2.6
2	4.4	2.6
3	4.5	2.7
4	4.4	2.6
5	4.4	2.6
6	4.3	2.6
7	4.2	2.5
8	4.3	2.6
9	4.4	2.6
10	4.6	2.8
11	4.1	2.5
12	4.0	2.4
13	4.0	2.4
14	4.1	2.5
15	4.4	2.6
16	4.2	2.5
17	4.2	2.5

 *****PROJECT PASSES*****
 NO EXCEEDANCES OF NAAQ STANDARDS ARE PREDICTED

CO Florida 2012 - Results
 Wednesday, August 16, 2017

Project Description

Project Title Malabar Road PD&E
 Facility Name Malabar Road from SR 507 to US 1
 User's Name Atkins
 Run Name Design Year (2045) No-Build
 FDOT District 5
 Year 2045
 Intersection Type West Tee
 Speed Arterial 30 mph
 Approach Traffic Arterial 2422 vph

Environmental Data

Temperature 47.8 °F
 Reid Vapor Pressure 13.3 psi
 Land Use Suburban
 Stability Class D
 Surface Roughness 108 cm
 1 Hr. Background Concentration 3.3 ppm
 8 Hr. Background Concentration 2.0 ppm

Results

(ppm, including background CO)

Receptor	Max 1-Hr	Max 8-Hr
1	4.7	2.8
2	4.7	2.8
3	5.0	3.0
4	4.7	2.8
5	4.7	2.8
6	4.7	2.8
7	4.7	2.8
8	4.7	2.8
9	4.8	2.9
10	4.9	2.9
11	4.4	2.6
12	4.1	2.5
13	4.1	2.5
14	4.3	2.6
15	4.9	2.9
16	4.6	2.8
17	4.4	2.6

 *****PROJECT PASSES*****
 NO EXCEEDANCES OF NAAQ STANDARDS ARE PREDICTED

CO Florida 2012 - Results
 Wednesday, August 16, 2017

Project Description

Project Title Malabar Road PD&E
 Facility Name Malabar Road from SR 507 to US 1
 User's Name Atkins
 Run Name Design Year (2045) Build
 FDOT District 5
 Year 2045
 Intersection Type West Tee
 Speed Arterial 30 mph
 Approach Traffic Arterial 2524 vph

Environmental Data

Temperature 47.8 °F
 Reid Vapor Pressure 13.3 psi
 Land Use Suburban
 Stability Class D
 Surface Roughness 108 cm
 1 Hr. Background Concentration 3.3 ppm
 8 Hr. Background Concentration 2.0 ppm

Results

(ppm, including background CO)

Receptor	Max 1-Hr	Max 8-Hr
1	4.8	2.9
2	4.8	2.9
3	5.0	3.0
4	4.8	2.9
5	4.7	2.8
6	4.7	2.8
7	4.7	2.8
8	4.8	2.9
9	4.9	2.9
10	4.9	2.9
11	4.5	2.7
12	4.1	2.5
13	4.1	2.5
14	4.4	2.6
15	4.9	2.9
16	4.6	2.8
17	4.4	2.6

 *****PROJECT PASSES*****
 NO EXCEEDANCES OF NAAQ STANDARDS ARE PREDICTED
