

# **DRAFT PRELIMINARY ENGINEERING REPORT**

## **Malabar Road Project Development and Environment (PD&E) Study**

### **From St. Johns Heritage Parkway to Minton Road**

City of Palm Bay and Brevard County, Florida

Financial Project ID Number: 437210-1-28-01

ETDM Number: 14396

October 2024

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 the Federal Highway Administration and FDOT.

# PROFESSIONAL ENGINEER CERTIFICATION

## PRELIMINARY ENGINEERING REPORT

**Project:** Malabar Road PD&E Study

**ETDM Number:** 14396

**Financial Project ID:** 437210-1-28-01

**Federal Aid Project Number:** TBD

This preliminary engineering report contains engineering information that fulfills the purpose and need for the Malabar Road Project Development & Environment Study from the St. Johns Heritage Parkway to Minton Road in the City of Palm Bay and Brevard 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 Kittelson & Associates, 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 *John R. Freeman, Jr., P.E., PTOE, RSP<sub>1</sub>* on the date adjacent to the seal.

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## 1.0 PROJECT SUMMARY

Initiated in November 2019, this Project Development and Environment (PD&E) Study has been conducted to assess various widening alternatives for Malabar Road. This Preliminary Engineering Report (PER) documents the purpose and need, the alternatives developed, how the preferred alternative was selected, and presents the preliminary design analysis for the preferred alternative.

### 1.1 Project Description

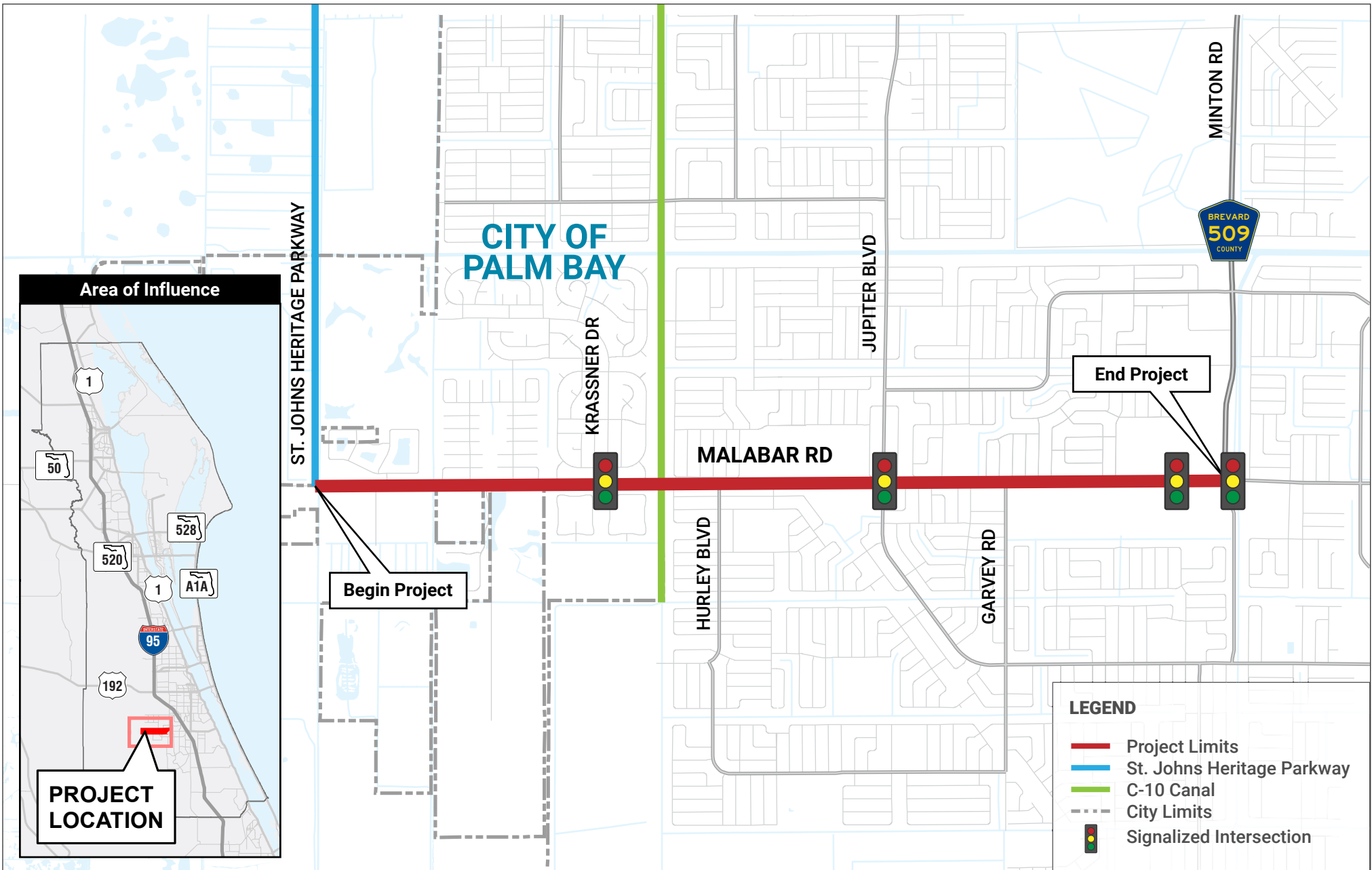
The Malabar Road Project Development and Environment (PD&E) Study evaluated capacity, safety, and multi-modal improvements on Malabar Road from St. Johns Heritage Parkway to Minton Road, a distance of approximately four miles, in the City of Palm Bay and Brevard County, Florida. Malabar Road is an east-west regional roadway connecting western Brevard County/City of Palm Bay to US 1 in Malabar. The roadway's maintaining jurisdiction is Brevard County at its western edge, before transitioning to the City of Palm Bay for several miles, and then becoming a state road (S.R. 514) between I-95 and US 1. Within the study area, Malabar Road is an urban minor arterial. The study area is shown in **Figure 1**.

Malabar Road within the project limits is a two-lane roadway. The section from St. Johns Heritage Parkway to Garvey Road is undivided, whereas the section from Garvey Road to Minton Road has median turn lanes. An 8' sidewalk is present on Malabar Road's north side for the entirety of the project limits. Minimal sidewalk is present on the south side. No bicycle lanes are present along the study limit's length.

There are currently four signalized intersections and numerous unsignalized intersections along the study corridor. The four signalized intersections are located at Krassner Drive/Bending Branch Lane, Jupiter Boulevard, the Plaza Shopping Center, and Minton Road as shown in **Figure 1**.

This roadway is unique due to the surrounding canal system that is operated/maintained by the Melbourne-Tillman Water Control District (MTWCD). Malabar Road within the project limits crosses over four canals (C-7, C-8, C-9, and C-10). Canal C-20 runs parallel to Malabar Road on the north side from Canal C-10 (250' west of Bavarian Avenue) to approximately 0.30 miles west of Minton Road. Within the project limits, there is one roadway bridge over Canal C-10 and three pedestrian bridges over Canals C-8, C-9, and C-10 for the north side sidewalk.

The proposed improvements will widen Malabar Road from two to four lanes from the St. Johns Heritage Parkway to Minton Road. The preferred alternative's typical section along the study corridor will include two 11' lanes in each direction, a 22' wide median, a 10' shared-use path on the north side, and an 8' sidewalk on the south side. The intersections at St. Johns Heritage Parkway, Krassner Drive/Bending Branch Lane, Hurley Boulevard, and Maywood Avenue/Daffodil Drive are proposed as roundabouts while Jupiter Boulevard, the Plaza Shopping Center, and Minton Road are proposed to remain signalized. Existing typical sections are provided in **Section 2.2.1** and proposed typical sections are provided in **Section 1.5.2**.



# Malabar Road PD&E Study

FPID: 437210-1-28-01

STUDY ROADWAY

**FIGURE 1**

## 1.2 Purpose and Need

The purpose of this project is to provide additional capacity improvements to relieve existing congestion and accommodate projected future traffic demand. It is also to address current corridor and intersection safety issues. The need for these improvements is described in this section.

### 1.2.1 Project Status

The project is within the jurisdiction of the Space Coast Transportation Planning Organization (SCTPO) boundaries. The final design phase is currently funded in FY 2024 as shown on page 2,381 of the FDOT State Transportation Improvement Program (STIP) and page A-16 of the SCTPO Transportation Improvement Program (TIP). The City of Palm Bay has allocated \$7M in local funding for the final design phase as shown in rows 197 and 198 of Exhibit A in Resolution 2022-18 of the Capital Improvement Plan (CIP). The SCTPO 2045 Long Range Transportation Plan (LRTP) Cost Feasible Plan (CFP) includes the design phase for this project in the current time period, the right-of-way phase in the 2026 to 2030 time period, and the construction phase in the 2031 to 2035 time period. This project begins at St. Johns Heritage Parkway and ends at Minton Road, ETDM #14396.

### 1.2.2 Transportation Demand/Capacity

The existing (2020) traffic analysis shows the four signalized intersections and 13 unsignalized intersections operated with an overall Level of Service (LOS) of E or better and no overcapacity movements. Even though the intersections were operating acceptably, the existing traffic analysis for the segments shows multiple segments of the Malabar Road corridor operated worse than the City standard of LOS C, with traffic volumes ranging from 7,200 to 16,000 Annual Average Daily Traffic (AADT). As population and employment growth are expected to continue in western Palm Bay, the east-west traffic volumes along Malabar Road are anticipated to increase. This will ultimately lead to unacceptable segment and intersection operations.

In the future 2050 no-build condition, three of the four signalized intersections and 12 of the 15 unsignalized intersections are anticipated to operate at LOS F or with a volume-to-capacity (V/C) ratio greater than 1.0 in either the AM or PM peak hour based on the traffic analysis performed. Two additional unsignalized intersections were added in the future 2050 no-build condition, thus the reason for the increase to 15 total unsignalized intersections. Most segments of Malabar Road are projected to function unacceptably as a two-lane roadway, with traffic volumes ranging from 16,000 to 28,000 AADT. **Table 1** provides the traffic summary for the existing and future no-build conditions.

**Table 1: Malabar Road Existing 2020 and No-Build 2050 AADT and LOS**

Malabar Road Segment	No. of Lanes	2020 AADT	2020 LOS <sup>1</sup>	2050 AADT	2050 LOS <sup>1</sup>
St. Johns Heritage Parkway to Krassner Dr./Bending Branch Ln.	2	7,200	D	16,000	E
Krassner Dr./Bending Branch Ln. to Jupiter Blvd.	2	11,000	B	21,000	F
Jupiter Blvd. to Plaza Shopping Center	2	16,000	E	28,000	E
Plaza Shopping Center to Minton Rd.	2 <sup>2</sup>	16,000	F <sup>3</sup>	28,000	F <sup>3</sup>

<sup>1</sup> Displayed LOS is for worst peak hour (AM/PM) and peak direction (EB/WB).

<sup>2</sup> In the EB direction, a second through lane is added at the Minton Road intersection. There are two through lanes in the WB direction, but the outside lane drops just west of the Plaza Shopping Center intersection. Thus, this segment of Malabar Road functions as a two-lane facility.

<sup>3</sup> This is likely due to the relatively short length of segment between signalized intersections and the relatively high control delay of the adjacent signalized intersections.

The western Palm Bay area is anticipated to experience over 30 percent population growth, and between 5 percent to over 300 percent traffic growth, in the next 30 years, leading to increased travel on facilities west of I-95 and south of US 192<sup>1</sup>. The St. Johns Heritage Parkway is providing a “beltway” facility to accommodate the forecasted increase in traffic in western Palm Bay. The St. Johns Heritage Parkway is already constructed from Malabar Road to US 192, and a study is being performed for the extension of the Parkway from Babcock Street north to Malabar Road.

Malabar Road is one of three primary east-west roadways connecting to the Parkway and is the only one of those roadways that has an interchange with I-95. Malabar Road from Minton Road to Corporate Circle is four lanes and the section from Corporate Circle to I-95 is six lanes. Malabar Road from the St. Johns Heritage Parkway to Minton Road is the only two-lane section west of I-95.

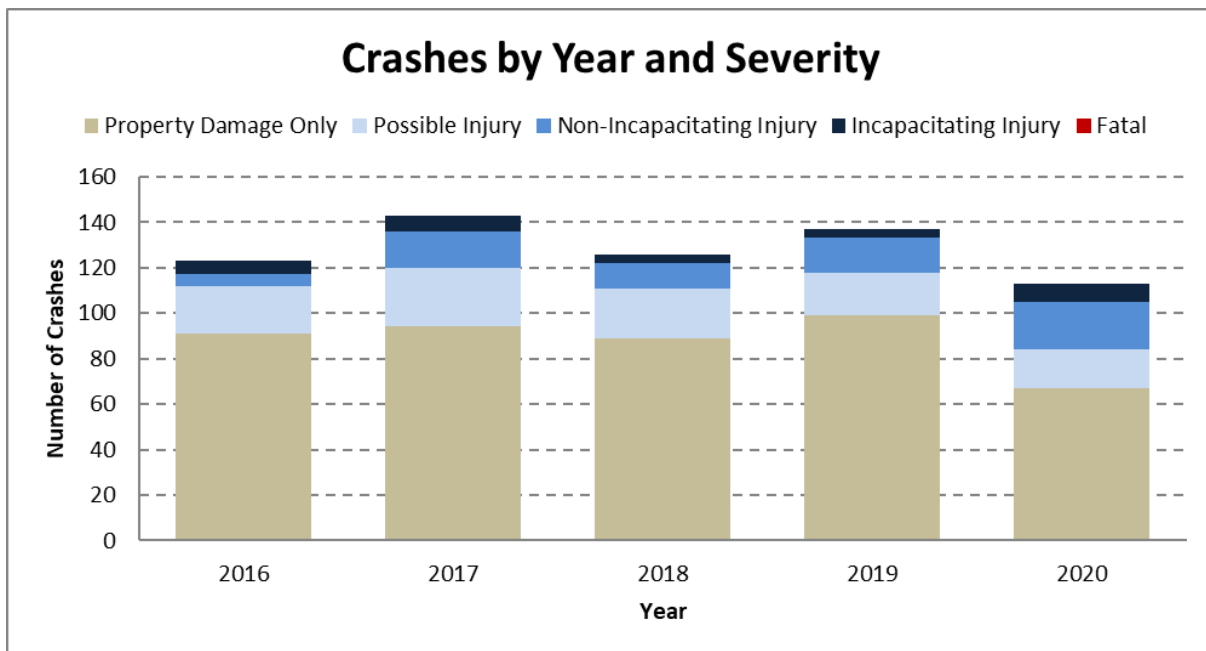
A PD&E study was completed in 2021 for Malabar Road from Babcock Street to US 1 with a preferred alternative to widen from two to four lanes. Design and right-of-way for the Babcock Street to US 1 project is planned in the SCPTO’s 2045 Long Range Transportation Plan (LRTP) Cost Feasible Plan for the 2026 to 2030 time period and construction is planned for the 2031 to 2035 time period.

<sup>1</sup> Based on City of Palm Bay traffic analysis.

1.2.3 Safety

Crash records from 2016 to 2020 were obtained for Malabar Road from 900' west of the St. Johns Heritage Parkway to ¼ mile east of Minton Road. There were a total of 642 reported crashes during this period, 202 (32 percent) resulted in at least one injury. There were no reported fatal crashes along the study corridor during the five-year period. As displayed in **Figure 2**, the crashes per year along the corridor generally increased between 2016 (123 crashes) and 2019 (137 crashes). The 2020 crash data saw a decrease to 113 crashes, likely due to decreases in traffic volumes related to the COVID-19 pandemic. While the overall total crashes decreased in 2020, the total number of injury crashes was the second highest behind 2017. This could be attributed to higher travel speeds along the corridor due to the lower volume, which leads to more severe crashes. It is important to note the traffic counts for this project were performed in January 2020, prior to the beginning of the pandemic restrictions in March 2020.

The highest crash type observed was rear end, comprising 54 percent of the total crashes. Left turn (14 percent) and sideswipe crashes (12 percent) were the second and third highest crash types.



**Figure 2: Crashes per Year (Corridor Wide)**

Three existing signalized intersections at Jupiter Boulevard, the Plaza Shopping Center, and Minton Road were the highest crash locations along the study corridor, accounting for 330 of the 642 total reported crashes (51 percent). The four highest crash unsignalized intersections are St. Johns Heritage Parkway, Hurley Boulevard, Hillock Avenue, and Maywood Avenue/Daffodil Drive accounting for 90 total crashes (14 percent). Two high crash segments from 0.05 miles east of

## SECTION 1 – PROJECT SUMMARY

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Jupiter Boulevard to 0.05 west of Santa Rosa Avenue (1,400 feet in length) and from 0.05 miles east of Maywood Avenue/Daffodil Drive to 0.05 west of the Plaza Shopping Center (1,175 feet in length) accounted for 61 total crashes (10 percent). A crash rate analysis was performed on the 2016 to 2018 crash data because average crash rates were not available for 2019 and 2020. Only one segment of Malabar Road, between Jupiter Boulevard and the Plaza Shopping Center, had a higher than average crash rate for one year of analysis. While the segments had low safety ratios, the three signalized intersections at Jupiter Boulevard, the Plaza Shopping Center, and Minton Road each had higher crash rates than statewide or districtwide averages for similar roadways in at least two of the three analysis years.

### *1.2.4 Planning Consistency*

The next phase of project development, the final design phase, is currently funded in fiscal year (FY) 2024 as shown on page 2,381 of the FDOT FY 2023/24-2026/27 State Transportation Improvement Program (STIP) and page A-16 of the SCTPO FY 2024–2028 Transportation Improvement Program (TIP). The City of Palm Bay has allocated \$7M in local funding for the final design phase as shown in rows 197 and 198 of Exhibit A in Resolution 2022-18 of the Capital Improvement Plan (CIP). Resolution #24-10 amended the SCTPO LRTP to include the design phase for this project. The SCTPO's 2045 LRTP Cost Feasible Plan documents the right-of-way and construction phases for the project. The right-of-way phase is planned in the 2026 to 2030 time period with a mix of local and state funds. The construction phase is planned in the 2031 to 2035 time period utilizing local funding. A summary of the planning consistency is shown in **Table 2**.



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**Table 2: Summary of Planning Consistency**

Currently Adopted CFP-LRTP (YES/NO)		Comments					
Yes	<input checked="" type="checkbox"/>	See Amendment Five; Resolution #24-10 of the Space Coast TPO 2045 LRTP, amended 12/15/2023: <a href="https://www.spacecoasttpo.com/what-we-do/planning/core-work-products/long-range-transportation-plan">https://www.spacecoasttpo.com/what-we-do/planning/core-work-products/long-range-transportation-plan</a> . Design is the only future phase that is funded. ROW is in the 2026-2030 time band and construction is in the 2031-2035 time band.					
No	<input type="checkbox"/>						
Phase	TIP/STIP	Currently Approved	\$	FY	Comments		
PE (Final Design)	TIP	Y <input checked="" type="checkbox"/>	\$10.039M	2024	PD&E Study is funded with local funding and expected to finish Summer 2025. Design for project is fully funded with a mix of local/TPO funding which can be found on page A-16 of the Space Coast TPO FY 24 - 28 TIP (adopted July 13, 2023, Amendment 2 December 14, 2023).		
		N <input type="checkbox"/>					
	STIP	Y <input checked="" type="checkbox"/>	\$10.039M	2024		PD&E Study is funded with local funding and expected to finish Summer 2025. Design for project is fully funded with a mix of local/TPO funding which can be found on page 2,381 of the FDOT STIP FY 2023/24-2026/27.	
		N <input type="checkbox"/>					
	CIP	Y <input checked="" type="checkbox"/>	\$7M	2024			PD&E Study is funded with local funding and expected to finish Summer 2025. Design for project is fully funded with a mix of local/TPO funding. The City of Palm Bay has allocated \$7M towards the final design phase. See rows 197 and 198 from Exhibit A of the City's CIP Resolution 2022-18 for the \$7M local funding allocation.
		N <input type="checkbox"/>					
ROW	TIP	Y <input type="checkbox"/>			Right-of-way for project is currently unfunded.		
		N <input checked="" type="checkbox"/>					
	STIP	Y <input type="checkbox"/>				Right-of-way for project is currently unfunded.	
		N <input checked="" type="checkbox"/>					
	CIP	Y <input type="checkbox"/>					Right-of-way for project is currently unfunded.
		N <input checked="" type="checkbox"/>					
Construction	TIP	Y <input type="checkbox"/>			Construction for project is currently unfunded.		
		N <input checked="" type="checkbox"/>					
	STIP	Y <input type="checkbox"/>				Construction for project is currently unfunded.	
		N <input checked="" type="checkbox"/>					
	CIP	Y <input type="checkbox"/>					Construction for project is currently unfunded.
		N <input checked="" type="checkbox"/>					

### **1.3 Commitments**

To ensure the project will not adversely affect protected species and their habitats, the following are commitments to the U.S. Fish and Wildlife Service (USFWS) –

- The City of Palm Bay will conduct a species-specific survey for the Audubon’s crested caracara per USFWS protocol during the design and permitting phase of the proposed project.
- The City of Palm Bay will avoid construction within 1,500 meters of caracara nests during nesting season by avoiding construction activities from November 1<sup>st</sup> to April 30<sup>th</sup> for areas within 1,500 meters of the potential nests.
- The most recent version of the USFWS Standard Protection Measures for the Eastern Indigo Snake will be utilized by the City of Palm Bay during construction.
- The City of Palm Bay will provide appropriate mitigation for impacts to wood stork SFH, per the Wood Stork Effect Determination Key (USFWS, 2008).
- The City of Palm Bay commits to reinitiating consultation during design and permitting with USFWS for the eastern black rail and providing the information necessary to determine the type, degree, and extent of impacts to listed species potentially adversely impacted by the proposed project. The City of Palm Bay will develop mitigation measures in consultation with the USFWS to offset unavoidable impacts. Completion of consultation and documentation of the project’s compliance with the avoidance, minimization and mitigation requirements for the impacted resources will be provided by the City of Palm Bay in a subsequent project reevaluation prior to each segment.
- If the monarch butterfly is listed by the USFWS as Threatened or Endangered and the project may affect the species, the City of Palm Bay commits to re-initiating consultation with USFWS to determine appropriate avoidance and minimization measures for protection of the newly listed species.
- If the tricolored bat is listed by the USFWS as Threatened or Endangered and the project may affect the species, the City of Palm Bay commits to re-initiating consultation with USFWS to determine appropriate avoidance and minimization measures for protection of the newly listed species.

Below is a list of additional commitments made for the Malabar Road PD&E Study:

- The City of Palm Bay is committed to analyzing traffic noise impacts at all nearby noise-sensitive land uses. All currently vacant lots with active building permits have been included in this analysis. If a future noise-sensitive land use receives a building permit before the project’s Date of Public Knowledge, they will be assessed for traffic noise impacts during the project’s final design phase of development.

## 1.4 Alternatives Analysis Summary

### 1.4.1 Roadway Typical Sections

Two initial typical section alternatives were developed to support the Malabar Road purpose and need for capacity and safety improvements:

- Alternative A – Minimum right-of-way alternative
  - 89.5' right-of-way alternative from the St. Johns Heritage Parkway to Canal C-10 **(Figure 3)**
  - 92.5' right-of-way alternative from Canal C-10 to Sta. 256+80 **(Figure 4)**
- Alternative B – Desired right-of-way alternative
  - 100' right-of-way alternative from the St. Johns Heritage Parkway to Canal C-10 **(Figure 5)**
  - 103' right-of-way alternative from Canal C-10 to Sta. 256+80 **(Figure 6)**

Each of the initial typical sections were applied from the St. Johns Heritage Parkway to Sta. 256+80, which is just west of the Plaza Shopping Center where Malabar Road begins to transition to a four-lane roadway. The posted speed for each typical section alternative is 35 mph from St. Johns Heritage Parkway to Championship Circle, 45 mph from Championship Circle to east of Maywood Avenue/Daffodil Drive, and 35 mph from east of Maywood Avenue/Daffodil Drive to Minton Road. This maintains the existing posted speed limits.

The initial Malabar Road typical section alternatives were developed using design provisions from the Florida Greenbook and the FDOT Design Manual (FDM). Alternative A was developed to minimize the right-of-way impacts to residential properties on the south side of Malabar Road and minimize Canal C-20 impacts on the north side of Malabar Road east of Canal C-10. The following features are common between the 89.5' and the 92.5' typical sections:

- Two 11' travel lanes in each direction;
- 15.5' wide median, including Type E curb and gutter;
- Type F curb and gutter outside of the travel lanes; and
- 10' shared-use path on the north side and 6' sidewalk on the south side.
  - The inside edge of the 6' sidewalk is at the back of curb.

The primary difference between the 89.5' and 92.5' typical sections is the presence of Canal C-20 on the north side of Malabar Road east of Canal C-10. In the 92.5' typical, an extra 3' is added on the north side for guardrail protection between the roadway and Canal C-20.

Alternative A utilized a smaller median width of 15.5' and a 6' south side sidewalk at the back of curb to reduce the overall right-of-way needed for the study corridor. A 15.5' median does not meet the minimum 22' Florida Greenbook or FDM median widths for a 45 mph facility, thus a design variation would be needed if this alternative was to move forward. Alternative B increases

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the median width to a standard 22' median (including Type E curb and gutter) per FDM criteria. Alternative B also provides a 4' grass buffer between the south side curb and the sidewalk, which was not provided in Alternative A. The additional 6.5' in the median and 4' grass buffer on the south side equates to the 10.5' difference between the 89.5'/92.5' Alternative A typical sections and the 100'/103' Alternative B typical sections. The following features are common between the 100' and the 103' typical section alternatives:

- Two 11' travel lanes in each direction;
- 22' wide median, including Type E curb and gutter;
- Type F curb and gutter outside of the travel lanes;
- 10' shared-use path on the north side and 6' sidewalk on the south side; and
- 4' grass buffer between the back of the curb and the 6' south side sidewalk.

Similar to Alternative A, the 3' difference between the 100' and 103' typical sections is north side guardrail protection between the roadway and Canal C-20.

The Alternative A and Alternative B typical sections were presented at the Alternatives Public Meeting conducted on Thursday, September 24, 2020 and subsequent local jurisdiction meetings in October 2020. During these meetings, discussion was held regarding the lack of on-road bicycle facilities being provided in the typical section alternatives. While adding on-road bicycle facilities was deemed not feasible by the study team due to the right-of-way and Canal C-20 impacts, widening the south side sidewalk to 8' was explored. A 10' shared-use path is already being proposed on the north side, so widening the south side sidewalk to 8' would provide a wider facility accommodating both pedestrians and bicycles. The 8' south side sidewalk was incorporated into the preferred alternative.

### *1.4.2 Bridge Typical Sections*

One bridge structure is present over Canal C-10 at approximately Sta. 142+00. Four bridge typical sections were developed in support of the initial typical section alternatives discussed in the previous section:

- Alternative A – Minimum right-of-way bridge typical sections
  - Raised sidewalk alternative
  - Flush sidewalk with traffic separator alternative
- Alternative B – Desired right-of-way bridge typical sections
  - Raised sidewalk alternative
  - Flush sidewalk with traffic separator alternative

The Alternative A bridge typical sections have a 15.5' median consistent with the Alternative A roadway typical section. The Alternative B bridge typical sections have a 22' median consistent with Alternative B roadway typical section. The raised sidewalk bridge typical section (both Alternatives A and B) incorporates a 10' shared-use path on the north side and 6' sidewalk on the

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south side that is raised above the travel lanes and separated by a 1.5' paved shoulder. A traffic railing with a pedestrian/bicycle railing on top is present to the outside of the bridge structure. The flush sidewalk bridge typical section (both Alternatives A and B) provides the same 10' shared-use path and 6' sidewalk, but the facilities are flush with the bridge deck and separated from the travel lanes by a 2.5' paved shoulder and 1'4" traffic railing. A pedestrian/bicycle railing is present to the outside of the bridge structure.

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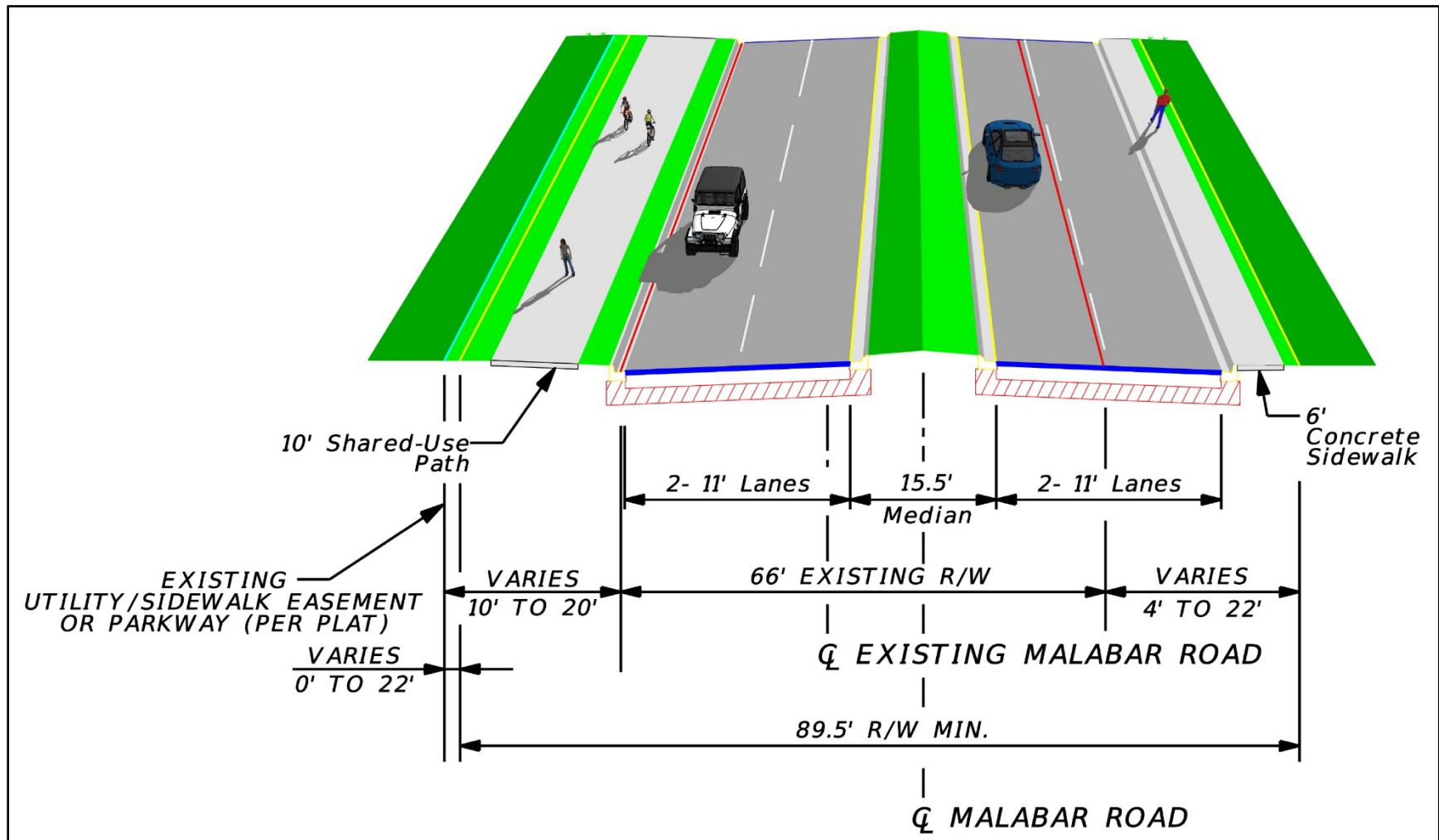


Figure 3: 89.5' Alternative A – St. Johns Heritage Parkway to Canal C-10

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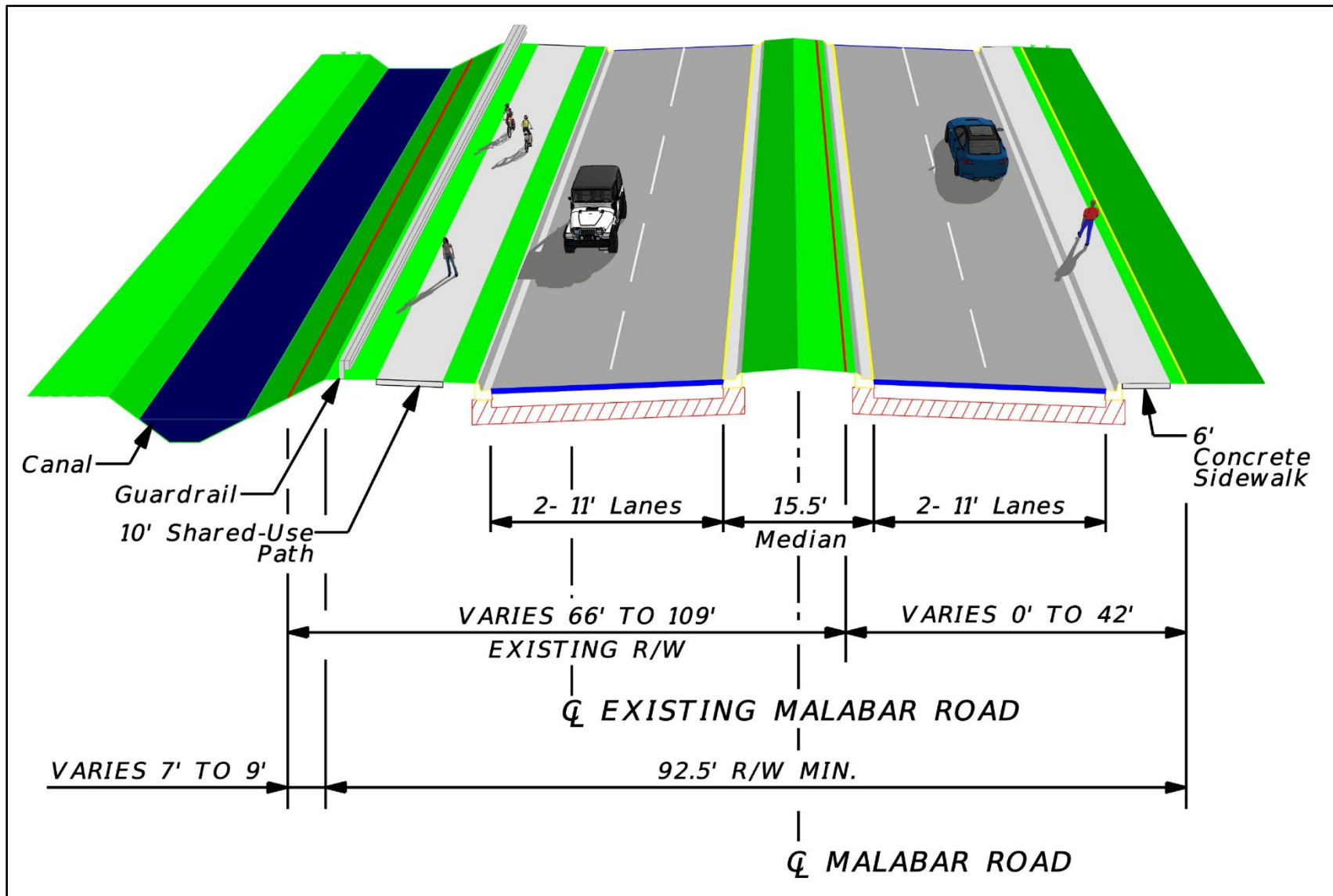


Figure 4: 92.5' Alternative A – Canal C-10 to Sta. 256+80

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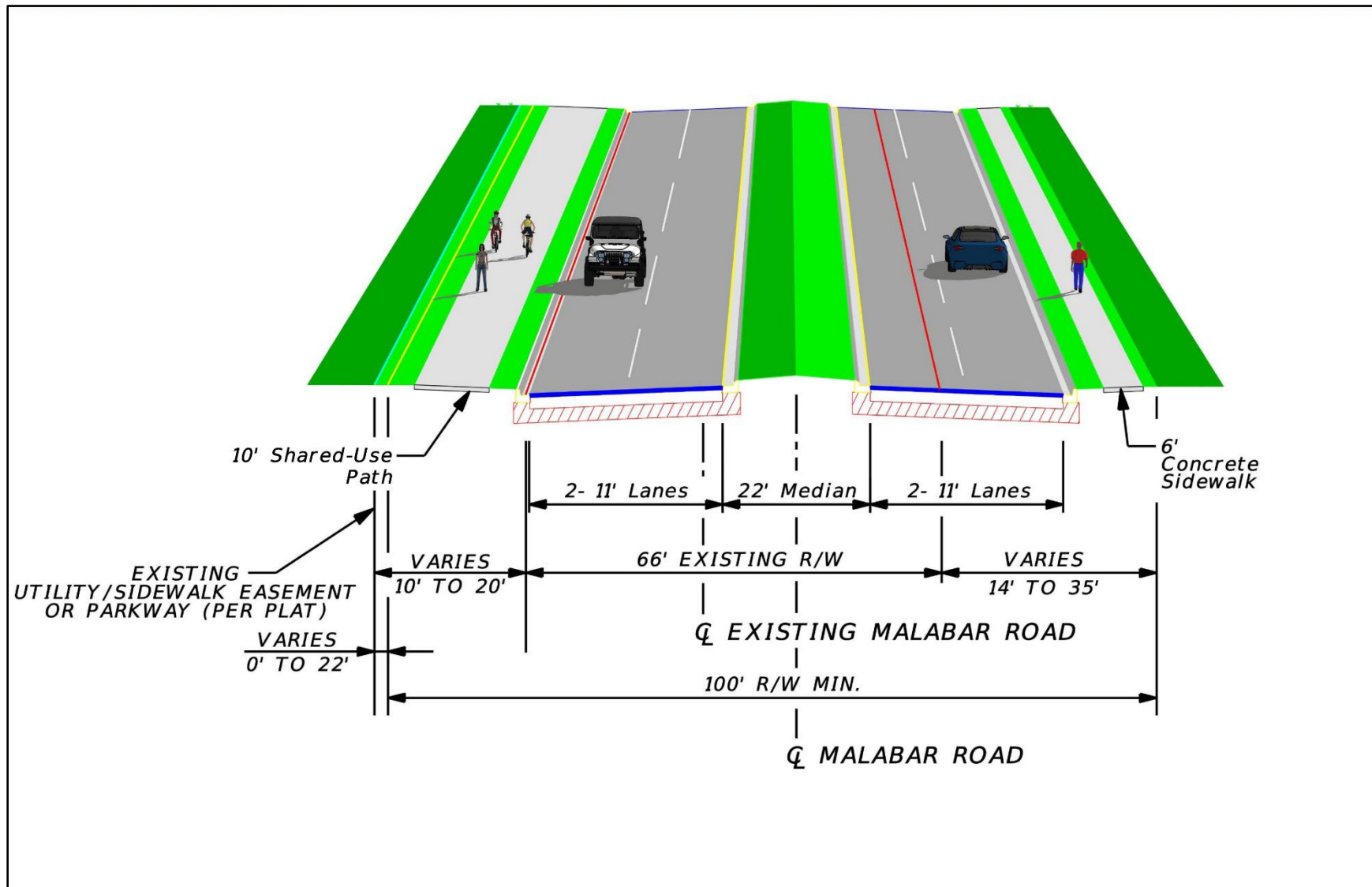


Figure 5: 100' Alternative B – St. Johns Heritage Parkway to Canal C-10



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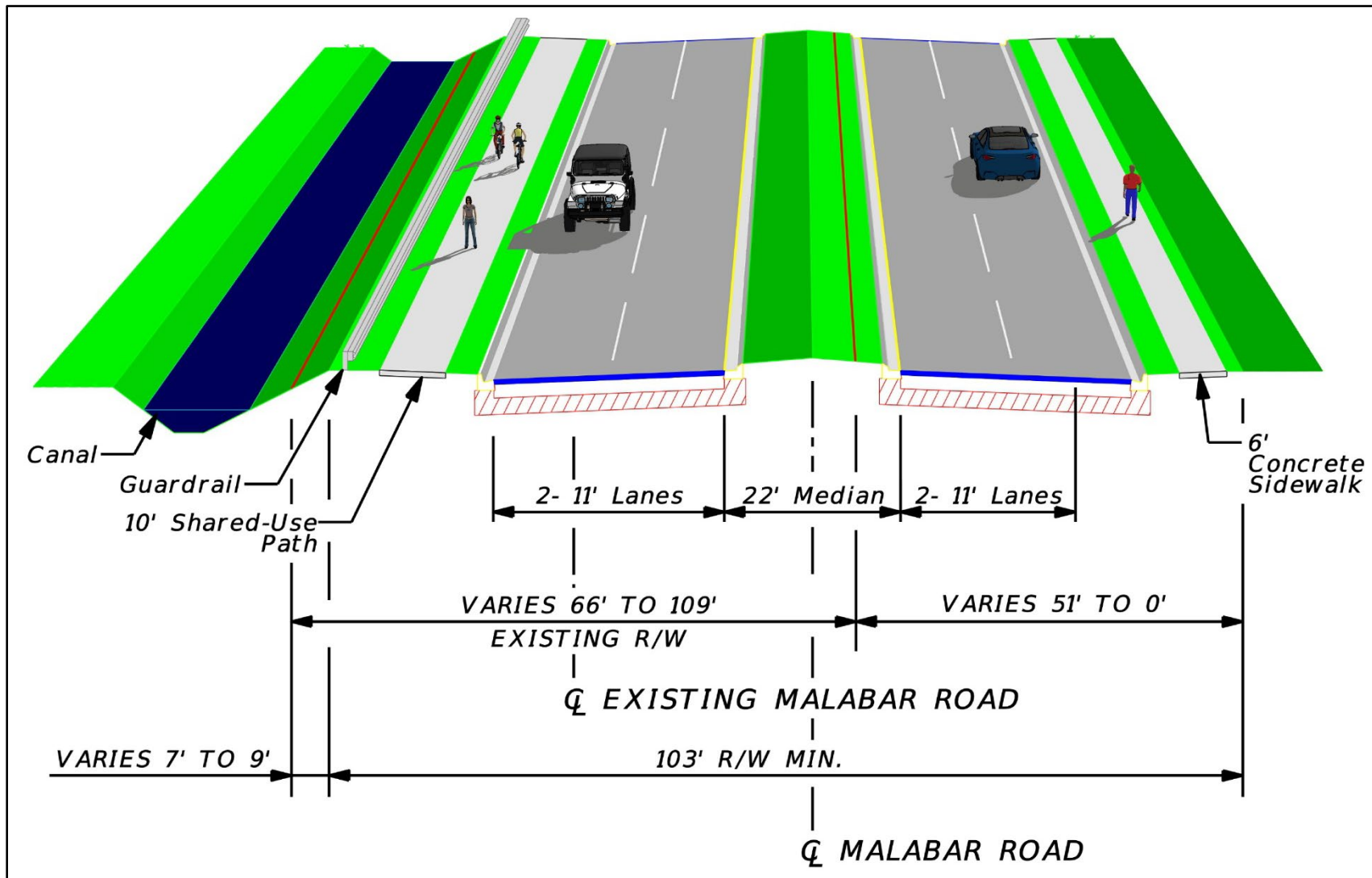


Figure 6: 103' Alternative B – Canal C-10 to Sta. 256+80

### *1.4.3 Intersection Alternatives*

The following intersections were reviewed for either a traffic signal/unsignalized intersection or a roundabout:

- Traffic Signal vs Roundabout Evaluation –
  - Malabar Road & St. Johns Heritage Parkway;
  - Malabar Road & Wisteria Avenue/Abilene Drive;
  - Malabar Road & Krassner Drive/Bending Branch Lane;
  - Malabar Road & Jupiter Boulevard; and
  - Malabar Road & Garvey Road.
- Unsignalized Intersection vs Roundabout Evaluation –
  - Malabar Road & Hurley Boulevard; and
  - Malabar Road & Maywood Avenue/Daffodil Drive.

In order to analyze and compare the signalized/unsignalized alternatives to the roundabouts at each location, an intersection operational analysis and safety analysis were performed. Based on this analysis, roundabouts are anticipated to operate better or the same as the signalized/unsignalized intersection at every location except Garvey Road. Roundabouts have been shown to reduce fatal/injury crash types versus signalized/unsignalized intersections, and the results show the roundabout has lower predicted fatal/injury crashes at every intersection.

During the intersection alternatives analysis, it was determined that the following intersections would remain signalized in the preferred alternative due to operational limitations and right-of-way impacts of a roundabout configuration:

- Malabar Road & Plaza Shopping Center; and
- Malabar Road & Minton Road.

### *1.4.4 Cost Estimates*

The estimated project costs for Alternatives A and B, as shown in **Table 4**, displays the design cost (calculated as 12 percent of the total construction cost), the wetland mitigation cost (calculated as \$120K per acre impacted), the anticipated right-of-way acquisition cost (without ponds), the total construction cost, and the CEI cost (calculated as 15 percent of the total construction cost).

**Table 3: Malabar Road Total Project Cost Estimates**

Cost Element	Alternative A 89.5'/92.5' Minimum Right-of-Way		Alternative B 100'/103' Desired Right-of-Way	
	With Traffic Signals	With Roundabouts	With Traffic Signals	With Roundabouts
Design Costs	\$7,900,000	\$8,800,000	\$8,000,000	\$9,100,000
Wetland Mitigation Costs	\$60,000	\$60,000	\$60,000	\$60,000
ROW Acquisition Costs (Without Ponds)	\$1,496,600	\$1,625,400	\$1,677,300	\$1,815,800
Construction Costs	\$64,600,000	\$72,400,000	\$65,700,000	\$74,800,000
Construction Engineering & Inspection Costs	\$9,700,000	\$10,900,000	\$9,900,000	\$11,200,000
<b><u>PRELIMINARY ESTIMATE OF TOTAL PROJECT COST</u></b>	<b><u>\$83,756,600</u></b>	<b><u>\$93,785,400</u></b>	<b><u>\$85,337,300</u></b>	<b><u>\$96,975,800</u></b>

## 1.5 Description of Preferred Alternative

### 1.5.1 Selection of Preferred Alternative

The purpose of this project is to provide additional capacity improvements to relieve existing congestion and accommodate projected future traffic demand. It is also to address current corridor and intersection safety issues.

Alternative B with 8' south side sidewalks was selected as the preferred alternative by the City of Palm Bay and Brevard County. Alternative B was selected because it provides the wider median plus the 4' grass buffer, both meeting 2024 FDM standards, while having a negligible impact on right-of-way and only a slightly higher project cost when compared to Alternative A. A wider median would facilitate U-turn movements at directional median openings not having a bulb-out. The 4-ft grass buffer between the back of curb and the sidewalk enhances pedestrian safety from an errant vehicle and provides more comfort to the pedestrian in the sidewalk. The following bullets summarize how the preferred alternative meets the purpose and need noted above:

- Transportation Demand/Capacity
  - In the 2050 build condition, each roadway segment is anticipated to operate at LOS C or better, except the segment from the Plaza Shopping Center to Minton Road.
    - This segment is anticipated to operate at LOS F due to the short distance (approximately 750') between the signalized intersections at the Plaza Shopping Center and Minton Road, and the effect of the overlapping delays of these two adjacent signals.

- The signals at the Plaza Shopping Center and Minton Road will be optimized as one system in the future build condition to enhance operations between the two signals.
- Each of the signalized intersections are anticipated to perform at LOS E or better and no intersections operated with a V/C ratio greater than 1.0 in either the 2050 AM or PM peak hour.
- Providing a four-lane Malabar Road from the St. Johns Heritage Parkway to Minton Road would provide at least four travel lanes from the St. Johns Heritage Parkway to US 1 once the planned projects are constructed.
- The project will also enhance the access to St. Johns Heritage Parkway, a critical north/south arterial in western Brevard County.
- Safety
  - Using the predictive safety analysis methods provided in the Highway Safety Manual (HSM), as traffic volumes increase in the no-build condition, crashes are predicted to increase by over 120 percent between 2020 and 2050.
  - By providing a four-lane facility, the 2050 crashes are predicted to be up to 40 percent less than a two-lane facility with the same traffic volumes.

### *1.5.2 Typical Sections*

Alternative B with 8' south side sidewalks was selected as the preferred alternative by the City of Palm Bay and Brevard County. The preferred alternative typical sections were designed using 2024 FDM criteria as discussed in **Section 4.2**. The following describes the typical section elements:

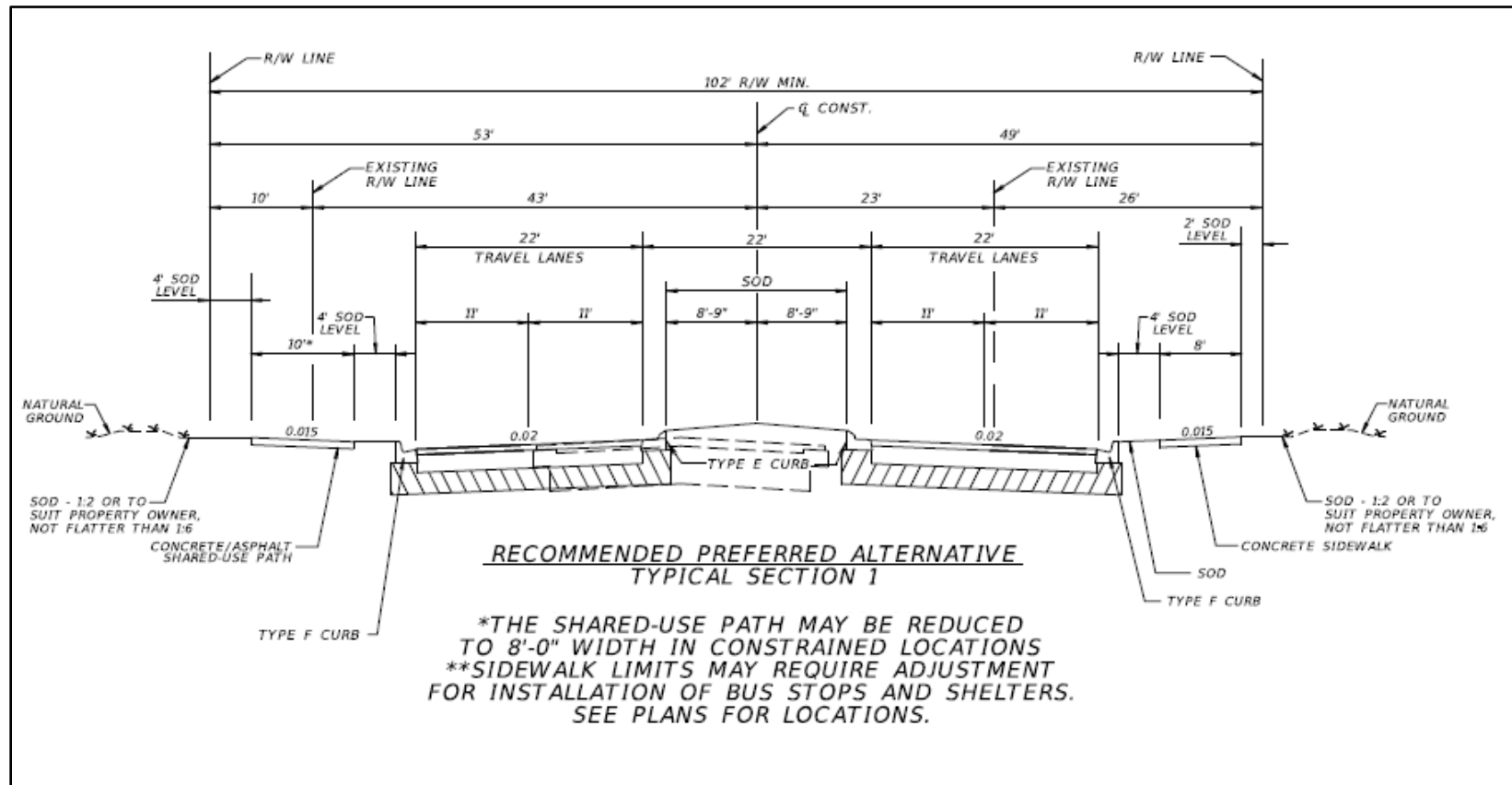
- Two 11' travel lanes in each direction;
- 22' wide median, including Type E curb and gutter;
- Type F curb and gutter outside of the travel lanes;
- 10' shared-use path on the north side and 8' sidewalk on the south side; and
- 4' grass buffer between the back of the curb and the 8' south side sidewalk.

Alternative B was selected because it provides the wider median plus the 4' grass buffer, both meeting 2024 FDM standards, while having a negligible impact on right-of-way and only a slightly higher project cost when compared to Alternative A. A wider median would facilitate U-turn movements at directional median openings not having a bulb-out. The 4-ft grass buffer between the back of curb and the sidewalk enhances pedestrian safety from an errant vehicle and provides more comfort to the pedestrian in the sidewalk. The following highlights key differences in typical section elements along the Malabar Road study corridor:

- St. Johns Heritage Parkway to Canal C-10 (**Figure 7**) –
  - Primarily contained within 102' to 106' of right-of-way.

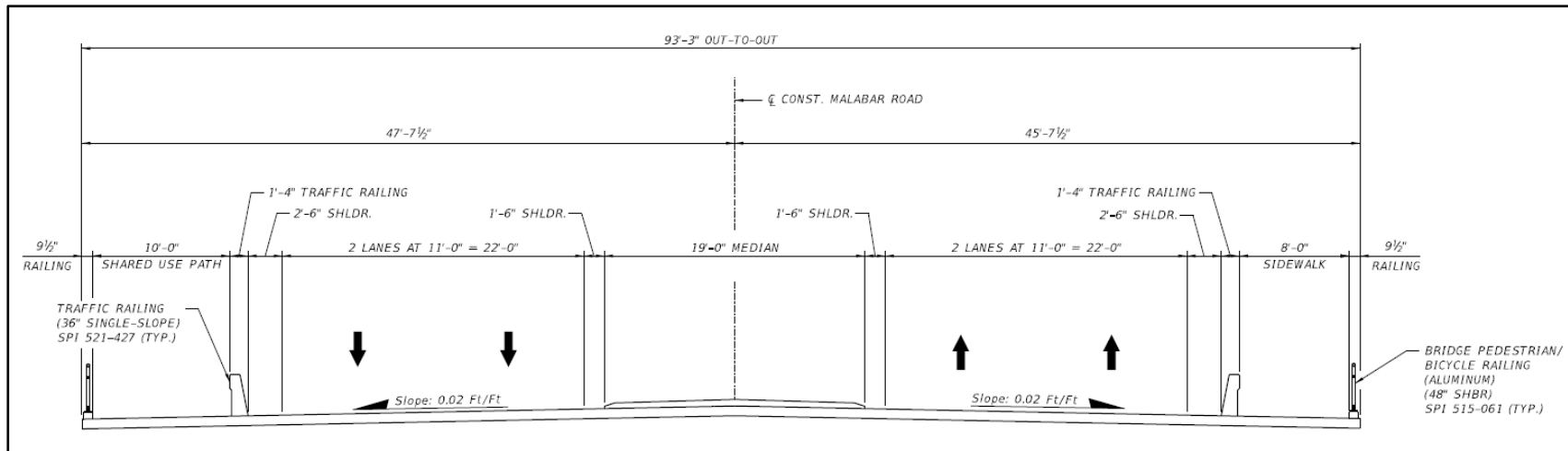
- Between Bending Branch Lane/Krassner Drive and the bridge over Canal C-10, the proposed roadway alignment is generally in the same location as the existing roadway. This was done to maintain the alignment of the westbound travel lanes coming from the bridge. The roadway in this section is positioned further south than the section from St. Johns Heritage Parkway to and Bending Branch Lane/Krassner Drive, resulting in the 106' right-of-way.
- In front of the Tillman Lakes development (Abilene Drive), the right-of-way expands to 136'.
  - No roadside drainage swales are present within this section.
- Malabar Road over Canal C-10 (**Figure 8**) –
  - Two 11' travel lanes in each direction, a 10' barrier separated shared-use path on the north side and an 8' barrier separated sidewalk on the south side.
  - 19' mountable raised median on the bridge with two 1.5' inside shoulders.
  - The overall bridge width is 93.25' with the roadway crowned at 2 percent at the centerline of construction.
- Canal C-10 to West of Jupiter Boulevard (**Figure 9**) –
  - Proposed right-of-way width varies between 100' west of Jupiter Boulevard to 194' in the areas where dry retention linear swales are present.
  - Canal C-20 runs parallel to Malabar Road on the north side for this entire section.
- West of Jupiter Boulevard to East of Jupiter Boulevard (**Figure 10**) –
  - Widening is primarily contained within a 101.5' proposed right-of-way footprint.
  - In front of the USPS, the proposed right-of-way reduces to 94.5', and the south side sidewalk is reduced to 6' and brought adjacent to the back of curb.
  - Canal C-20 is being relocated to the north and retaining walls are proposed for the north and south sides of the canal.
- East of Jupiter Boulevard to Maywood Avenue/Daffodil Drive (**Figure 11**) –
  - Proposed right-of-way width is typically 101.5' in this section but does widen to 191' in the area where dry retention linear swales are present.
  - Canal C-20 runs parallel to Malabar Road on this section's north side.
- Note the preferred typical section varies through the Maywood Avenue/Daffodil Drive roundabout.
- West of Plaza Shopping Center (**Figure 12**) –
  - Widening is primarily contained within a 107' proposed right-of-way.
  - A third lane is added in the eastbound direction to accommodate turn lane improvements on the Minton Road intersection's western leg.
- The section between the Plaza Shopping Center and Minton Road intersections varies due to the turn lane configurations.

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**Figure 7: Preferred Alternative Representative Typical Section – St. Johns Heritage Parkway to Canal C-10**

**SECTION 1 – PROJECT SUMMARY**



**Figure 8: Preferred Alternative Typical Section – Bridge over Canal C-10**

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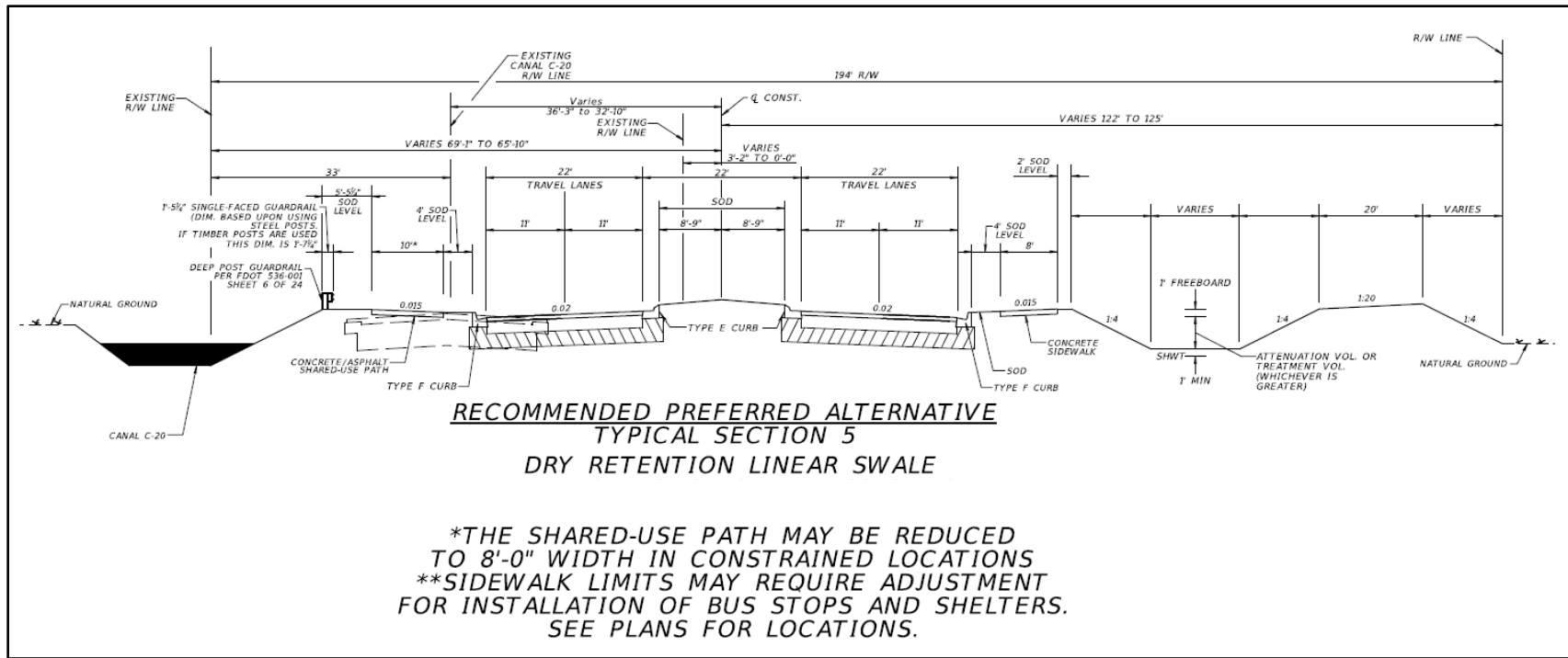
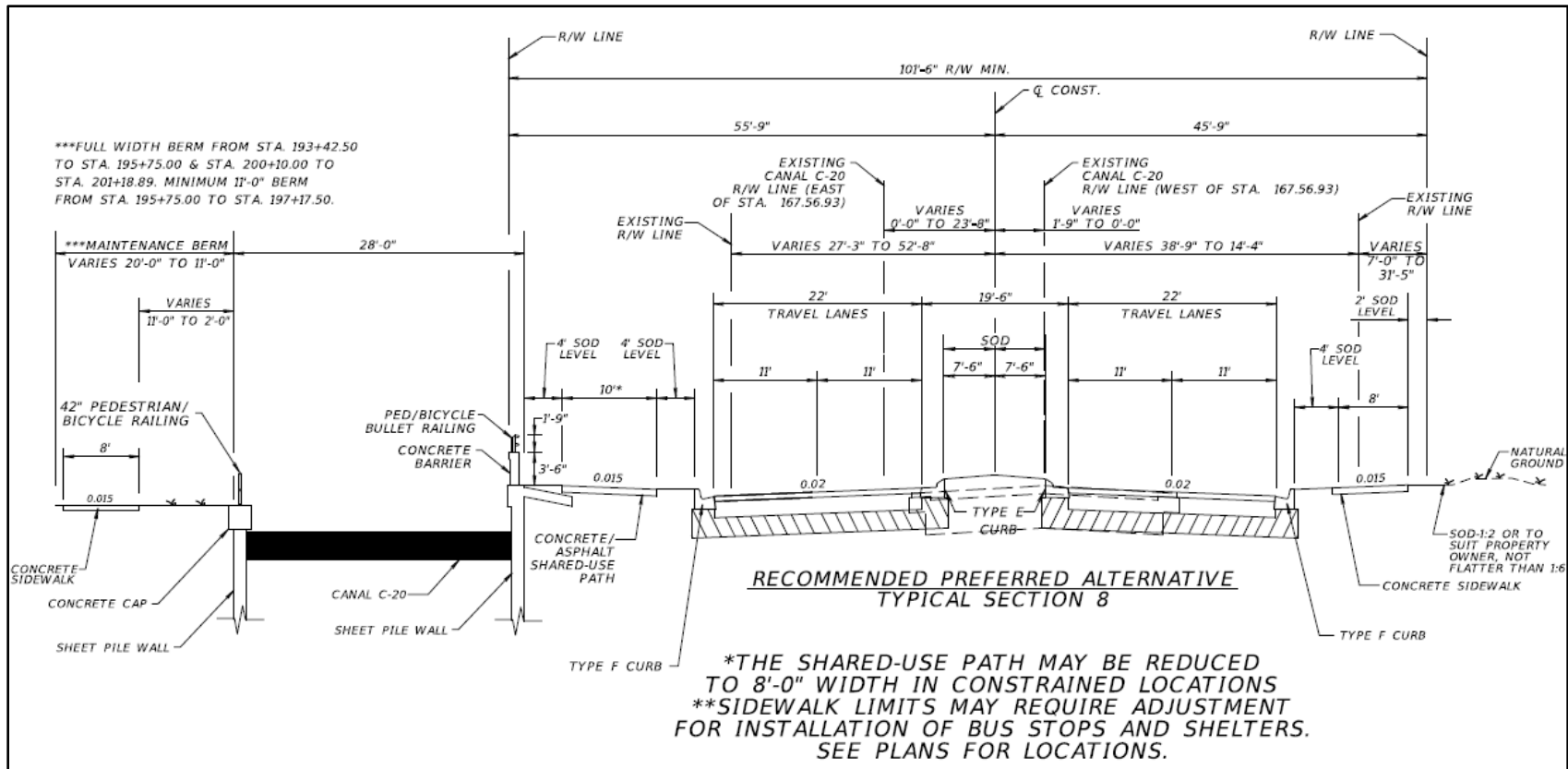


Figure 9: Preferred Alternative Representative Typical Section – Canal C-10 to West of Jupiter Boulevard

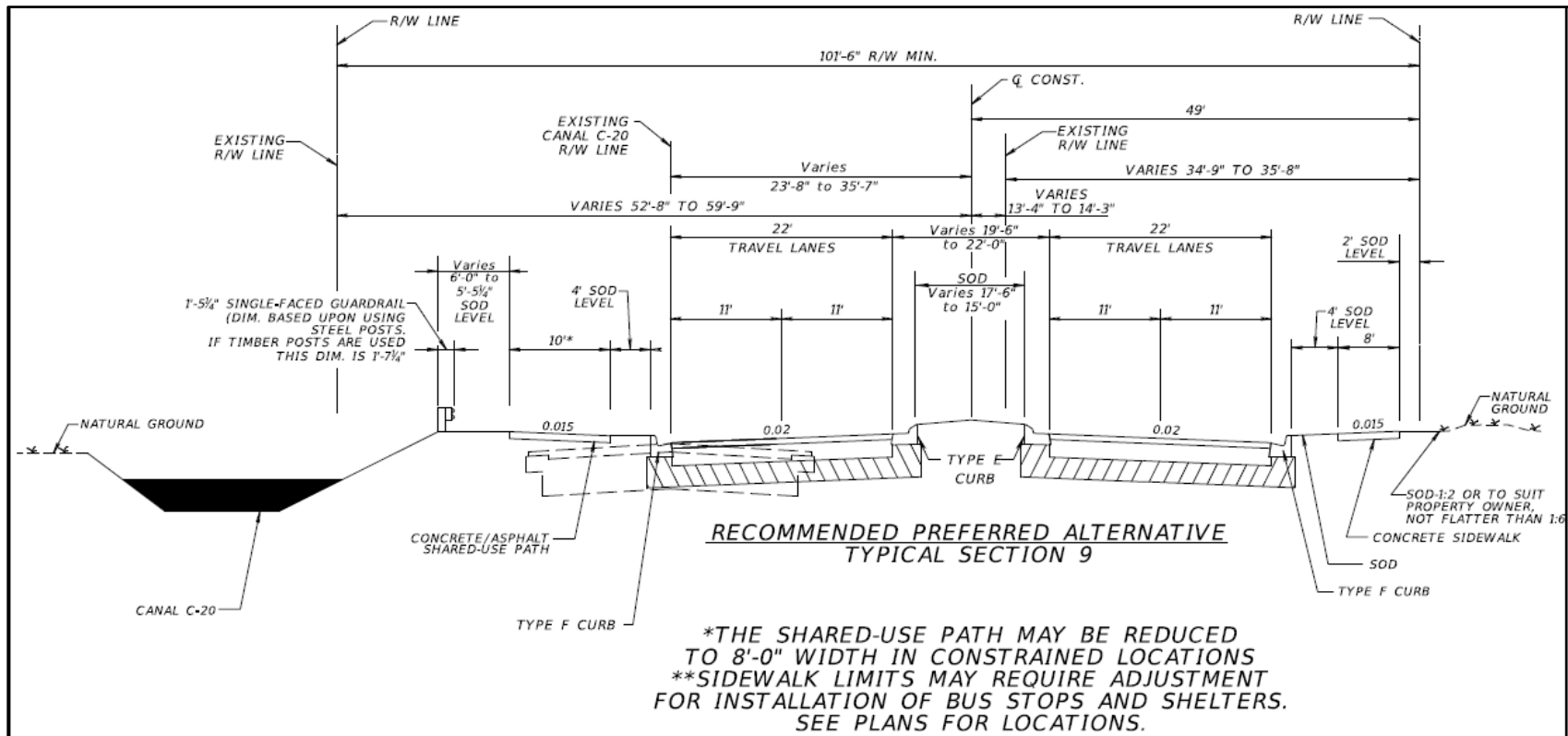


**SECTION 1 – PROJECT SUMMARY**



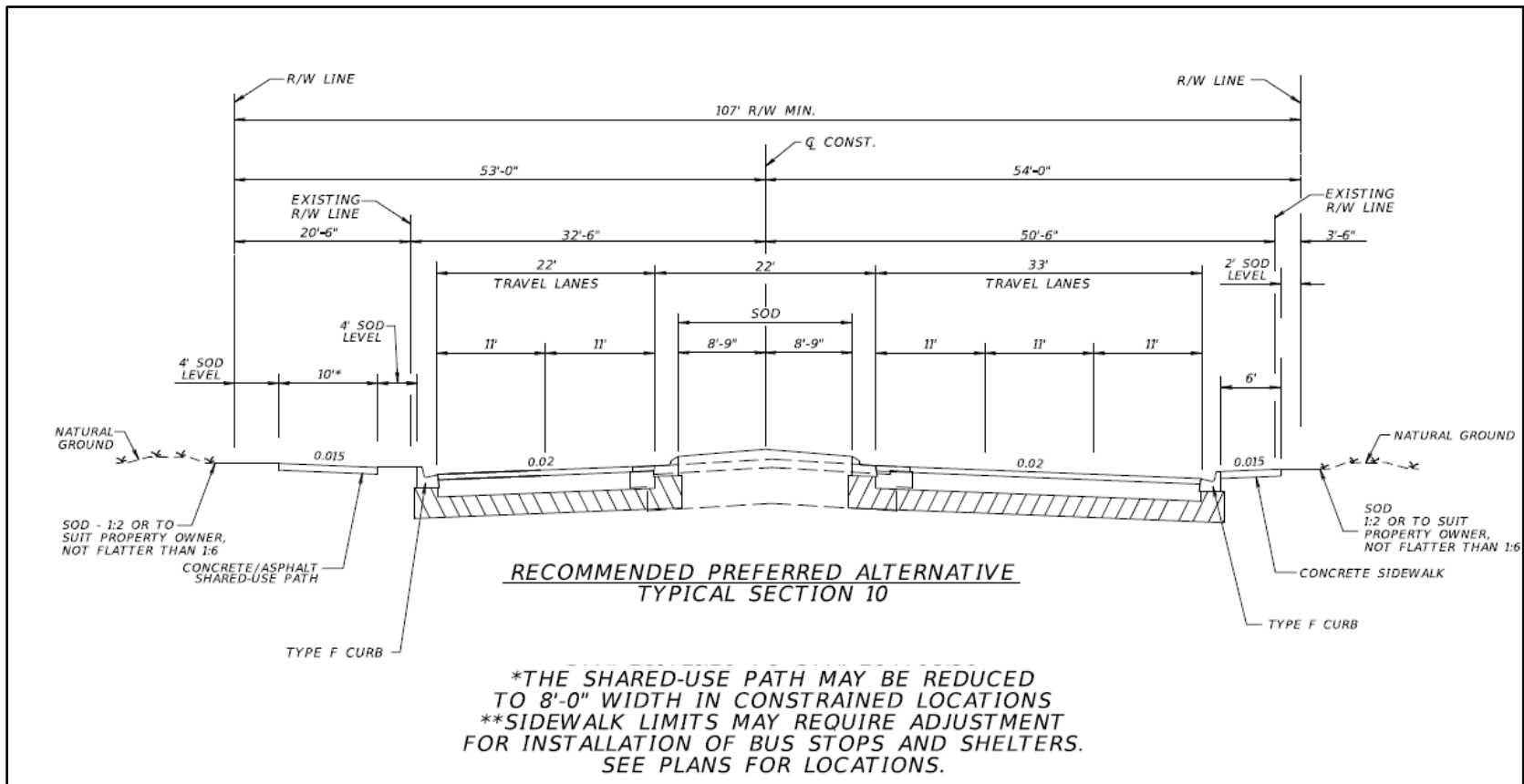
**Figure 10: Preferred Alternative Representative Typical Section – West of Jupiter Boulevard to East of Jupiter Boulevard**

**SECTION 1 – PROJECT SUMMARY**



**Figure 11: Preferred Alternative Representative Typical Section – East of Jupiter Boulevard to Maywood Avenue/Daffodil Drive**

**SECTION 1 – PROJECT SUMMARY**



**Figure 12: Preferred Alternative Representative Typical Section – West of Plaza Shopping Center**

### 1.5.3 Intersections

Based on the intersection alternatives analysis, the following intersection control types are recommended for the preferred alternative:

- Traffic Signals –
  - Malabar Road & Jupiter Boulevard\*;
  - Malabar Road & Garvey Road;
  - Malabar Road & Plaza Shopping Center; and
  - Malabar Road & Minton Road.
- Roundabouts –
  - Malabar Road & St. Johns Heritage Parkway;
  - Malabar Road & Krassner Drive/Bending Branch Lane;
  - Malabar Road & Hurley Boulevard; and
  - Malabar Road & Maywood Avenue/Daffodil Drive.
- Two-Way Stop Control –
  - Malabar Road & Snapdragon Drive;
  - Malabar Road & Championship Circle;
  - Malabar Road & Wisteria Avenue/Abilene Drive;
  - Malabar Road & Bavarian Avenue;
  - Malabar Road & Watoga Avenue/Avery Springs;
  - Malabar Road & Palm Bay Public Works Driveways;
  - Malabar Road & Post Office;
  - Malabar Road & Santa Rosa Avenue;
  - Malabar Road & Madalyn Landing; and
  - Malabar Road & Sutherland Drive.

\* While the intersection of Malabar Road and Jupiter Boulevard would have improved operations and safety as a roundabout, the signal alternative was selected due to constrained right-of-way. The US Post Office in the intersection's southwest corner is federal property and cannot be impacted, shifting the alignment to the north requiring the Canal C-20 to be relocated even as a signalized intersection. The roundabout's larger footprint would require additional Canal C-20 relocation impacting nearby residences.

### 1.5.4 Cost Estimates

The total estimated project cost, as shown in **Table 4**, displays the total construction cost, the utility relocation cost, the wetland mitigation cost (calculated as \$120K per acre impacted), the anticipated right-of-way cost, the design cost (calculated as 9 percent of the total construction cost), and the CEI cost (calculated as 15 percent of the total construction cost) for the Malabar Road four lane widening from St. Johns Heritage Parkway to Minton Road. The final long-range estimates (LREs) for the project can be found in the project files.

**Table 4: Malabar Road Total Project Cost Estimates**

<b>Cost Element</b>	<b>Cost</b>
Total Construction Cost	\$109,995,200
Utility Relocation Cost	\$9,722,400
Wetland Mitigation Cost	\$660,000
ROW Cost	\$2,403,800
Design Cost	\$10,000,000
CEI Cost	\$16,499,000
<b>Total Project Cost</b>	<b>\$149,280,400</b>

### 1.6 List of Technical Documents

The following is a list of technical documents prepared for the Malabar Road PD&E Study:

- Conceptual Stage Relocation Plan – October 2023
- Cultural Resources Assessment Survey (CRAS) – October 2023
- CRAS Pond Addendum #1 – December 2021
- CRAS Pond Addendum #2 – September 2022
- CRAS Pond C-7 Alt. 3 Addendum – June 2023
- U.S. Department of Agriculture Farmland Conversion Impact Rating Form – January 2022
- Level 1 Contamination Screening Evaluation Report – June 2023
- Location Hydraulics Report – October 2023
- Natural Resources Evaluation – October 2023
- Natural Resources Evaluation Addendum #1 – July 2024
- Noise Study Report – October 2023
- Pond Siting Report – October 2023
- Project Traffic Analysis Report – August 2021
- Public Involvement Plan – January 2020
- Report of Geotechnical Engineering Exploration – June 2023
- Utility Assessment Package – October 2023
- Water Quality Impact Evaluation Checklist – July 2023

## 2.0 EXISTING CONDITIONS

The purpose of the existing conditions analysis is to inform future improvement efforts by gaining an understanding of how the corridor performs today. The topics addressed in the existing conditions analysis include existing typical sections, right-of-way, roadway characteristics, traffic operations, safety, geotechnical information, and drainage information, among others.

The Malabar Road study corridor has split jurisdiction between Brevard County and the City of Palm Bay:

- Brevard County is the maintaining agency from the St. Johns Heritage Parkway (Sta. 62+00) to the east end of the bridge over Canal C-10 (Sta. 141+00).
  - Brevard County owns and maintains the bridge over Canal C-10.
- The City of Palm Bay is the maintaining agency from the east end of the bridge over Canal C-10 (Sta. 141+00) to Minton Road (Sta. 271+00).

### 2.1 Previous Planning Studies

No previous studies have been completed along Malabar Road in the study limits, but the St. Johns Heritage Parkway Alternative Corridor Evaluation Report (SJHP ACER), potentially intersecting with the study corridor's western end, was completed in February 2023. This study reviewed potential corridor alignments for the proposed St. Johns Heritage Parkway extension from Babcock Street to Malabar Road. This extension will provide a primary regional connection in southern Brevard County and may result in residential and commercial growth in the area. While a final corridor alignment will be finalized following the completion of a PD&E study, it is assumed that the roadway extension will be constructed and will terminus into the Malabar Road/St. Johns Heritage Parkway intersection at the study corridor's western limit. While the St. Johns Heritage Parkway extension was not in the 2045 SCTPO LRTP Cost Feasible Plan, this corridor was included on the 2045 LRTP Needs List.

### 2.2 Existing Roadway Conditions

#### 2.2.1 Roadway Typical Sections

Within the study area, Malabar Road is primarily a two-lane undivided, urban minor arterial. Malabar Road has the typical section elements summarized in **Table 5**. A field review was conducted on May 20, 2020 to verify the summarized characteristics. The existing roadway does not meet 2024 FDM criteria for the following roadway characteristics:

- FDM Chapter 222, Section 2.1 – *Sidewalk should be constructed on both sides of the roadway; however, if sidewalk is constructed on only one side, provide reasonable pedestrian access to destinations (e.g., transit stops, homes, places of work, stores, schools, post offices, libraries, parks) on the opposite side.*

## SECTION 2 – EXISTING CONDITIONS

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- Sidewalk is only present along the north side and portions of the south side along Malabar Road. Pedestrian facilities will be addressed in the alternatives analysis and complete pedestrian facilities will be included in the preferred alternative.

Malabar Road has four unique typical sections, plus the bridge typical section over Canal C-10, as shown in **Figure 13**. The five typical sections are discussed below:

- St. Johns Heritage Parkway (Sta. 62+00) to Championship Circle (Sta. 87+60) – Two-lane undivided roadway with 12' wide travel lanes, 2' paved shoulders, and a swale adjacent to the roadway on the north side. A sidewalk is north of the swale and outside of the Malabar Road right-of-way. A permitted swale system provides water quality treatment for Malabar Road beginning approximately 2,500 feet west of the St. Johns Heritage Parkway (outside of the project limits) and ending approximately 1,500 feet east of the St. Johns Heritage Parkway (within the project limits). The speed limit in this section is 35 mph. The approximate right-of-way in this section is 66'. This section of Malabar Road is maintained by Brevard County.
- Championship Circle (Sta. 87+60) to the west end of the bridge over Canal C-10 (Sta. 141+00) – Two-lane undivided roadway with 11' wide travel lanes, and a swale adjacent to roadway on the north side. A sidewalk is north of the swale and outside of the Malabar Road right-of-way. The speed limit in this section is 45 mph. The approximate right-of-way in this section is 66'. This section of Malabar Road is maintained by Brevard County.
- Bridge over Canal C-10 (Sta. 141+00 to Sta. 143+26.91) – Two-lane undivided roadway with 11' wide travel lanes, 3' paved shoulders, and 3' sidewalks. The sidewalk is raised above the travel lanes and is part of the concrete bridge railing. The speed limit across the bridge is 45 mph. The bridge is maintained by Brevard County.
- Bridge over Canal C-10 (Sta. 143+26.91) to Garvey Road (Sta. 221+23.46) – Two-lane undivided roadway with 11' wide travel lanes. Canal C-20 is located adjacent to Malabar Road on the north side and a sidewalk is north of the canal outside of the Malabar Road right-of-way. The speed limit in this section is 45 mph. The approximate right-of-way in this section ranges from 66' to 109'. The City of Palm Bay maintains this section.
- Garvey Road (Sta. 221+23.46) to Minton Road (Sta. 271+67) – Two-lane roadway with 11' wide travel lanes and a varying width two-way left turn lane. Canal C-20 is located adjacent to Malabar Road on the north side and a sidewalk is north of the canal outside of the Malabar Road right-of-way. Sidewalk is present on the south side. West of the Plaza Shopping Center intersection at approximately Sta. 260+00, Malabar Road begins to transition to have two lanes in each direction at the Minton Road west approach. The speed limit in this section is 45 mph up to Sta. 256+50 (just west of the Extra Space Storage driveway) and 35 mph from Sta. 256+00 to Minton Road. The approximate right-of-way in this section ranges from 66' to 112'. The City of Palm Bay maintains this section.

**SECTION 2 – EXISTING CONDITIONS**

**Table 5: Existing Roadway Characteristics Summary**

Characteristic	Malabar Road Roadway Segment			
	Segment 1 – St. Johns Heritage Pkwy. to Jupiter Blvd.	Segment 2 – Jupiter Blvd. to Garvey Rd.	Segment 3 – Garvey Rd. to Plaza Shopping Center	Segment 4 – Plaza Shopping Center to Minton Rd.
Segment Length (mi.)	2.50	0.53	0.81	0.14
Functional Classification	Urban Minor Arterial	Urban Minor Arterial – Other	Urban Minor Arterial – Other	Urban Minor Arterial – Other
Maintaining Jurisdiction	Brevard County/City of Palm Bay <sup>1</sup>	City of Palm Bay	City of Palm Bay	City of Palm Bay
Speed Limit	35 mph/45 mph <sup>2</sup>	45 mph	35 mph/45 mph <sup>3</sup>	35 mph
Lane Width	12 feet/11 feet <sup>4</sup>	11 feet	11 feet	11 feet
Paved Shoulder Width	2 feet/None <sup>5</sup>	None	None	None
Median	None	None	Two-way left turn lane	4-foot raised median
Passing Zones	No passing is allowed	No passing is allowed	No passing is allowed	No passing is allowed
Outside Curb and Gutter	None	None	None	Type F
Sidewalks	Sidewalk on north side <sup>6</sup>	Sidewalk on north side	Sidewalk on north side, partial sidewalk on south side	Sidewalk on both sides of roadway
Bike Lanes	None	None	None	None
Segment Street Lighting	None	None	None	None

<sup>1</sup> The maintaining jurisdiction changes at Canal C-10 west of Bavarian Avenue

<sup>2</sup> Malabar Road is 35 mph west of Championship Drive and 45 mph east of Championship Drive

<sup>3</sup> Posted speed limit changes from 45 mph to 35 mph at Sta. 256+50 (just west of the Extra Space Storage driveway)

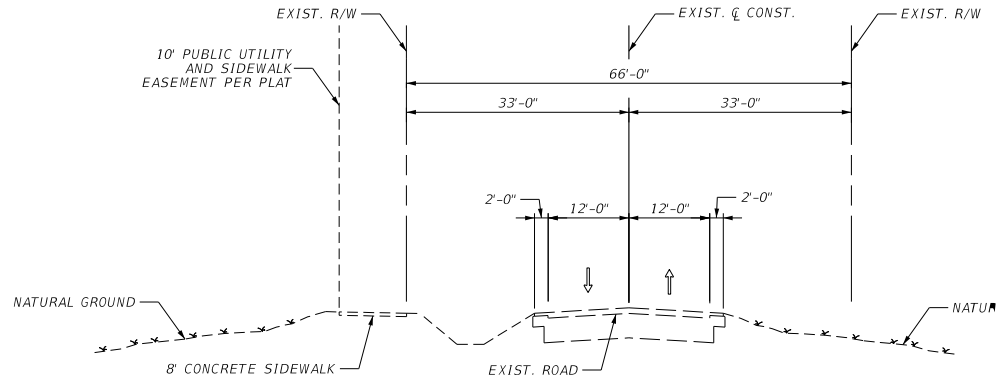
<sup>4</sup> Malabar Road has 12' travel lanes west of Championship Drive and 11' travel lanes east of Championship Drive

<sup>5</sup> Malabar Road has 2' paved shoulder west of Championship Drive and no paved shoulder east of Championship Drive

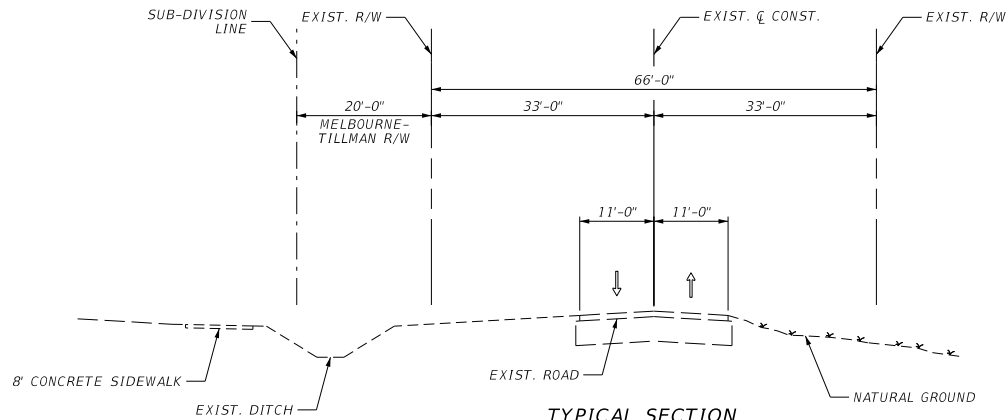
<sup>6</sup> Some sidewalk is present on the south side west of the Jupiter Boulevard intersection



BREVARD COUNTY JURISDICTION



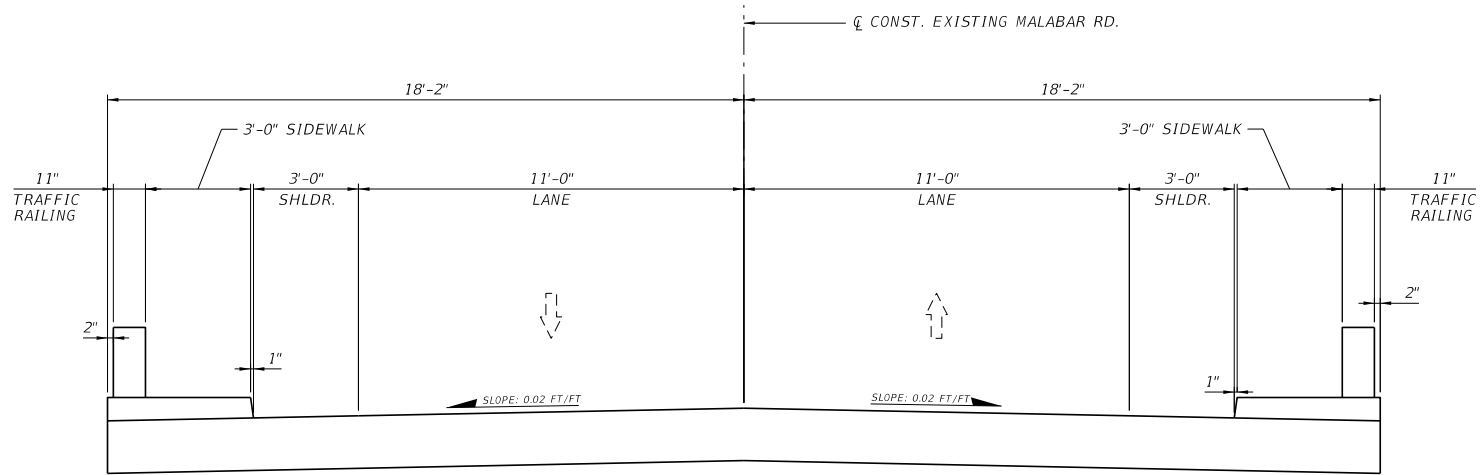
TYPICAL SECTION  
MALABAR ROAD  
STA. 62+00.00 TO STA. 87+60.00



TYPICAL SECTION  
MALABAR ROAD  
STA. 87+60.00 TO STA. 141+00.00

Not to Scale

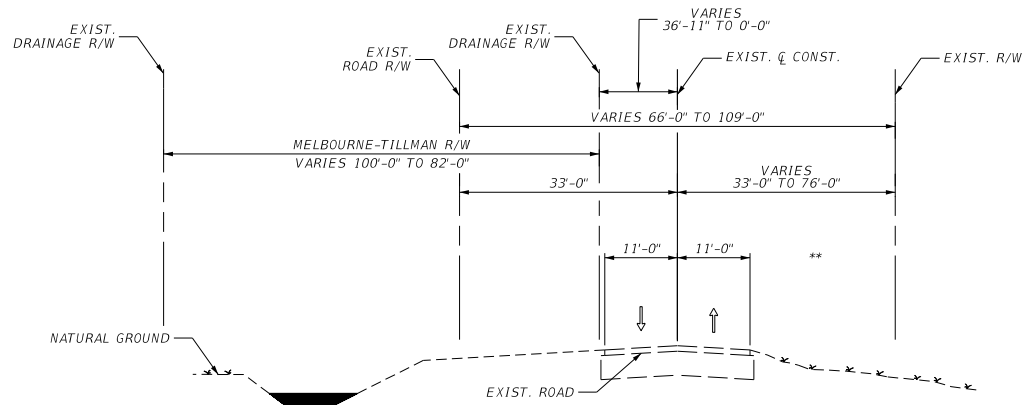
**BREVARD COUNTY JURISDICTION**



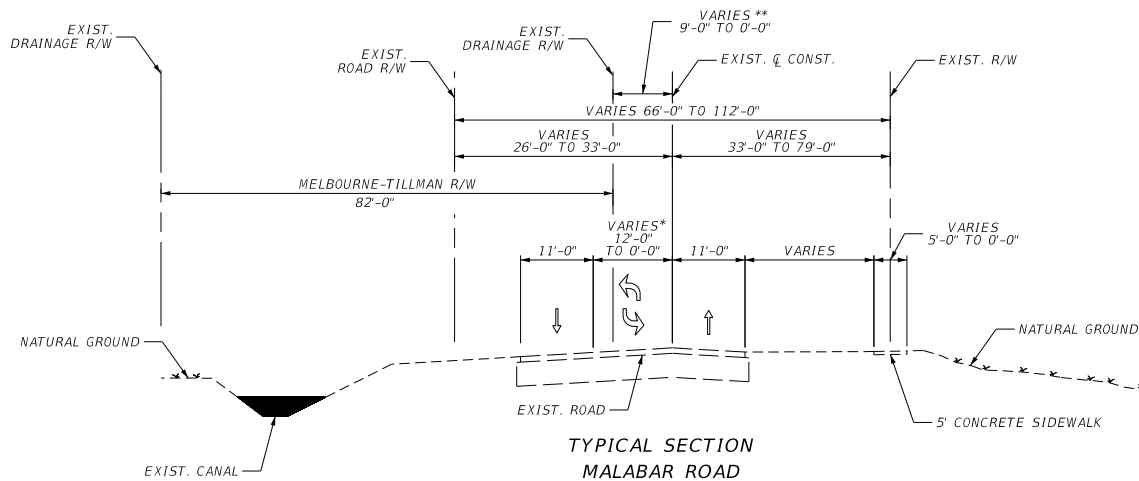
**BRIDGE OVER C-10 CANAL**  
**STA. 141+00 TO STA. 143+26.91**

Not to Scale

**CITY OF PALM BAY JURISDICTION**



**TYPICAL SECTION  
MALABAR ROAD  
STA. 143+26.91 TO STA. 221+23.46  
\*\* FROM STA. 186+00.00 TO STA. 192+50.00  
THERE IS A 5' CONCRETE SIDEWALK  
ON THE SOUTH SIDE**



**TYPICAL SECTION  
MALABAR ROAD  
STA. 221+23.46 TO STA. 260+00.00  
\* NO CENTER TURN LANE EXISTS  
FROM STA. 234+00.00 TO STA. 236+00.00  
\*\* DRAINAGE R/W STOPS AT STA 255+23.16**

Not to Scale

## SECTION 2 – EXISTING CONDITIONS

### 2.2.2 Roadway Functional & Context Classification

Within the study area, Malabar Road is a two-lane undivided, urban minor arterial. Malabar Road is a local road within the project limits and therefore does not have an assigned context classification. As noted in the **Design Controls and Criteria** section, the FDM was utilized for design control criteria. Where features allow and where practical, design control criteria consistent with C3R (suburban residential) context classification will be met. The C3R suburban residential context classification was selected based on characteristics defined in FDM Table 200.4.1: *C3R Suburban Residential – Mostly residential uses within large blocks and a disconnected/sparse roadway network.*

### 2.2.3 Access Management Classification

While Malabar Road is a local roadway, the existing access management classification most closely resembles an Access Class 4 (non-restrictive) facility per Table 201.4.2 of the 2024 FDM. The access management spacing criteria are as follows:

- Connection Spacing: 660 feet for >45 mph, 440 feet for ≤45 mph
- Signal Spacing: 2,640 feet

### 2.2.4 Right-of-Way

Right-of-way and parcel information was obtained from the local property appraiser. **Figure 13** shows the right-of-way along the corridor ranging from 66 feet in the Brevard County section up to 112 feet in the City of Palm Bay section. **Table 6** provides a detailed overview of the existing right-of-way present along the Malabar Road study corridor.

**Table 6: Existing Right-of-Way Summary**

From	To	Stationing	Length (Miles)	ROW Width (Feet)
St. Johns Heritage Parkway	East End of Bridge over Canal C-10	62+00 to 143+26.91	1.54	66
East End of Bridge over Canal C-10	Garvey Road	143+26.91 to 221+23.46	1.47	Varies 66 to 109*
Garvey Road	390' East of Palm Bay Memory Care Driveway	221+23.46 to 255+25	0.64	Varies 74 to 112*
390' East of Palm Bay Memory Care Driveway	Minton Road	255+25 to 270+63.70	0.30	Varies 76 to 109

\*Note: From Sta 143+27.60 to Sta 255+23.16, two right-of-way lines are depicted on the concept plans on the northern side of Malabar Road. The northernmost of these two lines is Malabar Road northern right-of-way, and the southernmost of these two lines is Melbourne Tillman Drainage District Canal C-20 southern right-of-way. These two right-of-way lines are noted on the Malabar Road preferred alternative plan set in **Appendix H**.

## SECTION 2 – EXISTING CONDITIONS

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Canal C-20 is located adjacent to the north side of Malabar Road starting east of Canal C-10. The right-of-way review revealed an issue with conflicting information regarding the canal's south right-of-way line vs the roadway's north right-of-way line. The roadway right-of-way line extends 33 feet to the north from the Malabar Road centerline (in most areas), whereas the canal right-of-way line extends 33 feet south to the Malabar Road centerline. This means 33 feet of the Malabar Road right-of-way from Canal C-10 to 390' east of Palm Bay Memory Care Driveway is shown on both canal and roadway right-of-way maps. Through discussions with City of Palm Bay right-of-way staff, it was determined this issue will be resolved with title searches during the design phase of the project. The right-of-way widths shown in Table 3 are based upon the Malabar Road right-of-way information.

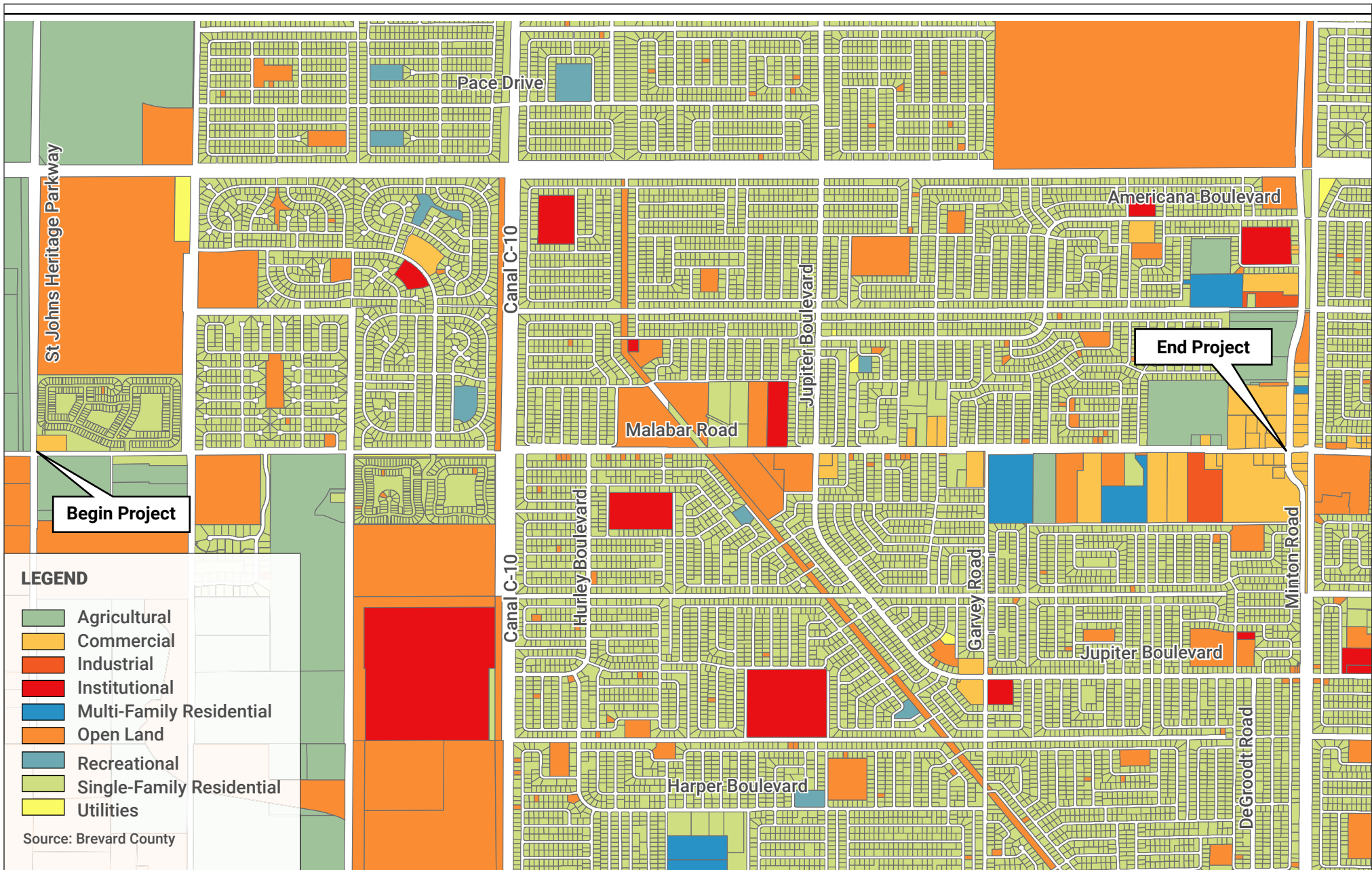
### *2.2.5 Adjacent Land Use*

Adjacent land use was obtained from readily available Brevard County GIS databases. The existing land uses adjacent and surrounding the study corridor are primarily single family residential. The study corridor's western end has a mix of agriculture, open land, and residential land uses whereas the corridor's eastern end has more commercial land uses. The study corridor's middle is mainly residential land uses with a mix of single family and multi-family residences. This also includes some open land, the United States Post Office (USPS), and the City of Palm Bay Public Works Complex. **Figure 14** displays the existing land use map for Malabar Road.

### *2.2.6 Pavement Type & Condition*

The pavement condition index (PCI) was obtained from the City of Palm Bay for Malabar Road from Bavarian Avenue to Minton Road. The PCI is a numerical index between 0 and 100, used to indicate the general condition of a pavement section. The PCI for Malabar Road from Bavarian Avenue to Minton Road ranged from a low of 79 to a high of 95, and field reviews confirmed the pavement to be in good condition in this section.

No pavement condition reports were available for the Brevard County portion of Malabar Road from the St. Johns Heritage Parkway to Canal C-10. Based on a field review performed January 26, 2021, the pavement was recently resurfaced from Championship Circle to Wisteria Avenue and from Canal C-9 to Canal C-10. This left an 800' gap of Malabar Road that was not resurfaced from Wisteria Avenue to Canal C-9, but this is where construction is occurring for the Chaparral Residential Development. This 800' section of Malabar Road is experiencing distress/cracking and if not resurfaced once the connection to the development is complete, this section will likely need to be totally reconstructed as part of the four-lane widening.



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EXISTING LAND USE

**FIGURE 14**

## SECTION 2 – EXISTING CONDITIONS

### 2.2.7 Existing Posted Speed

The existing posted speeds were verified by field review observations and vary along the Malabar Road study corridor, as shown below:

- St. Johns Heritage Parkway to Championship Drive – 35 mph;
- Championship Drive to just west of the Extra Space Storage Driveway (Sta. 256+50) – 45 mph; and
- Just west of the Extra Space Storage Driveway (Sta. 256+50) to Minton Road – 35 mph.

While no design plans were available for the existing roadway to be able to verify design speeds, the existing roadway has 12' lanes and a 2' paved shoulder from the St. Johns Heritage Parkway to Canal C-10 which is consistent with design speeds up to 55 mph. East of Canal C-10, the roadway's lanes narrow to 11' and there is no paved shoulder which is consistent with design speeds of 40 to 45 mph.

### 2.2.8 Horizontal Alignment

An existing roadway alignment was provided by the City of Palm Bay for use within this study. The existing alignment consists of tangential sections with no horizontal curves. Information for the tangential sections can be seen in **Table 7**.

**Table 7: Horizontal Alignment Tangential Sections**

Begin STA	End STA	Length (FT)	Bearing	Deflection Angle
36+40.39	62+80.39	2,640	N89°45'7"E	00°00'27"
62+80.39	89+00.00	2,619.61	N89°44'40"E	00°04'43"
89+00.00	101+91.94	1,291.94	N89°49'23"E"	0°00'00"
101+91.94	115+60.81	1,368.87	N89°49'23"E	0°05'12"
115+60.81	221+23.46	10,562.7	N89°44'11"E	0°05'00"
221+23.46	274+62.38	5,338.92	N89°39'11"E	--

### 2.2.9 Vertical Alignment

Based upon existing digital terrain models, the overall corridor is flat. Due to the age of Malabar Road, as-built vertical curve information was not available. From Project No. 10861 (Malabar Road Construction Plans) completed in 2008 it can be determined the existing grade elevation is approximately 18.5 feet at the St. Johns Heritage Parkway intersection (Sta. 62+00). The elevation gradually begins increasing starting at Sta. 97+50 and reaches a height of approximately 25.0 feet at the Minton Road intersection (Sta. 271+00). No vertical curves were present along the existing alignment, as grade changes fall within the allowable 0.70 percent for 45 mph roadways as detailed in Table 210.10.2 of the FDM.

### 2.2.10 Multi-Modal Facilities

#### 2.2.10.1 Pedestrian Facilities

The existing pedestrian facilities were verified by field review observations and using Google Earth aerial imagery. An 8' sidewalk is present on the north side of Malabar Road for the entirety of the project limits. Between Canal C-10 and Daffodil Drive/Maywood Avenue, the 8' sidewalk is located north of Canal C-20 outside of the Malabar Road right-of-way thus why it is not shown in **Figure 13**. A 5' wide sidewalk is present on the south side of Malabar Road at the following locations:

- From 525' west of Abilene Drive to 695' east of Abilene Drive;
- From Hurley Boulevard to 350' east of the Jupiter Boulevard intersection;
  - A City of Palm Bay Safe Routes to School Project for Jupiter Elementary School added the sidewalk from Hurley Boulevard to the USPS Driveway west of Jupiter Boulevard.
- In front of the Madalyn Landing Apartments (between Garvey Road and the Madalyn Apartments driveway);
- From 620' west of Sutherland Drive to 130' east of Sutherland Drive (in front of The Falls housing development); and
- From Daffodil Drive to Minton Road, with a small gap between the ExtraSpace Storage driveway and the Plaza Shopping Center.

Sporadic marked crosswalks are present for the 8' sidewalk at the stop-controlled intersections on the north side of Malabar Road. Marked crosswalks are present at the following signalized intersections:

- Krassner Drive/Bending Branch Lane – south, west, and north legs.
- Jupiter Boulevard – all legs.
- The Plaza Shopping Center – east and north legs.
- Minton Road – all legs.

In addition to the signalized intersections noted above, a marked crosswalk is present on the east leg of the Hurley Boulevard unsignalized intersection.

#### 2.2.10.2 Bicycle Facilities

The existing bicycle facilities were verified by field review observations and using Google Earth aerial imagery. No on road bicycle facilities are present along the length of the study corridor.

The existing trail facilities were obtained from readily available SCTPO GIS databases. The SCTPO has identified one Showcase Trail, the St. Johns River Eco-Heritage Trail, within the Malabar Road study corridor. There is an existing trail section constructed along the St. Johns Heritage Parkway from Emerson Drive to Malabar Road. A future planned section will extend to the north, connecting to the Brevard Zoo Linear Trail. A future planned section will also extend south and



## SECTION 2 – EXISTING CONDITIONS

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connect to an existing section of the trail, which proceeds southward to the Indian River County Line. The St. Johns River Eco-Heritage Trail is part of the Brevard and Indian River Counties Regional Trail, providing the region with access to over 100 miles of connected paved and unpaved trails.

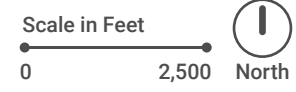
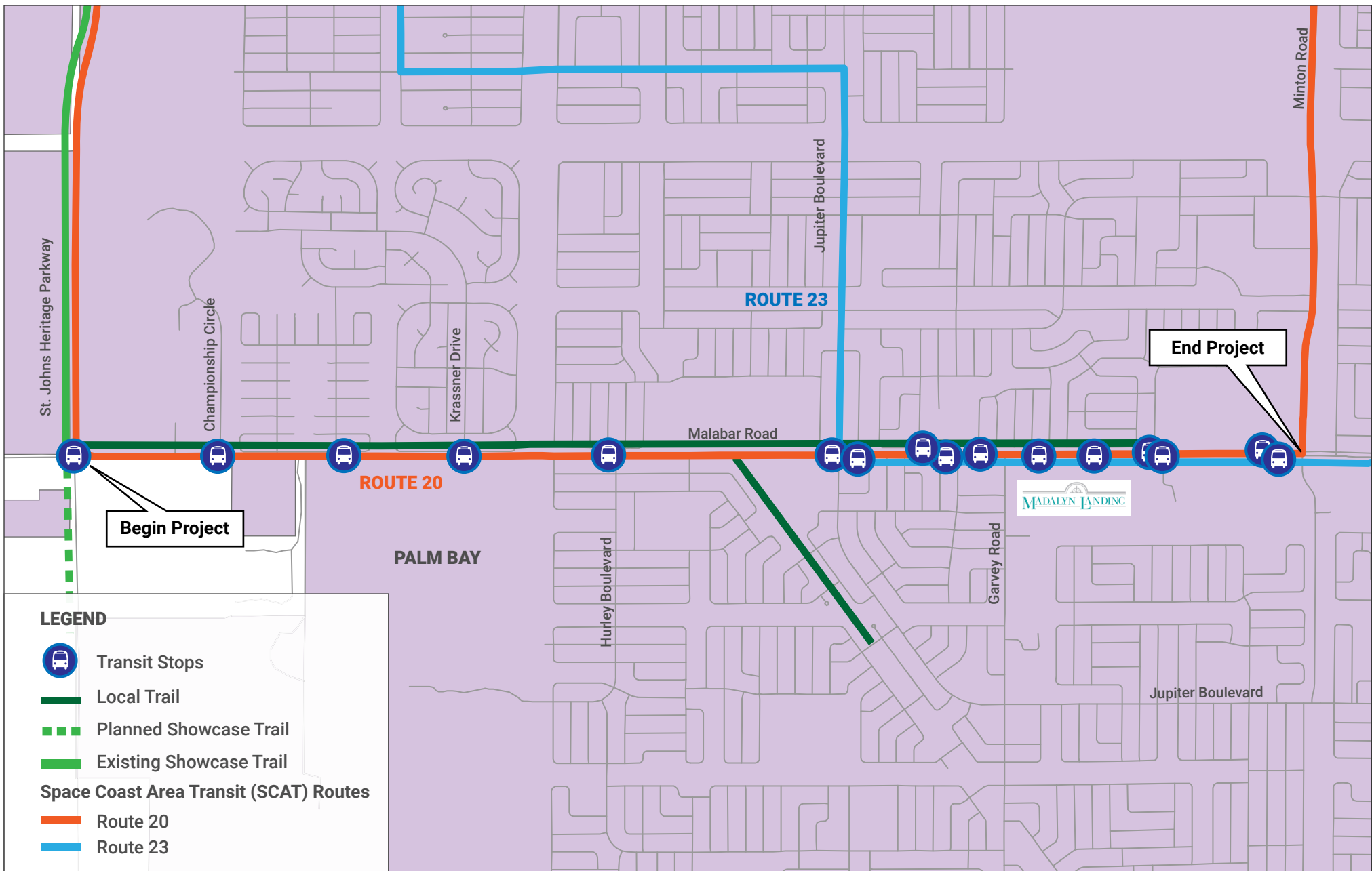
In addition to SCTPO identified trails, two local trails are located in the study vicinity. One local trail runs east-west along Malabar Road from St. John Heritage Parkway to west of Minton Road as previously discussed. The second local trail, called the Cross City Trail, is a 10' shared-use path located south of Malabar Road on the west side of the City of Palm Bay Public Works building. The trail is located adjacent to the power lines and starts at Walpole Road and ends approximately 50 feet south of Malabar Road. There is no connection between the Cross City Trail and the trail paralleling Malabar Road's north side due to the presence of Canal C-20. **Figure 15** displays the existing and future trails within the study area.

### 2.2.10.3 Transit Facilities

The existing transit facilities were verified by field review observations and using Google Earth aerial imagery. Transit route information was obtained from the Space Coast Area Transit website. Space Coast Area Transit operates Route 20 and Route 23 along the study corridor. Route 20 operates on a loop from Malabar Road to Minton Road to US 192 to St. Johns Heritage Parkway and back to Malabar Road, serving the communities of Palm Bay, Melbourne, and West Melbourne. There are 10 westbound stops for this route along the study corridor. The route operates with one hour headways from approximately 6:30 AM to 8:30 PM on weekdays and 7:30 AM to 5:30 PM on Saturdays. Route 23 operates on a loop from Malabar Road to Emerson Drive to Jupiter Boulevard and back to Malabar Road, serving Palm Bay. There are six eastbound stops for this route along the study corridor. The route operates with one hour headways from approximately 6:30 AM to 8:30 PM on weekdays and 7:30 AM to 5:30 PM on Saturdays.

The eastbound bus stop between the Circle K gas station and White Road includes a concrete landing pad and trash can. The eastbound bus stop in front of the Madalyn Landing Apartments is the only stop with a bus shelter. The other bus stops are sign posts in the grass shoulder with no concrete landing pads.

Per Space Coast Area Transit, Route 20 has an annual ridership of 23,000 and Route 23 has an annual ridership of approximately 72,000. The transit routes and stops are presented in **Figure 15** and the supporting transit data is documented in **Appendix A**.



# Malabar Road PD&E Study

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TRAIL AND TRANSIT FACILITIES

**FIGURE 15**

### 2.2.11 Intersections

Seventeen intersections along the study corridor were analyzed for existing conditions (2020). The existing lane configurations for each intersection are shown in **Figure 16**. Of the study intersections, four are signalized (Krassner Drive/Bending Branch Lane, Jupiter Boulevard, the Plaza Shopping Center, and Minton Road) and the remaining 13 are two-way stop controlled (TWSC) intersections. A field review was conducted on May 20, 2020 to verify the intersection geometrics.

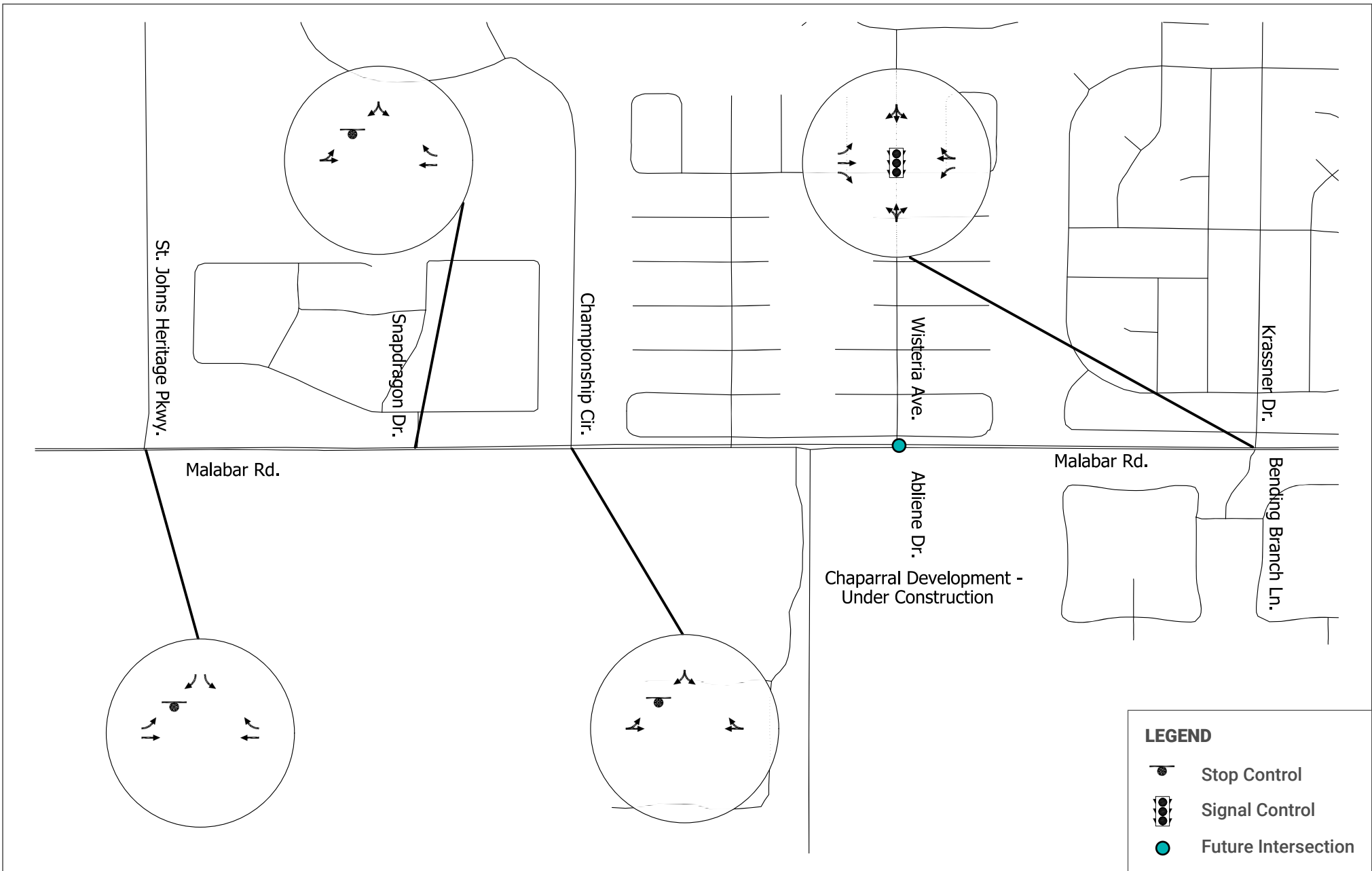
### 2.2.12 Physical or Operational Restrictions

The MTWCD maintains a drainage canal system traversing throughout the City of Palm Bay. The Malabar Road study corridor crosses four of these canals (C-7, C-8, C-9, and C-10) and is located directly adjacent to Canal C-20. Canal C-20 is on the north side of Malabar Road from Canal C-10 (Sta. 144+00) to just west of the Dollar General property (Sta. 257+00). At one location (Sta. 190+00) where Canal C-20 parallels Malabar Road, the United States Post Office is located on the Malabar Road's south side.

### 2.2.13 Traffic Data

Existing January 2020 traffic volumes were collected, including weekday 72-hour segment classification counts taken at locations along Malabar Road and individual intersection turning movement counts. The existing 72-hour segment classification counts were used to determine existing  $D$  and  $T_{24}$  factors and existing Annual Average Daily Traffic (AADT) volumes.

The existing 2020 AADT values and  $T_{24}$  factors along the study corridor are presented in **Table 8**. Vehicle classification counts were not collected for minor street roadways, so  $T_{24}$  factors were estimated as the peak hour truck percentage on the roadway leg multiplied by two following procedures relating  $T_{24}$  and DHT from the FDOT *Project Traffic Forecasting Handbook* (2019). Using the collected traffic volumes, existing traffic factors were calculated for the individual peak hour. Details including the peak-to-daily ratio, and the directional factor for the individual peak hour are also summarized in **Table 8**. Peak hour volumes summarized in **Table 8** also include the seasonal adjustment factor.

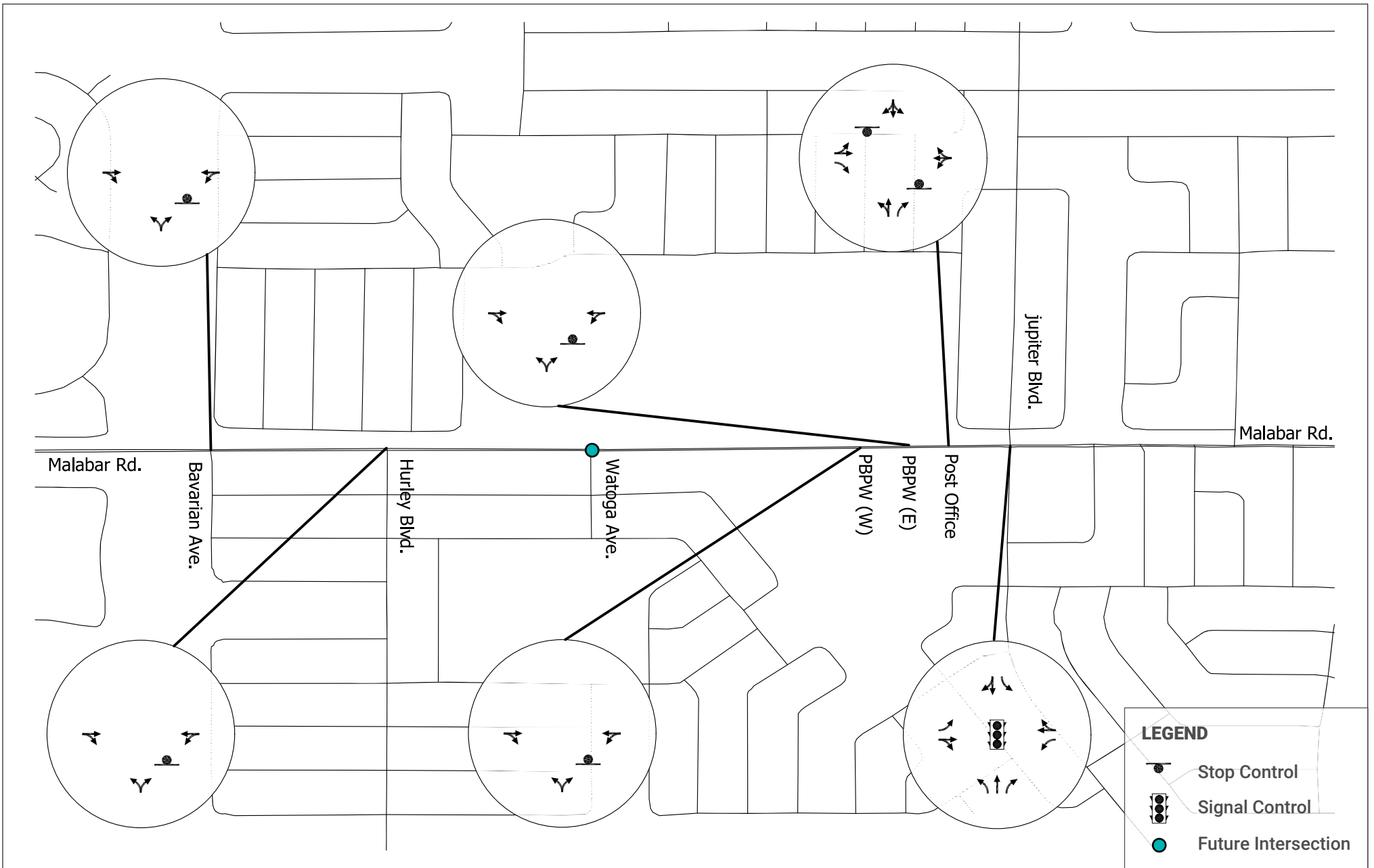


# Malabar Road PD&E Study

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EXISTING LANE CONFIGURATIONS

**FIGURE 16A**



# Malabar Road PD&E Study

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EXISTING LANE CONFIGURATIONS

**FIGURE 16B**



# Malabar Road PD&E Study

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EXISTING LANE CONFIGURATIONS

**FIGURE 16C**

**SECTION 2 – EXISTING CONDITIONS**

**Table 8: Weekday Existing Traffic Volumes and Factors**

Roadway	Count Dates	ADT	Axle Adj. Factor	Seasonal Adj. Factor	AADT	T <sub>24</sub> Factors	Peak Hour Volume	NB/EB	SB/WB	Peak-to-Daily Ratio	D
Malabar Road, St. Johns Heritage Parkway to Krassner Dr.	1/14/2020-1/16/2020	7,382	N/A*	0.97	7,200	4.54%	760	250	510	9.5%	67.3%
Malabar Road, Krassner Dr. to Garvey Rd.	1/14/2020-1/16/2020	11,138	N/A*	0.97	11,000	5.64%	940	420	520	8.4%	55.4%
Malabar Road, Garvey Rd. to Minton Rd.	1/14/2020-1/16/2020	16,978	N/A*	0.97	16,000	2.47%	1,370	790	580	8.1%	57.6%
St. Johns Heritage Parkway, north of Malabar Rd.	02/25/2020-02/27/2020	5,931	0.98	0.89	5,200	6.50%**	580	340	240	9.5%	59.1%
Jupiter Boulevard, north of Malabar Rd.	1/14/2020-1/16/2020	10,690	0.99	0.97	10,000	3.50%**	900	460	440	8.4%	51.2%
Jupiter Boulevard, south of Malabar Rd.	1/14/2020-1/16/2020	7,394	0.99	0.97	7,100	5.60%**	710	400	310	8.7%	55.9%
Garvey Road, south of Malabar Rd.	1/14/2020-1/16/2020	2,825	0.99	0.97	2,700	3.00%**	250	140	100	8.4%	58.8%
Minton Road, north of Malabar Rd.	1/14/2020-1/16/2020	22,967	0.99	0.97	22,000	1.30%**	2,000	1,090	870	8.2%	55.7%
Minton Road. South of Malabar Rd.	1/14/2020-1/16/2020	13,499	0.99	0.97	13,000	1.10%**	1,100	410	710	8.3%	63.4%

\*Vehicle classification count was used so an axle adjustment factor was not necessary.

\*\*Vehicle classification count was not used so T<sub>24</sub> factor was estimated as peak hour truck percentage multiplied by two.

### 2.2.14 Roadway Operational Conditions

#### 2.2.14.1 Existing 2020 Peak Hour Intersection Operations

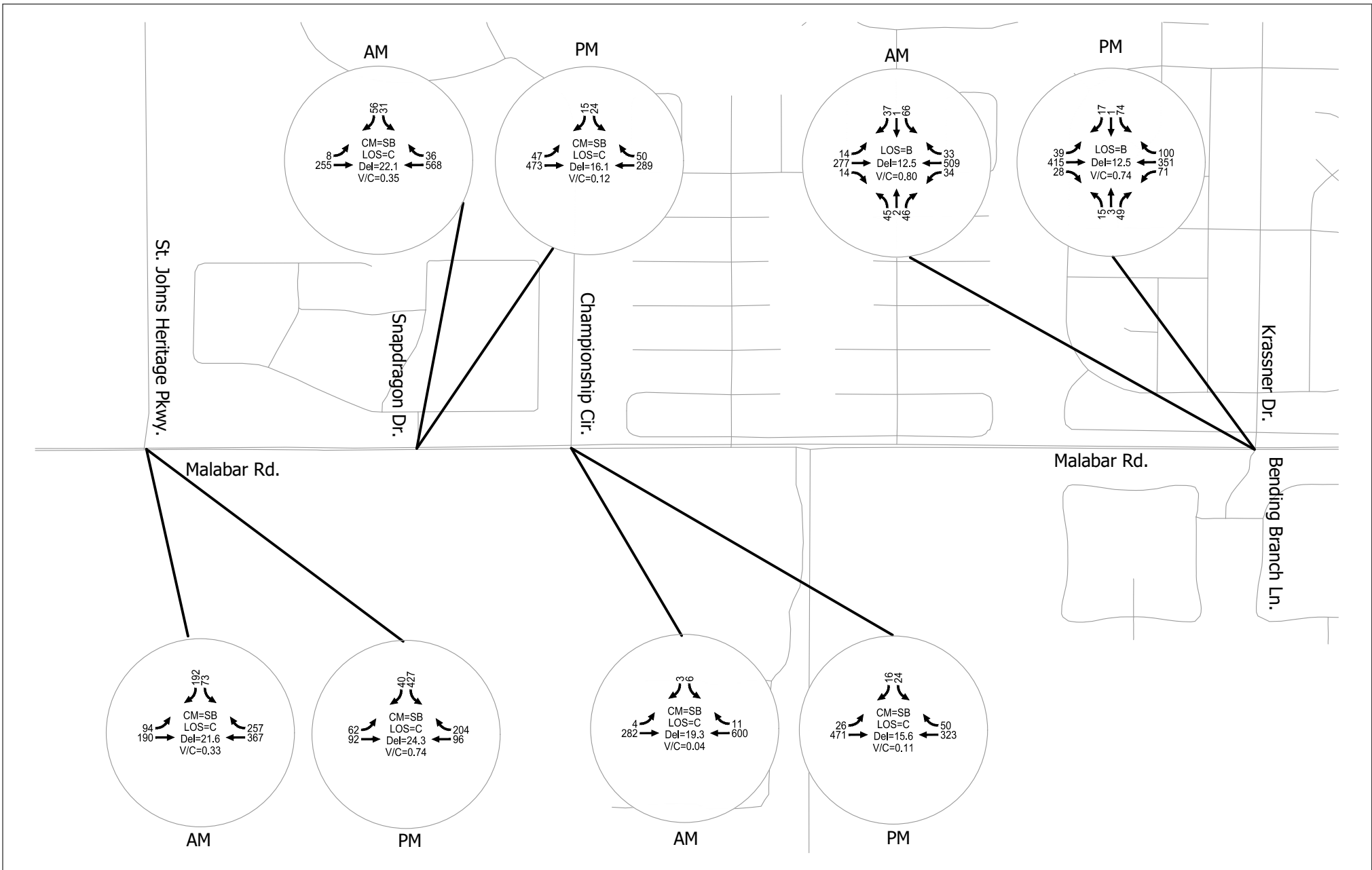
Existing 2020 intersection level-of-service (LOS) analyses were conducted using *Highway Capacity Manual 6<sup>th</sup> Edition (HCM6)* methodologies as implemented by Synchro 10. **Figure 17** summarizes the existing AM and PM peak hour intersection operations and turning movement volumes. For the TWSC intersections, the critical movement is shown along with the volume-to-capacity (v/c) ratio and delay for the critical movement. For the signalized intersections, the delay and LOS shown represent the overall intersection.


All movements operate with a v/c ratio of less than 1.0 and with a LOS of E or better during both the AM and PM peak hours. The Synchro 10 output results can be found in the *Malabar Road Project Traffic Analysis Report*.

#### 2.2.14.2 Existing 2020 Peak Hour Segment Operations

Malabar Road is an urban minor arterial for the length of the study corridor and has multiple signalized intersections creating interrupted flow traffic conditions for most of the study segments. However, the westbound segment from Krassner Drive/Bending Branch Lane to St. Johns Heritage Parkway is not influenced by a signal and is thus uninterrupted. To evaluate existing peak hour segment operations, the corridor was divided into the segments presented in **Table 9**. Analysis of the uninterrupted flow two-lane highway segments was performed using the *HCM 6<sup>th</sup> Edition* procedures as implemented in HCS software for Segment 1 in the westbound direction from **Table 9**. The results of the operational analysis are shown in **Table 10**. Analysis of the interrupted flow two-lane highway segments was performed using the *HCM6* Urban Street (interrupted flow) methodologies. Each segment's performance is shown in **Table 11**, as well as the average performance for the facility's entire length in each direction. Multiple individual segments operate worse than the City of Palm Bay's LOS C standard. The entire facility (from St. Johns Heritage Parkway to Minton Road) also operates worse than the City of Palm Bay's LOS C standard in the westbound direction in both time periods.





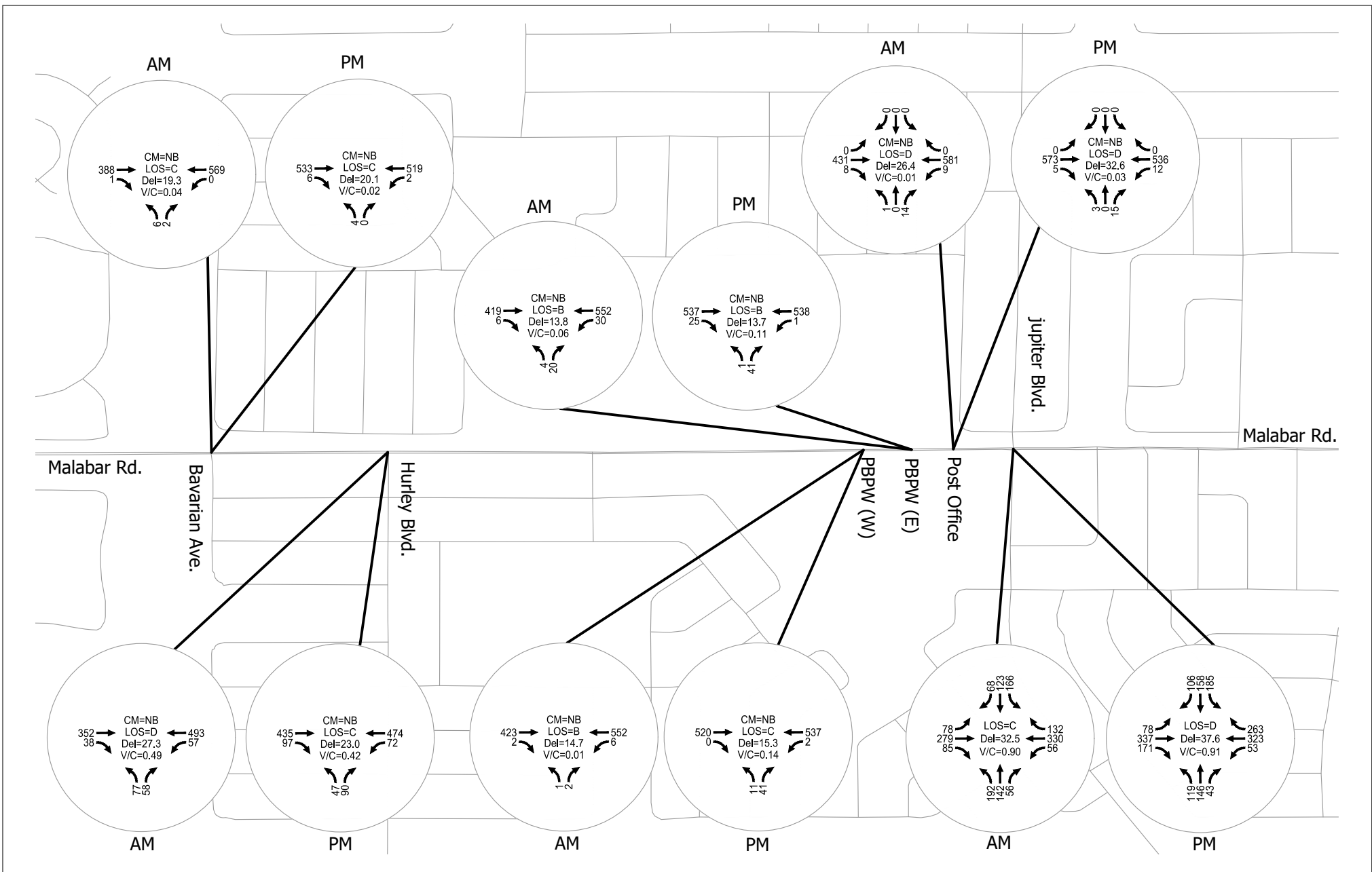
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# Malabar Road PD&E Study

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EXISTING TRAFFIC VOLUMES AND OPERATIONAL PERFORMANCE

**FIGURE 17A**



Not to Scale

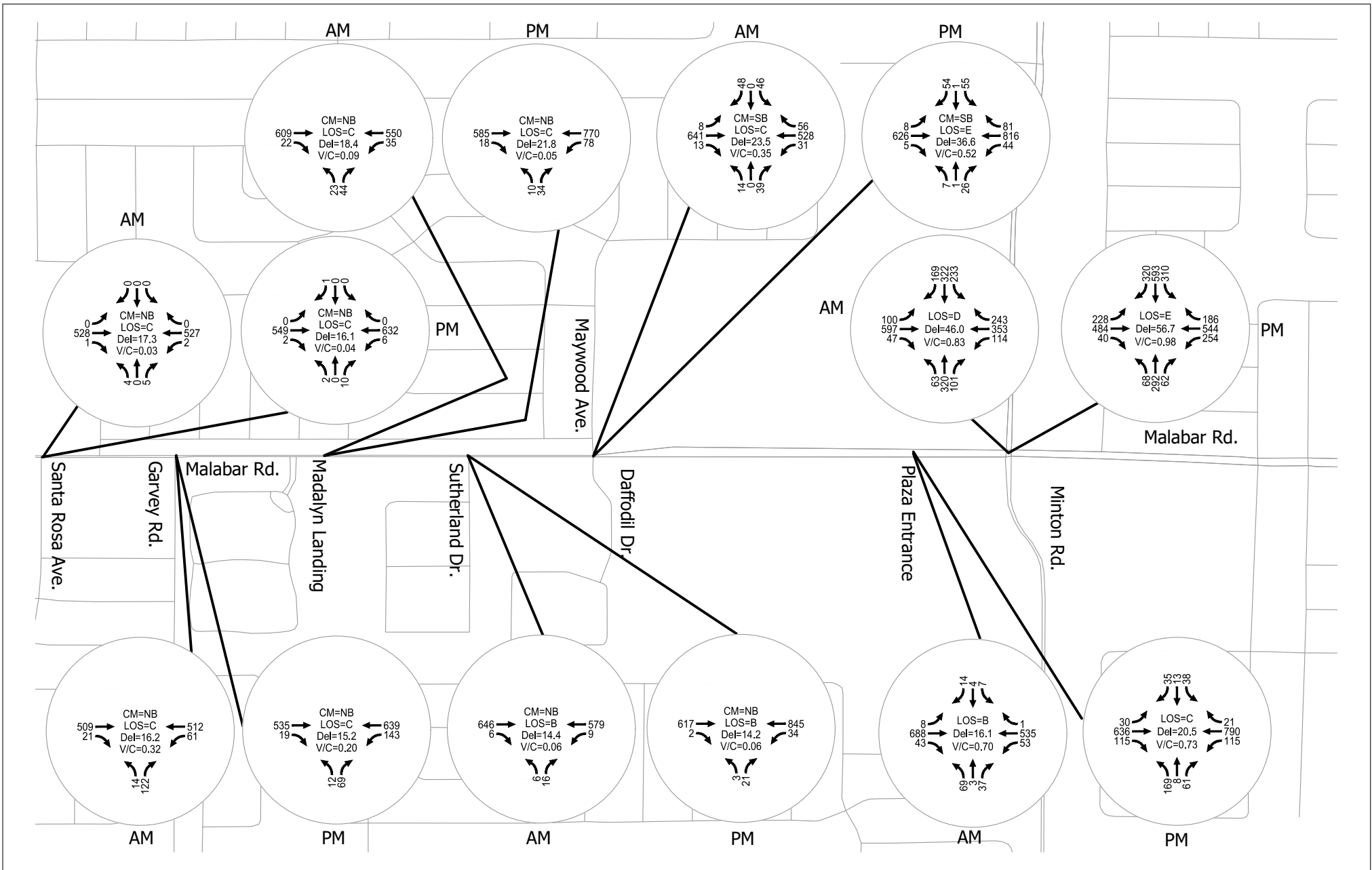
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EXISTING TRAFFIC VOLUMES AND OPERATIONAL PERFORMANCE

**FIGURE 17B**



Not to Scale

North

# Malabar Road PD&E Study

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EXISTING TRAFFIC VOLUMES AND OPERATIONAL PERFORMANCE

**FIGURE 17C**

SECTION 2 – EXISTING CONDITIONS

**Table 9: Existing Condition Evaluation Segments**

Segment #	Segment Limits	Flow Type	Analysis Method
1	Malabar Road, St. Johns Heritage Pkwy. to Krassner Dr./Bending Branch Ln.	Interrupted (EB) / Uninterrupted (WB)	Synchro 10/HCM 6 (Urban Street)/HCS 7 (Two-Lane Highway)
2	Malabar Road, Krassner Dr./Bending Branch Ln. to Jupiter Blvd.	Interrupted	Synchro 10/HCM 6 (Urban Street)
3	Malabar Road, Jupiter Blvd. to the Plaza Shopping Center	Interrupted	Synchro 10/HCM 6 (Urban Street)
4	Malabar Road, the Plaza Shopping Center to Minton Rd.	Interrupted	Synchro 10/HCM 6 (Urban Street)

**Table 10: Existing 2020 Segment LOS – (Uninterrupted Flow)**

Segment #	Segment Limits	Analysis Direction	AM Peak Hour				PM Peak Hour			
			BFFS (mph)	ATS (mph)	PFFS* (%)	LOS	BFFS (mph)	ATS (mph)	PFFS* (%)	LOS
1	Malabar Road, Krassner Drive/Bending Branch Lane to St. Johns Heritage Parkway	Westbound	50.6	32.8	73.5	D	50.6	35.4	79.4	C

Note: BFFS is Base Free Flow Speed, ATS is Average Travel Speed, and PFFS is Percent Free Flow Speed

SECTION 2 – EXISTING CONDITIONS

**Table 11: Existing 2020 Segment LOS – Both Directions (Interrupted Flow)**

Segment #	Segment Limits	Analysis Direction	AM Peak Hour				PM Peak Hour			
			BFFS (mph)	Synchro Travel Speed (mph)	P <sub>BFFS</sub> * (%)	LOS	BFFS (mph)	Synchro Travel Speed (mph)	P <sub>BFFS</sub> * (%)	LOS
1	Malabar Road, St. Johns Heritage Pkwy. to Krassner Dr./Bending Branch Ln.	Eastbound	46.4	36.5	78.7	B	46.4	35.9	77.4	B
2	Malabar Road, Krassner Dr./Bending Branch Ln. to Jupiter Blvd.	Eastbound	46.1	33.7	73.1	B	46.1	32.7	70.9	B
3	Malabar Road, Jupiter Blvd. to Plaza Entrance	Eastbound	45.0	35.5	77.8	B	45.0	33.7	73.9	B
4	Malabar Road, Plaza Entrance to Minton Rd.	Eastbound	36.8	7.8	21.2	F**	36.8	7.3	19.8	F**
<b>Facility</b>	<b>Malabar Road, St. Johns Heritage Pkwy. to Minton Rd.</b>	<b>Eastbound</b>	-	-	<b>63.0</b>	<b>C</b>	-	-	<b>60.8</b>	<b>C</b>
4	Malabar Road, Minton Rd. to Plaza Entrance	Westbound	38.1	10.6	27.8	F**	38.1	9.8	25.7	F**
3	Malabar Road, Plaza Entrance to Jupiter Blvd.	Westbound	45.0	20.0	43.9	D	45.2	16.0	35.0	E
2	Malabar Road, Jupiter Blvd. to Krassner Dr./Bending Branch Ln.	Westbound	46.1	31.5	68.3	B	46.1	31.6	68.5	B
<b>Facility</b>	<b>Malabar Road, Minton Rd. to Krassner Dr./Bending Branch Ln.</b>	<b>Westbound</b>	-	-	<b>46.9</b>	<b>D</b>	-	-	<b>43.2</b>	<b>D</b>

\*Note: P<sub>BFFS</sub> is the Percent of Base Free Flow Speed

\*\*This is likely due to the relatively short length of segment between signalized intersections and the relatively high control delay of the adjacent signalized intersection.

### 2.2.15 *Managed Lanes*

There are no managed lanes along the study corridor.

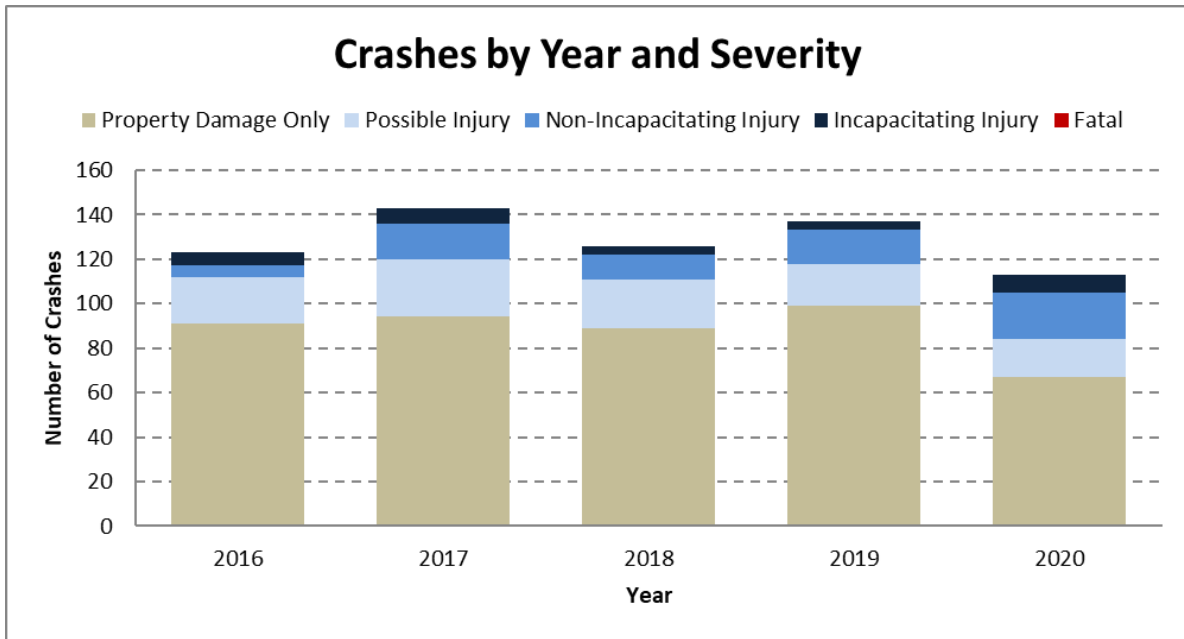
### 2.2.16 *Crash Data and Safety Analysis*

Crash records were obtained for Malabar Road from 900' west of the St. Johns Heritage Parkway to ¼ mile east of Minton Road for the most recent five-year period on record (2016 through 2020). The crash data was obtained from the University of Florida's Signal Four (S4) Analytics crash database because this is a non-State roadway. 2016 to 2018 crash data from the FDOT Crash Analysis Reporting System (CARS) and FDOT State Safety Office Geographic Information System (SSOGis) Crash Query Tool was also cross referenced for additional crashes that may not have been reported in the S4 dataset. This led to an additional five crashes being added to the analysis dataset. 2019 and 2020 CARS/SSOGis crash data was not fully complete at the time of this report, thus the reason only 2016 to 2018 CARS/SSOGis was cross referenced.

This section summarizes the corridor wide crash statistics. A detailed pedestrian/bicycle safety review is also discussed in this section. A summary of the 2016 to 2020 crash data set in tabular and graphical format is provided in **Appendix B**, along with a summary of crash data for high crash locations.

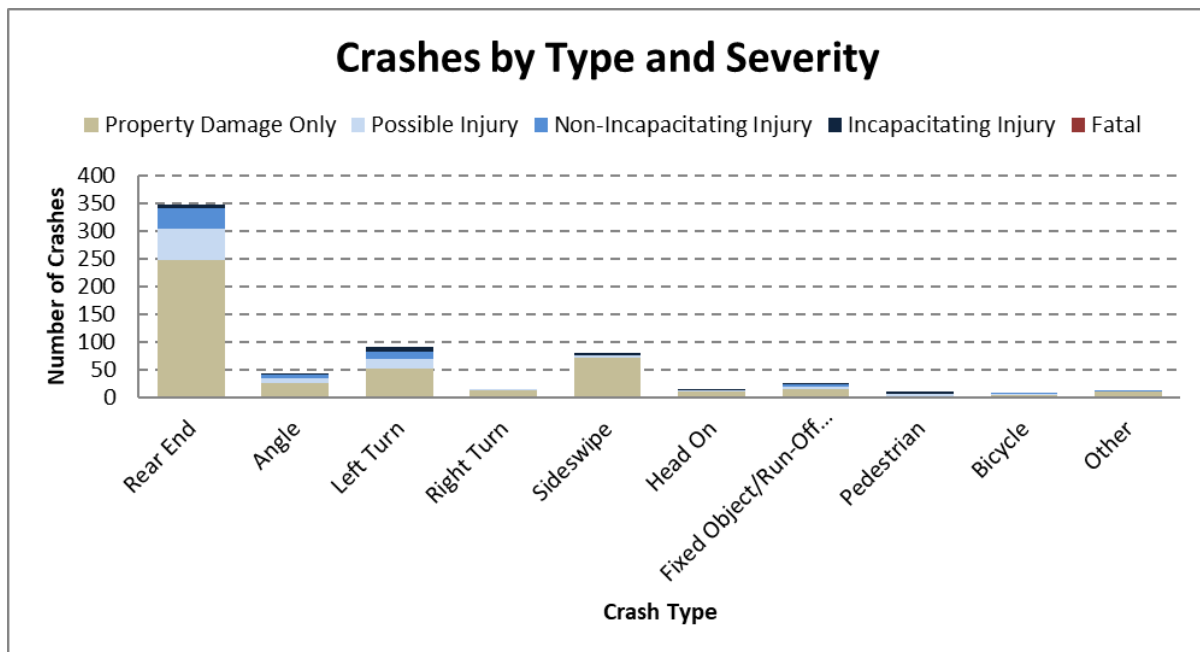
#### 2.2.16.1 Corridor Wide Crash Statistics

**Figure 18** displays a summary of crash frequency by year along with the respective severities from 2016 to 2020. There was a total of 642 reported crashes during this period, 202 (32 percent) resulted in at least one injury. There were no reported fatal crashes along the study corridor during the five-year period. As displayed in **Figure 18**, the crashes per year along the corridor generally increased between 2016 (123 crashes) and 2019 (137 crashes). The 2020 crash data saw a decrease to 113 crashes, likely due to decreases in traffic volumes related to the COVID-19 pandemic. While the overall total crashes decreased in 2020, the total number of injury crashes was the second highest behind 2017. This could be attributed to higher travel speeds along the corridor due to the lower volume, which leads to more severe crashes. It is important to note the traffic counts for this project were performed in January 2020, prior to the beginning of the pandemic restrictions in March 2020.



**Figure 18: Crashes per Year (Corridor Wide)**

**Figure 19** displays the crashes along the corridor by type and severity for the five-year study period. The highest crash type observed was rear end, comprising 54 percent of the total crashes. Left turn (14 percent) and sideswipe crashes (12 percent) were the second and third highest crash types.



**Figure 19: Crashes by Type and Severity (Corridor Wide)**

Other crash statistics to note include the following:

- Nine pedestrian crashes and eight bicycle crashes occurred along the study corridor. Thirteen of the 17 crashes resulted in at least one injury. More detail on the pedestrian/bicycle crashes can be found in the **Pedestrian and Bicycle Crash Review** section.
- The highest crash hours of the day were observed in the afternoon between 3 PM and 6 PM (33 percent of crashes). Sixteen percent of crashes were observed from 11 AM to 2 PM. Fourteen percent of crashes were observed from 7 AM to 10 AM. In total, the AM, PM, and Midday peak hours accounted for 63 percent of the crashes along the study corridor.
- Crashes occurring during non-daylight hours accounted for 21 percent of the crashes.
- Crashes occurring during wet roadway conditions accounted for 15 percent of the crashes, indicating a potential need for roadway resurfacing.
- Crashes involving alcohol and/or drugs accounted for 3 percent of the crashes.

### 2.2.16.2 Safety Ratio Analysis

A crash rate/safety ratio analysis was performed for the Malabar Road study corridor. The corridor's safety ratio was calculated to compare the annual crash rates of the corridor to the critical crash rates of similar facilities throughout FDOT District 5 and the State of Florida. The method takes into account the traffic volume along the corridor, considers the variance in crash data by including regional and statewide averages, and classifies roadway segment types into categories for more applicable comparisons. Crash rates/safety ratios were calculated for three segments and four signalized intersections within the study area:

- Segment 1 – Malabar Road from the St. Johns Heritage Parkway to Krassner Drive/Bending Branch Lane
- Intersection 1 – Malabar Road at Krassner Drive/Bending Branch Lane
- Segment 2 – Malabar Road from Krassner Drive/Bending Branch Lane to Jupiter Boulevard
- Intersection 2 – Malabar Road at Jupiter Boulevard
- Segment 3 – Malabar Road from Jupiter Boulevard to the Plaza Shopping Center
- Intersection 3 – Malabar Road at the Plaza Shopping Center
- Intersection 4 – Malabar Road at Minton Road

The first step in calculating the safety ratio is to calculate the actual crash rate, expressed as number of crashes per million vehicle miles traveled (MVMT). The actual crash rate is calculated from the total number of crashes in a year, AADT, and the length of the segment/corridor based on the equation below:

$$\text{Actual Crash Rate} = (\text{Number of crashes per year} \times 1,000,000) / (\text{ADT} \times 365 \times \text{segment length})$$



**SECTION 2 – EXISTING CONDITIONS**

Traffic data, such as functional classification and AADTs, were obtained from the SCTPO’s Annual State of the System (SOS) Report. The calculated actual crash rates were compared to the critical crash rate to find the safety ratio for each of the segments and intersections along Malabar Road. The critical crash rate is calculated using the statewide average crash rates for similar facilities based on the equation below:

$$\text{Critical Crash Rate} = \text{Statewide Average Crash Rate} + (\text{K Factor} \times \text{SQRT} \{ \text{Statewide Average Crash Rate} / \text{Vehicle Exposure} \}) - (0.5 / \text{Vehicle Exposure})$$

$$\text{Where Vehicle Exposure} = (\text{ADT} \times 365 \times \text{Segment Length}) / 1,000,000$$

$$\text{Safety Ratio} = \text{Actual Crash Rate} / \text{Critical Crash Rate}$$

The calculated rates were compared to critical rates for similar facilities across FDOT District 5 and the State of Florida. The safety ratio, calculated for each segment annually, is equal to the segment’s actual crash rate divided by the statewide (or districtwide) critical crash rate. The statewide and districtwide 2016 to 2018 safety ratios for the segments and intersections noted above are displayed in **Table 12** and **Table 13**. Note that statewide average crash rates were not published for 2019 or 2020 as per the date of this analysis, thus the reason why 2019 and 2020 safety ratios were not calculated.

A safety ratio greater than 1.0 means the segment or intersection is experiencing a higher crash rate compared to segments/intersections with similar roadway characteristics. Safety ratios greater than 1.0 have been **bolded**.

**Table 12: Segment District 5 and Statewide Safety Ratios**

Year	St. Johns Heritage Parkway to Krassner Drive/Bending Branch Lane		Krassner Drive/Bending Branch Lane to Jupiter Boulevard		Jupiter Boulevard to the Plaza Shopping Center	
	District 5	Statewide	District 5	Statewide	District 5	Statewide
2016	0.153	0.140	0.410	0.376	0.611	0.558
2017	0.276	0.194	0.705	0.496	<b>1.007</b>	0.697
2018	0.608	0.440	0.407	0.295	0.548	0.391

**Bold Cells** display roadway segments with crash rates higher than rates of similar facilities.

**Table 13: Intersection District 5 and Statewide Safety Ratios**

Year	Krassner Drive/Bending Branch Lane		Jupiter Boulevard		Plaza Shopping Center		Minton Road	
	District 5	Statewide	District 5	Statewide	District 5	Statewide	District 5	Statewide
2016	0.200	0.176	<b>3.089</b>	<b>2.714</b>	<b>1.200</b>	<b>1.055</b>	<b>3.500</b>	<b>3.066</b>
2017	0.000	0.000	<b>4.018</b>	<b>2.967</b>	<b>1.393</b>	<b>1.029</b>	<b>3.394</b>	<b>2.488</b>
2018	0.234	0.178	<b>3.115</b>	<b>2.355</b>	0.800	0.605	<b>5.077</b>	<b>3.814</b>

**Bold Cells** display intersections with crash rates higher than rates of similar facilities.

The segment of Malabar Road between Jupiter Boulevard and the Plaza Shopping Center exceeds the districtwide safety ratio of 1.0 in 2017. No other segments exceed the statewide and districtwide safety ratio of 1.0 during the analysis period.

Three of the four intersections analyzed along the Malabar Road study corridor exceeded the statewide and districtwide safety ratios of 1.0 in at least two of the three analysis years. Details of the safety ratio evaluation are included in **Appendix B**.

#### 2.2.16.3 High Crash Locations

To determine high crash locations along the Malabar Road study corridor, the 642 crashes were mapped using GIS software and the corresponding maps were visually reviewed. **Figure 20** displays the crash frequency/severity for the study corridor. From this review, the following locations were identified for further analysis:

- The intersection of Malabar Road and St. Johns Heritage Parkway accounted for 23 of the 642 crashes (4 percent) along the study corridor. The highest crash type observed was left turn, comprising 26 percent of the total crashes. Contributing causes for the left turn crashes may be the high turning volume to/from the St. Johns Heritage Parkway and large influxes of traffic during Heritage High School's pick up/drop off times.
- The offset intersections of Malabar Road/Hurley Boulevard and Malabar Road/Hillock Avenue accounted for 26 of the 642 crashes (4 percent) along the study corridor. The highest crash type observed was rear end, comprising 65 percent of the total crashes. Contributing causes for the rear end crashes may be the lack of left turn lanes along Malabar Road leading to overlapping queueing for the eastbound/westbound left turn movements at these intersections.
- The intersection of Malabar Road and Jupiter Boulevard accounted for 104 of the 642 crashes (16 percent) along the study corridor. The highest crash type observed was rear end, comprising 59 percent of the total crashes. Contributing causes for the rear end crashes may be the amount of congestion observed during the AM and PM peak hours at the intersection.

## SECTION 2 – EXISTING CONDITIONS

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- Malabar Road from 0.05 miles east of Jupiter Boulevard to 0.05 west of Santa Rosa Avenue (1,400 feet in length) accounted for 22 of the 642 crashes (3 percent) along the study corridor. The highest crash type observed was rear end, comprising 86 percent of the total crashes. Contributing causes for the rear end crashes may be congestion on the east leg of the Jupiter Boulevard intersection and the lack of left turn lanes along Malabar Road for the five public street intersections between Jupiter Boulevard and Santa Rosa Avenue.
- The intersection of Malabar Road and Maywood Avenue/Daffodil Drive accounted for 41 of the 642 crashes (6 percent) along the study corridor. The highest crash type observed was rear end, comprising 39 percent of the total crashes. Left turn (37 percent) was the second highest crash type. Contributing causes for the rear end crashes may be due to vehicles slowing down to make eastbound/westbound right turn movements. Contributing causes for the left turn crashes may be due to the relatively high southbound left turn and westbound left turn movements conflicting with east/west through traffic.
- Malabar Road from 0.05 miles east of Maywood Avenue/Daffodil Drive to 0.05 west of the Plaza Shopping Center (1,175 feet in length) accounted for 39 of the 642 crashes (6 percent) along the study corridor. The highest crash type observed was rear end, comprising 59 percent of the total crashes. Contributing causes for the rear end crashes may be due to the increased number of access points/driveways and the speed limit transition from 35 mph to 45 mph.
- The intersection of Malabar Road and the Plaza Shopping Center accounted for 39 of the 642 crashes (6 percent) along the study corridor. The highest crash type observed was rear end, comprising 54 percent of the total crashes. Contributing causes for the rear end crashes may be the amount of congestion observed during the AM and PM peak hours at the intersection.
- The intersection of Malabar Road and Minton Road accounted for 187 of 642 crashes (29 percent) along the study corridor. The highest crash type observed was rear end, comprising 47 percent of the total crashes. Contributing causes for the rear end crashes may be the amount of congestion observed during the AM and PM peak hours at the intersection.

In total, crashes at these locations accounted for 481 of the 642 crashes (75 percent) along the Malabar Road study corridor. **Appendix B** discusses these high crash locations in more detail.

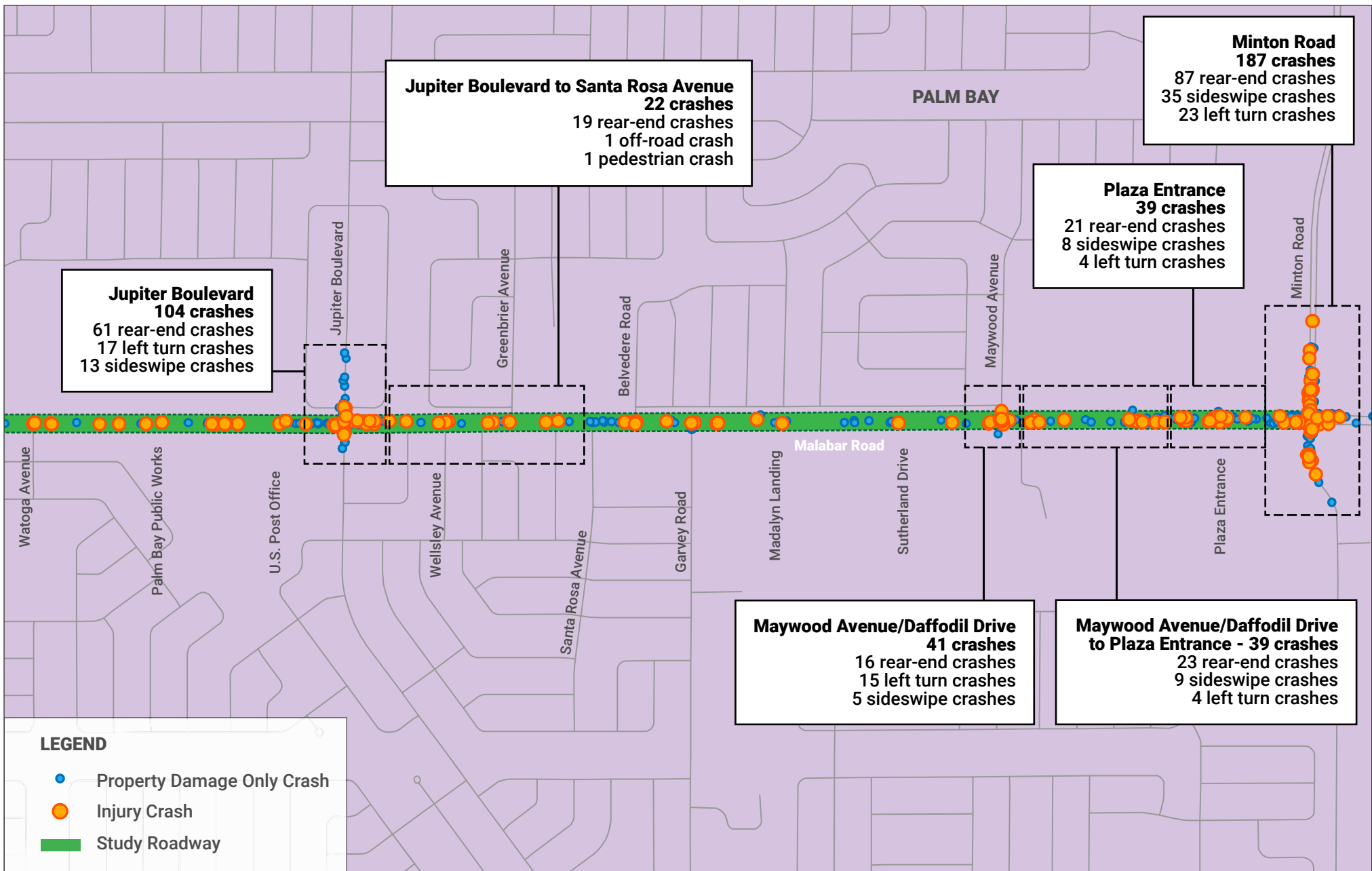


# Malabar Road PD&E Study

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CRASH MAP - ST. JOHNS HERITAGE PARKWAY TO MINTON ROAD (2016-2020)

**FIGURE 20A**



# Malabar Road PD&E Study

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CRASH MAP - ST. JOHNS HERITAGE PARKWAY TO MINTON ROAD (2016-2020)

**FIGURE 20B**

### 2.2.16.4 Pedestrian and Bicycle Crash Review

There were nine pedestrian crashes and eight bicycle crashes during the analysis period. Pedestrian and bicycle crashes by location are displayed in **Figure 21** and summarized below:

- One bicycle crash occurred at the St. Johns Heritage Parkway intersection resulting in no injuries.
- One pedestrian crash and one bicycle crash occurred at the Hurley Boulevard intersection each resulting in one injury.
- One pedestrian crash occurred at the Watoga Avenue intersection resulting in one injury.
- One pedestrian crash occurred at the Jupiter Boulevard intersection resulting in no injuries.
- One pedestrian crash occurred at the Greenbrier Avenue intersection resulting in one injury.
- One pedestrian crash and one bicycle crash occurred the Maywood Avenue/Daffodil Drive intersection each resulting in one injury.
- One pedestrian crash and one bicycle crash occurred on Malabar Road between the intersection of Maywood Avenue/Daffodil Drive and the Plaza Shopping Center. The pedestrian crash resulted in three injuries and the bicycle crash had no injuries.
- Three pedestrian crashes and four bicycle crashes occurred at the Minton Road intersection each resulting in three injuries.
- The nine pedestrian/bicycle crashes in the Plaza Shopping Center to Minton Road area were reviewed for any specific crash trends:
  - Of the nine crashes, five occurred during dark lighting conditions. This indicates a need for enhanced lighting in this section of Malabar Road.
  - Four of the seven crashes at the Minton Road intersection occurred with pedestrians/bicyclists crossing in the crosswalk. Three of those four crashes occurred in the south leg crosswalk with northbound traveling vehicles, two of which occurred under dark lighting conditions.

A more detailed summary of the 2016 to 2020 Malabar Road pedestrian/bicycle crash data set in tabular and graphical format is provided in **Appendix B**.

### 2.2.16.5 Contributing Causes

After review of the crash data and crash locations, several patterns emerged to help identify contributing causes of crashes along the corridor.

#### *Rear End Crashes*

Fifty-four (54) percent of crashes along the study corridor were rear end crashes. Just over half of the rear end crashes occurred at the signalized intersections, which is indicative of congestion. The remainder of the rear end crashes are likely being caused by drivers slowing to make left or

## SECTION 2 – EXISTING CONDITIONS

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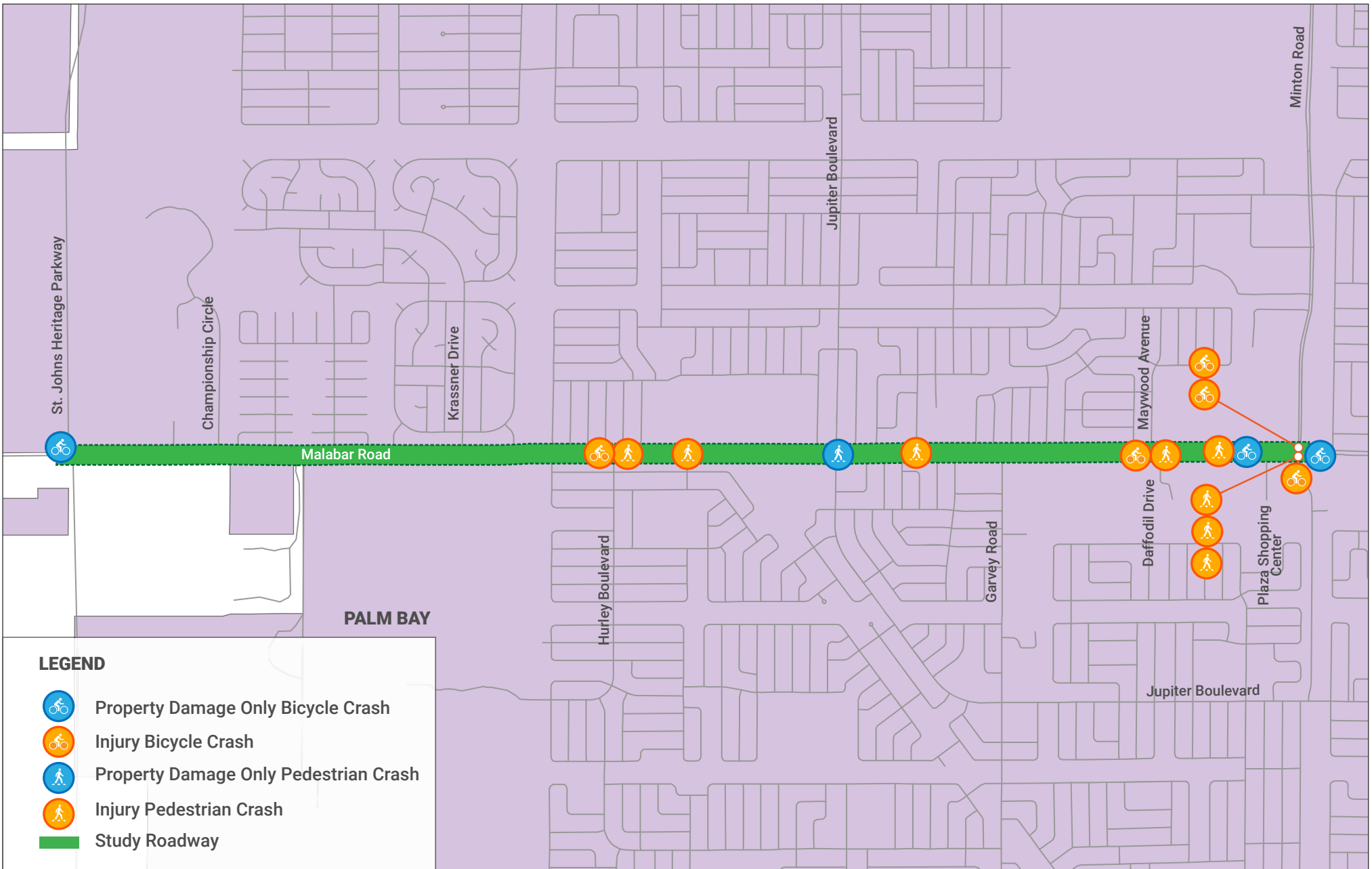
right turns along the two-lane roadway. With limited turn lanes along the corridor and a speed limit of 45 mph, slowing to make turns could be a contributing cause for rear end crashes.

### *Left Turn Crashes*

Left turn crashes accounted for the second highest crash type (14 percent) along Malabar Road. Just under half of the left turn crashes occurred along the study corridor outside of the signalized intersections. There are over 30 driveways and public streets where left turns can be made between the St. Johns Heritage Parkway and the Plaza Shopping Center. The high number of access points and lack of access management is a contributing cause for the left turn crashes along the study corridor. Permitted left turn movements are the contributing cause for left turn crashes at the signalized intersections.

### *Midday and PM Peak Hour Crashes*

In addition to crash types, the time of crashes was also reviewed. It was noted that there are increases in the number of crashes during the Midday and PM peak hours. Sixteen (16) percent of crashes occurred between 11 AM to 2 PM and 33 percent of crashes occurred from 3 PM to 6 PM, suggesting peak hour congestion is contributing to crashes during peak travel times.



# Malabar Road PD&E Study

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2016-2020 PEDESTRIAN AND BICYCLE CRASH LOCATIONS

**FIGURE 21**



### *2.2.17 Railroad Crossings*

There are no railroad crossings along the study corridor.

### *2.2.18 Drainage*

The project is within the St. Johns River Water Management District (SJRWMD) and Waterbody ID (WBID) 3090 – Melbourne-Tillman (C-1) Canal, impaired for iron but not impaired for nutrients. The project is also located within the jurisdictional area of the Melbourne-Tillman Water Control District (MTWCD) maintaining a network of canals in Brevard County including several crossing underneath Malabar Road (Canals C-7, C-8, C-9, and C-10) and one running parallel to Malabar Road (Canal C-20) for a portion of the study corridor. The City of Palm Bay also maintains smaller canals within the project's vicinity (Canals 26-06, 14-03b and 13-05). The MTWCD has a watershed stormwater model for this area used to collect data about culverts and drainage patterns. The model was provided to the consultant's drainage engineers in Interconnected Pond Routing (ICPR) file format with PDF results. Additional PDF results were provided from a separate Storm Water Management Model (SWMM). There are Total Maximum Daily Loads (TMDL) and a Basin Management Action Plan (BMAP) for nutrients for the Indian River Lagoon, the project's outfall, so nutrient loading analysis is required. Malabar Road is relatively flat through most of the corridor, and stormwater runoff is collected in roadside ditches discharging into various canals.

Most of the Malabar Road's stormwater runoff is untreated, with the exception of areas at the corridor's western and eastern ends. At the corridor's western end, a permitted swale system provides water quality treatment for the Malabar Road's two-lane configuration beginning approximately 2,500 feet west of the St. Johns Heritage Parkway (outside of the project limits) and ending approximately 1,500 feet east of the St. Johns Heritage Parkway (within the project limits). This system was permitted under SJRWMD Permit No. 113120-2 and modified under Permit No's. 125243-1 and 113120-4. It is anticipated these swales will be significantly impacted by the Malabar Road's widening and a permit modification will be required.

At the corridor's east end, beginning just west of the Walgreens near Minton Road, stormwater is collected in a storm sewer system and conveyed to Palm Bay "Pond A" located east of Minton Road and adjacent to MTWCD Canal C-37. The pond provides water quality treatment under Permit No. 16558-5 which is a modification of earlier permits using a different location for Pond A. This portion of Malabar Road is already widened to four lanes (except for the transition from the two-lane road), so it is anticipated that the additional impervious area to widen the transition area will be insignificant and no modifications will be needed to the pond configuration or control structure. Minor adjustments to the storm sewer system may be required.

There are several other notable permits along the corridor including Permit No. 62976-1 for sidewalk construction along Malabar Road's north side. This project did not require stormwater treatment or attenuation, but it provides useful information about the area's drainage

## SECTION 2 – EXISTING CONDITIONS

infrastructure. Permit No. 62395-1 for the construction of three pedestrian bridges over MTWCD Canal No's. C-8, C-9 and C-10 also provides information about the area's drainage patterns. The culvert crossing at MTWCD Canal C-8 was permitted to replace a failing arch pipe with an 8' x 6' concrete box culvert (CBC) under Permit No. 158876-1. The CBC was constructed in the summer of 2020.

There are seven existing drainage basins (shown in **Figure 22**), each named for the canal it discharges to except for the last basin. Basins C-7, C-8, C-9, C-10 West, and C-10 East discharge to MTWCD canals crossing underneath Malabar Road and flow north to Canal C-1. Basin C-20 discharges to Canal C-20 running parallel and adjacent to the Malabar Road's north side. The canal begins just west of Walgreens near Minton Road and flows west until it discharges directly into Canal C-10. Basin A consists of the area already permitted to discharge to Palm Bay Pond A as discussed above and will utilize the existing pond and outfall structure discharging to the C-37 canal.

There are ten existing cross drains within the project limits. Three of the cross drains provide conveyance underneath Malabar Road for MTWCD Canals C-7, C-8, and C-9. The other cross drains connect ditches on either side of Malabar Road or allow ditches along the south side of the road to discharge directly into Canal C-20 along the north side. There is also a bridge over Canal C-10 requiring hydraulic evaluation. The cross drains are summarized in **Table 14** and shown on the concept plans in **Appendix C**.

**Table 14: Summary of Cross Drains**

Structure No.	Station	Description	Remarks
CD-1	62+80	Double 96" RCP	C-7
CD-2	89+18	8' x 6' CBC	C-8
CD-3	114+67	18" CMP	
CD-4	115+71	Single 54" RCP	C-9
Bridge	142+00	#704004	C-10
CD-5	155+75	Single 13" x 21" CMP	
CD-6	176+84	Single 14" x 23" RCP	
CD-7	188+40	Single 21" x 28" RCP	
CD-8	224+58	Single 18" x 30" RCP	
CD-9	238+72	Single 19" x 30" RCP	
CD-10	248+33	Single 19" x 30" RCP	

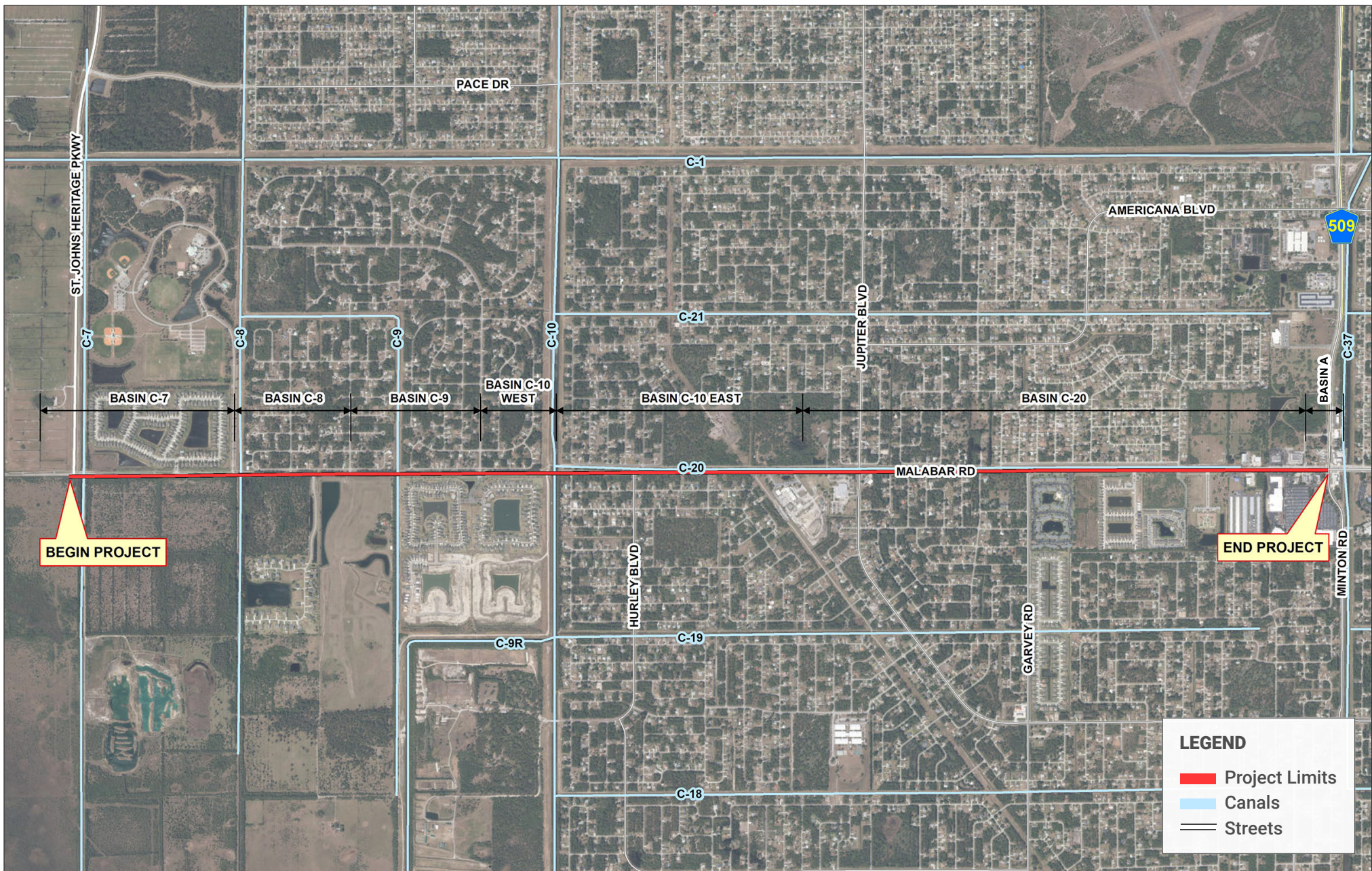
## SECTION 2 – EXISTING CONDITIONS

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The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) for Brevard County dated March 17, 2014 indicate the first 1,700 feet of Malabar Road at the western project limits intersect FEMA Flood Zone AE with an established 100-year Base Flood Elevation (BFE) of 20.0 feet, as shown in **Figure 23**. This area is associated with low-lying land within the Three Forks Conservation Area and improvements in this area will require floodplain compensation. The remainder of the corridor is outside of the 100-year floodplain. There are no regulatory FEMA floodways within the project limits.

Coordination with Brevard County, City of Palm Bay, SJRWMD, and MTWCD has included discussion of flooding history and maintenance concerns within the project limits. There are no known major flooding concerns within the study area and wet-season field reviews have indicated fairly dry conditions aside from the MTWCD Canals. Minor flooding has been reported along portions of Canal C-20 and will be addressed by modifying culverts that are too small. Additional information regarding drainage needs is documented in the project's *Pond Siting Report* and *Location Hydraulics Report*.





Not to Scale

North

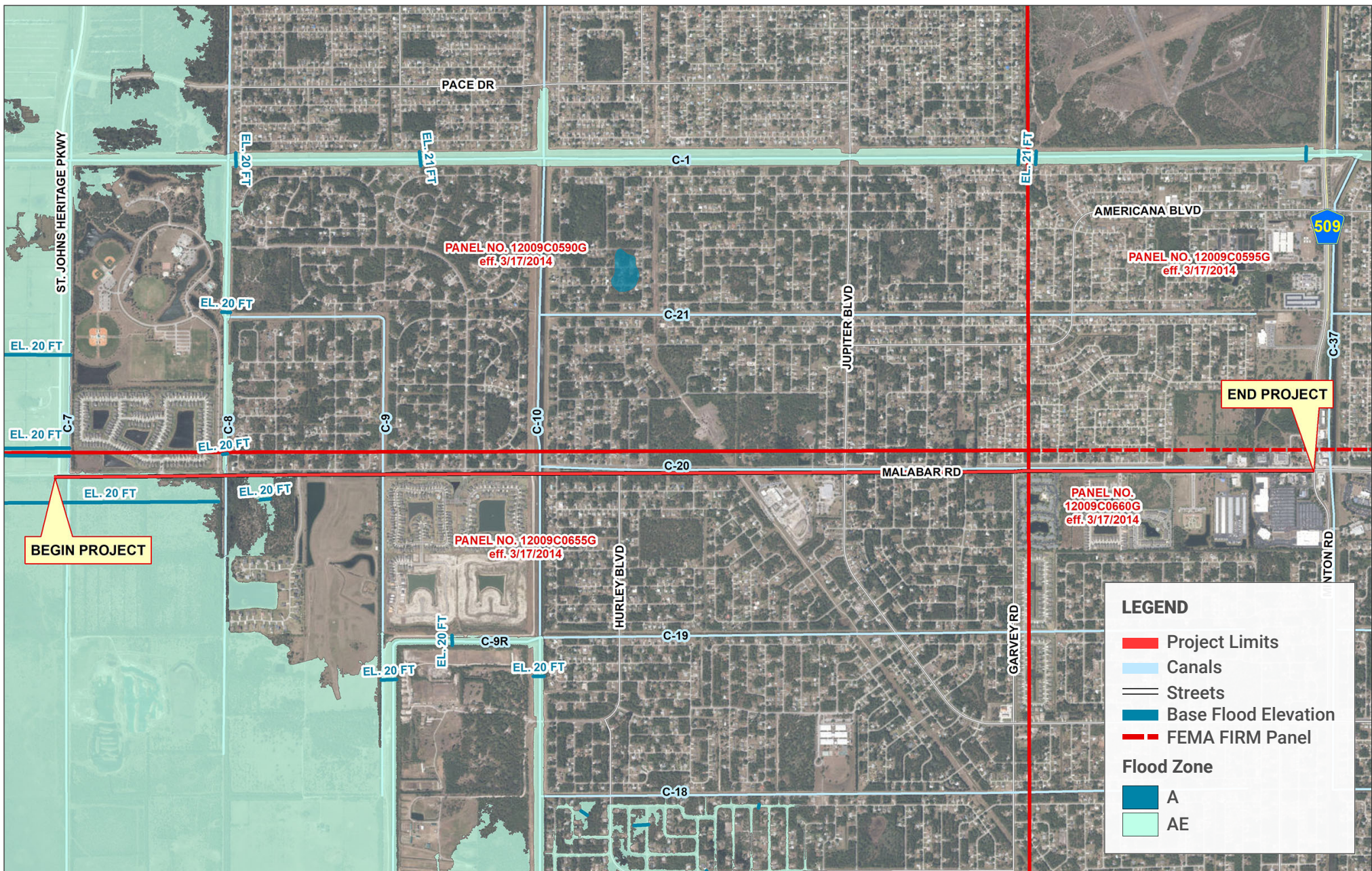
# Malabar Road PD&E Study

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MALABAR ROAD DRAINAGE BASINS

**FIGURE 22**





Not to Scale

North

# Malabar Road PD&E Study

FPID: 437210-1-28-01

FEMA FLOOD INSURANCE RATE MAP

**FIGURE 23**



2.2.19 Lighting

Lighting conditions were observed based on a field review performed January 26, 2021. While consistent street lighting is not present along the study corridor, intersection lighting is present at the following locations:

- All four corners at Krassner Drive/Bending Branch Lane;
- Northeast corner at Hurley Boulevard;
- Northwest corner at Hillock Avenue;
- Southeast corner at Watoga Avenue;
- Southwest corner at both Palm Bay Public Works Entrances;
- Northwest corner at Jupiter Boulevard;
- Southwest corner at Tile Avenue;
- Northeast corner at Belvedere Road;
- Southeast corner at Garvey Road;
- Northwest corner at Maywood Avenue/Daffodil Drive; and
- Northwest, northeast, and southeast corners at Minton Road.

2.2.20 Utilities

Eight Utility Agency/Owners (UAO) have been identified within the study area through the Sunshine 811 Design Ticket and utility coordination efforts. **Table 15** identifies the UOA’s contacted, and a description of their facilities located on the project. **Table 16** identifies the specific UOA contacts. Additional information regarding the existing utilities and anticipated impacts can be found in the *Utility Assessment Package*.

**Table 15: Existing Utilities in the Study Area**

Utility Company	Facility	Description
City of Palm Bay Utilities Department	Water/ Wastewater/ Sewer	<ul style="list-style-type: none"> <li>• 16" sewer force main south of Malabar Rd.</li> <li>• Approximately 1,200 ft of existing 8" sanitary sewer runs parallel to the south side of Malabar Rd. west of Minton Rd.</li> <li>• 16" – 20" water on north side of Malabar Rd.</li> </ul>
AT&T Distribution	Phone	<ul style="list-style-type: none"> <li>• At west end of Malabar Rd (near intersection of St. John Heritage Pkwy.) there is aerial and other lines that quickly transition to two buried lines south of Malabar Rd.</li> <li>• Near Snapdragon Rd., one of the above-mentioned lines transitions back to aerial and the other remains buried south of Malabar Rd.</li> <li>• East of Snapdragon Rd. an additional buried line runs to the north of Malabar Rd.</li> <li>• Near Allison Dr. an additional line runs north of Malabar</li> </ul>

**SECTION 2 – EXISTING CONDITIONS**

Utility Company	Facility	Description
		<p>Rd. and a third buried line runs south of Malabar Rd. – these lines end at Wisteria Ave. NW</p> <ul style="list-style-type: none"> <li>• At Flying U Ln., a fourth buried line runs south of Malabar Rd and ends at Wisteria Ave. NW</li> <li>• At Wisteria Ave. NW another line begins and runs south of Malabar Rd. – at this intersection only three lines remain along Malabar Rd. One aerial line and one other line south of Malabar Rd. and one buried line north of Malabar Rd.</li> <li>• Slightly past Bending Branch Way the one aerial line becomes three aerial lines. All other lines remain the same</li> <li>• To the west of Bavarian Ave. SW, one of the additional aerial lines becomes buried for one area then continues as aerial and the other ends</li> <li>• To the east of Bavarian Ave. SW, the other line switched sides of the road and begins running on the north side of Malabar Rd.</li> <li>• To the east of Hurley Blvd. SW, the buried line ends then begins again at Watoga Ave. SW. At this location there are two buried and two aerial lines south of Malabar Rd. and one other line runs north of Malabar Rd.</li> <li>• At Transportation Blvd. one aerial line south of Malabar Rd. crosses under the road with a buried line then continues parallel to Malabar Rd. as an aerial line</li> <li>• At Jupiter Blvd. SW, one buried line turns away from Malabar Rd. and a second aerial line runs north or Malabar Rd.</li> <li>• At Belvedere Rd. NW a conduit begins and runs south of Malabar Rd.</li> <li>• At Backwater Dr. a conduit begins and runs to the north of Malabar Rd.</li> <li>• At Daffodil Dr. SW multiple aerial lines run north of Malabar Rd. while multiple buried lines and one conduit runs south of Malabar Rd.</li> </ul>
Crown Castle Fiber	Fiber Optic Cable (FOC)	<ul style="list-style-type: none"> <li>• Two 1.5" High Density Polyethylene (HDPE) Conduits cross Malabar Rd. near STA. 175+50</li> </ul>
Florida Power and Light-Distribution	Electric	<ul style="list-style-type: none"> <li>• Distribution line on south side of Malabar Rd. until slightly west of Jupiter Blvd. NW where the distribution line crosses Malabar Rd and runs along the north side of Malabar Rd. until it reaches Minton Rd. where it crosses Malabar again and runs on the south side</li> </ul>

**SECTION 2 – EXISTING CONDITIONS**

Utility Company	Facility	Description
Florida Power and Light-Transmission	Electric	<ul style="list-style-type: none"> <li>Existing 230 kV transmission line crosses Malabar Rd. just west of Jupiter Blvd. NW</li> <li>Existing 230 kV transmission line crosses Malabar Rd. west of Bavarian Ave. SW</li> </ul>
Uniti Fiber LLC	FOC	<ul style="list-style-type: none"> <li>Three - 1.25" black ducts wit 96ct FOC beginning at STA 182+50 to STA 272+50.</li> <li>Small aerial portion beginning at STA. 272+50 and continuing through the end of the job</li> <li>At STA. 271+00 the ducts cross Malabar Rd.</li> </ul>
Bright House Networks, LLC	FOC	<ul style="list-style-type: none"> <li>Existing overhead Cable TV runs south of Malabar Rd. from the beginning of the job through STA 177+50</li> <li>Existing underground CATV runs north of Malabar Rd. from STA. 156+50 to approximate STA 177+75 and transitions to overhead CATV from approximate STA. 177+75 to approximate STA. 271+00</li> <li>Underground CATV runs south of Malabar Rd, from approximate STA. 229+00 to approximate STA. 238+50</li> <li>Underground CATV crosses Malabar Rd. at approximately STA 79+00, approximate STA. 182+50, approximate STA. 226+00, approximate STA. 229+00, and approximate STA 257+00</li> <li>Overhead CATV crossed Malabar Rd. at approximate STA. 129+00, approximate STA. 140+00, approximate STA. 177+50, approximate STA. 192+75, approximate STA. 202+50, approximate STA. 207+50, approximate STA. 211+75, approximate STA. 221+50, approximate STA. 247+00, approximate STA. 260+50, and approximate STA. 272+25</li> <li>At approximate STA. 265+75 underground CATV crosses Malabar Rd. and runs south of Malabar Rd. until approximate STA. 267+50</li> <li>At approximate STA. 271+00 overhead CATV crosses Malabar Rd. and runs south of Malabar Rd through the end of the job</li> </ul>
Hotwire Communications	FOC/Phone	<ul style="list-style-type: none"> <li>Permitted and approved for the installation of (1) 3" conduit by directional bore along the south side of Malabar Road crossing C-10 (229' R/W width) with a depth below the canal bottom of fourteen feet. The bore will run for approximately 340 feet on the south side of Malabar Road Bridge #704004.</li> </ul>



**Table 16: UAO Contacts**

Utility Company	Contact	Email Address	Phone Number
AT&T Distribution	Luke Folkerts	LF2490@att.com	407-496-6041
Bright House Networks, LLC	Paul Rymer	Paul.Rymer@charter.com	321-757-6503
City of Palm Bay Utilities Department	Christopher Little	Christopher.little@palmbayflorida.org	321-952-3410
Crown Castle Fiber	Danny Haskett	Danny.Haskett@crowncastle.com	786-246-7827
Florida Power and Light-Distribution	Andrew Zicker	AndrewZicker@fpl.com	321-726-4833
Florida Power and Light-Transmission	Beau Bentley	Beau.Bentley@fpl.com	803-835-5982
Hotwire Communications	Eddie Miranda	EMiranda@Hotwiremail.com	321-710-1733
Uniti Fiber LLC	James Mosley	James.Mosley@uniti.com	251-654-8216

In accordance with Part 2, Chapter 10 of the PD&E Manual, the utility providers listed in **Table 15** were contacted on March 31, 2020 of the proposed improvements and requested to identify any easements and the location of their existing/planned utilities within the study area.

#### *2.2.21 Soils & Geotechnical Data*

The Natural Resources Conservation Service (NRCS) Soil Survey for Brevard County was reviewed for near-surface soil and groundwater information. The NRCS Soil Survey map of the study area is provided in **Figure 24** and the soils depicted in the vicinity of the project alignment are summarized in **Table 17**.

The majority of the study area's soils are poorly drained sands with shallow seasonal high groundwater conditions. The soils classified as sand (A-3) to silty fine sand (A-2-4) are generally suitable for roadway construction and are classified by FDOT as select material. However, the sand layers are typically underlain by shallow clayey fine sand to sandy clay (A-2, A-2-6, A-4, A-6), classified by FDOT as plastic material. The plastic soils have been limited to fill material for roadway embankment construction and can cause a shallow, perched groundwater condition, impacting pavement base.

## SECTION 2 – EXISTING CONDITIONS

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The seasonal high-water table is typically within 1.5 feet of the natural ground surface. Shallow groundwater can impact roadway grades and stormwater pond site selection, design, and construction.

The NRCS Soil Survey information is general and may be outdated. It may not be reflective of actual soil and groundwater conditions, particularly if recent development in the site vicinity has modified soil conditions or surface/subsurface drainage. The NRCS seasonal high groundwater levels summarized above do not account for changes in groundwater due to development and are only relevant for the natural, undisturbed soil condition.

The primary geotechnical considerations for roadway and pond design and construction will be the shallow groundwater conditions within the roadway widening limits. Continuation of the roadway cross slope in roadway widening locations will lower the exterior pavement grades and shallow groundwater may impact the pavement section design and result in the need for asphalt base or roadway underdrains. In addition, pond sites with relatively shallow surficial groundwater levels typically necessitate wet detention pond systems. Additional information regarding geotechnical needs is documented in the project's *Report of Geotechnical Engineering Exploration*.

SECTION 2 – EXISTING CONDITIONS

**Table 17: Soils in Project Vicinity**

Unit No.*	Soil Name		Depth (inches)	Soil Description	AASHTO Soil Classification Symbol	Seasonal High Groundwater Depth Range (feet)	Hydrologic Group
2	Anclote sand, frequently ponded, 0 to 1 percent slopes		0 - 80	Sand	A-3, A-2-4	+2.0 - 0.0	A/D
17	Eau Gallie sand, 0 to 2 percent slopes		0 - 22	Sand	A-3, A-2-4	0.5 – 1.5	A/D
			22 - 58	Sand, fine sand	A-3, A-2-4		
			58 - 80	Sandy loam, fine sandy loam	A-4, A-2-4		
Bridge	142+00		0 - 22	Sand	A-3, A-2-4	#704004	C-10
18	Eau Gallie, Winder, and Riviera soils, depressional	Eau Gallie, depressional	0 - 22	Sand, fine sand	A-3	+2.0 - 0	A/D
			22 - 35	Sand, fine sand	A-2		
			35 - 55	Sand, fine sand	A-3		
			55 - 61	Sandy loam, fine sandy loam, sandy clay loam	A-2		
			61 - 80	Sand, loamy sand, sandy loam	A-2		
		Winder, depressional	0 - 12	Loamy sand	A-2		B/D
			12 - 17	Sandy loam, loamy sand, fine sandy loam	A-2		
			17 - 65	Sandy clay loam	A-2, A-6		
		Riviera, depressional	0 - 30	Sand	A-3		A/D
			30 - 49	Sandy loam, sandy clay loam	A-2		
			49 - 62	Sand, sandy loam, loamy fine sand	A-2, A-3		
19	Riviera sand, 0 to 2 percent slopes		0 - 28	Sand	A-2-4, A-3	0.3 – 1.5	C/D
			28 - 39	Sandy loam, sandy clay loam	A-2-4, A-4, A-6		

**SECTION 2 – EXISTING CONDITIONS**

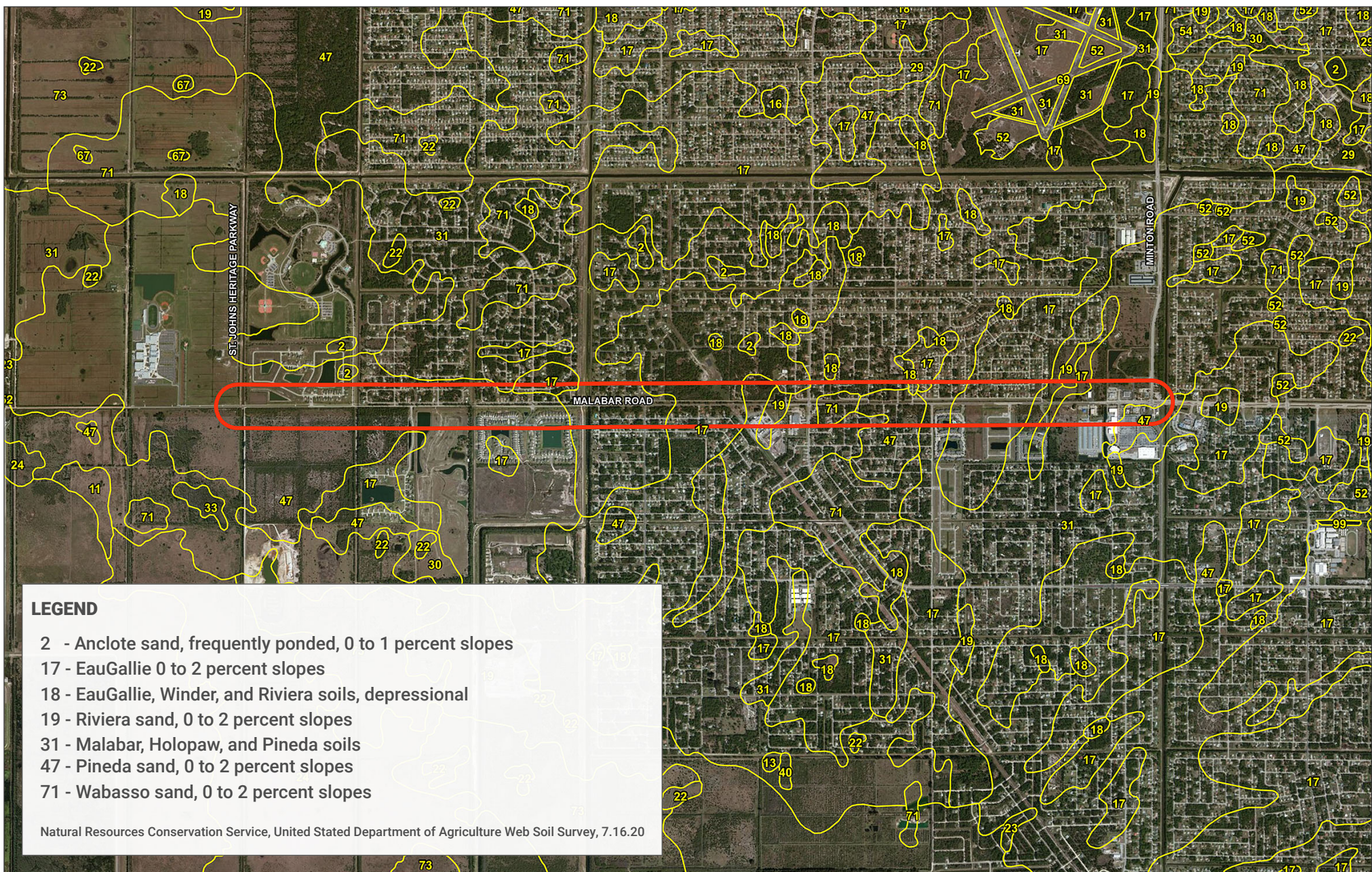
Unit No.*	Soil Name		Depth (inches)	Soil Description	AASHTO Soil Classification Symbol	Seasonal High Groundwater Depth Range (feet)	Hydrologic Group	
			39 - 55	Sandy loam, fine sandy loam, sandy clay loam	A-2-4, A-4, A-6			
			55 - 80	Sandy loam, sandy clay loam	A-4, A-6			
31	Malabar, Holopaw, and Pineda soils		Malabar	0 - 45	Sand	A-3	0.0 – 1.0	A/D
				45 - 54	Sandy clay loam, fine sandy loam, clay loam	A-2, A-6		
				54 - 61	Sandy loam, sandy clay loam	A-2, A-6		
				61 - 65	Sand, fine sand, loamy fine sand	A-2, A-3		
			Holopaw	0 - 45	Sand, fine sand	A-3		
				45 - 62	Sandy loam, sandy clay loam, fine sandy loam	A-2		
				62 - 71	Loamy sand, loamy fine sand, fine sand	A-2, A-3		
			Pineda	0 - 35	Sand, fine sand	A-3		
				35 - 38	Loamy sand, sandy loam	A-2		
				38 - 60	Sandy loam, sandy clay loam, fine sandy loam	A-2		
				60 - 65	Loamy sand, sand, sandy loam	A-3, A-2		
			47	Pineda sand, 0 to 2 percent slopes		0 - 35		
35 - 60	Sandy clay loam, sandy loam	A-2-4, A-6, A-4						

**SECTION 2 – EXISTING CONDITIONS**

Unit No.*	Soil Name	Depth (inches)	Soil Description	AASHTO Soil Classification Symbol	Seasonal High Groundwater Depth Range (feet)	Hydrologic Group
		60 - 80	Sandy loam, sand, loamy sand	A-2-4		
71	Wabasso sand, 0 to 2 percent slopes	0 - 30	Sand	A-3, A-2-4	0.5 – 1.5	C/D
		30 - 58	Sandy clay loam	A-6, A-7-6		
		58 - 80	Loamy sand, sandy loam	A-2-4, A-2-6		

\*Note: The specific locations of these soils can be found on **Figure 24**.





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NRCS SOIL SURVEY MAP

**FIGURE 24**



### *2.2.22 Aesthetics Features*

No scenic views/vistas or aesthetic features (landscaping, pavers, noise walls, etc.) are located along Malabar Road within the project limits.

### *2.2.23 Traffic Signs*

No overhead traffic signs are located along Malabar Road within the project limits. Regulatory signage is present in the form of stop signs at unsignalized intersections and speed limit signs posted intermittently along the corridor. Warning signage is located where hazards are present and for the westbound merge lane is present from west of the Shopping Plaza signalized intersection to the Minton Road signalized intersection. Transit stop signage is present along the side of the roadway. Guide signage such as street name signs are present at signalized and unsignalized intersections along the corridor.

### *2.2.24 Noise Walls & Perimeter Walls*

No noise or perimeter walls are located along Malabar Road within the project limits.

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

No existing ITS/TSM&O features are located along Malabar Road within the project limits.

## **2.3 Existing Bridges and Structures**

There are a total of four bridges and one non-bridge concrete culvert located within the project limits:

1. Malabar Road over MTWCD Canal C-10 Bridge (Bridge No. 704004)
2. Pedestrian Bridge over Canal C-8
3. Pedestrian Bridge over Canal C-9
4. Pedestrian Bridge over Canal C-10
5. Non-Bridge Concrete Box Culvert at MTWCD Canal C-8

A detailed description of each structure is provided in this section.

### *2.3.1 Canal C-10 Bridge*

The existing Malabar Road over MTWCD Canal C-10 Bridge (Bridge No. 704004) was constructed in 1972 with no widenings or major repairs to date. The bridge and approach slabs are located on a horizontal tangent with no PI points within the bridge limits. Both the bridge and approach slabs are located on a relatively flat vertical grade, while the bridge typical section is on a normal crown. The bridge is non-skewed and intersects Canal C-10 at a 90-degree angle.

Existing bridge plans are not available; therefore, bridge dimensions were approximated based on field measurements and information provided in the most recent Bridge Inspection Report (BIR)

(included in **Appendix D**). The bridge is comprised of five approximate 28' equal spans for an overall approximate 140' bridge length. The bridge measures approximately 36'4" overall width consisting of two 11' travel lanes, two 3' outside shoulders, two 3'1" raised sidewalks, and two 1'1" wide concrete railings (see **Figure 25**). The existing concrete railings are substandard and do not meet current Manual for Assessing Safety Hardware (MASH) criteria.

The bridge superstructure utilizes 18"-thick precast/prestressed (PC/PS) concrete voided slab units with an asphalt overlay of varying thickness. Through-deck drainage scuppers are present along each gutter line discharging runoff directly into Canal C-10. The bridge substructure utilizes cast-in-place concrete abutments and intermediate bents supported by 14"-square PC/PS concrete piles with the abutments protected by concrete slope paving. Three (3) conduits are attached along the bridge's north side, while a MTWCD stage-discharge gage is attached to a north side single intermediate bent cap.

Based on the most recent BIR (Feb. 2020), the bridge is in "fair" to "good" condition with a sufficiency rating of 65.1. The bridge sufficiency rating is derived by evaluating factors indicating the structure's ability to remain in service. A 100 percent rating would represent an entirely sufficient bridge and a zero percent rating would represent an entirely deficient bridge. The FDOT standards indicate structures with a sufficiency rating of 80 percent or less require some rehabilitation and those less than 50 percent require replacement.

The National Bridge Inventory (NBI) rating includes structural evaluation of deck, superstructure, substructure, and culvert on a 0-9 scale. Rating of 0 indicates failed condition (out of service and beyond corrective action) and rating of 9 indicates excellent condition. The NBI is 5 (Fair condition – all primary structural elements are sound but may have minor corrosion, cracking, or chipping. May include minor erosion on bridge piers.) for the deck and superstructure elements and a 7 (good condition – some minor problems) for the substructure elements. Information gathered from the National Bridge Inventory is summarized in **Table 18**.

Past bridge inspection reports have documented cracking in the asphalt wearing surface at the longitudinal joints between adjacent bridge slab units. This issue is common in non-composite slab unit bridges and is caused by differential deflection between adjacent units. While this cracking does not pose structural concerns, it creates ongoing maintenance issues related to crack sealing, longitudinal joint damage, and asphalt failure. Due to these concerns, FDOT issued a memorandum in 1984 discontinuing the use of these systems until a new system that eliminated longitudinal cracking could be developed.



**Table 18: Existing Canal C-10 Bridge Information**

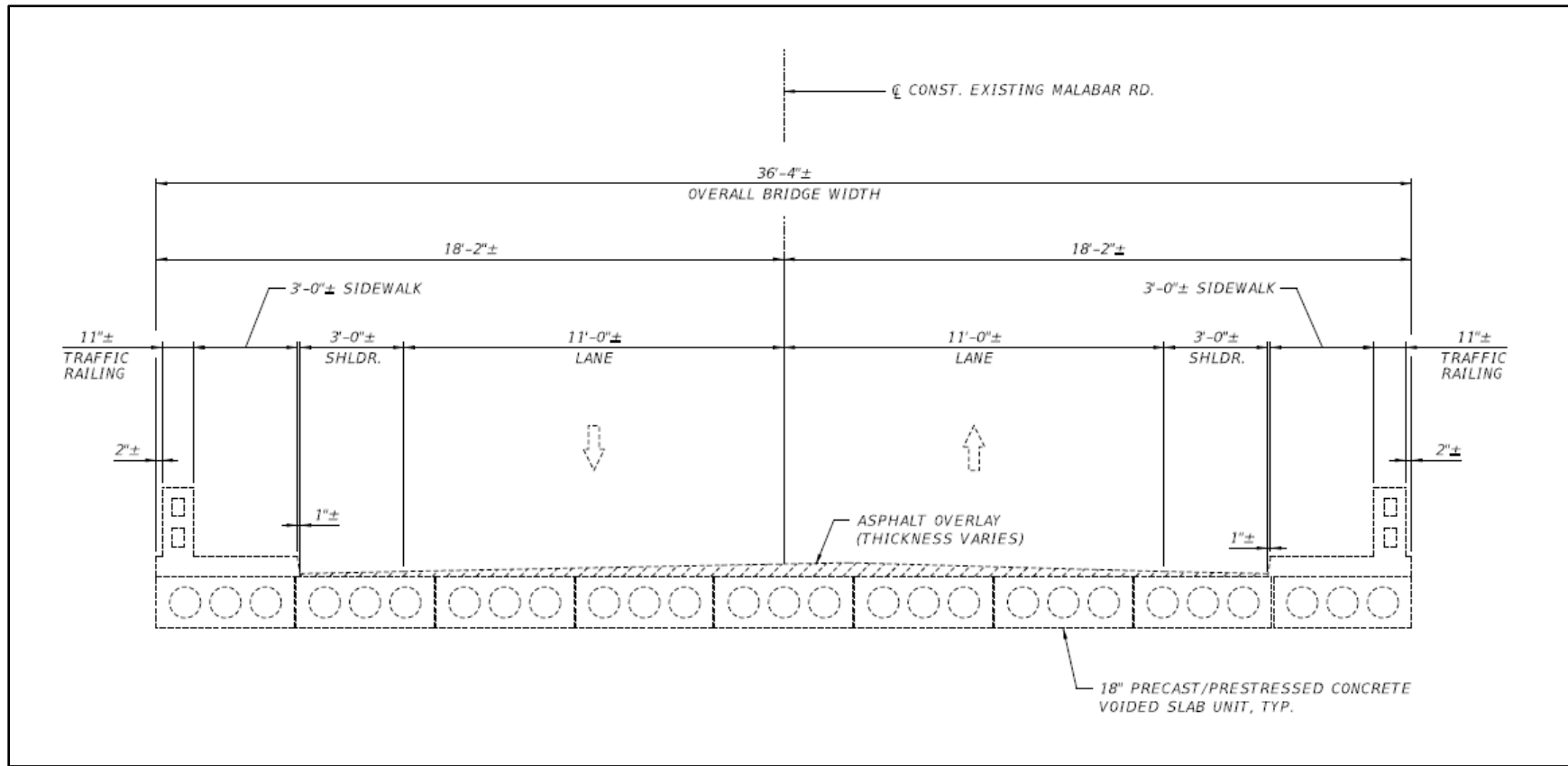
Category	Bridge No. 704004
Year Constructed	1972
Structure Name	Malabar Road over Canal C-10
Facility Carried	Malabar Road
Approximate Location	2.5 Miles West of Minton Road
Owner/Maintaining Agency	County Highway Agency
Crossing/Waterway/Canal ID	Canal C-10 (MTWCD)
Bridge Length	140.1 ft.
Number of Traffic Lanes	2
Number of Spans	5
Structure Type	Pre-Stressed Concrete
Pile Type	Concrete
Deck Type	Concrete Precast Panels
Deck Condition	5 – Fair
Superstructure Condition	5 – Fair
Substructure Condition	7 – Good
Sufficiency Rating	65.1

A bridge load rating was performed in 2010 with a load rating summary included as part of the most recent BIR. The rating concluded that the bridge was at, or above, legal loads, and posting was not required. However, the load rating was based on assumed data since no existing bridge plans were available and it may not represent as-built conditions. Any re-use of the structure requires supplemental field data and evaluation to determine actual structural properties to be used for a more thorough and accurate load rating.

Based on the substandard railings, low sufficiency rating, superstructure type, and documented maintenance issues, it would not be a prudent expenditure of public funds to widen the existing structure in order to attain a 50 to 75 year service life for the overall structure. Therefore, it is recommended the bridge be replaced as part of the four-lane widening.

**Appendix D** provides additional information on the existing Canal C-10 bridge.

**SECTION 2 – EXISTING CONDITIONS**



**Figure 25: Existing Canal C-10 Bridge Typical Section**

### 2.3.2 *Pedestrian Bridges*

In addition to the vehicular bridge over Canal C-10, there are three existing pedestrian bridges within the project limits located along Malabar Road's north side:

1. Pedestrian Bridge over Canal C-8 – Single-Span, 8' Wide x 60' Long
2. Pedestrian Bridge over Canal C-9 – 2-Span, 8' Wide x 80' Long
3. Pedestrian Bridge over Canal C-10 – 3-Span, 8' Wide x 168' Long

The three pedestrian bridges were constructed in 1999 utilizing PC/PS concrete double tee beams supported by cast-in-place concrete bents with 14"-square PC/PS concrete piles. Concrete slope paving is located in front of each abutment. Based on a field review, the bridges utilize pipe guiderails along each outside edge. Typically, pipe guiderails are intended for use on drop-off hazards 60 inches or less; whereas pedestrian/bicycle railings are intended for use on drop-off hazards greater than 60 inches (FDM 224.15(2)). The three pedestrian bridges have drop-off hazards in excess of 60 inches.

Since the pedestrian bridges are not located over a State maintained highway or a Non-State Federal Aid highway, they are not covered by the FHWA National Bridge Inspection Standards. As a result, they are not inspected as part of the FDOT Structures Inspection Program (FDOT Bridge and Other Structures Inspection and Reporting, Topic No. 850-010-030-k). The inspection and maintenance of these bridges falls to the owner, the City of Palm Bay. Currently, the City does not inspect these bridges. Regardless of owner, pedestrian bridges are typically not load rated. Partial existing plans were available for the pedestrian bridges; however, the plans did not have sufficient structural information to determine if the bridges meet current standards. Therefore, the study team cannot make a recommendation regarding the continued use of these structures.

### 2.3.3 *Concrete Box Culvert at Canal C-8*

There is one existing, non-bridge, concrete box culvert (CBC) located within the project limits. The existing single barrel CBC is located at Canal C-8 and has the following dimensions: 6' (H) x 8' (W) x 51' (L). The CBC runs parallel to the canal with 90-degree wingwalls at all four corners of the structure. Recently constructed in 2020, the culvert is in excellent condition; therefore, the box culvert is a viable candidate for re-use and lengthening.

## 2.4 Existing Environmental Features

### 2.4.1 *Social Environment*

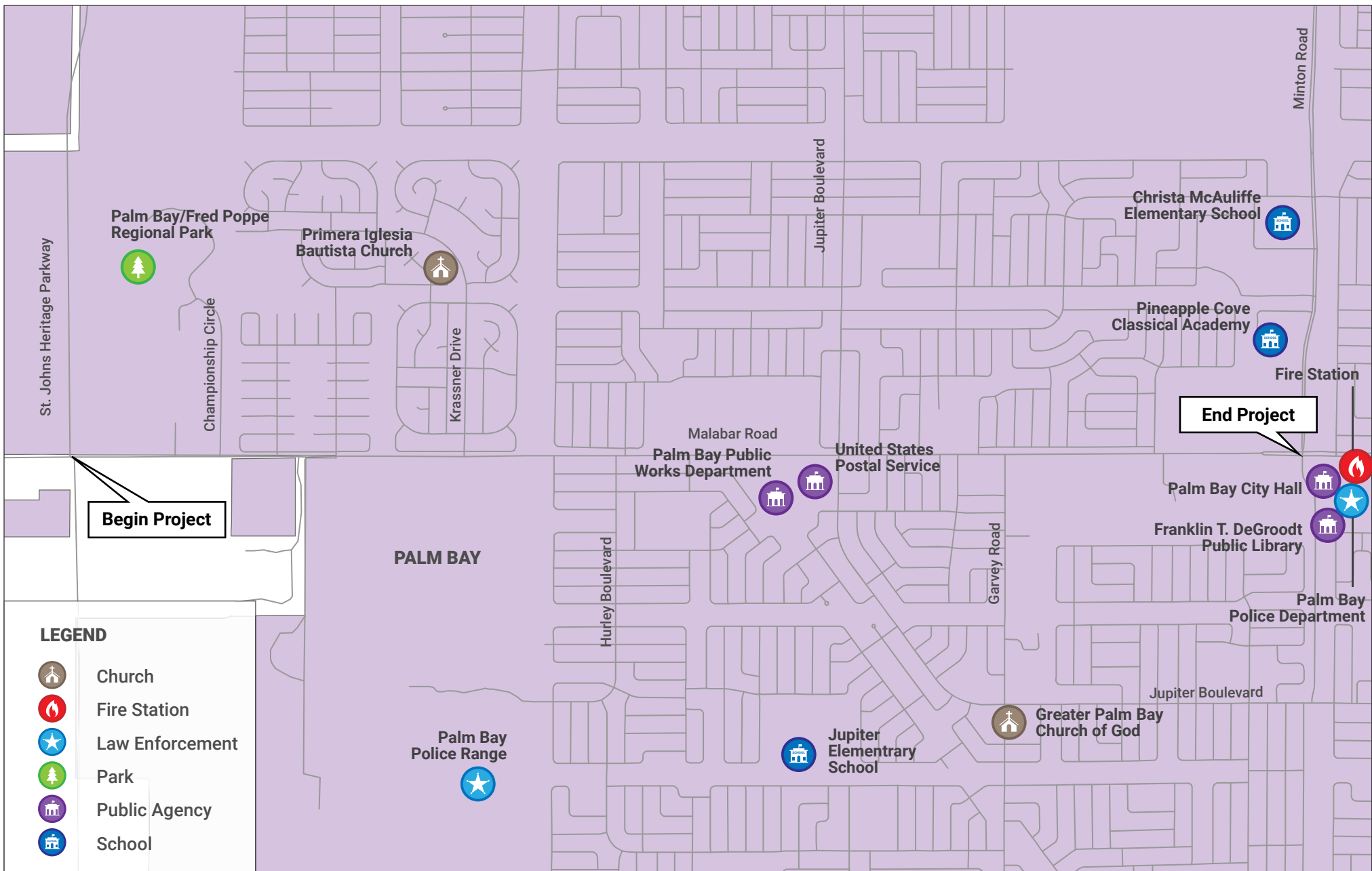
#### 2.4.1.1 Community Features and Demographics

**Figure 26** shows the community features along the study corridor such as law enforcement, City of Palm Bay Public Works Department, USPS, churches, and fire stations. Fred Poppe Regional Park is located on the study corridor's western end north of Malabar Road (not adjacent to the roadway), the Palm Bay Public Works Department is located on Malabar Road's south side just west of Jupiter Boulevard, and Palm Bay City Hall is located on Malabar Road's south side just east of Minton Road.

Based on the Environmental Screening Tool's Sociocultural Data Report (SDR), there are 434 households with a population of 1,309 residents identified within 500-foot buffer along the project corridor. Approximately 90 percent of households are single family dwelling units while approximately 10 percent are multifamily units. The median income is slightly over \$50,000 with just over 17 percent of the households below poverty level. Minority population comprises approximately 47 percent of the total population adjacent to the study corridor.

#### 2.4.1.2 Existing Farmlands

As discussed in **Section 2.2.5** and shown in **Figure 14**, a majority of the agricultural land/farmlands are on the west side of the study corridor. The largest agricultural areas are located along Malabar Road's south side between the St. Johns Heritage Parkway and Canal C-9.



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COMMUNITY FEATURES

**FIGURE 26**

### 2.4.2 *Natural Environment*

No significant natural features were identified within the limits of the Malabar Road study area including public and private conservation land; special aquatic sites, including sanctuaries and refuges, Wild and Scenic Rivers, Aquatic Preserves, and Outstanding Florida Waters; nor does it provide designated critical habitat or Essential Fish Habitat to federally protected or managed species. However, the proposed project is located near the Three Forks Conservation Area (TFCA).

The TFCA is a 53,335-acre property owned and managed by the SJRWMD. This conservation area lies within the Upper St. Johns River Basin and comprises a significant portion of the Upper St. Johns River Basin Project, a cooperative effort with the United States Army Corps of Engineers (USACE) to provide flood control and environmental protection in the region. Comprised mostly of floodplain marsh and wet prairie, the TFCA provides habitat for protected species including the Audubon's crested caracara, Everglade snail kite, wood stork, bald eagle, southeastern American kestrel, Florida sandhill crane and wading birds. While the project area does not include the TFCA, adjacent parcels abut the TFCA boundary, which is approximately 0.25 miles west of the western terminus of the proposed project. No impacts to the TFCA are anticipated as a result of the proposed roadway improvements.

#### 2.4.2.1 Potentially Occurring Listed Species

A total of 40 protected species have the potential to occur in the Malabar Road study area, according to the information obtained during the preliminary data collection. These include three (3) reptile, 15 avian, two (2) mammal, one (1) insect, and 19 plant species shown in **Table 19**. Ecologists determined a species' potential occurrence in the study area based on its habitat preferences and distributions, existing site conditions, historical data, and multiple field surveys. The likelihood of occurrence was rated as low, moderate, high, or observed. A low rating indicates that the species occurs in Brevard County, but suitable habitat is not present within the study area and the species has not been observed or documented within the study area. A moderate rating indicates that the species occurs in Brevard County, suboptimal habitat or limited suitable habitat occurs within the study area, but the species has not been observed in species-specific surveys or documented within the study area. A high rating indicates that the species occurs within Brevard County, suitable habitat is present within the study area and the species is suspected to occur or has been previously documented within the study area. Observed species are those that have been observed during the evaluation for this PD&E study. Protected species occurrences within the Malabar Road study area are shown on **Figure 3-1** of the project's NRE. The NRE is located in the project file as well.

**Table 19: Potentially Occurring Listed Species**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Status</b>
<b>Reptiles</b>		
Eastern indigo snake	<i>Drymarchon couperi</i>	FT
Florida pine snake	<i>Pituophis melanoleucus</i>	ST
Gopher tortoise	<i>Gopherus polyphemus</i>	ST
<b>Birds</b>		
Audubon's crested caracara	<i>Polyborus plancus audubonii</i>	FT
Bald eagle	<i>Haliaeetus leucocephalus</i>	BGEPA / MBTA
Eastern black rail	<i>Laterallus jamaicensis jamaicensis</i>	FT
Everglade snail kite	<i>Rostrhamus sociabilis plumbeus</i>	FE
Florida burrowing owl	<i>Athene cunicularia floridana</i>	ST
Florida grasshopper sparrow	<i>Ammodramus savannarum floridanus</i>	FE
Florida sandhill crane	<i>Antigone canadensis pratensis</i>	ST
Florida scrub-jay	<i>Aphelocoma coerulescens</i>	FT
Little blue heron	<i>Egretta caerulea</i>	ST
Red-cockaded woodpecker	<i>Dryobates borealis</i>	FE
Reddish egret	<i>Egretta rufescens</i>	ST
Roseate spoonbill	<i>Platalea ajaja</i>	ST
Southeastern American kestrel	<i>Falco sparverius Paulus</i>	ST
Tricolored heron	<i>Egretta tricolor</i>	ST
Wood stork	<i>Mycteria americana</i>	FT
<b>Mammals</b>		
Florida black bear	<i>Ursus americanus floridanus</i>	M
Tricolored bat	<i>Perimyotis subflavus</i>	C
<b>Insects</b>		
Monarch butterfly	<i>Danaus Plexippus</i>	C
<b>Plants</b>		
Blue-flowered butterwort	<i>Deeringothamnus pulchellus</i>	ST
Carter's werea	<i>Warea carteri</i>	FE
Celestial lily	<i>Nemastylis floridana</i>	SE

**SECTION 2 – EXISTING CONDITIONS**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Status</b>
Coastal vervain	<i>Glandularia maritima</i>	SE
Cut-throat grass	<i>Panicum abscissum</i>	SE
Florida beargrass	<i>Nolina atopocarpa</i>	ST
Giant Orchid	<i>Pteroglossaspis ecristata</i>	ST
Large-flowered rosemary	<i>Conradina grandiflora</i>	ST
Lewton’s polygala	<i>Polygala lewtonii</i>	SE
Many-flowered grass pink	<i>Calopogon multiflorus</i>	ST
Nodding pinweed	<i>Lechea cernua</i>	ST
Plume polypody	<i>Polypodium plumula</i>	SE
Redmargin Zephyrlily	<i>Zephranthes simpsonii</i>	ST
Sand butterfly pea	<i>Centrosema Arenicola</i>	SE
Short-leaved rosemary	<i>Conradina brevifolia</i>	FE
Small’s flax	<i>Linum carteri var. smallii</i>	SE
Swamp plume polypody	<i>Polypodium ptilodon</i>	SE
Widespread polypody	<i>Polypodium dispersum</i>	SE
Yellow-flowered butterwort	<i>Pinguicula lutea</i>	SE

FE = Federally Endangered; FT = Federally Threatened

SE = State Endangered; ST = State Threatened

M = Managed; C = Candidate

BGEPA = Bald and Golden Eagle Protection Act; MBTA = Migratory Bird Treaty Act

**2.4.2.2 Federally Listed Species and Designated Critical Habitat**

The study area is located within or partially within the USFWS Consultation Area (CA) of the Audubon’s crested caracara, Everglade snail kite, Florida grasshopper sparrow, Florida scrub-jay, and red-cockaded woodpecker. A Consultation Area is intended to identify the geographical landscape where each federally listed species is most likely to occur. The westernmost portion of the proposed project corridor occurs within the secondary protection zone (1,500 meters) of two Audubon’s crested caracara nests. Portions of the study area also fall within seven wood stork Core Foraging Areas (CFA), 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 species, including the eastern indigo snake, eastern black rail, tricolored bat, and monarch butterfly.



## SECTION 2 – EXISTING CONDITIONS

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### 2.4.2.3 State Listed Species

The Florida Fish and Wildlife Conservation Commission (FWC) maintains the list of animals designated as federally endangered, federally threatened, state threatened, or species of special concern. The FWC has developed a comprehensive management plan and species action plans for the state's 59 state-listed species (FWC 2016, 2020). For this project the following state listed species were identified: Florida Burrowing Owl, Florida Pine Snake, Florida Sandhill Crane, Gopher Tortoise, Southeastern American Kestrel, and Imperiled Wading Birds.

### 2.4.2.4 Other Protected Species or Habitats

For this project the following other protected species or habitats were identified: Bald Eagle and Florida Black Bear.

## 2.4.3 *Physical Environment*

### 2.4.3.1 Contamination

Contamination concerns in the study area include cattle grazing operations that may have incorporated cattle dip vats (arsenic) and citrus groves (herbicides/pesticides/heating oil). The majority of the contamination facilities are located on the study area's eastern portion near Minton Road. The study area is characterized by agricultural, residential, and commercial land uses with several contamination impact areas. Utilizing aerial photographs and FDEP's Map Direct website, the study team has identified the following potential contamination concerns in the study area for consideration in the evaluation of alignment alternatives:

- Cattle grazing (agricultural land use);
- Citrus Groves (agricultural land use);
- Eight (8) petroleum tank sites;
  - One (1) tank site has documented contamination impacts.
- Five (5) hazardous material sites;
- Two (2) solid waste / disaster debris management sites;
- One (1) arsenic groundwater contamination plume encompassing two (2) sites; and
- No CERCLA or Superfund sites were found within one mile.

The predominant indicators of potential study area contamination are the eight petroleum tank sites and the arsenic groundwater contamination plume. Petroleum storage tanks are prone to leakage and spills, causing contaminated soil and/or groundwater.

The *Level I Contamination Screening Evaluation Report* (CSER) assessed the risk of encountering petroleum or hazardous substance contamination of soil, groundwater, surface water, or sediment that could adversely affect the Malabar Road widening. The CSER activities included a review of public regulatory files and historical data sources, and a site reconnaissance of the project study area. As a result of this evaluation, Contamination Risk Ratings have been assigned to 21 sites.

**SECTION 2 – EXISTING CONDITIONS**

The 21 site locations are shown on **Figure 27**. The contamination status, a detailed description, and a photograph of each site are summarized in the *Malabar Road Level I Contamination Screening Evaluation Report*.

Using the FDOT Risk Ratings, 12 Low Risk sites (**Table 20**) and nine Medium Risk sites (**Table 21**) have been identified. Level II Impact to Construction Assessments may be required for the Medium Risk sites along Malabar Road.

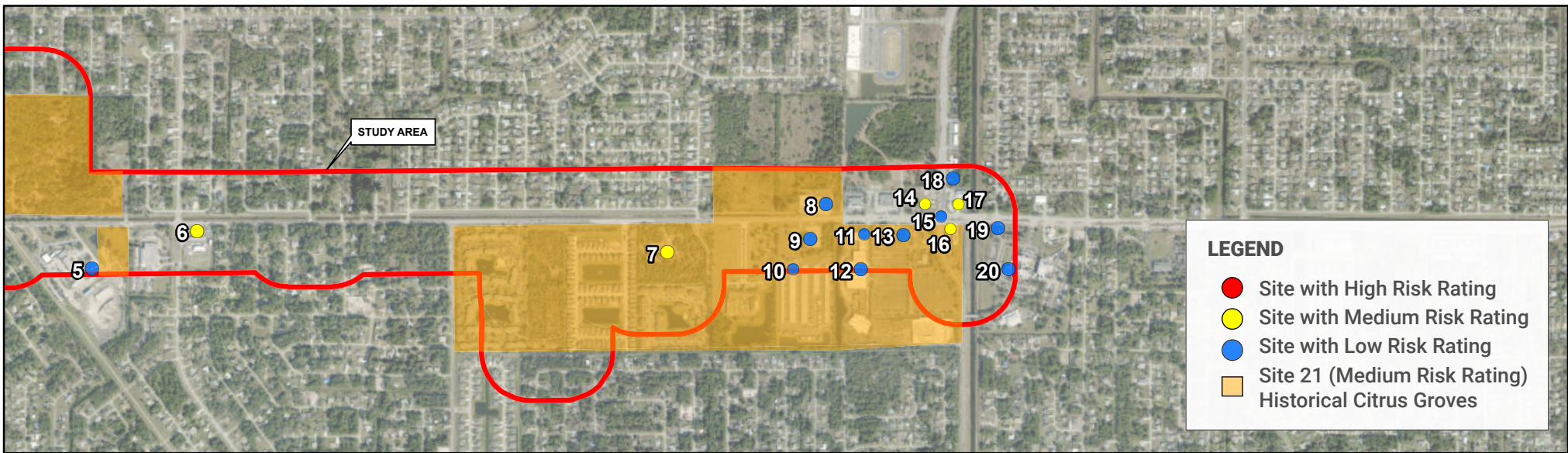
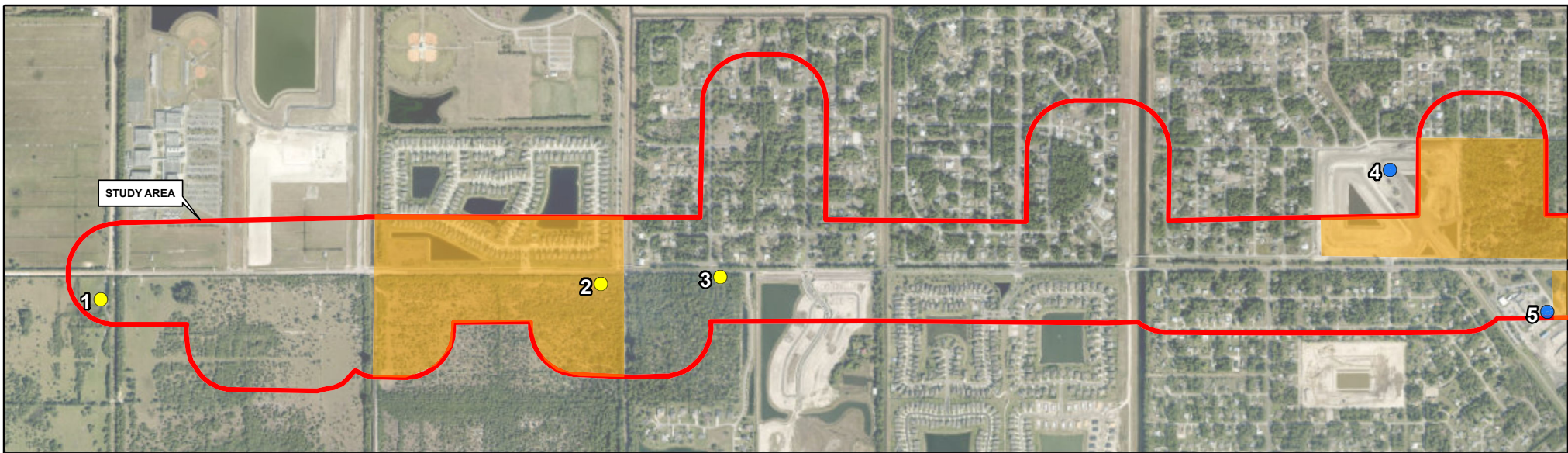
**Table 20: Low Risk Contamination Sites from Level 1 CSER**

Site Number	Site Name	Site Address	Risk Potential
4	Biarritz Disaster Debris Management Site	1224 – 1228 Biarritz Street	Low
5	City of Palm Bay - Public Works	1050 Malabar Road	Low
8	O'Reilly Auto Parts	235 Malabar Road	Low
9	Autozone	260 Malabar Road	Low
10	Coastal Biosystem	270 Malabar Road	Low
11	Sun Clean Dry Cleaners	190 Malabar Road #123	Low
12	Winn-Dixie Store #2230	190 Malabar Road	Low
13	Bennett Auto Supply	142 Malabar Road	Low
15	SPILLS Site	Malabar Road & Minton Road	Low
18	Lubrication Specialist Inc.	6369 Minton Road	Low
19	Construction Yard	120 Malabar Road	Low
20	Palm Bay City Hall	120 Malabar Road	Low

**Table 21: Medium Risk Contamination Sites from Level 1 CSER**

Site Number	Site Name	Site Address	Risk Potential
1	Cattle Pen	Malabar Road	Medium
2	Agricultural Barn	2200 Malabar Road	Medium
3	Cattle Pen	Malabar Road	Medium
6	Circle K #2726513	900 Malabar Road	Medium
7	Malabar Cove	3 NW Malabar Road	Medium
14	Bob Youtzy Landclearing	201 Malabar Road	Medium
16	7-Eleven Food Store #32756	6405 Minton Road	Medium
17	Cumberland Farms	105 Malabar Road / 6375 Minton Road	Medium
21	Historical Citrus	N/A	Medium





**LEGEND**

- Site with High Risk Rating
- Site with Medium Risk Rating
- Site with Low Risk Rating
- Site 21 (Medium Risk Rating)  
Historical Citrus Groves

Not to Scale

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POTENTIAL CONTAMINATION SITES FROM LEVEL 1 CSER

**FIGURE 27**

## 3.0 FUTURE CONDITIONS

This section summarizes the traffic forecasting, future no-build traffic evaluation, and future build traffic evaluation for the Malabar Road study corridor. For more information, please see the *Malabar Road Project Traffic Analysis Report*.

### 3.1 Traffic Forecasting

Future traffic conditions were modeled using the Central Florida Regional Planning Model (CFRPM) version 6.1. The model was validated and then used to determine model growth rates for each segment of the Malabar Road corridor. These annual growth rates were applied to the existing Annual Average Daily Traffic (AADTs) as volume growth per year values to determine the 2030 (opening year) and 2050 (design year) future volumes.

### 3.2 Future No-Build Evaluation

The future no-build evaluation assumed the two-lane roadway existing today. The estimated future no-build turning movement volumes were used to analyze the traffic operations at each intersection along Malabar Road during design year weekday AM and PM peak hour traffic conditions. There are four signalized intersections and 15 unsignalized intersections in the future no-build condition. The four signalized intersections are the same as in the existing condition: Krassner Drive/Bending Branch Lane, Jupiter Boulevard, the Plaza Shopping Center, and Minton Road. The future no-build condition added two more unsignalized intersections at Wisteria Avenue/Abilene Drive (for future development adding a south leg to this intersection) and Watoga Avenue/Avery Springs (for future development adding a north leg to this intersection). This increased the number of unsignalized intersections from 13 in the existing condition to 15 in the future no-build condition. The traffic analysis shows three signalized intersections and 12 unsignalized intersections are anticipated to perform at LOS F or with a volume to capacity (V/C) ratio greater than 1.0 in either the AM or PM peak hour, as shown in **Table 22**.



**Table 22: No-Build (2050) Intersection LOS**

Intersection	Control Type	2050 AM LOS	2050 PM LOS
Malabar Rd. & St. Johns Heritage Pkwy.*	Two-Way Stop Control	F	F
Malabar Rd. & Snapdragon Dr.*	Two-Way Stop Control	F	F
Malabar Rd. & Championship Cir.*	Two-Way Stop Control	F	F
Malabar Rd. & Wisteria Ave./ Abilene Dr.*	Two-Way Stop Control	F	F
Malabar Rd. & Krassner Dr./ Bending Branch Ln.**	Signal	D	C
Malabar Rd. & Bavarian Ave.*	Two-Way Stop Control	F	F
Malabar Rd. & Hurley Blvd.*	Two-Way Stop Control	F	F
Malabar Rd. & Watoga Ave.*	Two-Way Stop Control	F	F
Malabar Rd. & Palm Bay Public Works (W)*	Two-Way Stop Control	E	F
Malabar Rd. & Palm Bay Public Works (E)*	Two-Way Stop Control	E	D
Malabar Rd. & Post Office*	Two-Way Stop Control	F	F
Malabar Rd. & Jupiter Blvd.**	Signal	F	F
Malabar Rd. & Santa Rosa Ave.*	Two-Way Stop Control	F	F
Malabar Rd. & Garvey Rd.*	Two-Way Stop Control	F	F
Malabar Rd. & Madalyn Landing*	Two-Way Stop Control	E	E
Malabar Rd. & Sutherland Dr.*	Two-Way Stop Control	E	E
Malabar Rd. & Maywood Ave./ Daffodil Dr.*	Two-Way Stop Control	F	F
Malabar Rd. & Plaza Entrance**	Signal	F	F
Malabar Rd. & Minton Rd.**	Signal	E	E

\*LOS shown is for worst movement

\*\*LOS shown is for entire intersection

The future no-build traffic volumes were also used to analyze the segment operations along Malabar Road. Most segments were analyzed under interrupted flow conditions, but one segment was analyzed under uninterrupted flow conditions. The analysis results shows each of Malabar Road's four segments are anticipated to operate at LOS E or F in at least one direction and in either the AM or PM peak hour.

### 3.3 Future Build Evaluation

The future design year build evaluation was analyzed with Malabar Road as a divided four-lane roadway. The estimated build turning movement volumes were used to analyze the traffic operations at each Malabar Road intersection during the weekday AM and PM peak hour traffic

conditions. For the initial future build evaluation, signals were utilized as the intersection control type to estimate improvement potential for locations where future signals may be warranted. An intersection alternatives analysis was performed for signals and roundabouts at specific intersection locations, and this analysis is discussed in **Section 5.4.5**.

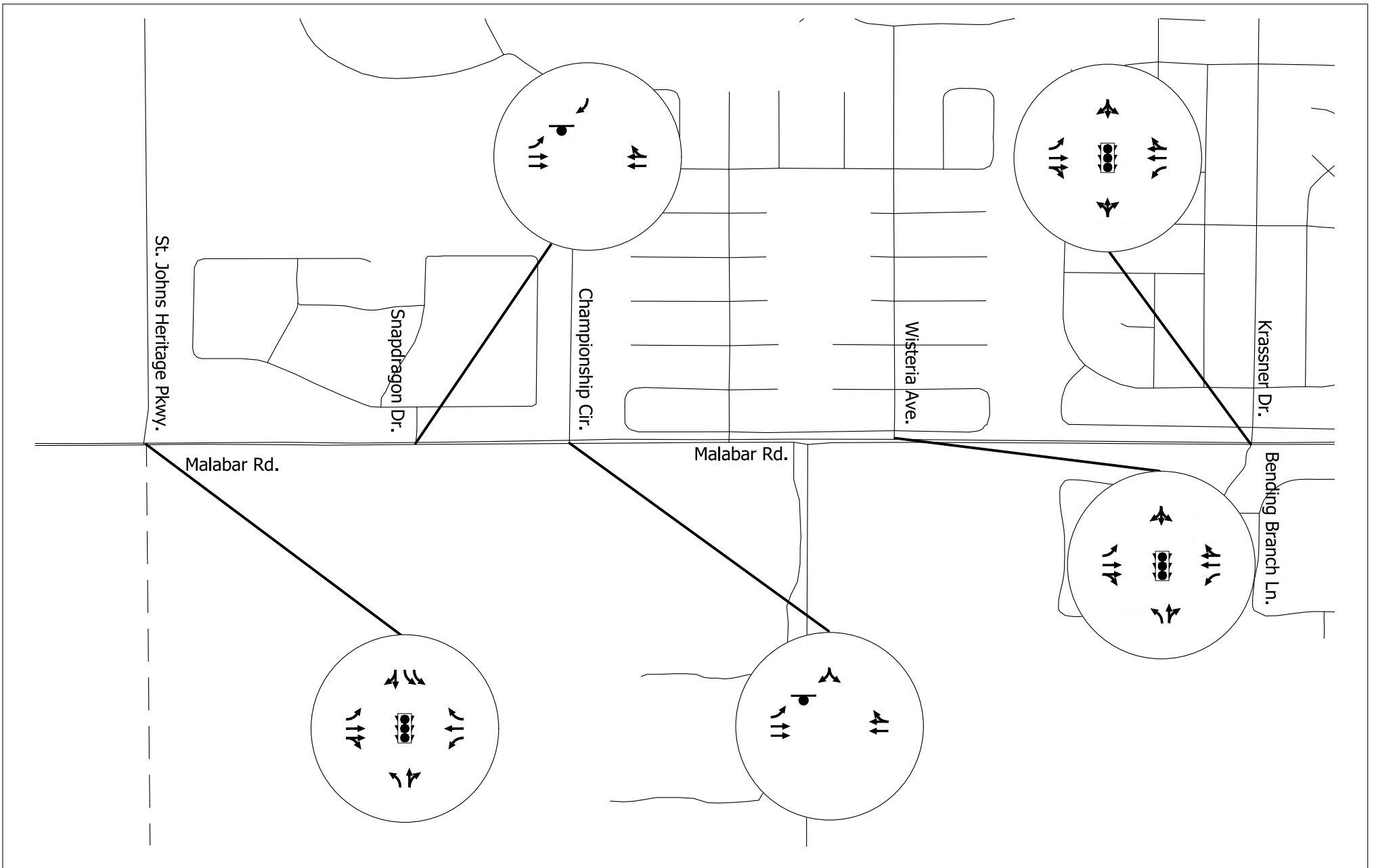
Nine signalized intersections and 10 unsignalized intersections were analyzed in the future build evaluation. Five unsignalized intersections were converted to signalized intersections for the future build evaluation based on a preliminary signal warrant analysis (St. Johns Heritage Parkway, Wisteria Avenue/Abilene Drive, Hurley Boulevard, Garvey Road, and Maywood Avenue/Daffodil Drive). The traffic analysis showed each of the signalized intersections are anticipated to perform at LOS E or better and no intersections operated with a V/C ratio greater than 1.0 in either the AM or PM peak hour.

The future build traffic volumes were also used to analyze the segment operations along Malabar Road. As Malabar Road in the build condition was assumed to be signalized throughout the entire corridor, the corridor was analyzed under interrupted flow conditions. The analysis results shows one segment of Malabar Road is anticipated to operate at LOS F while the rest of the segments are anticipated to operate at LOS C or better. The LOS F segment is due to the short distance (approximately 750') between the signalized intersections at the Plaza Shopping Center and Minton Road and the effect of the overlapping delays of these two adjacent signals. The signals at the Plaza Shopping Center and Minton Road should be optimized as one system in the future build condition to enhance operations between the two signals. These same results were observed during the existing conditions analysis, as shown in **Table 11**.

**Figure 28** provides the future build intersection lane configurations and traffic control. **Figure 29** shows the 2050 traffic volumes and operational performance. **Table 23** provides the future build segment operational results.

### 3.4 Conclusion

The future no-build evaluation shows three of four signalized intersections and 12 of the 15 unsignalized intersections are anticipated to perform at LOS F or with a V/C ratio greater than 1.0 in either the AM or PM peak hour. Additionally, three of the four Malabar Road segments are anticipated to operate at LOS E or F in at least one direction and in either the AM or PM peak hour. These issues can be addressed by widening Malabar Road to four lanes and providing enhancements at the study intersections along the corridor. For more information regarding the future conditions traffic analysis, please see the *Malabar Road Project Traffic Analysis Report*.



Not to Scale

North

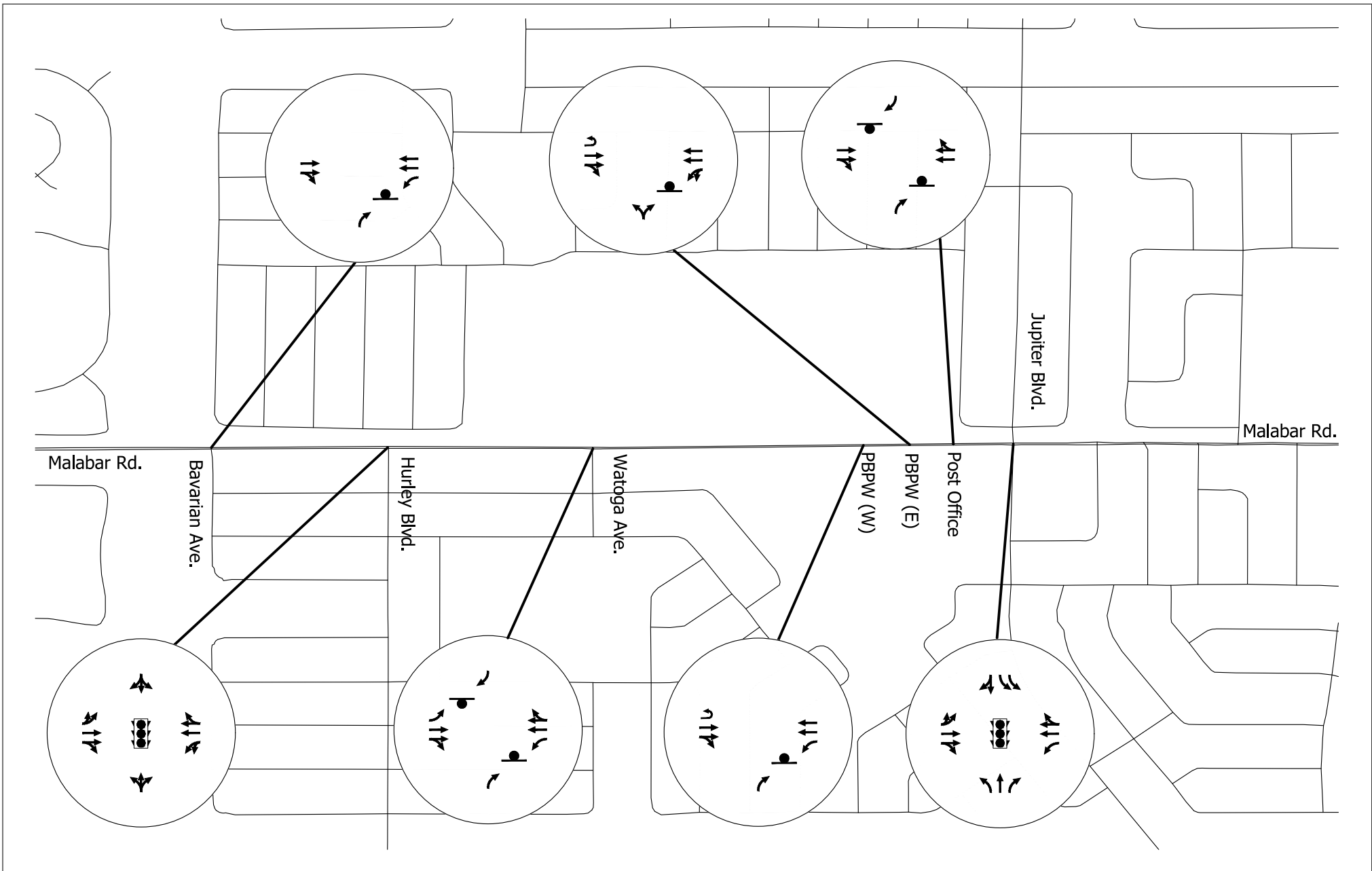
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2050 BUILD LANE CONFIGURATIONS

**FIGURE 28A**





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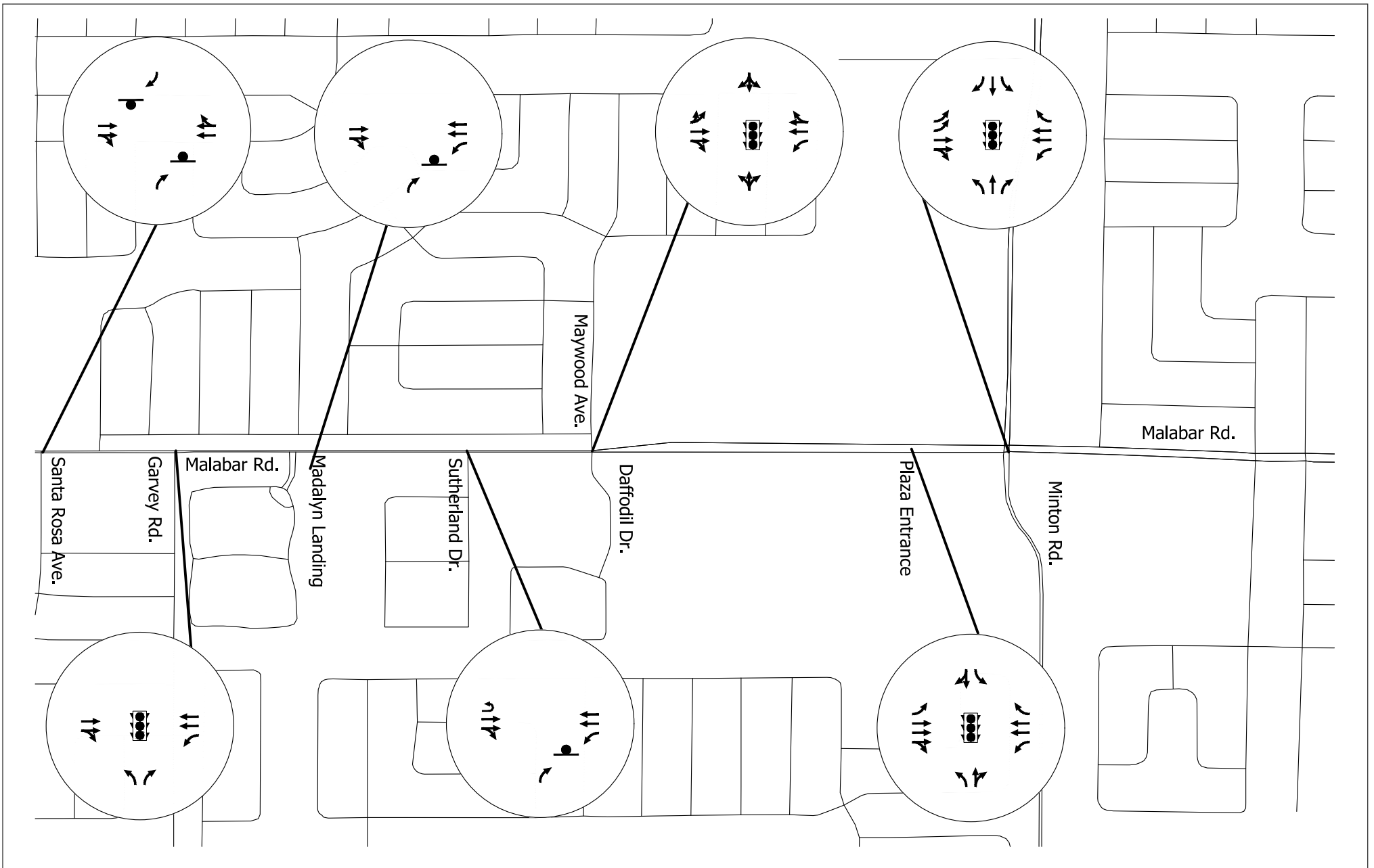
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2050 BUILD LANE CONFIGURATIONS

**FIGURE 28B**



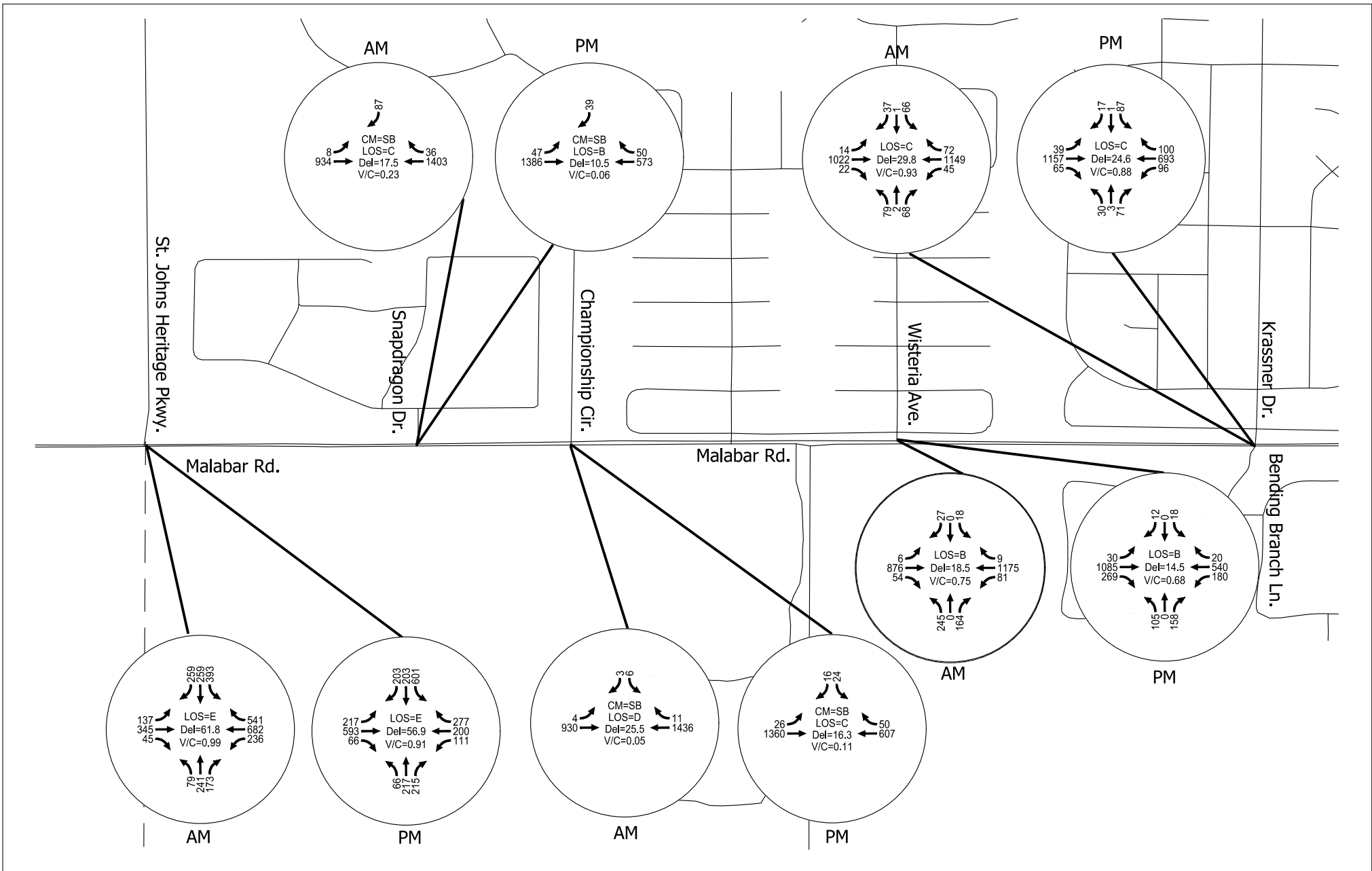
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# Malabar Road PD&E Study

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2050 BUILD LANE CONFIGURATIONS

**FIGURE 28C**



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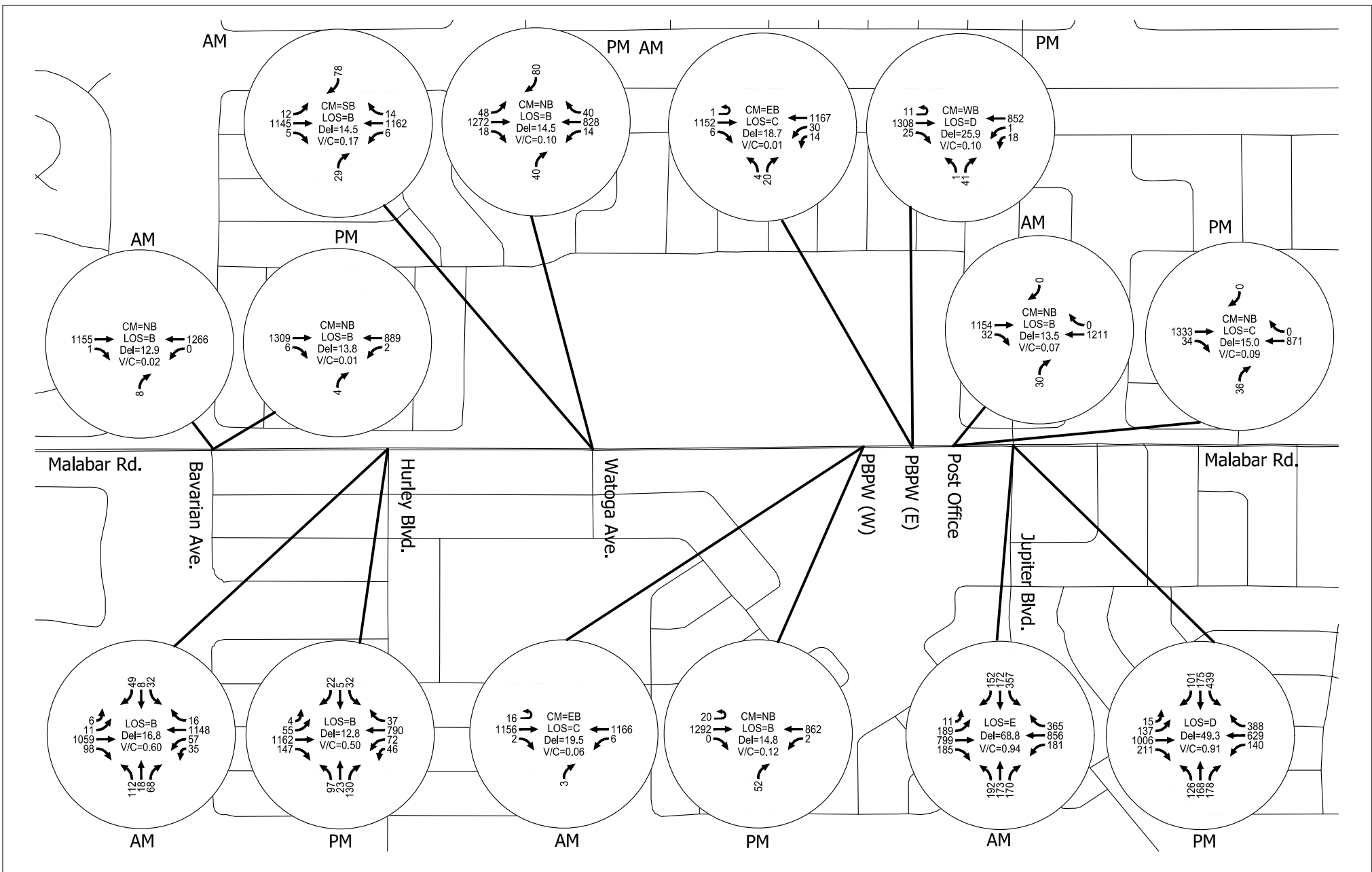
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# Malabar Road PD&E Study

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2050 BUILD TRAFFIC VOLUMES AND OPERATIONAL PERFORMANCE

**FIGURE 29A**



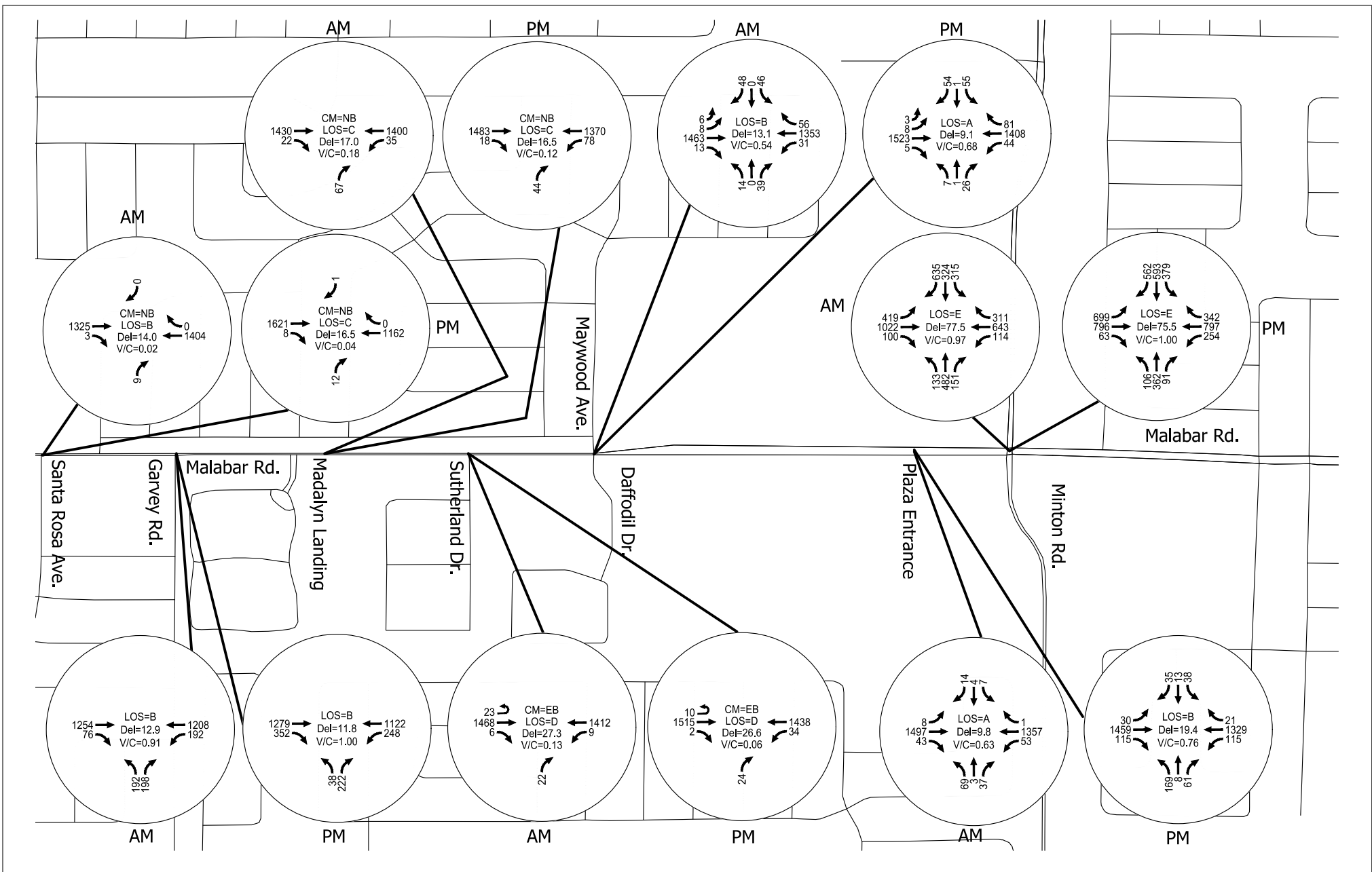
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# Malabar Road PD&E Study

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2050 BUILD TRAFFIC VOLUMES AND OPERATIONAL PERFORMANCE

**FIGURE 29B**



Not to Scale 

# Malabar Road PD&E Study

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2050 BUILD TRAFFIC VOLUMES AND OPERATIONAL PERFORMANCE

**FIGURE 29C**

**SECTION 3 – FUTURE CONDITIONS**

**Table 23: 2050 Build Segment LOS – Both Directions (Interrupted Flow)**

Segment #	Segment Limits	Analysis Direction	AM Peak Hour				PM Peak Hour			
			BFFS (mph)	Synchro Travel Speed (mph)	P <sub>BFFS</sub> * (%)	LOS	BFFS (mph)	Synchro Travel Speed (mph)	P <sub>BFFS</sub> * (%)	LOS
1	Malabar Road, St. Johns Heritage Pkwy. to Wisteria Ave./Abilene Dr.	Eastbound	43.9	31.4	71.5	B	43.9	31.6	72.0	B
2	Malabar Road, Wisteria Ave./Abilene Dr. to Krassner Dr./Bending Branch Ln.	Eastbound	44.1	24.5	55.5	C	44.1	29.7	67.3	B
3	Malabar Road, Krassner Dr./Bending Branch Ln. to Hurley Blvd.	Eastbound	43.9	26.2	59.7	C	43.9	31.8	72.5	B
4	Malabar Road Hurley Blvd. to Jupiter Blvd.	Eastbound	43.8	23.9	54.6	C	43.8	27.3	62.3	C
5	Malabar Road, Jupiter Blvd. to Garvey Rd.	Eastbound	43.4	32.4	74.7	B	43.4	34.9	80.5	A
6	Malabar Road, Garvey Rd. to Maywood Ave./Daffodil Dr.	Eastbound	44.0	36.8	83.7	A	44.0	36.2	82.3	A
7	Malabar Road, Maywood Ave./Daffodil Dr. to Plaza Entrance	Eastbound	40.4	22.6	56.0	C	40.4	22.0	54.5	C
8	Malabar Road, Plaza Entrance to Minton Rd.	Eastbound	38.1	5.6	14.7	F**	38.1	7.4	19.4	F**
<b>Facility</b>	<b>Malabar Road, St. Johns Heritage Pkwy. to Minton Rd.</b>	<b>Eastbound</b>	-	-	<b>58.8</b>	<b>C</b>	-	-	<b>63.9</b>	<b>C</b>
8	Malabar Road, Minton Road to Plaza Entrance	Westbound	38.1	6.6	17.3	F**	38.1	5.0	13.1	F**
7	Malabar Road, Plaza Entrance to Maywood Ave./Daffodil Dr.	Westbound	40.4	24.9	61.7	C	40.4	21.8	54.0	C
6	Malabar Road, Maywood Ave./Daffodil Dr. to Garvey Rd.	Westbound	44.0	28.3	64.4	C	44.0	35.7	81.2	A
5	Malabar Road, Garvey Rd. to Jupiter Boulevard	Westbound	43.4	38.4	88.5	A	43.4	33.4	77.0	B
4	Malabar Road, Jupiter Blvd. to Hurley Blvd.	Westbound	43.8	22.7	51.8	C	43.8	32.7	74.7	B
3	Malabar Road, Hurley Blvd. to Krassner Dr./Bending Branch Ln.	Westbound	43.9	36.9	84.1	A	43.9	39.7	90.5	A
2	Malabar Road, Krassner Drive/Bending Branch Lane to Wisteria Avenue/Abilene Drive	Westbound	44.1	26.8	60.7	C	44.1	31.9	72.3	B
1	Malabar Road, Krassner Drive/Bending Branch Lane to St. Johns Heritage Parkway	Westbound	43.9	22.6	51.5	C	43.9	29.0	66.1	C
<b>Facility</b>	<b>Malabar Road, Minton Rd. to St. Johns Heritage Pkwy.</b>	<b>Eastbound</b>	-	-	<b>60.0</b>	<b>C</b>	-	-	<b>66.1</b>	<b>C</b>

\*Note: P<sub>BFFS</sub> is the Percent of Base Free Flow Speed

\*\*This is likely due to the relatively short length of segment (~750') between signalized intersections and the relatively high control delay of the adjacent signalized intersection.

## 4.0 PROJECT DESIGN CONTROLS AND CRITERIA

### 4.1 Roadway Context Classification

Within the study area, Malabar Road is a two-lane undivided, urban minor arterial. Malabar Road is a local road within the project limits and therefore does not have an assigned context classification. As noted in the next section, the FDM was utilized for design control criteria and where features allow and where practical, C3R (suburban residential) context classification will be met.

### 4.2 Design Controls and Criteria

#### 4.2.1 *Roadway Design Controls and Criteria*

The Malabar Road PD&E is a Local Agency Program (LAP) project having an estimated construction value greater than \$10M, thus the FDM is the controlling design guide for roadway components. However, during the alternatives analysis stage, both the 2018 Florida Greenbook and the 2024 FDM were utilized for typical section design. These alternatives were presented at the Alternatives Public Meeting. Once the preferred alternative was selected, the FDM was utilized for the design of the typical section and concept plans. The roadway design control list used for the preferred alternative development is listed in **Table 24**. The current roadway design criteria from the 2024 FDM used for this study are listed in **Table 25**, **Table 26**, and **Table 27**. This design criterion is subject to change and only the most current design criteria should be used for the final design phase.



**Table 24: Design Control List**

Design Control		Malabar Road	Source <sup>1</sup>
General Criteria	Design Vehicle	WB-62FL (corridor)	Set by City and County
		SU (loons)	
	Functional Class	Urban Minor Arterial	Set by City/County/TPO
	Context Classification	N/A	Local Road
	Proposed Access Management Classification	5	Selected by Study; FDM Table 201.4.2
	Design/Posted Speed	Design: 40/45 mph <sup>2</sup> Posted: 35/45 mph <sup>3</sup>	Set by City and County
	Design Year	2050	Scope of Services
	Facility within Urban Boundary?	Yes	Florida Urban Area Buffer Maps

<sup>1</sup> Note: Where existing property features allow and where practical, FDM criteria will be met for C3R (suburban residential) context classification.

<sup>2</sup> Design speed is 40 mph from St. Johns Heritage Parkway to Championship Circle, 45 mph from Championship Circle to east of Maywood Avenue/Daffodil Drive, and 40 mph from east of Maywood Avenue/Daffodil Drive to Minton Road.

<sup>3</sup> Posted speed is 35 mph from St. Johns Heritage Parkway to Championship Circle, 45 mph from Championship Circle to east of Maywood Avenue/Daffodil Drive, and 35 mph from east of Maywood Avenue/Daffodil Drive to Minton Road.

**Table 25: Design Standards List for Typical Sections**

Design Standards		Malabar Road	Source
Typical Section	Proposed Typical Section Type	Urban	Selected by Study
	Lane Widths	11' for both 40/45 mph	FDM Table 210.2.1
	Median Width (ft) (min)	22' for both 40/45 mph	FDM Table 210.3.1
	Border Width (ft) (min)	12' for 40 mph 14' for 45 mph	FDM Table 210.7.1
	Lateral Offset (ft)	4' from face of curb for both 40/45 mph	FDM Table 215.2.2
	Pavement Cross Slope	0.02 (typ.) 0.04 (max)	FDM Section 210.2.4
	Curb & Gutter Type	Type F (Outside) Type E (Inside)	FDM Section 210.5
	Sidewalk Width (ft.)	6' min.	FDM Table 222.2.1
	Bicycle Lane Width	N/A	FDM Section 223.2.1.1
	Shared-Use Path Width	10' (min.)	FDM Section 224.4

**Table 26: Design Standards List for Horizontal Alignment**

Design Standards		Malabar Road	Source
Horizontal Alignment	Max Deflection Without a Horizontal Curve	2° 00' 00" for 40 mph 1° 00' 00" for 45 mph	FDM Section 210.8.1
	Max Deflection Angle Through Intersections	5° 00' 00" for 40 mph 3° 00' 00" for 45 mph	FDM Table 212.7.1
	Minimum Radius of Curve (ft.)	546 for 40 mph 694 for 45 mph	FDM Table 210.9.2
	Desired Length of Curve (ft.)	600 for 40 mph 675 for 45 mph	FDM Table 210.8.1
	$e_{max}$	0.05	FDM Section 210.9

**Table 27: Design Standards List for Vertical Alignment**

Design Standards		Malabar Road	Source
Vertical Alignment	Max Grade	7% for 40 mph 6% for 45 mph	FDM Table 210.10.1
	Max Change in Grade Without Using Vertical Curve	0.80% for 40 mph 0.70% for 45 mph	FDM Table 210.10.2

*4.2.2 Structures Design Controls and Criteria*

The FDOT FY 2024-25 Standard Plans for Road and Bridge Construction and the FY 2024-25 Standard Specifications for Road and Bridge Construction will be the guiding documents for the project design. The following structure design specification reference materials will be utilized for the design of the new Malabar Road bridge over Canal C-10:

1. American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications, Ninth Edition
2. 2024 FDOT Structures Manual
3. 2024 FDM
4. 2024 FDOT Bridge Load Rating Manual

**Table 28** displays the various design standards for structures elements as part of the Malabar Road project.

**Table 28: Design Standards for Structures**

Design Criteria	Standard	Source
Lane Width, Bridge	11'	FDM Table 210.2.1
Outside Shoulder Width, Bridge	2.5'	FDM Figure 260.1.4
Inside Shoulder Width, Bridge	1.5' wide	FDM Figure 260.1.4(2)
Vertical Clearance (Non-Navigable Waterway)	2'	FDM Section 260.8.1
Horizontal Clearance (Crossings Subject to Boat Traffic)	10'	FDM Section 260.8.2

*4.2.3 Stormwater Design Controls and Criteria*

The design of stormwater management facilities is governed by the rules established by the SJRWMD, City of Palm Bay, and MTWCD. Water treatment and attenuation requirements will

comply with the guidelines as defined in Chapter 62-330 of the Florida Administrative Code (F.A.C) and the SJRWMD Permit Information Manual.

Wet detention ponds, dry retention ponds and dry linear swales will provide for water quality improvements as well as water quantity attenuation for the project runoff. The stormwater ponds are conservatively designed and sized for each segment's typical section. Stormwater ponds were modeled in Interconnected Pond Routing (ICPR) to meet limiting discharge criteria set forth by the MTWCD. Please refer to the sections below for the water quality, water quantity, detention/retention pond facilities configuration criterion, and limiting discharge criteria used for the project.

The *Pond Siting Report* for the project outlines the specific drainage design criteria (water quality, water quantity, detention/retention pond configuration, and discharge criteria) for the SJRWMD, City of Palm Bay, and MTWCD.

### 4.2.3.1 SJRWMD Criteria

- **Water Quality:**

- Wet Detention Ponds: Treatment will be provided for the greater of one inch (1") of runoff over the drainage area or two and a half inches (2.5") of runoff from the impervious area (excluding water bodies).
  - An orifice should be set at the Average Wet Seasonal Water Elevation (AWSWE) and sized to drawdown one-half of the required treatment volume within 24 to 30 hours but no more than one half of this volume will be discharged within the first 24 hours.
- Retention Ponds:
  - Off-line Systems: retention will be provided for the greater of one-half inch (0.5") of runoff over the drainage area or one and a quarter inches (1.25") of runoff from the impervious area (excluding waterbodies).
  - On-line Systems: retention of an additional one-half inch (0.5") of runoff from the drainage area over the volume specified for off-line systems.
  - The entire treatment volume is to be infiltrated within 72 hours after a storm event.
- The project traverses Waterbody ID (WBID) 3090 – Melbourne-Tillman (C-1) Canal, which is not impaired for nutrients according to the current FDEP 303(d) list of impaired water bodies. However, Canal C-1 eventually outfalls to the Indian River Lagoon, which is impaired for both Total Phosphorus and Total Nitrogen and is subject to a Total Maximum Daily Load (TMDL). As a conservative measure, nutrient loading analysis has been performed on all basins to verify no adverse effects to the downstream waters. There are no Outstanding Florida Waters (OFW) within this study area.

- **Water Quantity:** For open basins, SJRWMD requires that the post-development peak discharge shall be at or below pre-development peak discharge for the 25-year/24-hour and mean annual storms. Offsite discharges and peak stages for the existing and proposed conditions shall be computed using the SJRWMD 25-year/24-hour rainfall depth and the NRCS Type II Florida Modified 24-hour rainfall distribution with an AMC II.
- **Pond Configuration:**
  - Wet Detention Ponds: The average length to width ratio of the wet detention pond must be at least 2:1. If short flow paths are unavoidable, the effective flow path can be increased by adding diversion barriers within the pond. Another alternative is to demonstrate that the effective permanent pool volume is provided between each inflow point in the pond to the outflow of the pond.
    - Permanent Pool – The permanent pool shall be sized to provide at least a 14-day residence time during the wet season (June – October).
    - Littoral Zone – The littoral zone shall be gently sloped (1V:6H or flatter). At least 30 percent of the wet detention pond surface area shall consist of a littoral zone.
      - Littoral Zone Alternatives:
        - An additional 50% of the appropriate permanent pool volume.
        - Pre-treatment of stormwater prior to the stormwater entering the wet detention pond. The level of pretreatment must be at least that required for retention, underdrain, exfiltration, or swale systems.
      - Pond Depth – Maximum pond depth of 12 feet and a mean depth (pond volume divided by the pond area at the control elevation) between 2 and 8 feet.
      - Side Slopes – The pond must be designed so that the average pond side slope measured between the control elevation and two feet below the control elevation is no steeper than 1V:3H.
  - Retention Ponds: The effectiveness of retention facilities is controlled by two key factors: the construction procedures for the facility and the overall sequence of the site construction.
    - Initially construct the retention basin to rough grade by under-excavating the basin bottom and sides by approximately 12 inches.
    - After the drainage area contributing to the retention basin has been fully stabilized, the interior side slopes and basin bottom should be excavated to final design specifications.

- Once the retention basin has been excavated to final grade, the entire basin bottom should be deep raked and loosened for optimal infiltration.
- The retention basin should be stabilized with pervious material or permanent vegetative cover.

4.2.3.2 City of Palm Bay Criteria

- **Water Quality:** Specified in the SJRWMD section above.
- **Dry Detention Ponds:** Specified in the SJRWMD section above.
  - Retention Ponds:
    - Retention will be provided for the greater of one-half inch (0.5”) of runoff over the drainage area or one and one-half inches (1.50”) of runoff from the impervious area (excluding waterbodies).
- **Water Quantity:** Specified in the SJRWMD section above.
- **Pond Configuration:** Specified in the SJRWMD section above.

4.2.3.3 Melbourne-Tillman Water Control District Criteria

- **Maximum Allowable Discharge into Canals:**
  - Wet Detention Ponds and Retention Ponds: 0.08 cfs/acre for the 25-year/24-hour storm and 0.05 cfs/acre for the mean annual storm.
    - This criteria applies only to the new impervious area; therefore, the maximum allowable discharge for each basin was calculated by adding the pre-development discharge over the existing right-of-way and the MTWCD maximum discharge over the new impervious area.

## 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 Malabar Road. The primary advantages of the No-Build Alternative are that it does not require any capital or expenditure of local, state, or federal transportation funds, and it results in no impacts to the social, natural, cultural, or physical environment.

The No-Build Alternative will remain under consideration throughout the study process.

#### 5.1.1 *Advantages of the No-Build (No-Action) Alternative*

Advantages of the No-Build Alternative include:

- No right-of-way acquisition, residential relocations, or business impacts/displacements;
- No design, right-of-way, or construction costs;
- No inconvenience to the traveling public and property owners during construction;
- No impacts to utilities and drainage structures; and
- No impacts to the natural, social, cultural, or physical environment.

#### 5.1.2 *Disadvantages of the No-Build (No-Action) Alternative*

Disadvantages of the No-Build Alternative include:

- It is not consistent with local government plans, the Space Coast TPO's LRTP, or TIP;
- It does not improve levels of service or address traffic congestion;
- It does not improve multi-modal mobility; and
- Safety is not improved and the number of crashes is projected to increase.

The No-Build Alternative will not meet the purpose and need for this project.

### 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. TSM&O options generally include traffic signal and intersection improvements, access management, transit improvements and other low impact improvements such as the implementation of Intelligent Transportation System (ITS) components. The additional capacity needed to meet Malabar Road's 2050 design year projected traffic volumes and resultant LOS standards cannot be provided solely through the implementation of TSM&O improvements. TSM&O improvements by themselves cannot address the long-term safety needs along the study corridor either. However, access management and intersection improvement TSM&O strategies are included as part of the study corridor's four lane Build Alternatives. In conclusion, the TSM&O alternative alone does not meet the capacity and safety needs for the project.



### 5.3 Multimodal Alternatives

A singular multimodal alternative would not address the Transportation Demand/Capacity or Safety purpose and need elements. Multimodal alternatives (pedestrian, bicycle, and transit facilities) were included for each of the Build alternatives to help satisfy the Modal Interrelationships portion of the purpose and need in the form of sidewalks and shared use paths. As discussed in **Section 7.6.2**, existing transit stops will be relocated and upgraded (where necessary).

### 5.4 Build Alternative(s)

#### 5.4.1 Initial Typical Sections

The initial Malabar Road typical section alternatives were developed using design provisions from the Florida Greenbook and the FDM. Two initial typical section alternatives were developed to support the Malabar Road purpose and need for capacity and safety improvements:

- Alternative A – Minimum right-of-way alternative
  - 89.5' right-of-way alternative from the St. Johns Heritage Parkway to Canal C-10 (**Figure 30**)
  - 92.5' right-of-way alternative from Canal C-10 to Sta. 256+80 (**Figure 31**)
- Alternative B – Desired right-of-way alternative
  - 100' right-of-way alternative from the St. Johns Heritage Parkway to Canal C-10 (**Figure 32**)
  - 103' right-of-way alternative from Canal C-10 to Sta. 256+80 (**Figure 33**)

Each of the initial typical sections were applied from the St. Johns Heritage Parkway to Sta. 256+80, which is just west of the Plaza Shopping Center where Malabar Road begins to transition to a four-lane roadway. The remainder of this section discusses the initial typical sections in more detail.

##### 5.4.1.1 Alternative A – Minimum Right-of-Way

Alternative A was developed to minimize the right-of-way impacts to residential properties on the south side of Malabar Road and minimize Canal C-20 impacts on the north side of Malabar Road east of Canal C-10. The following features are common between the 89.5' and the 92.5' typical sections:

- Two 11' travel lanes in each direction;
- 15.5' wide median, including Type E curb and gutter;
- Type F curb and gutter outside of the travel lanes; and
- 10' shared-use path on the north side and 6' sidewalk on the south side.
  - The inside edge of the 6' sidewalk is at the back of curb. Without the 4' grass buffer, Alternative A would have a border width less than 14' along the south side of the corridor, requiring a design variation.

The primary difference between the 89.5' and 92.5' typical sections is the presence of Canal C-20 on the north side of Malabar Road east of Canal C-10. In the 92.5' typical, an extra 3' is added on the north side for guardrail protection between the roadway and Canal C-20.

### 5.4.1.2 Alternative B – Desired Right-of-Way

Alternative A utilized a smaller median width of 15.5' and a 6' south side sidewalk at the back of curb to reduce the overall right-of-way needed for the study corridor. A 15.5' median does not meet the minimum 22' Florida Greenbook or FDM median widths for a 45 mph facility, thus a design variation would be needed if this alternative was to move forward. Alternative B increases the median width to a desired 22' median (including Type E curb and gutter). Alternative B also provides a 4' grass buffer between the south side curb and the sidewalk, which was not provided in Alternative A. The additional 6.5' in the median and 4' grass buffer on the south side equates to the 10.5' difference between the 89.5'/92.5' Alternative A typical sections and the 100'/103' Alternative B typical sections. The following features are common between the 100' and the 103' typical section alternatives:

- Two 11' travel lanes in each direction;
- 22' wide median, including Type E curb and gutter;
- Type F curb and gutter outside of the travel lanes;
- 10' shared-use path on the north side and 6' sidewalk on the south side; and
- 4' grass buffer between the back of the curb and the 6' south side sidewalk.

Similar to Alternative A, the 3' difference between the 100' and 103' typical sections is north side guardrail protection between the roadway and Canal C-20.

### 5.4.2 *Bridge Typical Sections*

As discussed in **Section 2.3**, one bridge structure is present over Canal C-10 at approximately Sta. 142+00. Four bridge typical sections were developed in support of the initial typical section alternatives discussed in the previous section:

- Alternative A – Minimum right-of-way bridge typical sections
  - Raised sidewalk alternative (**Figure 34**)
  - Flush sidewalk with traffic separator alternative (**Figure 35**)
- Alternative B – Desired right-of-way bridge typical sections
  - Raised sidewalk alternative (**Figure 36**)
  - Flush sidewalk with traffic separator alternative (**Figure 37**)

The Alternative A bridge typical sections have a 15.5' median consistent with the Alternative A roadway typical section. The Alternative B bridge typical sections have a 22' median consistent with Alternative B roadway typical section. The raised sidewalk bridge typical section (both Alternatives A and B) incorporates a 10' shared-use path on the north side and 6' sidewalk on the south side that is raised above the travel lanes and separated by a 1.5' paved shoulder. A traffic

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railing with a pedestrian/bicycle railing on top is present to the outside of the bridge structure. The flush sidewalk bridge typical section (both Alternatives A and B) provides the same 10' shared-use path and 6' sidewalk, but the facilities are flush with the bridge deck and separated from the travel lanes by a 2.5' paved shoulder and 1'4" traffic railing. A pedestrian/bicycle railing is present to the outside of the bridge structure. Twin bridges were also considered and dismissed as an alternative, as discussed in **Section 5.6.2**.

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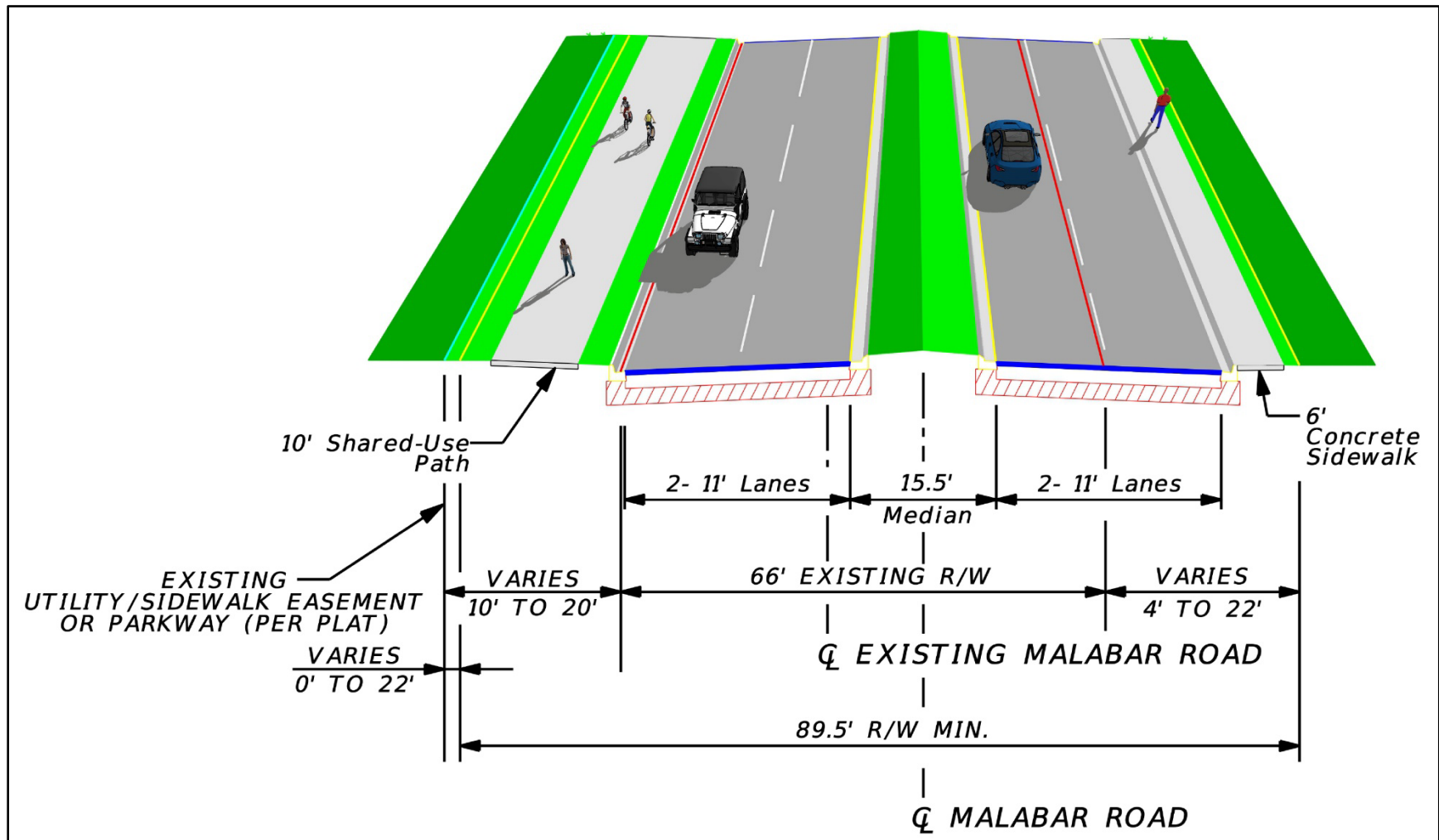


Figure 30: 89.5' Alternative A – St. Johns Heritage Parkway to Canal C-10

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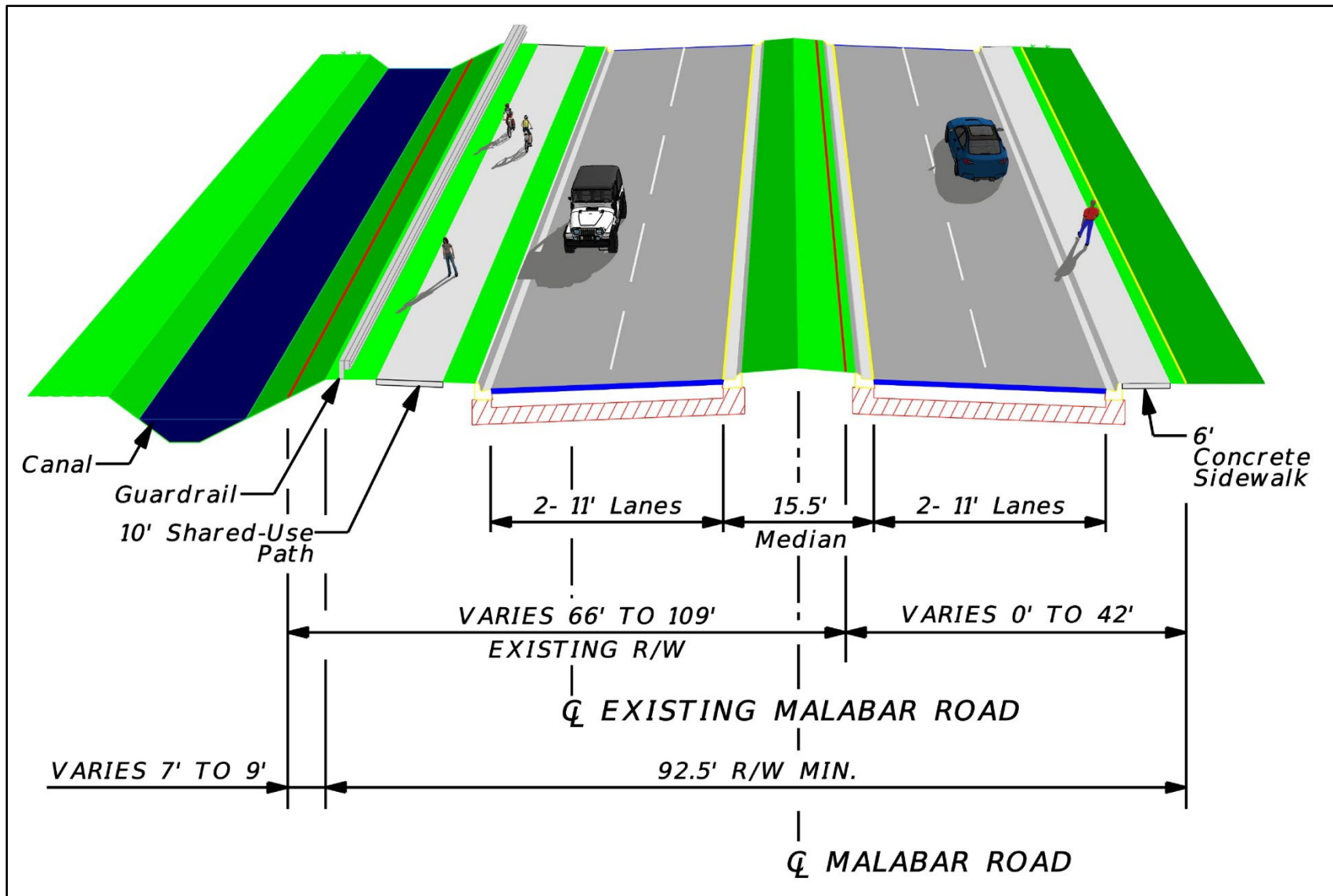


Figure 31: 92.5' Alternative A – Canal C-10 to Sta. 256+80

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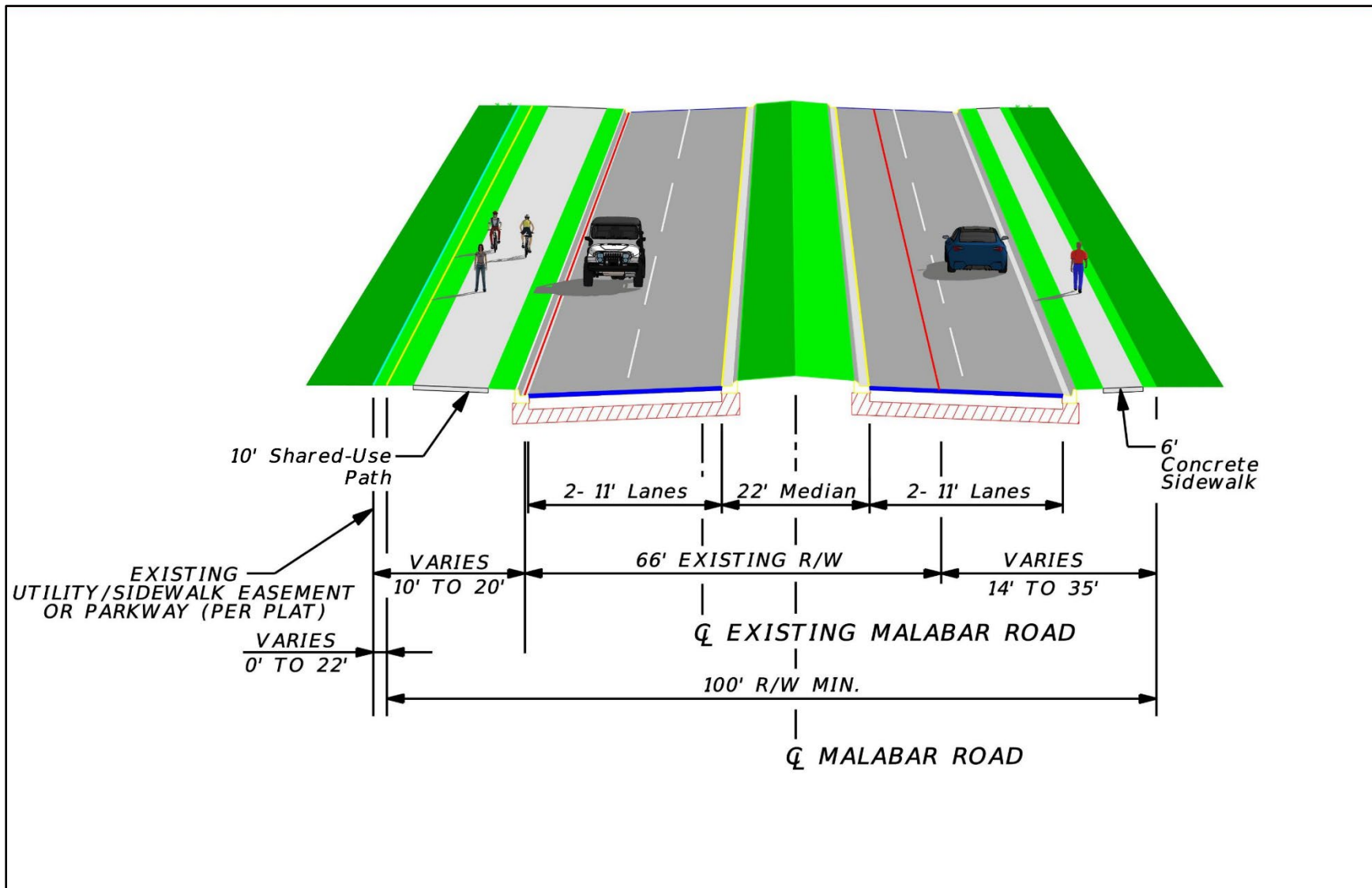


Figure 32: 100' Alternative B – St. Johns Heritage Parkway to Canal C-10

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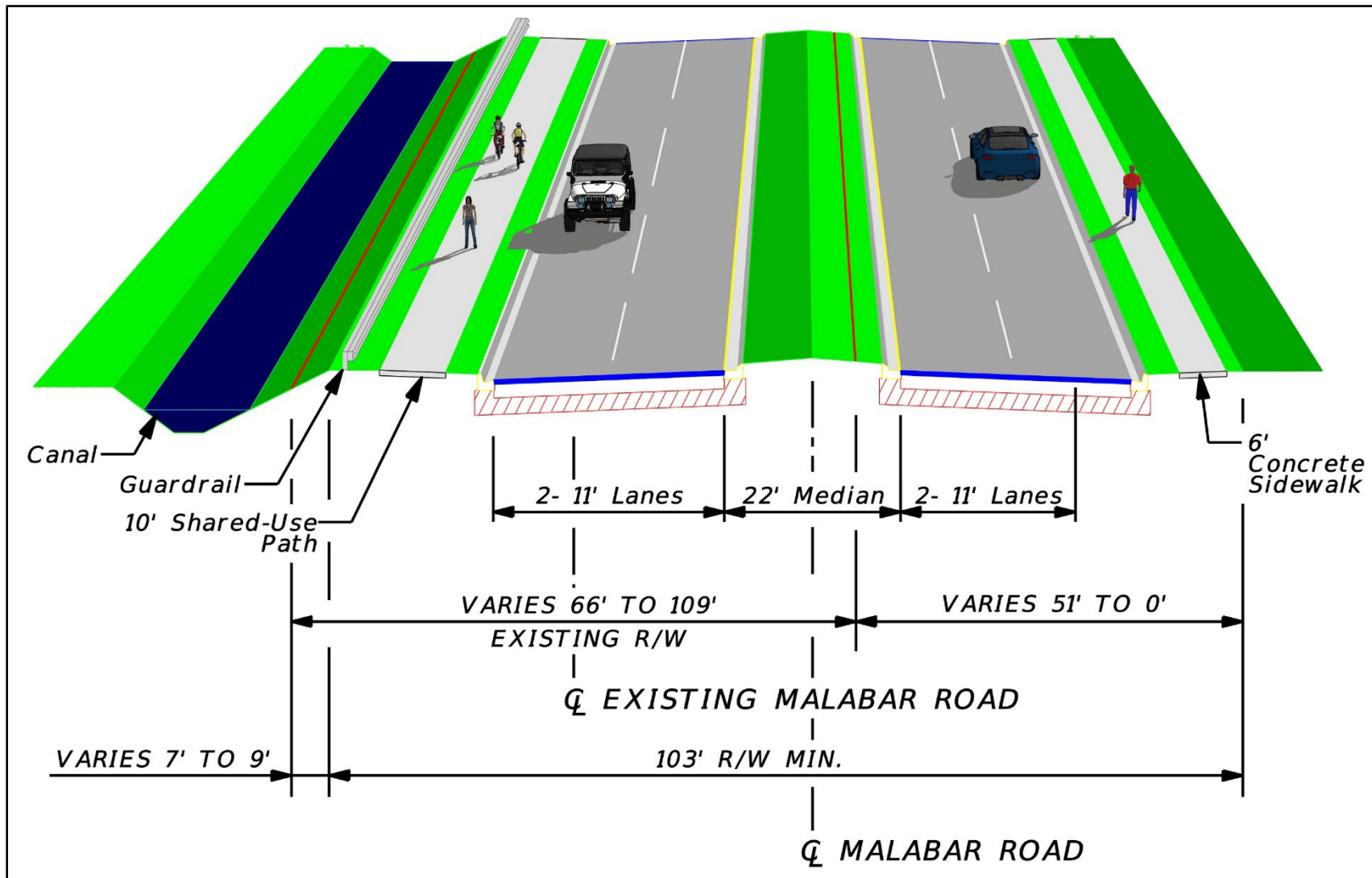
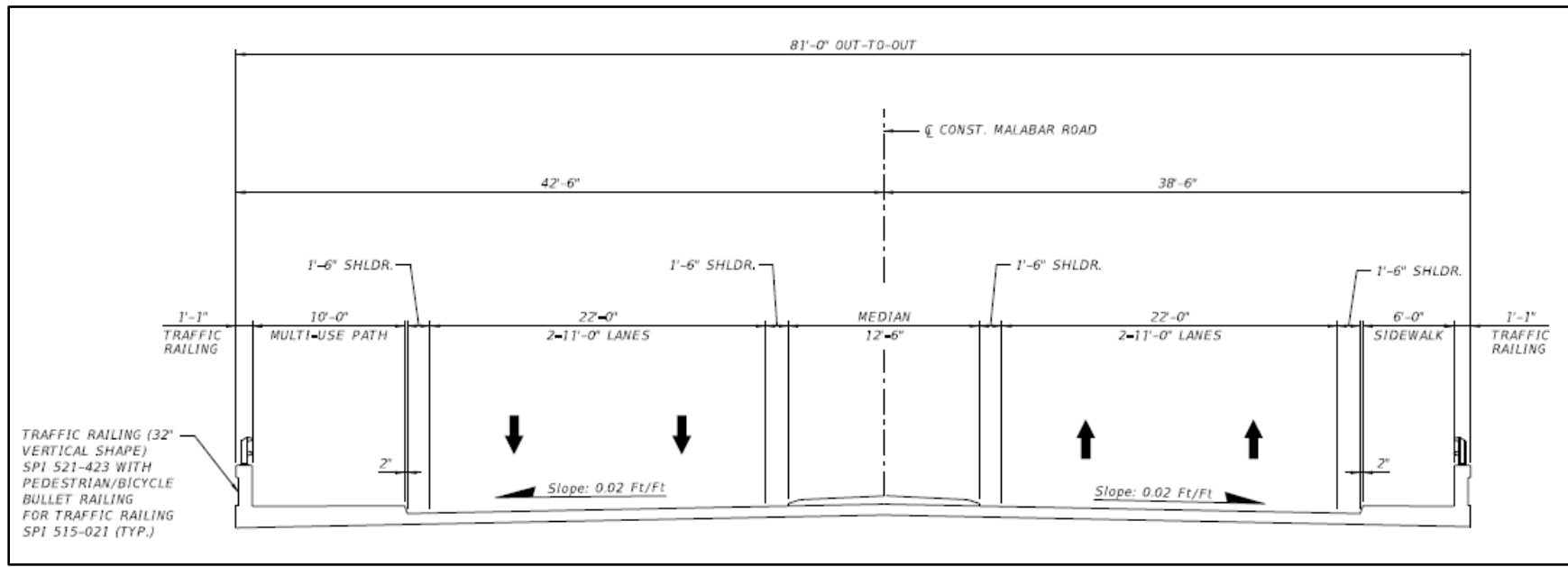


Figure 33: 103' Alternative B – Canal C-10 to Sta. 256+80

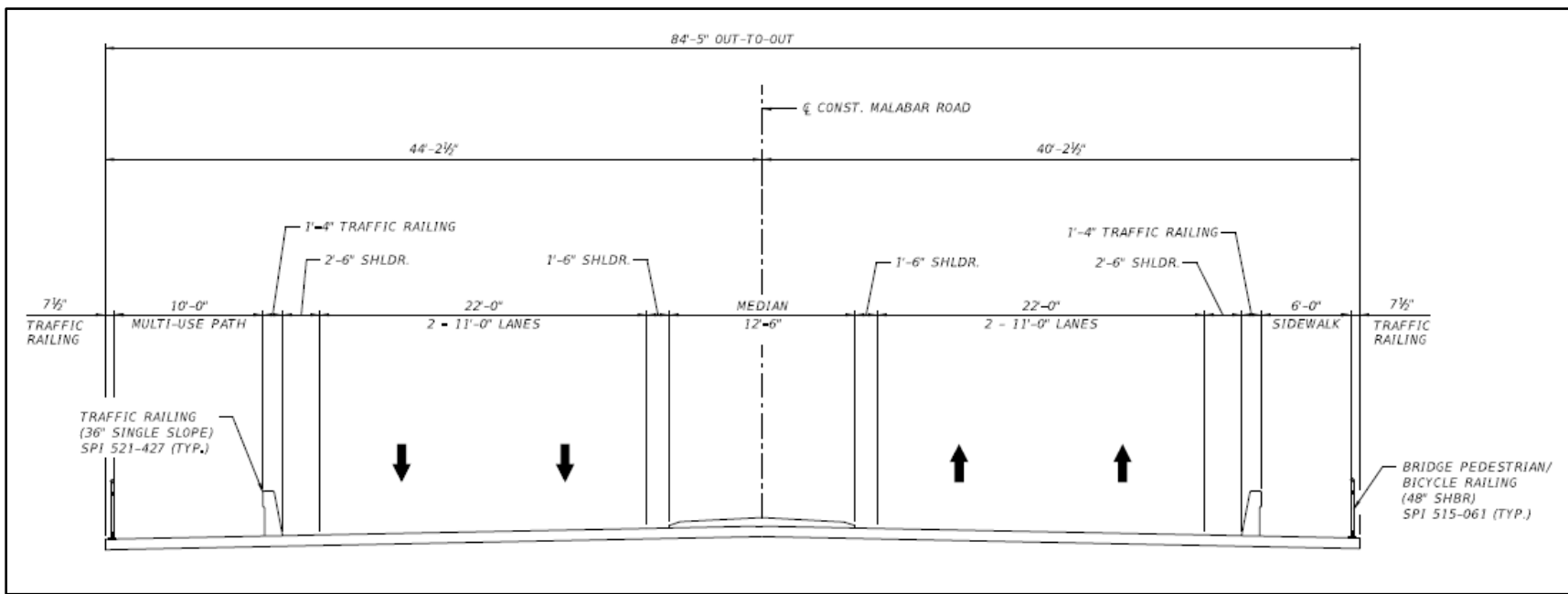


**SECTION 5 – ALTERNATIVES ANALYSIS**



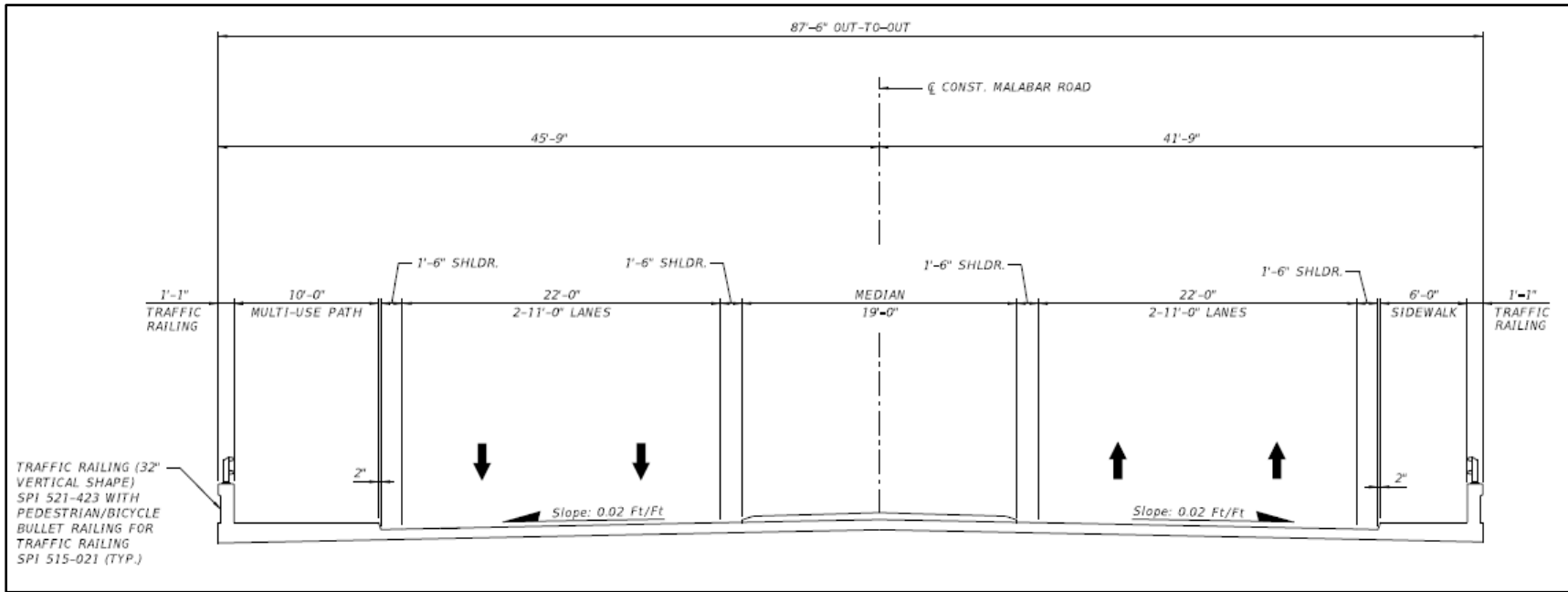
**Figure 34: Canal C-10 Bridge – Alternative A Minimum Right-of-Way and Raised Sidewalk**

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**Figure 35: Canal C-10 Bridge – Alternative A Minimum Right-of-Way and Flush Sidewalk**

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**Figure 36: Canal C-10 Bridge – Alternative B Desired Right-of-Way and Raised Sidewalk**



### 5.4.3 Alignment Analysis

In traditional PD&E studies, each typical section is reviewed from a left, center, and right widening perspective. Instead of performing a traditional left/center/right widening alignment analysis for Malabar Road, a qualitative analysis was used to assess each widening type based on the existing constraints along Malabar Road:

- Left Widening – Widening Malabar Road to the left (north side) would result in higher impacts to Canal C-20, which is present from Canal C-10 to Sta. 256+50 (just west of the ExtraSpace Storage driveway). These impacts would result in higher drainage mitigation costs and a left widening alternative would not have been supported by the MTWCD.
- Right Widening – While there is more open land on the south side of Malabar Road, widening Malabar Road to the right (south side) would still result in residential right-of-way acquisitions and potential impacts to civic/governmental land uses (like the USPS in the southwest corner at the Malabar Road/Jupiter Boulevard intersection). These impacts would result in higher right-of-way acquisition costs along the corridor but there would be reduced impacts to Canal C-20.
- Center Widening – Widening Malabar Road from the center would impact both Canal C-20 and the properties on the south side. Even with a center widening, impacting Canal C-20 would result in drainage mitigation costs but it would reduce the right-of-way acquisition costs along the south side of Malabar Road.

Through discussions with local jurisdictions about the impacts noted above, the study team made the decision to assess a “best fit” alignment that would attempt to minimize impacts to Canal C-20 while widening mostly to the south side of Malabar Road. A best fit alignment was developed for both Alternatives A and B noted in **Section 5.4.1. Appendix C** provides the concept plans for Alternative A and Alternative B.

To further reduce right-of-way impacts along the study corridor, the decision was made to not include on-road bicycle facilities. Per Section 223.2.3 of the 2024 FDM, a shared-use path can be substituted for bicycle lanes when the roadway design speed is 35 mph or greater and the following three conditions are met: 1. Context classification of C1, C2, or C3; 2. Separation can be maintained between bicycle and motorized traffic through intersections; and 3. Conflict points are minimal and mitigated. These conditions were met along Malabar Road, thus a shared-use path is proposed on the north side of the project in lieu of on-road bicycle facilities. This saved approximately 10’ of right-of-way for each of the initial typical sections analyzed.

### 5.4.4 Refined Typical Sections

The initial typical sections were presented at the Alternatives Public Meeting conducted on Thursday, September 24, 2020, and subsequent local jurisdiction meetings in October 2020. During these meetings, discussion was held regarding the lack of on-road bicycle facilities being

provided in the typical section alternatives. While adding on-road bicycle facilities was deemed not feasible by the study team due to the right-of-way and Canal C-20 impacts noted in the previous section, widening the south side sidewalk to 8' was explored. A 10' shared-use path is already being proposed on the north side, so widening the south side sidewalk to 8' would provide a wider facility accommodating both pedestrians and bicycles. The 8' south side sidewalk was incorporated into the preferred alternative as described in **Section 5.6**.

### 5.4.5 Intersection Alternatives Analysis

As noted in **Section 3.3**, the initial build conditions analysis assumed some locations would require signalization based on potential future signal warrants. A formal Intersection Control Evaluation (ICE) was not required because this PD&E is an off-system project, but roundabouts were analyzed at the same locations where the initial build conditions analysis assumed traffic signals. The following intersections were reviewed for potential intersection improvements:

- Traffic Signal vs Roundabout Evaluation –
  - Malabar Road & St. Johns Heritage Parkway;
  - Malabar Road & Wisteria Avenue/Abilene Drive;
  - Malabar Road & Krassner Drive/Bending Branch Lane;
  - Malabar Road & Hurley Boulevard;
  - Malabar Road & Jupiter Boulevard;
  - Malabar Road & Garvey Road; and
  - Malabar Road & Maywood Avenue/Daffodil Drive.

During the intersection alternatives analysis, it was determined that the following intersections would remain signalized in the preferred alternative due to operational limitations and right-of-way impacts of a roundabout:

- Malabar Road & Plaza Shopping Center; and
- Malabar Road & Minton Road.

In order to analyze and compare the signalized/unsignalized alternatives to the roundabouts at each location, an intersection operational analysis and safety analysis were performed. The intersection operational analyses were conducted using *HCM6* methodologies as implemented by Synchro 10 for the signalized/unsignalized intersections and SIDRA Intersection 8.0 software for the roundabouts. The FDOT Safety Performance for Intersection Control Evaluation (SPICE) tool was utilized for the safety analysis of the signalized/unsignalized intersections and roundabouts. As shown in **Table 29**, roundabouts are anticipated to operate better or the same as the signalized/unsignalized intersection at every location except Garvey Road. Roundabouts have been shown to reduce fatal/injury crash types versus signalized/unsignalized intersections, and the results show the roundabout has lower predicted fatal/injury crashes at every intersection.

**Table 29: Intersection Alternatives Operational and Safety Results**

Intersection	Signalized Intersection		Roundabout	
	2050 Worst AM/PM LOS	20 Year Fatal/ Injury Crashes	2050 Worst AM/PM LOS	20 Year Fatal/ Injury Crashes
St. Johns Heritage Parkway	AM/PM – E	29.8	AM – D	26.0
Wisteria Avenue/ Abilene Drive	AM/PM – B	40.4	AM/PM – A	20.8
Krassner Drive/ Bending Branch Lane	AM/PM – C	42.3	AM/PM – A	17.6
Hurley Boulevard	AM/PM – B	56.0	AM/PM – A	17.7
Jupiter Boulevard	AM – E	92.5	PM – E	49.8
Garvey Road	AM/PM – B	56.8	AM – C	23.6
Maywood Avenue/ Daffodil Drive	AM – B	55.9	AM/PM – A	25.2

For more detail on the intersection operational analysis for the signalized intersections and roundabouts, please see the *Malabar Road Project Traffic Analysis Report*. The SPICE outputs for each of the intersections noted in **Table 29** are shown in **Appendix E**.

#### 5.4.6 Pond Siting Alternatives Analysis

The project is located within the jurisdictions of the SJRWMD and the MTWCD. The pond siting alternatives analysis included determination of appropriate drainage basins and pond types, sizes, and locations based on the available project information and criteria set forth by the SJRWMD, MTWCD, and City of Palm Bay. These criteria include local limiting discharge criteria set by MTWCD that were considered when performing pond sizing calculations. Water table depth varies across the project limits, and stormwater facilities will include a combination of wet detention ponds, dry retention ponds, and dry linear swales providing treatment and attenuation for stormwater runoff.

As discussed previously in **Section 2.2.17** and shown in **Figure 22**, drainage basins were determined by identifying existing outfall points at each MTWCD canal crossing under Malabar Road within the project area and establishing the roadway limits out falling to those points. There are four MTWCD canals that cross underneath Malabar Road within the project limits (C-7, C-8, C-9, and C-10), and one that runs parallel and adjacent to Malabar Road for the project limit's eastern portion (C-20). The drainage basins are named based on the canal to which they outfall, except for the last basin, which is named for the existing "Pond A" that it will utilize. Pond A outfalls



to the Canal C-37, crossing underneath Malabar Road just past the project limits eastern end. The drainage basins are summarized in **Table 30** below.

**Table 30: Horizontal Alignment Tangential Sections**

Basin Name	From Station	To Station	Remarks
C-7	55+48	88+10	
C-8	88+10	107+68	C-8 and C-9 are combined in proposed condition
C-9	107+68	129+48	
C-10 West	129+48	142+00	
C-10 East	142+00	184+00	
C-20	184+00	264+15	In the proposed condition, the divide between C-20 and Pond A is moved to 267+50
A	264+15	274+00	

For each basin, ponds were sized to accommodate stormwater runoff from the appropriate preferred typical section as described in this report. Various factors were used to determine pond sizes including average wet seasonal water elevations, ground elevation, and conveyance hydraulics. An initial 20 percent upsize in the required pond right-of-way area was applied for the ponds to account for preliminary design parameters. Additionally, each basin’s preferred pond alternative was modeled in Interconnected Pond Routing (ICPR), and the model was used to determine an additional contingency factor needed to determine if the pond would meet local limiting discharge criteria.

For most basins, two pond site alternatives were identified. For Basins C-10 West and C-20, a third site was also identified. For Basin A, an existing permitted pond will be utilized which has enough capacity available to accommodate the small increase in impervious area in this basin, so no new pond site locations were identified. New pond site locations were determined based on a number of factors including existing and proposed land use, parcel availability (including efforts to utilize City of Palm Bay owned parcels and remnant parcels created by the Malabar Road widening), environmental impacts (including wetlands and endangered species), floodplain impacts, utility conflict potential, cultural resources, and potential contamination.

In addition to stormwater pond sites, one floodplain compensation area (FPCA) was also investigated to provide compensation for one Floodplain Impact Area (FIA) located at the project’s western end. The FPCA consists of excavating an area adjacent to the 100-year Zone AE floodplain (Elev. 20.00 feet NAVD) and utilizing the standard “cup for cup” compensation methodology. This FPCA was identified for the purpose of conservative right-of-way estimation. Alternative methods

of floodplain compensation (such as floodplain modeling or utilizing the proposed stormwater pond) should be investigated during the design phase and evaluated along with the FPCA.

For more information including descriptions of each basin, pond site alternatives, the FPCA and further explanations of design and limiting discharge criteria, please refer to the project's *Pond Siting Report*.

### 5.5 Comparative Alternatives Evaluation

This section reviews the comparative evaluation matrix presented at the Alternatives Public Workshop for the two typical section alternatives, Alternative A and B. Additionally, a discussion on how the 8' sidewalk alternative compares to the original alternatives presented to the public is presented in this section. A comparison of estimated construction costs and right-of-way impacts for the intersection alternatives is also reviewed in this section.

#### 5.5.1 Typical Sections

The Malabar Road comparative evaluation matrix presented at the September 24, 2020 Alternatives Public Workshop is shown in **Table 31**. The comparative evaluation matrix reviews the following metrics for the no-build, Alternative A, and Alternative B:

- Engineering Evaluation Criteria
  - Project Cost –
    - Design;
    - Wetland Mitigation;
    - Right-of-Way Acquisition (without ponds);
    - Construction; and
    - Construction Engineering and Inspection (CEI).
  - Traffic, Safety, and Utilities –
    - Intersection Operations and Safety;
    - Roadway Segment Safety; and
    - Potential Utility Impacts.
- Environmental Evaluation Criteria
  - Social Environment –
    - Social Resources Degree of Impact from ETDM;
    - Right-of-Way Take Area (acres) (without ponds);
    - Number of Parcels Impacted (without ponds); and
    - Number of Residential Relocations.
  - Natural Environment –
    - Natural Resources Degree of Impact from ETDM;
    - Wetland Impacts (acres);
    - Surface Water Impacts (acres);
    - Floodplain Impacts (acres); and

- Potential Threatened/Endangered Species Impacts.
- Cultural Environment –
  - Cultural Resources Degree of Impact from ETDM;
  - Historic Resources Potentially Impacted; and
  - Cultural Resources Potentially Impacted.
- Physical Environment –
  - Physical Resources Degree of Impact from ETDM;
  - Medium Risk Contamination Sites Impacted; and
  - Potential Noise Impacts.

As previously discussed, roundabouts were considered at intersections along the Malabar Road corridor. For the comparative analysis purposes, both Alternative A and Alternative B were compared with traffic signals/unsignalized intersections and roundabouts at the following locations:

- Malabar Road & St. Johns Heritage Parkway;
- Malabar Road & Krassner Drive/Bending Branch Lane;
- Malabar Road & Hurley Boulevard;
- Malabar Road & Jupiter Boulevard; and
- Malabar Road & Garvey Road.

The Wisteria Avenue/Abilene Drive and Maywood Avenue/Daffodil Drive intersections were considered for roundabouts after the Alternatives Public Meeting, so those intersections were not originally included in the comparative alternatives matrix shown in **Table 31**.

From a cost perspective, Alternative B is approximately \$1.5M to \$3M more expensive than Alternative A. Both Alternatives A and B are expected to improve LOS and safety when compared to the no-build condition but are expected to have moderate to high potential utility impacts due to the overhead electrical relocation.

Based on the ETDM summary, the environmental resource impacts will range from enhanced to moderately impacted. The right-of-way take area for Alternative B is approximately 3 to 3.5 acres higher than Alternative A, but the number of parcels impacted is virtually the same when comparing the two alternatives. Each alternative has generally the same amount of natural, cultural, and physical environment impacts. The roundabout alternatives has a slightly higher noise impact than the traffic signal alternatives.

Table 31: Alternatives A and B Comparative Evaluation Matrix

Engineering Evaluation Criteria		No-Build Alternative	Alternative A 89.5'/92.5' Minimum Right-of-Way		Alternative B 100'/103' Desired Right-of-Way	
			With Traffic Signals	With Roundabouts	With Traffic Signals	With Roundabouts
PROJECT COSTS	Design Costs	\$0	\$7,900,000	\$8,800,000	\$8,000,000	\$9,100,000
	Wetland Mitigation Costs	\$0	\$60,000	\$60,000	\$60,000	\$60,000
	ROW Acquisition Costs (Without Ponds)	\$0	\$1,496,600	\$1,625,400	\$1,677,300	\$1,815,800
	Construction Costs	\$0	\$64,600,000	\$72,400,000	\$65,700,000	\$74,800,000
	Construction Engineering & Inspection Costs	\$0	\$9,700,000	\$10,900,000	\$9,900,000	\$11,200,000
	<b>PRELIMINARY ESTIMATE OF TOTAL PROJECT COST</b>	<b>\$0</b>	<b>\$83,756,600</b>	<b>\$93,785,400</b>	<b>\$85,337,300</b>	<b>\$96,975,800</b>
TRAFFIC, SAFETY, AND UTILITIES	Intersection Operations <sup>1</sup>	1 @ LOS <sup>2</sup> D 4 @ LOS F	1 @ LOS A 1 @ LOS B 2 @ LOS D 1 @ LOS E	2 @ LOS A 2 @ LOS C 1 @ LOS D	1 @ LOS A 1 @ LOS B 2 @ LOS D 1 @ LOS E	2 @ LOS A 2 @ LOS C 1 @ LOS D
	Intersection Safety <sup>1</sup>	N/A	10% More Total Crashes and 45% More Fatal & Injury Crashes than Roundabout	10% Less Total Crashes and 45% Less Fatal & Injury Crashes than Signal	10% More Total Crashes and 45% More Fatal & Injury Crashes than Roundabout	10% Less Total Crashes and 45% Less Fatal & Injury Crashes than Signal
	Roadway Segment Safety	35% to 40% Higher Crashes vs Build	35% to 40% Crash Reduction vs No-Build		35% to 40% Crash Reduction vs No-Build	
	Potential Utility Impacts	None	Moderate	High	Moderate	High
<b>Environmental Evaluation Criteria</b>						
SOCIAL ENVIRONMENT	Social Resources Degree of Impact from ETDM*	None	Enhanced to Moderate		Enhanced to Moderate	
	ROW Take Area (acres)(Without Ponds)	None	11.43	11.64	14.52	15.18
	Parcels Impacted (#)(Without Ponds)	None	94	99	94	100
	Residential Relocations (#)	None	1	1	1	1
NATURAL ENVIRONMENT	Natural Resources Degree of Impact from ETDM*	None	Moderate		Moderate	
	Wetland Impacts (acres)	None	0.5	0.5	0.5	0.5
	Surface Water Impacts (acres)	None	2.32	2.32	2.35	2.35
	Floodplain Impacts (acres)	None	1.26	1.26	1.41	1.41
	Potential Threatened & Endangered Species Impacts	None	Moderate		Moderate	
CULTURAL ENVIRONMENT	Cultural Resources Degree of Impact from ETDM*	None	Minimal		Minimal	
	Historic Resources Potentially Impacted (#)	None	2	2	2	2
	Cultural Resources Potentially Impacted (#)	None	No registered resources; one zone of High Cultural Sensitivity	No registered resources; one zone of High Cultural Sensitivity	No registered resources; one zone of High Cultural Sensitivity	No registered resources; one zone of High Cultural Sensitivity
PHYSICAL ENVIRONMENT	Physical Resources Degree of Impact from ETDM*	None	Minimal to Moderate		Minimal to Moderate	
	Medium Risk Contamination Sites Impacted (#)	None	11	11	11	11
	Noise Impacts	None	Residential impacts likely	Same residential impacts Slight noise increase to adjacent properties	Potential for slightly more residential impacts	Same residential impacts Slight noise increase to adjacent properties

<sup>1</sup> Intersections included St. Johns Heritage Parkway, Krassner Dr., Hurley Blvd., Jupiter Blvd., and Garvey Rd.

<sup>2</sup> LOS = Level of Service

\* ETDM - Efficient Transportation Decision Making

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Based on discussions with the City of Palm Bay, Brevard County, MTWCD, and SCTPO following the Alternatives Public Meeting, Alternative B was selected as the preferred alternative. More discussion on why Alternative B was selected is provided in **Section 5.6.1**.

### 5.5.1.1 South Side Sidewalk Adjustments

As noted in **Section 5.4.4**, adding on-road bicycle facilities was deemed not feasible by the study team due to the right-of-way and Canal C-20 impacts so widening the south side sidewalk to 8' was explored. Alternative B with 6' sidewalks was compared to a version of Alternative B with 8' sidewalks from a construction cost and right-of-way perspective. The construction costs only increased by approximately \$250K when adding an 8' sidewalk, and the right-of-way take area/parcel impacts were negligible when comparing the 6' alternative to the 8' alternative. For these reasons, the Alternative B sidewalk was increased from 6' to 8' for the preferred alternative.

### 5.5.2 *Intersections*

As noted in **Section 5.5.1**, Alternatives A and B were compared with traffic signals and roundabouts at the intersection locations discussed in that section. It was determined that each intersection would be reviewed independently to determine the estimated construction costs for the alternatives at each intersection, which are shown in **Table 32**.

**Table 32: Traffic Signal vs Roundabout Construction Costs**

<b>Intersection</b>	<b>Traffic Signal Construction Cost</b>	<b>Roundabout Construction Cost</b>	<b>Difference Roundabout minus Signal</b>
St. Johns Heritage Parkway	\$3,420,800	\$3,292,100	<b>-\$128,700</b>
Krassner Drive/ Bending Branch Lane	\$3,753,800	\$4,011,100	<b>\$257,300</b>
Hurley Boulevard	\$2,246,600	\$2,819,700	<b>\$573,100</b>
Garvey Road	\$2,717,700	\$3,242,200	<b>\$524,500</b>

The St. Johns Heritage Parkway roundabout had a lower cost than the traffic signal alternative, largely due to the cost of signaling the intersection that is not present in the roundabout alternative. The Krassner Drive/Bending Branch Lane roundabout was approximately \$250K higher than the traffic signal primarily due to the reconfigurations of the north and south legs that is not present in the signal alternative. The Hurley Boulevard and Garvey Road roundabouts were approximately \$500K-\$575K higher than their respective traffic signals due to drainage impacts the roundabout would have on Canal C-20.

It is important to note that after the Alternatives Public Meeting, it was determined that Jupiter Boulevard would move forward as a traffic signal due to the impacts to Canal C-20 and the need to avoid impacts to the US Post Office in the intersection's southwest corner. This is the reason why it is not included in **Table 32**. More information regarding why the signal was chosen is provided in **Section 5.6.3**.

The Wisteria Avenue/Abilene Drive and Maywood Avenue/Daffodil Drive intersections were not discussed for roundabouts until after the Alternatives Public Meeting. No construction costs were generated for the Wisteria Avenue/Abilene Drive roundabout alternative, but construction costs were generated for Maywood Avenue/Daffodil Drive as part of the intersection alternatives analysis discussed in **Section 5.6.3.1**. At Maywood Avenue/Daffodil Drive, the traffic signal construction cost is approximately \$1,716,000 and the roundabout construction cost is approximately \$3,169,000. The nearly \$1.5M cost difference is largely due to the shifting of the intersection to the south and the amount of new pavement required for the roundabout.

## 5.6 Selection of the Preferred Alternative

### 5.6.1 Roadway Typical Section

As previously noted, Alternative B with 8' south side sidewalks was selected as the preferred alternative by City of Palm Bay and Brevard County. The following describes the typical section elements:

- Two 11' travel lanes in each direction;
- 22' wide median, including Type E curb and gutter;
- Type F curb and gutter outside of the travel lanes;
- 10' shared-use path on the north side and 8' sidewalk on the south side; and
- 4' grass buffer between the back of the curb and pedestrian/bicycle facilities on both sides of the roadway.

While Alternative B has a slightly higher right-of-way take area, the number of parcels impacted and residential relocations was the same as Alternative A. Alternative B was selected for a majority of the Malabar Road corridor because it provides the wider median plus the 4' grass buffer, both meeting FDM standards, while having a negligible impact on right-of-way and only a slighter higher project cost when compared to Alternative A. Alternative A, which includes a 15.5' wide median, was selected from Sta. 181+66 to Sta. 202+90 (west and east of Jupiter Boulevard) to reduce impacts to Canal C-20 where the alignment shifts to avoid the USPS property.

### 5.6.2 Bridge Typical Section

As noted in the previous section, Alternative B with 8' sidewalks was selected as the preferred alternative. The flush sidewalk bridge typical section was selected as the preferred alternative



section. This would include a 10' shared-use path on the north side and an 8' sidewalk on the south side. These facilities are flush with the bridge deck and separated from the travel lanes by a 2.5' paved shoulder and 1'-4" traffic railing. A pedestrian/bicycle railing is present to the outside of the bridge structure.

Based on the preferred typical section and the location of the proposed eastbound left-turn lane for Bavarian Avenue within the bridge limits, a single bridge structure is recommended for the bridge. The use of two parallel bridges would result in a separation of approximately 8' which is less than the preferred minimum separation of 10' per FDM 260.5; therefore, a two-bridge option was eliminated from further consideration.

### 5.6.3 Intersections

#### 5.6.3.1 Signalized Intersections

Based on the intersection alternatives analysis discussed in **Section 5.4.5** and the construction costs reviewed in **Section 5.5.2**, the following intersections are recommended as traffic signals in the preferred alternative:

- Malabar Road & Jupiter Boulevard;
- Malabar Road & Garvey Road;
- Malabar Road & Plaza Shopping Center; and
- Malabar Road & Minton Road.

As previously noted, the intersections at the Plaza Shopping Center and Minton Road were only considered for signals in the future condition. A traffic signal was selected for Garvey Road because it had better operational analysis results and was over \$500K lower cost than the roundabout alternative. Further, the traffic signal at Garvey Road does not impact Canal C-20 like the roundabout alternative did.

While the intersection of Malabar Road and Jupiter Boulevard would have improved operations and safety as a roundabout, the signal alternative was selected due to constrained right-of-way. The US Post Office in the intersection's southwest corner is federal property and cannot be impacted, shifting the alignment to the north requiring the Canal C-20 to be relocated even as a signalized intersection. The roundabout alternative would also impact the adjacent intersection of Shalimar Avenue/Carmelite Avenue immediately to the north of the Jupiter Boulevard intersection. This would require both Shalimar Avenue and Carmelite Avenue to be converted to cul-de-sacs, forcing residents to travel nearly  $\frac{3}{4}$  of a mile out of their way to access the Malabar Road/Jupiter Boulevard intersection. The roundabout alternative also impacted Canal C-20, requiring a 750' 8'x5' box culvert to allow Canal C-20 to flow in relatively the same location it does today.



5.6.3.2 Roundabouts

Based on the intersection alternatives analysis discussed in **Section 5.4.5** and the construction costs reviewed in **Section 5.5.2**, the following intersections are recommended as roundabouts in the preferred alternative:

- Malabar Road & St. Johns Heritage Parkway;
- Malabar Road & Krassner Drive/Bending Branch Lane;
- Malabar Road & Hurley Boulevard; and
- Malabar Road & Maywood Avenue/Daffodil Drive.

For each of the intersections noted above, the roundabout is anticipated to operate better and have lower fatal/injury crashes than the traffic signal. To further justify the roundabout improvements at these locations, net present value (NPV) of benefits and benefit/cost (B/C) ratios were calculated using the FDOT ICE Tool and are shown in **Table 33**.

**Table 33: Roundabout NPVs and B/C Ratios**

<b>Intersection</b>	<b>Roundabout Delay NPV</b>	<b>Roundabout Safety NPV</b>	<b>Roundabout Overall NPV</b>	<b>Roundabout Overall B/C</b>
St. Johns Heritage Parkway	\$29,500,000	\$385,000	\$29,885,000	N/A*
Krassner Drive/ Bending Branch Lane	\$18,190,000	\$4,700,000	\$22,890,000	>100
Hurley Boulevard	\$6,450,000	\$7,420,000	\$13,870,000	20.7
Maywood Avenue/Daffodil Drive	\$2,520,000	\$5,690,000	\$8,210,000	5.8

\* At the St. Johns Heritage Parkway intersection, the roundabout construction costs are lower than the signal and the benefits are higher thus the roundabout is recommended.

As shown in **Table 33**, each of the four intersections are anticipated to have improved delay and safety benefits for the roundabout alternative when compared against the traffic signal. The FDOT ICE Tool B/C outputs can be found in **Appendix F**.

5.6.3.3 Two-Way Stop Control

Besides the signalized intersections and roundabouts, the remainder of the study intersections are recommended as two-way stop control in the preferred alternative:

- Malabar Road & Snapdragon Drive;
- Malabar Road & Championship Circle;
- Malabar Road & Wisteria Avenue/Abilene Drive;
- Malabar Road & Bavarian Avenue;
- Malabar Road & Watoga Avenue/Avery Springs;
- Malabar Road & Palm Bay Public Works Driveways;

## SECTION 5 – ALTERNATIVES ANALYSIS

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- Malabar Road & Post Office;
- Malabar Road & Santa Rosa Avenue;
- Malabar Road & Madalyn Landing; and
- Malabar Road & Sutherland Drive.

Each of these intersections is anticipated to operate at LOS D or better in the future build condition.

As previously discussed, the intersection of Wisteria Avenue/Abilene Drive was analyzed for traffic signal and roundabout configurations. This intersection is anticipated to meet signal warrants once full development occurs for the Chaparral Residential Development on the Abilene Drive leg of the intersection. When the intersection meets signal warrants, consideration should be given to convert this intersection from a two-way stop control intersection to a roundabout. As discussed in **Section 5.4.5**, the roundabout at Wisteria Avenue/Abilene Drive is anticipated to operate better and have lower fatal/injury crashes than the traffic signal. The NPV analysis showed the roundabout has a delay NPV of \$6,310,000 and a safety NPV of \$3,600,000, for a total NPV of \$9,910,000. It is anticipated the cost of right-of-way and construction will be paid by the developer. The FDOT ICE Tool outputs can be found in **Appendix F**.

## 6.0 AGENCY COORDINATION & PUBLIC INVOLVEMENT

### 6.1 Agency Coordination

#### 6.1.1 ETDM

Initial evaluations of the proposed Malabar Road project occurred during the Efficient Transportation Decision Making (ETDM) process. The ETDM process helps to identify project stakeholders and affected communities, obtain preliminary agency and public comments, and determine environmentally sensitive areas and project impact levels. The ETDM Summary Report (#14396) for Malabar Road, from the St. Johns Heritage Parkway to Minton Road, was published on October 25, 2019. The ETDM Summary Report shows 3 resources to be enhanced, 9 resources to have minimal impact, and 7 resources to have moderate impact. No resources had a degree of effect of substantial or requiring issue resolution. The report can be accessed on the ETDM public website (<https://etdmpub.fl-a-etat.org/est/>) and is found in **Appendix G**.

#### 6.1.2 Environmental Agency Coordination

Throughout the Malabar Road PD&E Study, environmental agencies were engaged to review and approve various documents as noted below:

- State Historic Preservation Officer (SHPO) – Reviewed the original CRAS in August 2021, and three subsequent addenda in February 2022, November 2022, and August 2023.
- USFWS and FWC – Reviewed the original NRE in December 2021 and the subsequent addendum in August 2024.
- NRCS – Reviewed the Farmland Conversion Impact Rating Form in April 2022.

#### 6.1.3 Project Kick-Off Letter

To announce the project's start, and in place of a project kick-off meeting, letters were emailed to elected and appointed officials, and newsletters were mailed to those whose property lies, in whole or part, within at least 300 feet on either side of each project alternative, as well as other local citizens who may be impacted by the construction of this project. The project kick-off letter described the PD&E study process, the project purpose and need, and the project schedule. Agency websites included the names and contact information for elected and appointed officials. Elected and Appointed Officials contact information is listed in the Public Involvement Plan (PIP). Names and mailing addresses were obtained from the Brevard County property appraiser website. The project's *Comments and Coordination Report* includes a package of the kick-off letters, Newsletter #1, contact information, mailing addresses, and a map identifying properties receiving mailed notifications.

*6.1.4 Project Update Meetings*

Various agency meetings were conducted to give a project update presentation and collect comments. Project update presentations were provided to the following agencies on the following days:

1. City of Palm Bay, Melbourne-Tillman Water Control District (MTWCD), and FDOT – project kick-off meeting – In-person meeting conducted at the Public Works Green Modular Conference Room on 11/18/2019;
2. City of Palm Bay, MTWCD, and Brevard County – design review meeting – Conducted virtually via Microsoft Teams on 4/17/2020;
3. City of Palm Bay, Brevard County, and MTWCD – access management meeting – Conducted virtually via Microsoft Teams on 7/22/2020
4. City of Palm Bay, MTWCD, Brevard County, SCTPO, and FDOT – public meeting comments review meeting – Conducted virtually via Microsoft Teams on 10/20/2020;
5. SCTPO Citizen Advisory Committee – Presented in-person at the Center of Collaboration on 10/5/2020;
6. SCTPO Technical Advisory Committee – Presented in-person at the Center of Collaboration on 10/5/2020;
7. SCTPO Governing Board – Presented in-person at the Center of Collaboration on 10/8/2020;
8. SCTPO Bicycle and Pedestrian Technical Advisory Committee – Presented virtually via GoToWebinar on 10/26/2020;
9. City of Palm Bay, MTWCD, and Brevard County – Discussion of preferred pond sites – Conducted virtually via Microsoft Teams on 3/31/2021;
10. City of Palm Bay and SCTPO – Discussion of final design funding options – Conducted virtually via Microsoft Teams on 4/8/2021;
11. FDOT – Review comments on draft PER – Conducted virtually via Microsoft Teams on 5/4/2022;
12. City of Palm Bay and MTWCD – Review changes to Canal C-20 retaining wall – Conducted virtually via Microsoft Teams on 6/28/2022;
13. City of Palm Bay and FDOT – Environmental Look Around Meeting – Conducted virtually via Microsoft Teams on 10/11/2022;
14. City of Palm Bay and SJRWMD – Environmental Look Around Meeting – Conducted virtually via Microsoft Teams on 12/9/2022;
15. On-Site Property Owner Representative (Tony Masone) – Regarding Pond C-7 relocation – Conducted in-person on 4/26/2023;
16. City of Palm Bay City Council – Presented in-person on 3/7/2024;
17. SCTPO Technical Advisory Committee/Citizen’s Advisory Committee – Presented in-person at the Center of Collaboration on 7/8/2024; and

18. SCTPO Governing Board – Presented in-person at the Center of Collaboration on 7/11/2024.

Meeting agendas, along with questions and comments obtained from these project update presentations, are contained in the project's *Comments and Coordination Report*.

#### **6.1.5 Transit Coordination**

During alternatives development, Space Coast Area Transit was contacted to verify existing transit stops along the Malabar Road study corridor and provide guidance on any potential future transit stops. Space Coast Area Transit confirmed the existing transit stops along the corridor and also noted at the present time there are no plans for the addition of any new bus stop locations in the near future. However, with the development going on the area, Space Coast Area Transit may get requests for new stops to be installed once the new subdivisions along the corridor are constructed. This email correspondence took place January 28, 2021 through February 1, 2021 and a copy of the email can be found in the project's *Comments and Coordination Report* and **Appendix K**.

During development of the preferred alternative, a meeting was held with Space Coast Area Transit on September 23, 2021 to review the proposed bus stop locations. The proposed bus stop locations are discussed in **Section 7.6**. A summary of this meeting is included in the project's *Comments and Coordination Report* and **Appendix K**.

## **6.2 Public Involvement**

### **6.2.1 Public Workshop Announcements**

To announce the September 24, 2020 Alternatives Public Meeting and solicit participation, the following notifications were sent to potential attendees or published on the following dates:

1. Invitation letters emailed to 49 elected and appointed officials – emailed 08/25/2020;
2. Press release submitted to City of Palm Bay contacts distribution list – 09/01/2020;
3. Newsletters mailed to 1,134 property owners and interested persons – 09/09/2020;
4. Display advertisement published in Florida Today – 09/11/2020;
5. Notification posted in the Florida Administrative Register (FAR) – 09/14/2020; and
6. Notification posted to the public notices section of the City of Palm Bay's Website – 09/15/20.

A package of the announcements is contained in the project's *Comments and Coordination Report*.

### **6.2.2 Alternatives Public Workshop**

The Alternatives Public Meeting was a virtual public meeting held on Thursday, September 24, 2020 at 5:30 p.m. using GoToWebinar. Three days prior to the virtual public meeting, the public meeting displays and handout were posted in City Hall's Community Meeting Room A and on the

project website for public review. Attendees were invited to register for the virtual public meeting using the registration link on the project website. The Alternatives Public Meeting has two primary objectives: (1) informing the public on the alternatives being considered; and (2) obtaining input from the public, elected, and appointed officials, property and business owners, and other interested parties.

The virtual public meeting started at 5:30 p.m. with the City's consultant project manager describing the project background and where to view the meeting materials and providing an overview of the two concept alternatives. The City's consultant public involvement coordinator provided an overview of the different ways to submit a comment or question during and after the webinar, and other options available to hear/view the webinar. A recorded narrated presentation began at 6:00 p.m. During the meeting, attendees could submit comments or questions by typing them into the GoToWebinar's questions box on the control panel. If attendees called in to the meeting or were watching the meeting through the City's website, they could submit comments after the meeting using printed public comment forms available at City Hall. Questions and comments could be submitted by mail, email or deposited into a comment box at City Hall's Community Meeting Room A, or by digital comment forms on the project website. The comment period officially closed on October 5, 2020; however, comments received after this date were also included in the public record. There were seventy-eight (78) registrants for the public meeting, of which forty-one (41) attended. Eight (8) comments were received during the public comment period from Tuesday, September 22, 2020 to Monday, October 5, 2020. All public comments were responded to in writing, and the following summarizes the comments received:

- Two of the comments specifically noted support of the project and two additional comments supported the traffic signal alternative as opposed to roundabouts. Responses to the traffic signal vs roundabout comments focused on the benefits of roundabouts in this specific context.
- Four comments asked various questions related to proposed pedestrian/bicycle facilities along the study corridor. Responses to these comments focused on the various pedestrian/bicycle alternatives assessed and the design criteria needing to be met for the corridor.
- Two comments asked various right-of-way questions, one specifically regarding the impacts to Canal C-20. Responses focused on needing to legally determine right-of-way during the design phase and noting that specific drainage features will be coordinated with the MTWCD during the design phase.

The project's *Comments and Coordination Report* includes a package of meeting sign-in sheets, the presentation, copies of public comment forms, a list of meeting materials provided on the project website, and the *Alternatives Public Meeting Summary* which contains the comments received and the written response to the comments.

**6.3 Public Hearing**

Section to be completed at a later date.

*6.3.1 Public Hearing Announcements*

Section to be completed at a later date.



## 7.0 PREFERRED ALTERNATIVE

This section includes a description of design features of the preferred alternative. The concept plans for the preferred alternative are located in **Appendix H**. The typical section package is located in **Appendix I**.

### 7.1 Typical Sections

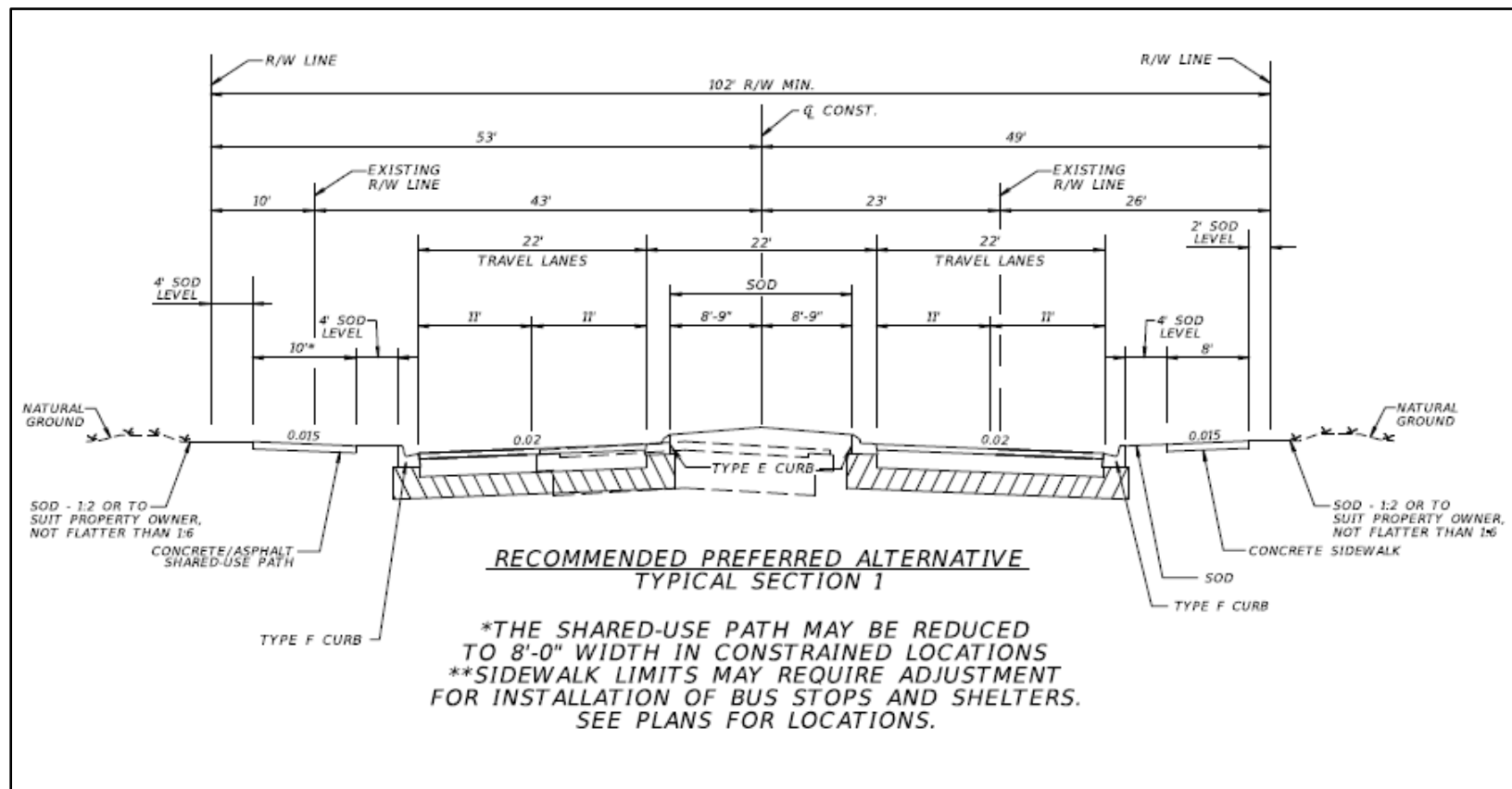
The preferred alternative will widen Malabar Road from two to four lanes from the St. Johns Heritage Parkway to Minton Road. The typical section along the study corridor was selected by the City of Palm Bay and Brevard County. The following describes the general preferred alternative typical section elements:

- Two 11' travel lanes in each direction;
- 22' wide median, including Type E curb and gutter;
- Type F curb and gutter outside of the travel lanes;
- 10' shared-use path on the north side and 8' sidewalk on the south side; and
- 4' grass buffer on both sides between back of curb and pedestrian/bicycle facilities.

The preferred typical section from the St. Johns Heritage Parkway (Sta. 65+49.13) to Canal C-10 (Sta. 141+06) is primarily contained within 102' to 106' of right-of-way. No roadside drainage swales are present within this section. From Sta. 101+93.87 to 114+98.60, the roadway right-of-way widens to 136' as there is a 34' setback on the south side in front of the Tillman Lakes development. A representative typical section for the St. Johns Heritage Parkway to Canal C-10 segment is shown in **Figure 38**.

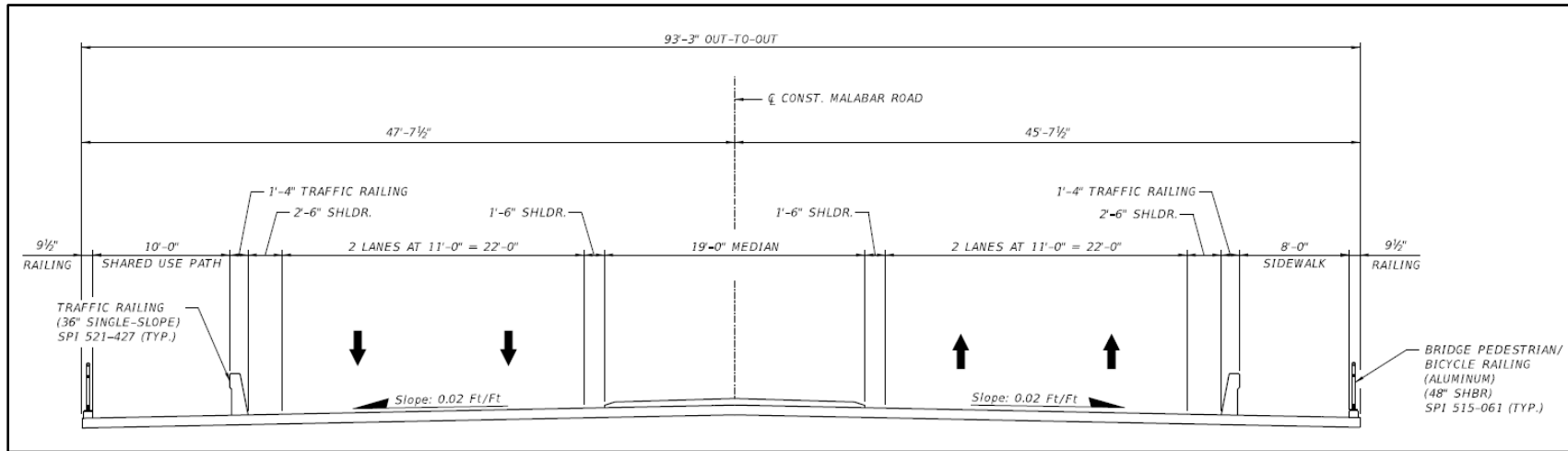
The preferred typical section for Malabar Road over Canal C-10 consists of two 11' travel lanes in each direction, a 10' barrier separated shared-use path on the north side and an 8' barrier separated sidewalk on the south side. There is a 19' mountable raised median on the bridge with two 1.5' inside shoulders. The 1.5' inside bridge shoulder is consistent with the gutter pan width from the Type E curb along the approach roadway, per FDM Figure 260.1.4(2). The outside edges of the median will be mountable curb. The raised median transitions to an 11' wide eastbound left turn lane serving Hoffer Avenue with a 5' traffic separator at the bridge's eastern end. A 1'-4" wide by 3' tall Single-Slope Traffic Railing (FDOT Standard Plans Index (SPI) 521-427) will be used along the outside of each 2.5' outside shoulder. A 9.5" wide by 48" tall Bridge Pedestrian/Bicycle Railing (FDOT SPI 515-051 or -061) will be used along the outside coping to protect pedestrians and cyclists from the drop-off hazard. The overall bridge width is 93.25' with the roadway crowned at 2 percent at the centerline of construction. **Figure 39** displays the preferred alternative for the bridge over Canal C-10.

**SECTION 7 – PREFERRED ALTERNATIVE**



**Figure 38: Preferred Alternative Representative Typical Section – St. Johns Heritage Parkway to Canal C-10**

**SECTION 7 – PREFERRED ALTERNATIVE**



**Figure 39: Preferred Alternative Typical Section – Bridge over Canal C-10**

## SECTION 7 – PREFERRED ALTERNATIVE

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The preferred typical section from Canal C-10 to Sta. 271+67 varies considerably along the corridor. The following highlights key differences in typical section elements within this section:

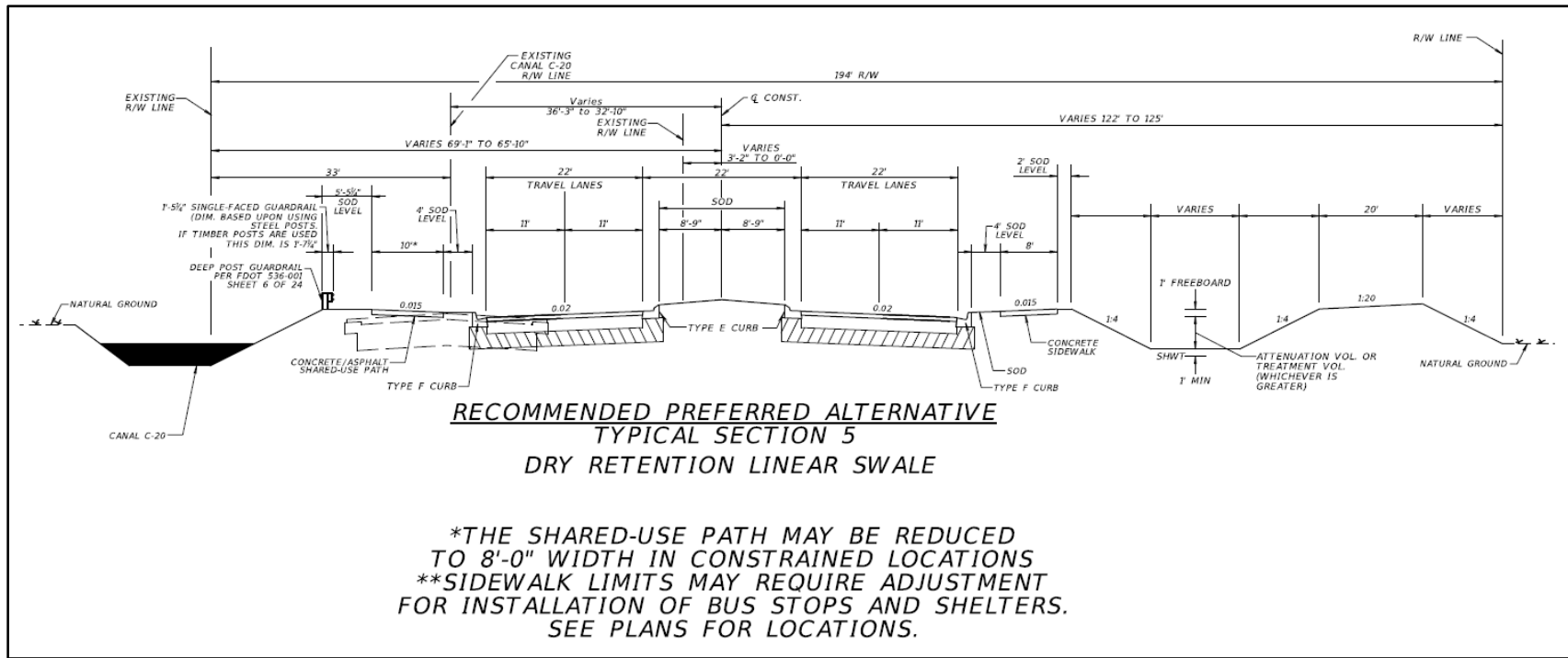
- Canal C-10 (Sta. 143+07.62) to West of Jupiter Boulevard (Sta. 181+66) (**Figure 40**) –
  - Proposed right-of-way width varies between 100' west of Jupiter Boulevard to 194' in the areas where dry retention linear swales are present on the roadway's south side.
  - Canal C-20 runs parallel to Malabar Road on the north side for this entire section.
  - Dry retention linear swales run parallel to Malabar Road's south side for a majority of this section.
  - A median width variation will be required as the proposed median width reduces from 22' to 19.5' between Sta. 176+03.60 and Sta. 181+66.
  - A border width variation will be required as the proposed border width on the south side of Malabar Road is less than 14' from Sta. 143+07.62 to Sta. 145+06.17.
  - The existing roadway is positioned in the preferred typical section's northern half.
- West of Jupiter Boulevard (Sta. 181+66) to East of Jupiter Boulevard (Sta. 202+90) (**Figure 41**) –
  - Widening is primarily contained within a 101.5' proposed right-of-way footprint.
  - In front of the USPS (Sta. 185+55.63 to Sta. 193+14), the proposed right-of-way reduces to 94.5', and the south side sidewalk is reduced to 6' and brought adjacent to the back of curb. This is done to avoid taking any USPS land and avoid impacts to this federal property while minimizing the Canal C-20 relocation. Once clear of the USPS area, the sidewalk transitions back to 8' and away from the back of curb as shown in **Figure 41**.
    - A median width variation will be required as the proposed median width reduces from 22' to 19.5' between Sta. Sta. 181+66 and 208+88.26.
    - A border width variation will be required as the proposed border width on the south side of Malabar Road is less than 14' from Sta. 185+55.63 to Sta. 193+14.
  - Canal C-20 is being relocated to the north and retaining walls are proposed for the north and south sides of the canal. By utilizing retaining walls and not sloped embankments coupled with the reduced typical section width, the right-of-way needed on the north side of the canal will be reduced and the adjacent minor streets/residences will not be impacted.
  - Dry retention linear swales are proposed parallel to Malabar Road on the south side from Sta. 198+69.11 to Sta. 201+18.89.
  - The existing roadway is positioned in the middle of the preferred typical section.
- East of Jupiter Boulevard (Sta. 202+90) to Maywood Avenue/Daffodil Drive (Sta. 242+82.45) (**Figure 42**) –

## SECTION 7 – PREFERRED ALTERNATIVE

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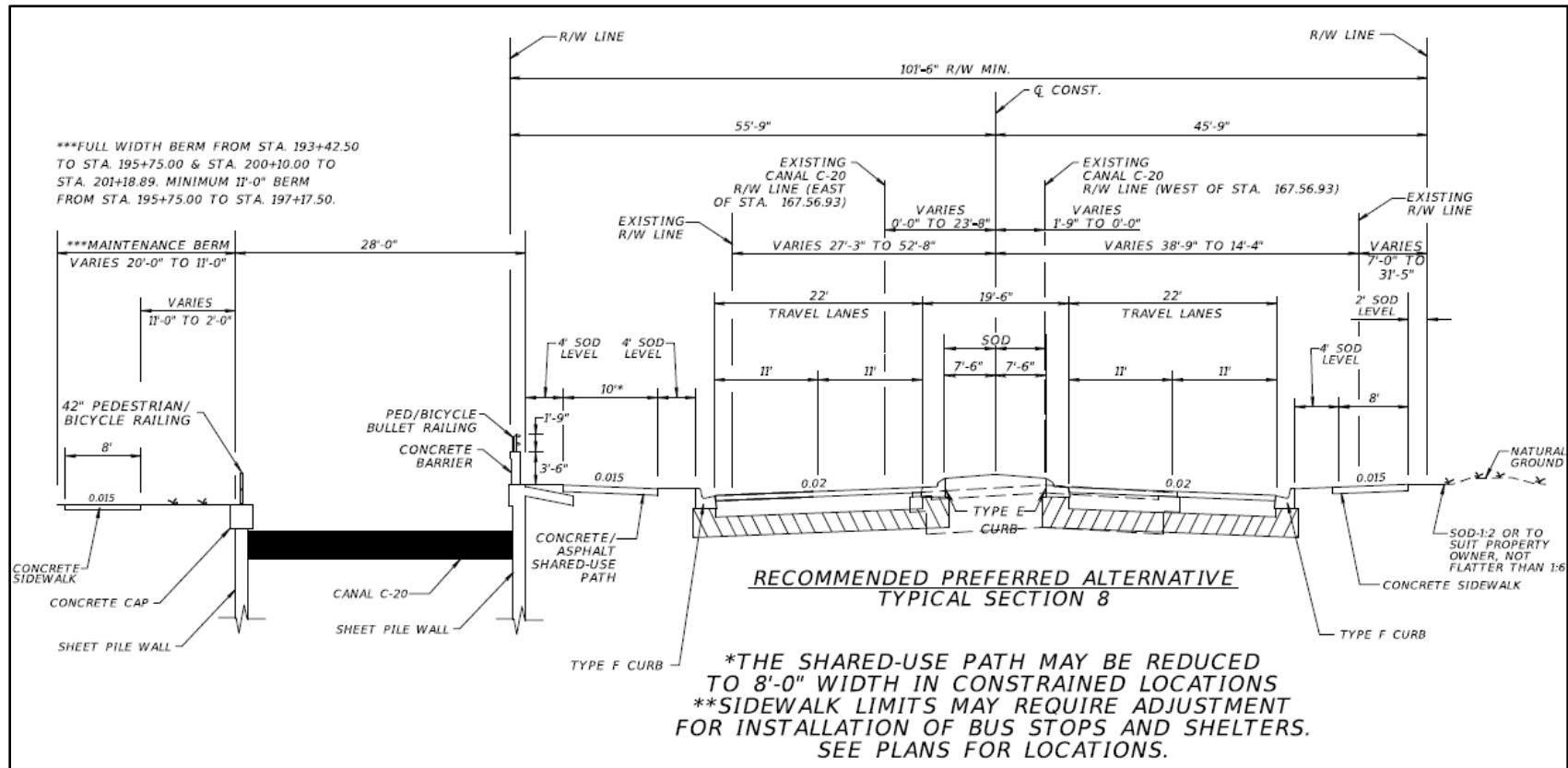
- Proposed right-of-way width is typically 101.5' in this section but does widen to 191' in the area where dry retention linear swales are present on the south side between Tile Avenue and Ware Avenue.
- Canal C-20 runs parallel to Malabar Road on this section's north side.
- The existing roadway is positioned in the northern half of the preferred typical section.
- Note the preferred typical section from Sta. 242+82.45 to Sta. 261+21.20 varies due to the Maywood Avenue/Daffodil Drive roundabout.
- West of Plaza Shopping Center (Sta. 261+21.20 to Sta. 264+08.50) (**Figure 43**) –
  - Widening is primarily contained within a 107' proposed right-of-way.
  - A third lane is added in the eastbound direction to accommodate turn lane improvements on the Minton Road intersection's western leg.
  - The south side sidewalk is reduced to 6' and brought adjacent to the back of curb.
  - A border width variation will be required as the proposed border width on the south side of Malabar Road is less than 12' from Sta. 261+21.20 to Sta. 264+08.50.
  - The existing roadway is positioned in the middle of the preferred typical section.
- The section from Sta. 264+08.50 to Sta. 271+67 varies due to the turn lane configurations between the Plaza Shopping Center and Minton Road intersections.
  - A border width variation will be required as the proposed border width on the south side of Malabar Road is less than 12' from Sta. 264+08.50 to approximately Sta. 266+75.

**SECTION 7 – PREFERRED ALTERNATIVE**



**Figure 40: Preferred Alternative Representative Typical Section – Canal C-10 to West of Jupiter Boulevard**

**SECTION 7 – PREFERRED ALTERNATIVE**



**Figure 41: Preferred Alternative Representative Typical Section – West of Jupiter Boulevard to East of Jupiter Boulevard**



SECTION 7 – PREFERRED ALTERNATIVE

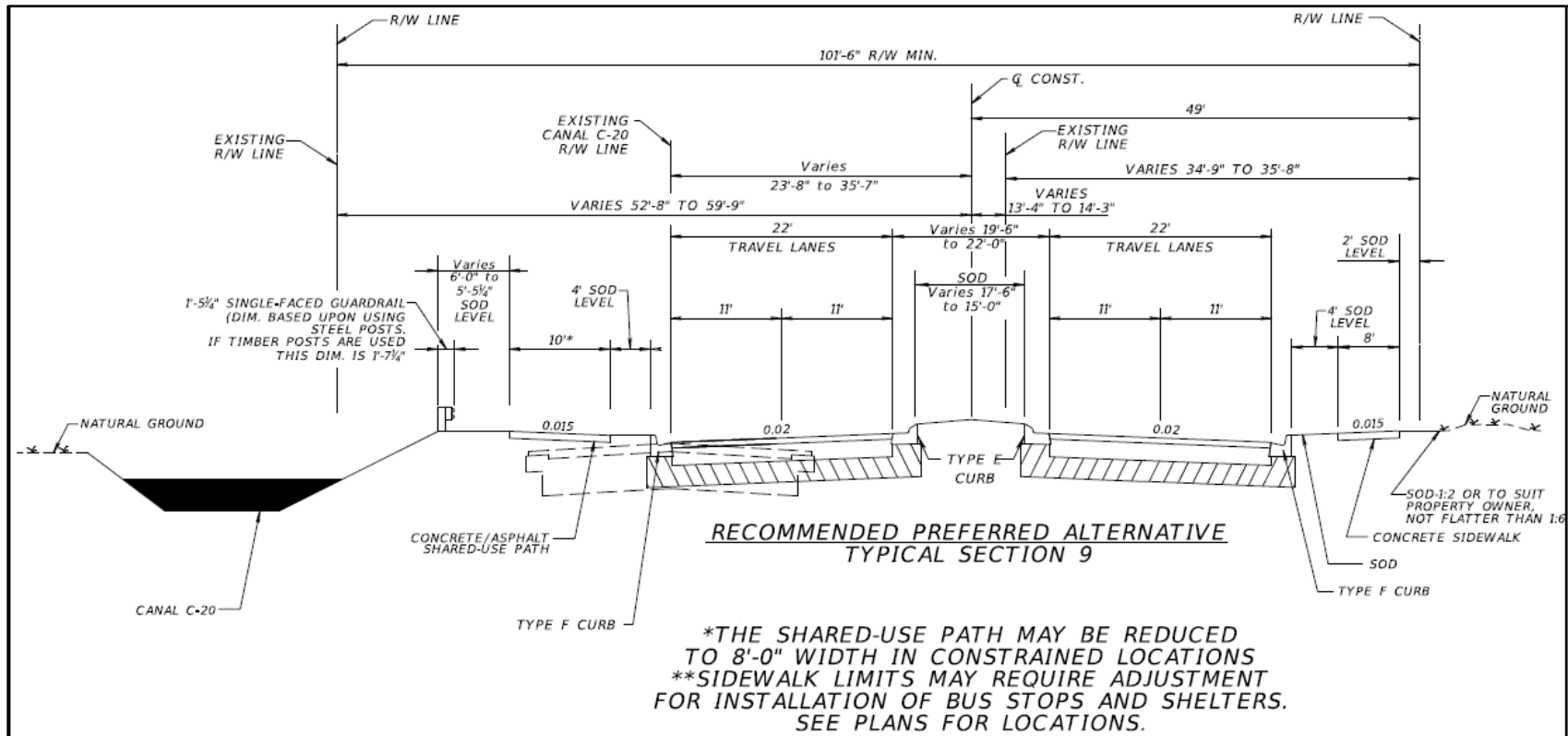
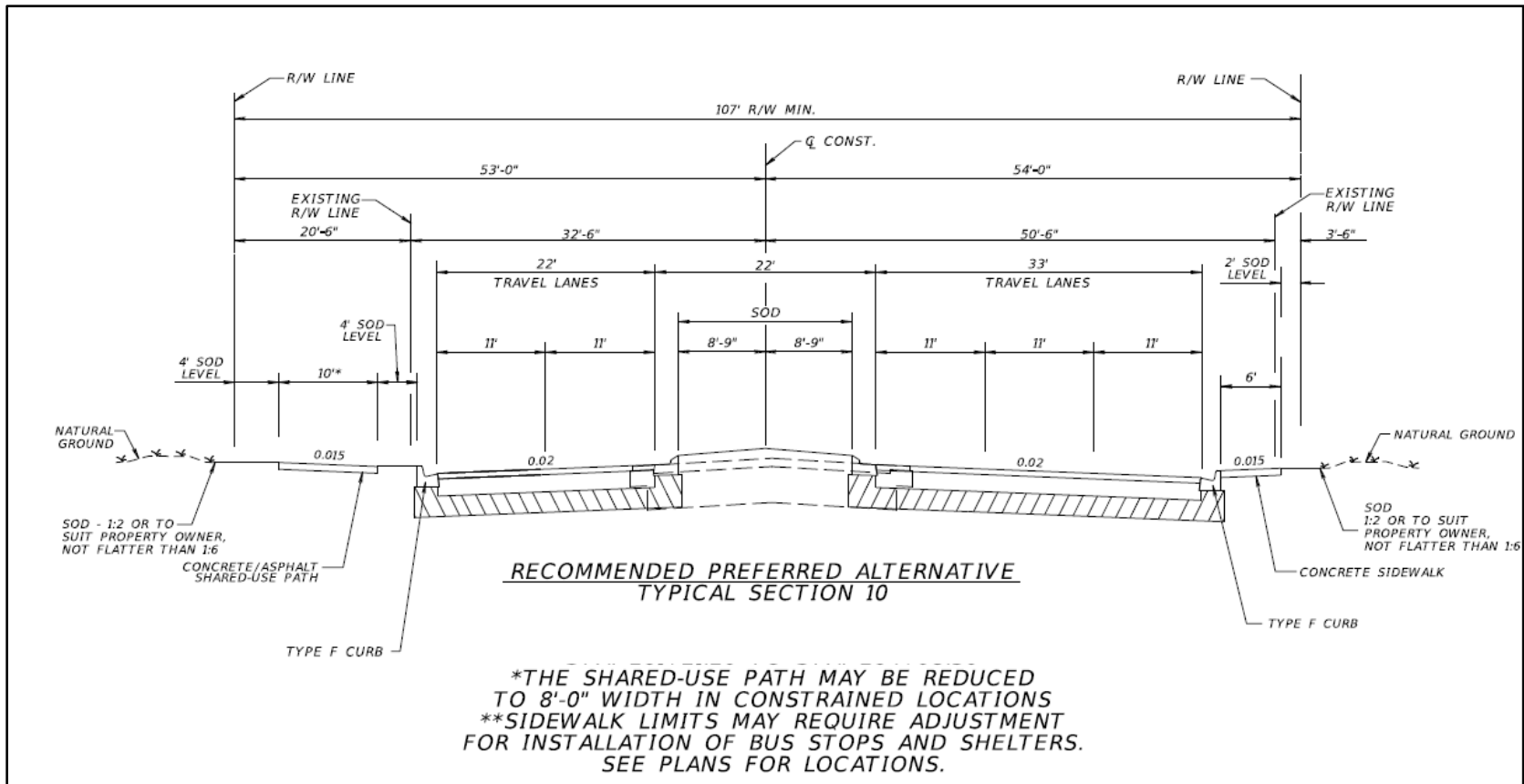


Figure 42: Preferred Alternative Representative Typical Section – East of Jupiter Boulevard to Maywood Avenue/Daffodil Drive

**SECTION 7 – PREFERRED ALTERNATIVE**



**Figure 43: Preferred Alternative Representative Typical Section – West of Plaza Shopping Center**

## **7.2 Access Management**

As noted in **Section 2.2.3**, Malabar Road is not a state roadway but the existing access management classification most closely resembles an FDOT Access Class 4 (non-restrictive) facility. As part of the two- to four-lane widening preferred alternative, Malabar Road is proposed to meet FDOT Access Class 5 guidance for the entire corridor (St. Johns Heritage Parkway to Minton Road) with the following spacing guidance:

- Class 5 45 mph or Less –
  - Full Median Opening: 1,320'
  - Directional Median Opening: 660'

The following discusses the specific characteristics of the roundabouts/traffic signals and full median openings along the Malabar Road study corridor:

- Eight roundabouts/traffic signals –
  - St. Johns Heritage Parkway – roundabout
  - Krassner Drive/Bending Branch Lane – roundabout
  - Hurley Boulevard – roundabout
  - Jupiter Boulevard – traffic signal
  - Garvey Road – traffic signal
  - Maywood Avenue/Daffodil Drive – roundabout
  - Plaza Shopping Center – traffic signal
  - Minton Road – traffic signal
- Four full median openings –
  - Championship Circle
  - Wisteria Avenue/Chapparal Residential Development
  - Palm Bay Public Works East Driveway
  - Belvedere Road

The matrix in **Appendix L** shows the spacing between the proposed median openings. The following proposed median openings are expected to exceed a 10 percent difference from FDOT spacing guidance and provides a justification for the proposed spacing:

- Palm Bay Public Works (West) bi-directional median opening and Palm Bay Public Works (East) full median opening – spaced 500' apart/24 percent difference
  - Full median access is needed for both Palm Bay Public Works driveways to accommodate large trucks.
- Palm Bay Public Works (East) full median opening and Jupiter Boulevard signalized intersection – spaced 975' apart/26 percent difference
  - Full access for the Palm Bay Public Works property is needed to facilitate inbound/outbound public works vehicles

- Wellsley Avenue bi-directional median opening and Greenbriar Avenue bi-directional median opening – spaced 525' apart/20 percent difference
  - The westbound bi-directional median opening at Wellsley Avenue provides access to Wellsley Avenue and Tile Avenue to minimize out of direction travel. The eastbound bi-directional median opening at Greenbriar Avenue accommodates traffic entering Malabar Road from Wellsley Avenue and Tile Avenue that needs to U-turn to travel westbound. Access to Greenbriar Avenue is also needed because it is the only Malabar Road access point for the residential properties north of Malabar Road in this segment.
- Santa Rosa Avenue eastbound directional median opening and Belvedere Road full median opening – spaced 350' apart/47 percent difference
  - Full access is needed at Belvedere Road because it is one of two access points (the other being Maywood Avenue/Daffodil Drive) for the residential properties north of Malabar Road in this segment
  - The eastbound directional median opening at Santa Rose Avenue is provided to facilitate u-turn movements and better accommodate properties on the north side of Malabar Road in this segment
- Belvedere Road full median opening and Garvey Road signalized intersection – spaced 450' apart/66 percent difference
  - Full access is needed at Belvedere Road because it is one of two access points (the other being Maywood Avenue/Daffodil Drive) for the residential properties north of Malabar Road in this segment
- Maywood Avenue/Daffodil Drive roundabout and Palm Bay Memory Care westbound directional median opening – spaced 475' apart/28 percent difference
  - A westbound directional median opening is needed for Palm Bay Memory Care to facilitate traffic coming from the east
- Plaza Shopping Center signalized intersection and Minton Road signalized intersection – spaced 750' apart/43 percent difference
  - Both of these signalized intersections are present in the existing condition

### 7.3 Right-of-Way

The preferred alternative is anticipated to impact 108 parcels and requires approximately 39 acres of right-of-way for the combined roadway and stormwater pond impacts, as shown in **Table 34**. The City of Palm Bay already owns 33 of these parcels, and three of the 108 parcels currently have dwelling units that are anticipated to be impacted by the preferred alternative. Of the three parcels with dwelling unit impacts, the dwelling unit on the first parcel is occupied (per the date of this report) and the City of Palm Bay owns the second and third parcels. The total right-of-way cost for the project (roadway and stormwater ponds) is estimated at \$2,403,800. A *Conceptual Stage Relocation Plan* was completed for the project and is included in the project files.

**Table 34: ROW Needs and Cost Estimates**

Limits	Parcels Impacted	ROW Acreage	Pond + FPCA Acreage	Total ROW Acreage	Total ROW Cost Estimate
St. Johns Heritage Parkway to Minton Road	108	15.1	23.9	39.0	\$2,403,800

## 7.4 Horizontal and Vertical Geometry

### 7.4.1 Horizontal Alignment

Seventeen horizontal curves are present for the preferred alternative along Malabar Road between the St. Johns Heritage Parkway and Minton Road. Eleven of the proposed horizontal curves are located within roundabout approaches/exits. Horizontal curves meet criteria defined by FDOT minimum curve standards found in the 2024 FDM Table 210.9.2 ( $e_{\max} = 0.05$ ). Data for the preferred alternative curves can be seen in **Table 35**. Curves and their respective data are located on the preferred alternative plan sheets provided in **Appendix H**.

**Table 35: Malabar Road Preferred Alternative Horizontal Curve Summary**

Curve Characteristic	Malabar Road – Curve Number					
	3*	6*	11	14	19*	24*
Design Speed (mph)	40	40	40	40	45	45
PI Sta.	54+27.97	60+04.08	87+02.92	92+02.99	125+55.51	132+42.21
$\Delta$	1°09'21" (LT)	8°07'24" (LT)	1°06'24" (LT)	1°10'38" (RT)	1°51'55" (LT)	5°55'34" (RT)
D	3°22'35"	7°12'25"	0°16'36"	0°17'40"	2°20'29"	1°40'35"
T	17.12	56.45	200.01	200.01	39.83	176.92
L	34.24	112.72	400.00	400.00	79.66	353.52
R	1,697.00	795.00	20,708.06	19,467.86	2,447.00	3,418.00
PC Sta.	54+10.85	59+47.63	85+02.91	90+02.98	125+15.68	130+65.30
PT Sta.	54+45.09	60+60.34	89+02.91	94+02.98	125+95.34	134+18.81
e Max (%)	NC	RC	NC	NC	NC	NC
Location	Eastbound St. Johns Heritage Pkwy. RAB Approach	Eastbound St. Johns Heritage Pkwy. RAB Approach	Alignment shift west of Canal No. 8	Alignment shift east of Canal No. 8	Eastbound Krassner Dr. RAB Approach	Eastbound Krassner Dr. RAB Exit

**Table 35: Malabar Road Preferred Alternative Horizontal Curve Summary Cont.**

Curve Characteristic	Malabar Road – Curve Number					
	27*	30*	35*	38*	41	44
Design Speed (mph)	45	45	45	45	45	45
PI Sta.	151+99.60	153+60.29	158+09.39	159+75.12	176+81.81	185+56.24
Δ	2°36'17" (LT)	5°02'34" (LT)	3°33'09" (RT)	2°31'48" (RT)	2°23'41" (LT)	2°31'07" (RT)
D	3°31'18"	2°59'59"	3°34'35"	2°25'36"	0°35'55"	0°35'56"
T	71.64	524.11	49.68	52.14	200.03	210.34
L	143.19	1,023.04	99.33	104.25	400.00	420.60
R	1,627.00	1,910.00	1,602.00	2,361.00	9,570.17	9,568.00
PC Sta.	152+88.65	25+56.61	157+59.71	159+22.98	174+81.78	183+45.90
PT Sta.	154+31.84	35+79.66	158+59.03	160+27.23	178+81.78	187+66.51
e Max (%)	RC	RC	RC	NC	NC	NC
Location	Eastbound Hurley Blvd. RAB Approach	Eastbound Hurley Blvd. RAB Approach	Eastbound Hurley Blvd. RAB Exit	Eastbound Hurley Blvd. RAB Exit	Alignment Shift at Public Works Dept.	Alignment Shift at USPS

**Table 35: Malabar Road Preferred Alternative Horizontal Curve Summary Cont.**

Curve Characteristic	Malabar Road – Curve Number				
	47	50	55*	58*	65*
Design Speed (mph)	45	45	45	45	45
PI Sta.	197+17.34	205+38.40	243+19.05	244+59.98	250+26.70
Δ	2°32'35" (RT)	2°28'16" (LT)	2°34'52" (LT)	3°30'25" (LT)	5°01'49" (RT)
D	0°35'56"	0°35'56"	3°36'13"	3°51'11"	2°42'00"
T	212.37	206.36	35.82	45.52	93.21
L	424.66	412.65	71.63	91.01	186.30
R	9,568.00	9,568.00	1,590.00	1,487.00	2,122.00
PC Sta.	195+04.97	203+32.05	242+83.23	244+14.46	249+33.49
PT Sta.	199+29.64	207+44.69	243+54.86	245+05.47	251+19.79
e Max (%)	NC	NC	RC	RC	NC
Location	Alignment Shift at White Road	Alignment Shift at Greenbriar Ave.	Eastbound Maywood Ave. RAB Approach	Eastbound Maywood Ave. RAB Approach	Eastbound Maywood Ave. RAB Exit

\* Denotes curves on roundabout approaches/exits. Section 6.8.5.4 of *NCHRP Report 672: Roundabouts: An Informational Guide* recommends curvature on roundabout approaches to assist with speed control at roundabout entries. Curvature radii is determined using a combination of factors including design speed and fastest path criteria.

### 7.4.2 Vertical Alignment

From Project No. 10861 (Malabar Road Construction Plans) completed in 2008, it can be determined there are no existing vertical curves within the project limits. Grade changes along Malabar Road fall within the allowable 0.70 percent threshold for 45 mph facilities as shown in FDM Table 210.10.2. It is recommended the proposed vertical alignment matches the existing vertical alignment for most of the corridor. However, profile adjustments may also be needed to maintain positive drainage where existing grades fall below 0.30 percent, which is the minimum allowed grade on curbed roadways according to FDOT FDM Section 210.10.1.1.

However, the profile will need to be raised on either side of the Canal C-10 bridge as the superstructure depth for the new bridge will increase by approximately 6.5". The total vertical profile will be raised approximately 4' to accommodate canal maintenance equipment. With a design speed of 45 mph and a proposed 2 percent grade on either side of the bridge, the Malabar Road intersection with the FPL maintenance road (west of the bridge) will be raised approximately 2'-7" and the Bavarian Avenue/Hoffer Avenue intersection (east of the bridge) will be raised approximately 3.5". The proposed intersection of Malabar Road at Delia Avenue will not be affected. It is recommended that the FPL maintenance road be tied back into existing with a grade not to exceed 10 percent to not negatively affect low boy heavy equipment transport trucks. The proposed vertical alignment at the Canal C-10 bridge is shown in **Figure 44**.

Where existing pavement is to be reused, it is suggested to maintain the existing roadway profile unless the grade is <0.30%. In these areas, it is recommended to "rock" the grade as needed to facilitate the drainage patterns. Pavement corings should be completed along existing corridor sections to determine the existing pavement section's structural integrity, pavement section depths, and base design resilient modulus. As discussed in **Section 2.2.6**, there were no obvious areas of base failure and portions of Malabar Road were resurfaced in late 2020/early 2021.



SECTION 7 – PREFERRED ALTERNATIVE

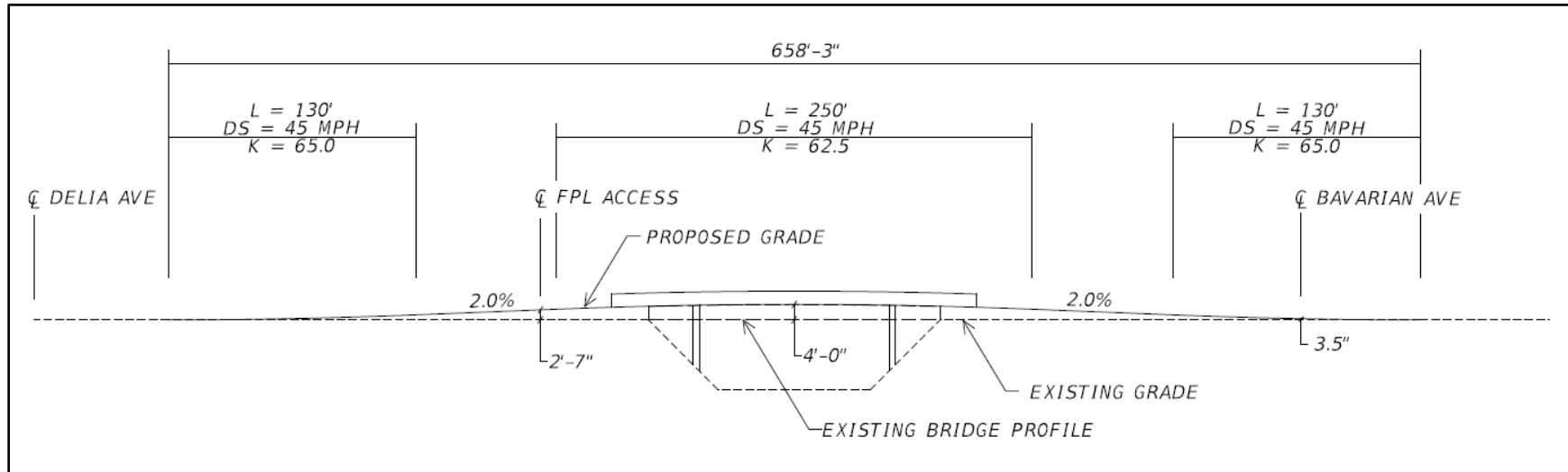


Figure 44: Vertical Profile for West and East Bridge Tie-Ins

## 7.5 Design Variations and Design Exceptions

As discussed in **Section 4.2**, the Malabar Road PD&E is a Local Agency Program project with construction costs that exceed \$10 million, thus the FDM is the controlling design guide for roadway components. The following design variations will be required based on the preferred alternative concept:

- Median width variation – the proposed median width reduces from 22' to 19.5' between Sta. 176+03.60 and 208+88.26.
- Border width variation in 45 mph design speed sections – the border width on the south side of Malabar Road is less than 14' at the following locations:
  - Sta. 143+07.62 to Sta. 145+06.17 – 12.5'
  - Sta. 185+55.63 to Sta. 193+14.00 – 8.5'
- Border width variation in 40 mph design speed sections – the border width on the south side of Malabar Road is less than 12' at the following locations:
  - Sta. 261+21.20 to approximately Sta. 266+75 – 11.5'

FDOT District 5 has determined they will not approve typical sections or a design variation memorandum for off-system projects during the PD&E phase, but will address them during the subsequent design phase, at which point a design variation memorandum will be needed and approved.

## 7.6 Multimodal Accommodations

### 7.6.1 *Bicycle and Pedestrian Accommodations*

As discussed in **Section 7.1**, a 10' shared-use path on the north side and an 8' sidewalk on the south side is being provided along the study corridor to accommodate pedestrians and bicycles. A 4' grass buffer is also proposed between the back of the curb and pedestrian/bicycle facilities on both sides of the roadway with the exception of three locations:

- South side from Sta. 143+07.62 to Sta. 145+06.17 (just east of the Canal C-10 bridge);
- South side from Sta. 185+55.63 to Sta. 193+14.00 (in front of the USPS property just west of Jupiter Boulevard); and
- South side from Sta. 252+00 to Sta. 271+67.

During the Alternatives Public Meeting and subsequent local jurisdiction meetings in Fall 2020, discussion was held regarding the lack of on-road bicycle facilities being provided in the proposed typical section alternatives. To further reduce right-of-way impacts along the study corridor, the decision was made to not include on-road bicycle facilities. As previously discussed in **Section 5.4.3**, per 2024 FDM Section 223.2.3, a shared-use path can be substituted for bicycle lanes when certain conditions are met.

As previously noted in Section 2.8, a new sidewalk has been constructed between Hurley Boulevard and Jupiter Boulevard with a connection to the Cross City Trail. The proposed widening's 8' south sidewalk will replace the existing sidewalk and maintain connection to the Cross City Trail. One consideration is to use Watoga Avenue's potential signalization, as part of the Avery Springs development, to provide a Cross City Trail crossing location. Trail users could cross at this signalized crosswalk to access the proposed 10' shared-use path on Malabar Road's north side. Between Watoga Avenue and where the Cross City Trail intersects with Malabar Road, the south side sidewalk width would be increased to 10'.

An existing 8' sidewalk is present on the north side of Malabar Road throughout the project limits. West of Canal C-10, the existing sidewalk will be replaced by the 10' shared-use path. From Canal C-10 to Maywood Avenue/Daffodil Drive, the existing 8' sidewalk will remain in place on Canal C-20's north side while the proposed 10' shared-use path will be constructed on the canal's south side. Keeping the existing 8' sidewalk in this segment will accommodate pedestrian/bicycle movement for residences on Canal C-20's north side. At locations where roadways cross Canal C-20, connections will be provided to get from the 8' existing north side sidewalk to the proposed south side 10' shared-use path. East of Maywood Avenue/Daffodil Drive, the existing sidewalk will be replaced by the 10' shared-use path.

As noted in **Section 7.2**, the three existing pedestrian bridges are being removed to accommodate the preferred alternative typical section. Because the bridge over Canal C-10 is being removed, the existing 8' sidewalk on the north side will be connected to the proposed 10' shared-use path at Hoffer Avenue.

### *7.6.2 Transit Accommodations*

As part of the four-lane widening, any bus stops located in the grass shoulder will be relocated to the proposed pedestrian facilities on the north/south sides of the roadway and boarding/alighting pads will be provided. The shelter at the Madalyn Landing Apartments will be relocated to the south side sidewalk due to the roadway widening. A meeting was held with Space Coast Area Transit on September 23, 2021 to review the proposed bus stop locations and a summary of this meeting is included in **Appendix K**. The existing and proposed bus stop locations are presented in **Table 36** and shown in the concept plans for the preferred alternative in **Appendix H**.

Per email discussions with Space Coast Area Transit, there are no plans for the addition of any new Malabar Road bus stop locations beyond what is shown in the concept plans. However, with the ongoing residential development in the area, Space Coast Area Transit may get requests for new stops to be installed once the new subdivisions along the corridor are constructed. The Preferred Alternative will not preclude accommodation of future transit stops along the study corridor. The email correspondence is included in **Appendix K**.

**Table 36: Existing and Proposed Bus Stop Locations**

Bus Stop Location	Direction	Existing Station	Proposed Station
St. Johns Heritage Parkway	WB	64+25	66+75
Championship Circle	WB	87+50	88+70
Wisteria Avenue	WB	108+25	108+65
Krassner Drive	WB	129+00	132+04
Hurley Boulevard	WB	155+50	158+05
Across from USPS West of Jupiter Boulevard	WB	188+25	188+17
White Road	EB	197+50	197+65
Greenbriar Avenue	WB	207+00	207+19
Ware Avenue	EB	210+75	209+93
Belvedere Road	WB	217+25	217+35
At Madalyn Landing Apartments <sup>1</sup>	EB	227+25	227+95
Sutherland Drive	EB	239+85	239+53
Maywood Avenue/Daffodil Drive	WB	247+50	250+48
Maywood Avenue/Daffodil Drive	EB	247+15	250+80
Plaza Shopping Center	WB	262+75	262+76
Minton Road	EB	270+15	270+19

<sup>1</sup> Bus stop has an existing shelter, and a shelter is also proposed in the future condition.

## 7.7 Intersection Concepts and Signal Analysis

As discussed in **Section 5.6.3**, the following intersection recommendations were made along the Malabar Road study corridor:

- Roundabouts –
  - Malabar Road & St. Johns Heritage Parkway;
  - Malabar Road & Krassner Drive/Bending Branch Lane;
  - Malabar Road & Hurley Boulevard; and
  - Malabar Road & Maywood Avenue/Daffodil Drive.
- Signalized Intersections –
  - Malabar Road & Jupiter Boulevard;

- Malabar Road & Garvey Road;
- Malabar Road & Plaza Shopping Center; and
- Malabar Road & Minton Road.

The remainder of this section provides design details of the preferred concepts for at these locations.

### 7.7.1 Roundabout Analysis

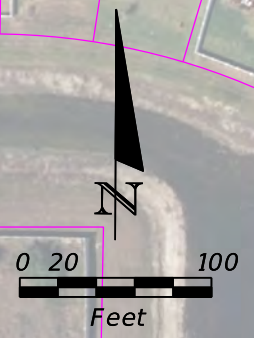
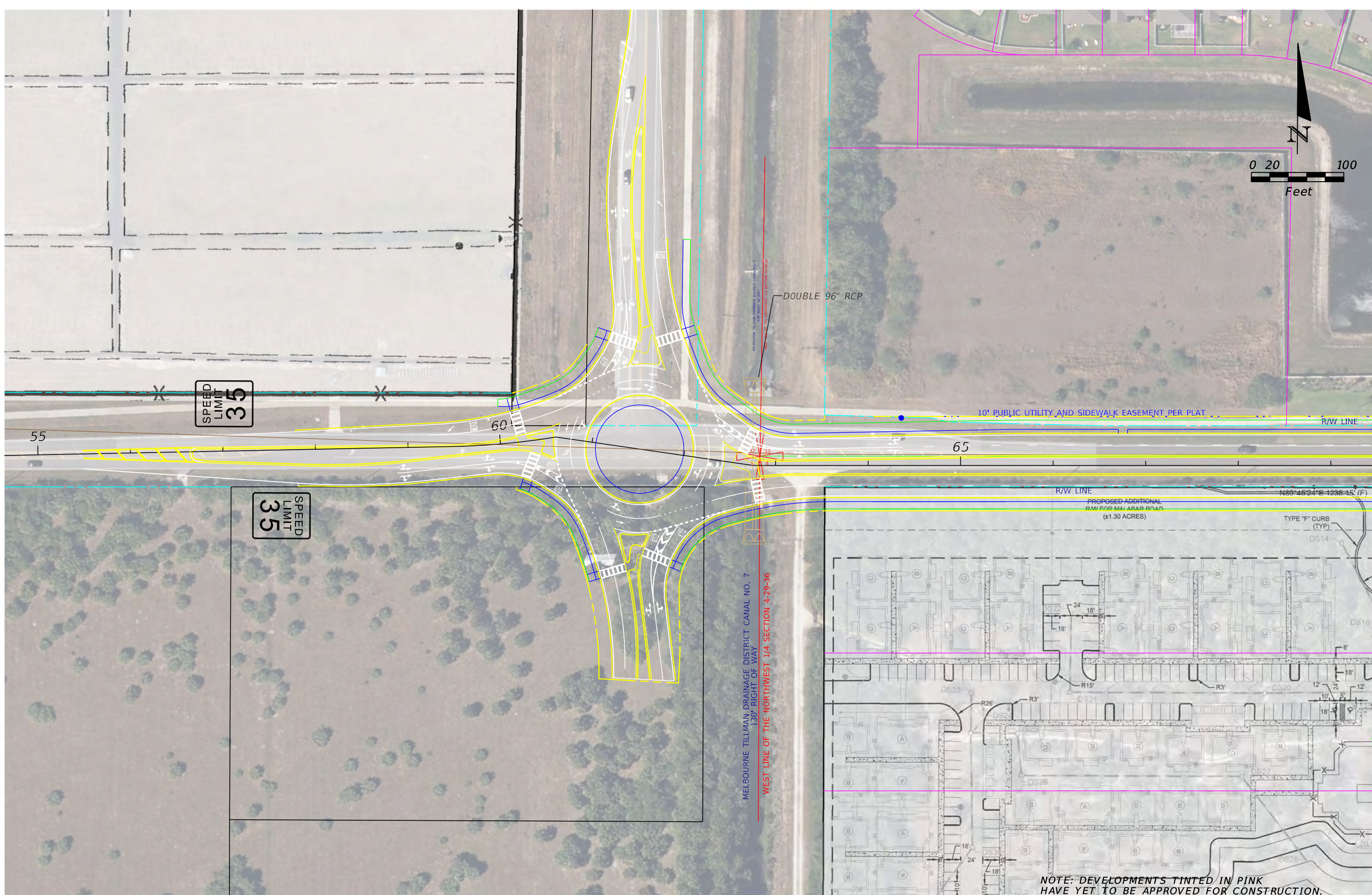
Each of the four roundabouts noted above were conceptually designed to criteria as presented in *NCHRP Report 672: Roundabout Design Guide*. The roundabouts were analyzed for the following criteria:

- **Entry speed:** Multilane entries were designed and checked based on an entry speed of 30 mph or less. Single lane entry speeds were designed and checked to limit entry speed to 25 mph or less.
- **Truck Checks:** The design vehicle for each roundabout is a WB-62FL. All turning movements were checked for the design vehicle's maneuverability. This includes through movements, right turns, and left turns.
- **Stopping Sight Distance:** Stopping sight distance (SSD) checks for entry and crosswalks were completed for all roundabouts. Circulatory SSD checks were also completed. SSD allows motorists to have enough time to react and completely stop before reaching objects within the road. No landscaping or hardscape fixtures over 2.5' in height should be constructed within SSD view angles.
- **Intersection Sight Distance:** Intersection sight distance checks were completed at all roundabout entries. Once again, no landscaping or hardscape fixtures over 2.5' in height should be constructed within the view angles.

In addition to the roundabout geometric design, lighting will be included at each of the roundabouts per FDM Section 231.3.3.

**Figure 45** through **Figure 48** displays the roundabout concepts for the St. Johns Heritage Parkway, Krassner Drive/Bending Branch Lane, Hurley Boulevard, and Maywood Avenue/Daffodil Drive. **Appendix F** contains the ICE Tool outputs for the roundabout operations and safety analysis discussed in **Section 5.6.3.2**. **Appendix M** contains the design checks for each of the four roundabouts.





MATCH LINE 69+50

LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	CITY BOUNDARY
	EXISTING BUS STOP LOCATIONS
	PROPOSED BUS STOP LOCATIONS
	POTENTIAL HISTORIC BUILDING
	MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA



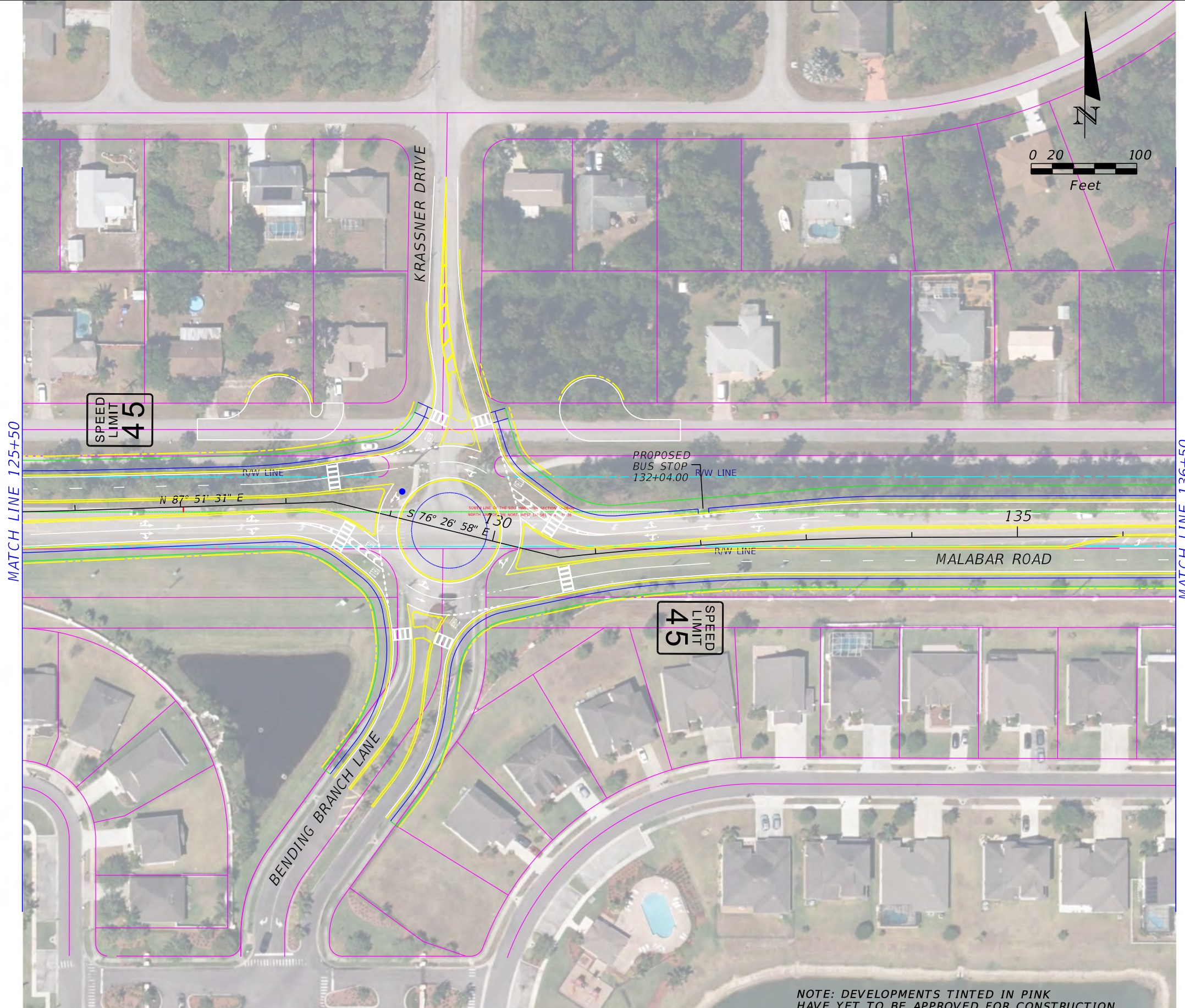
CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
PLAN SHEET  
PREFERRED ALTERNATIVE**

FIGURE NO.
45

NOTE: DEVELOPMENTS TINTED IN PINK HAVE YET TO BE APPROVED FOR CONSTRUCTION.





**LEGEND**

	EXISTING PARCEL LINE		POTENTIAL MEDIUM RISK CONTAMINATION SITES
	SUBDIVISION PARCEL LINES		CITY ACQUIRED PARCELS
	EXISTING RIGHT OF WAY		FLOODPLAIN
	PROPOSED RIGHT OF WAY		UNAPPROVED DEVELOPMENT
	CITY BOUNDARY		RECOMMENDED PREFERRED POND/SWALE LOCATION
	BUS STOP LOCATIONS		RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA
	HISTORIC BUILDING		

	POTENTIAL MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA



CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
PLAN SHEET  
PREFERRED ALTERNATIVE**



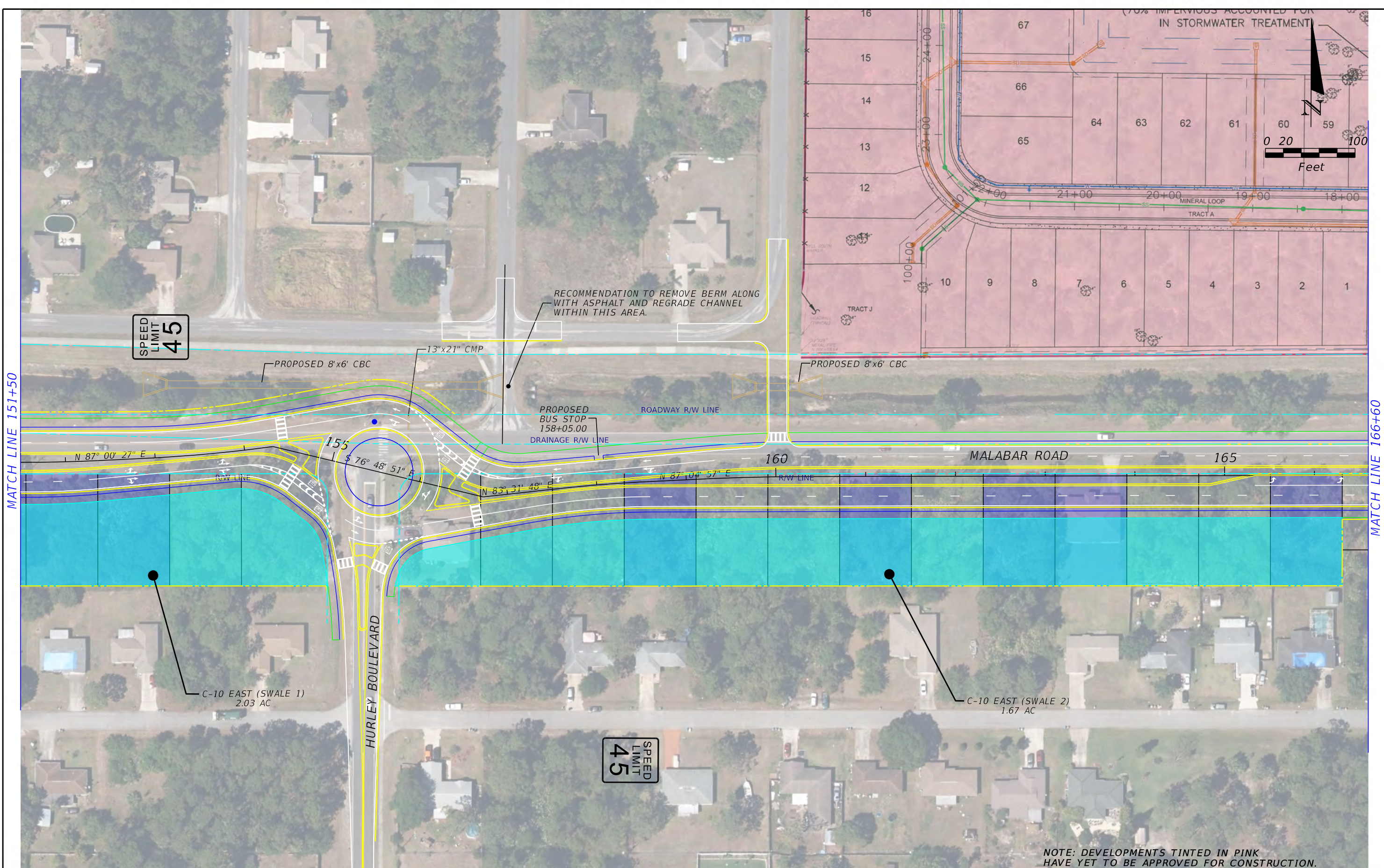
MATCH LINE 151+50

MATCH LINE 166+60

SPEED LIMIT 45

SPEED LIMIT 45

0 20 100 Feet



RECOMMENDATION TO REMOVE BERM ALONG WITH ASPHALT AND REGRADE CHANNEL WITHIN THIS AREA.

PROPOSED 8'x6' CBC

13'x21' CMP

PROPOSED BUS STOP 158+05.00

ROADWAY R/W LINE

DRAINAGE R/W LINE

PROPOSED 8'x6' CBC

MALABAR ROAD

HURLEY BOULEVARD

C-10 EAST (SWALE 1) 2.03 AC

C-10 EAST (SWALE 2) 1.67 AC

NOTE: DEVELOPMENTS TINTED IN PINK HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE		POTENTIAL MEDIUM RISK CONTAMINATION SITES
	SUBDIVISION PARCEL LINES		CITY ACQUIRED PARCELS
	EXISTING RIGHT OF WAY		FLOODPLAIN
	PROPOSED RIGHT OF WAY		UNAPPROVED DEVELOPMENT
	CITY BOUNDARY		RECOMMENDED PREFERRED POND/SWALE LOCATION
	BUS STOP LOCATIONS		RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA
	HISTORIC BUILDING		

	POTENTIAL MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

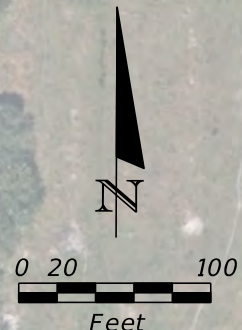
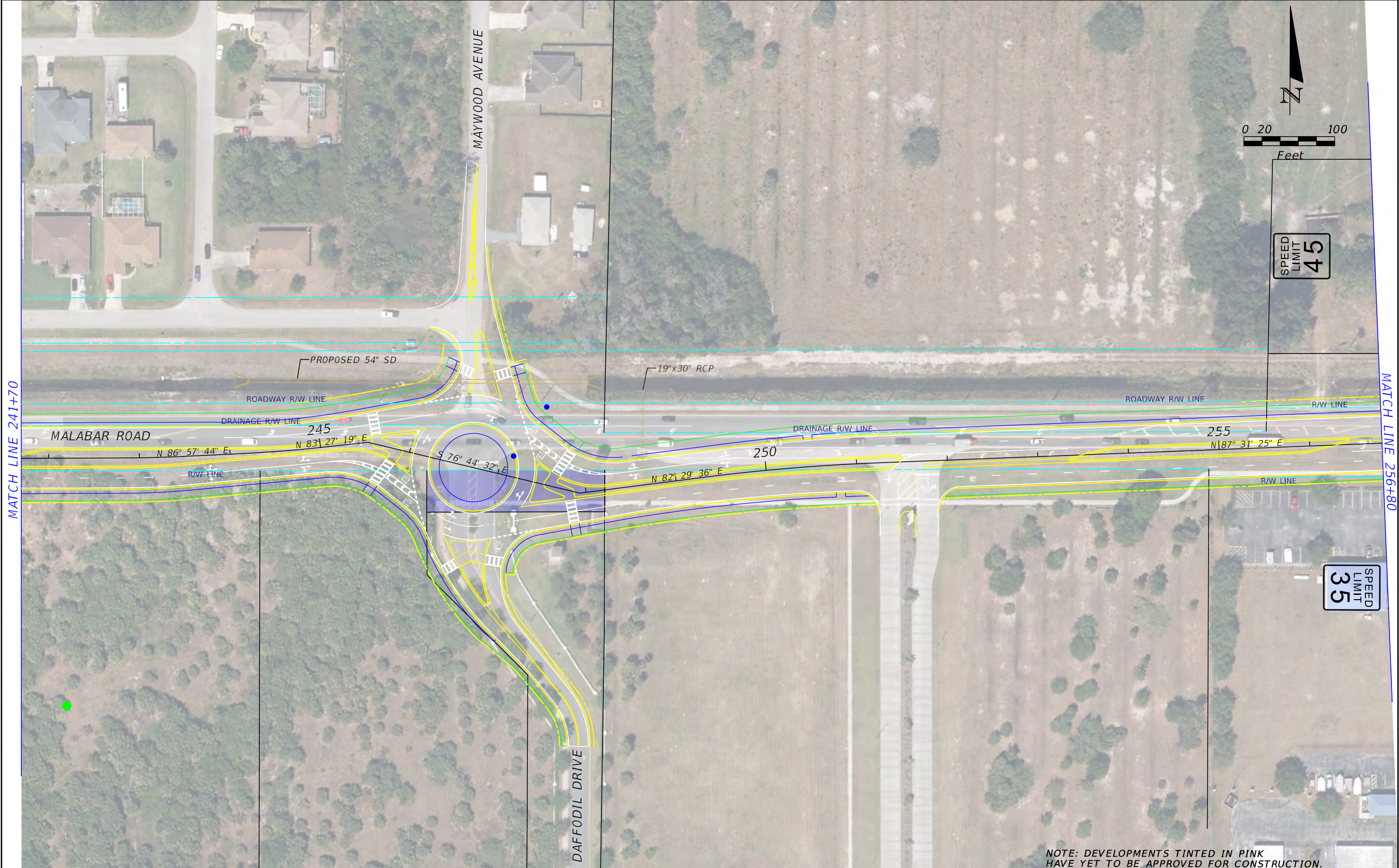


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
PLAN SHEET  
PREFERRED ALTERNATIVE**

FIGURE NO.  
47





SPEED LIMIT 45

SPEED LIMIT 35

MATCH LINE 241+70

MATCH LINE 256+80

NOTE: DEVELOPMENTS TINTED IN PINK HAVE YET TO BE APPROVED FOR CONSTRUCTION.

LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	CITY BOUNDARY
	BUS STOP LOCATIONS
	HISTORIC BUILDING
	POTENTIAL MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PREF. FLOODPLAIN COMPENSATION AREA



CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
PLAN SHEET  
PREFERRED ALTERNATIVE**

FIGURE NO.
48



### 7.7.1.1 Malabar Road at Krassner Drive/Bending Branch Lane Roundabout

As displayed in **Figure 46**, the Krassner Drive/Bending Branch Lane roundabout will impact Madison Road which is aligned parallel to Malabar Road approximately 100' to the north. It is proposed to convert the west and east legs of Madison Road at Krassner Drive into cul-de-sacs because the intersection would be located at the entrance/exit for the north leg of the roundabout. To facilitate the residential properties along Madison Road, new roadway connections are proposed at Delk Avenue and Madison Road as discussed in **Section 7.7.5**.

### 7.7.1.2 Malabar Road at Hurley Boulevard Roundabout

As displayed in **Figure 47**, the Hurley Boulevard roundabout will impact the Hillock Road access to Malabar Road. It is proposed to close this connection because the intersection would be located at the entrance/exit for the east leg of the roundabout. A new minor street roadway connection to Malabar Road is proposed via Hillcrest Avenue.

### 7.7.2 *Signalization Analysis*

Each of the four signalized intersections noted in **Section 7.7** were conceptually designed to criteria as presented in the 2024 FDM. **Figure 49** through **Figure 52** displays the signalization concepts for Jupiter Boulevard (**Figure 49** and **Figure 50**), Garvey Road (**Figure 51**), and the Plaza Shopping Center/Minton Road (**Figure 52**).

As discussed in **Section 2.2.16.3**, the Jupiter Boulevard and Plaza Shopping Center intersections exceeded the statewide and districtwide safety ratios of 1.0 in at least two of the three analysis years. Since these intersections are proposed to remain signalized in the preferred alternative, a qualitative safety assessment was conducted to identify potential countermeasures that may reduce crashes at these locations:

- As shown in **Table 31**, widening Malabar Road to four lanes is anticipated to reduce overall crashes by 35 to 40 percent. At the Jupiter Boulevard and Plaza Shopping Center signals, a safety benefit is also anticipated with the widening due to reduced congestion at these specific locations. Rear-end crashes (the highest crash type at both intersections) are anticipated to be the primary crash type reduced due to the widening and lessening of congestion.
- The Malabar Road eastbound/westbound left turn movements are anticipated to operate protected/permissive at the Jupiter Boulevard and Plaza Shopping Center signals. With the widening, left turn crashes may increase at these locations. A flashing yellow arrow (FYA) signal head can be installed to improve safety of these left turn movements in the preferred alternative. The FYA treatment may reduce overall left turn crashes by up to 15 percent and may reduce fatal/injury left turn crashes by up to 25 percent according to crash modification factors (CMFs) found in the CMF Clearinghouse.

### 7.7.2.1 Malabar Road at Jupiter Boulevard Signal

The Jupiter Boulevard intersection is being shifted to the north to eliminate right-of-way impacts at the USPS parcel in the southwest corner of the Malabar Road/Jupiter Boulevard intersection, as shown in **Figure 49** and **Figure 50**. The roadway shift to the north impacts Canal C-20 and if the full width of the canal were to be maintained, Shalimar Avenue and Carmelite Road (just north of Canal C-20) may have to be closed and multiple residences would be impacted. To eliminate the need for right-of-way on the north side of the canal, retaining walls are proposed west and east of the intersection, with a small gap where Jupiter Boulevard crosses Canal C-20. More information on the retaining walls is discussed in **Section 7.14.2**.

### 7.7.2.2 Malabar Road at Plaza Shopping Center and Minton Road Signals

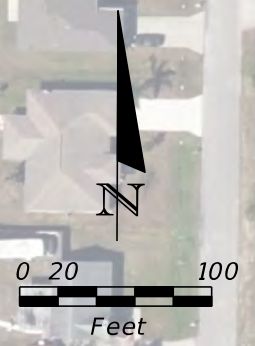
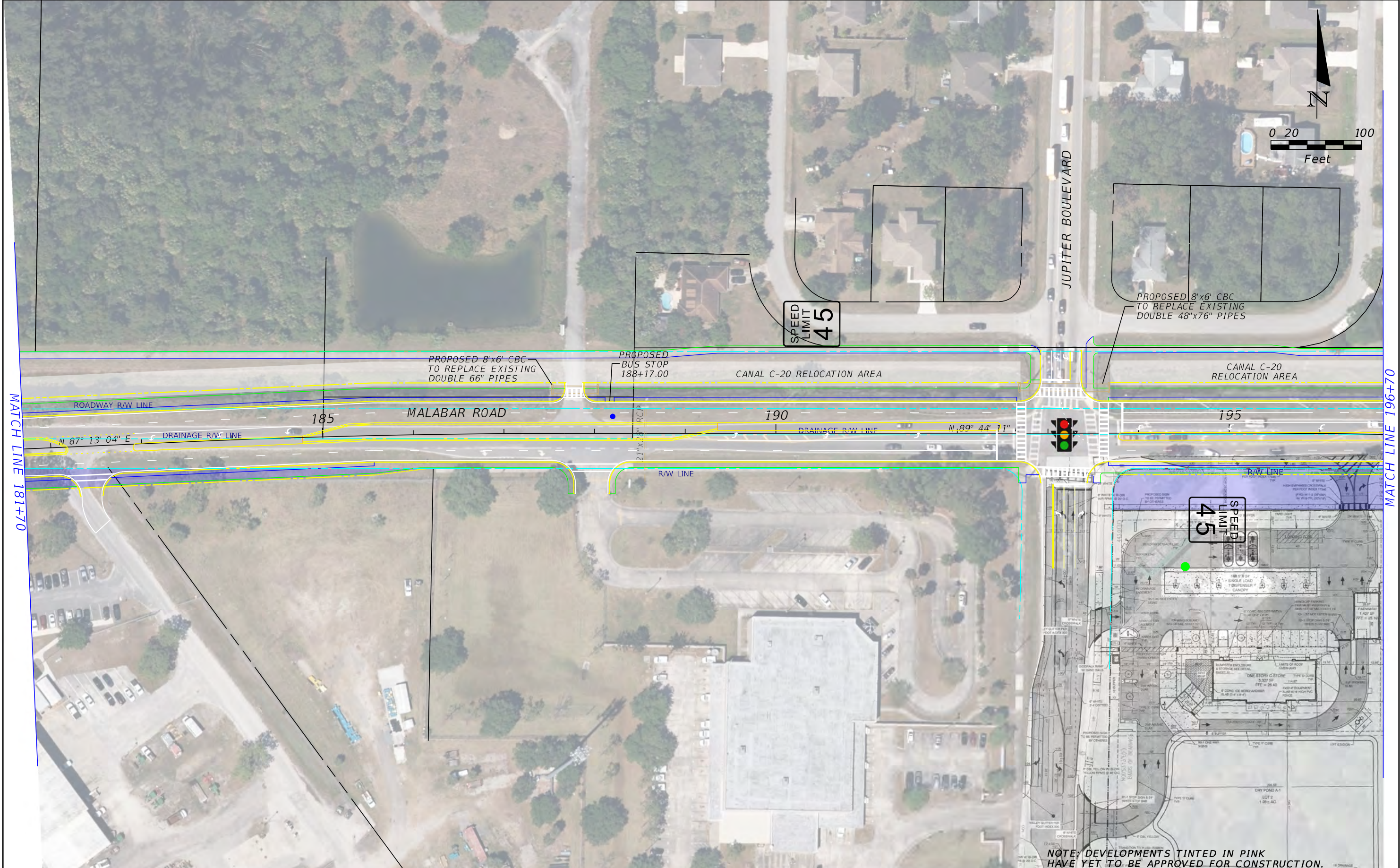
On the west leg of the Minton Road intersection, Malabar Road is being widened to accommodate three eastbound lanes (as shown in **Figure 52**). The inside lane will drop into the outside of the dual left turn lanes, and the remaining two lanes will continue eastbound through the intersection (with the outside lane being a shared through-right). To accommodate the extra lane, the third eastbound lane will be fully formed approximately 450' west of the Plaza Shopping Center intersection.

No other turn lane adjustments are proposed at either of these intersections, as a second westbound through lane is already present between Minton Road and the Plaza Shopping Center.

### 7.7.3 *Wisteria Avenue*

As discussed in **Section 5.6.3.3**, the intersection of Wisteria Avenue/Abilene Drive was analyzed for traffic signal and roundabout configurations. This intersection is anticipated to meet signal warrants once full development occurs for the Chaparral Residential Development on the Abilene Drive leg of the intersection. When the intersection meets signal warrants, consideration should be given to convert this intersection from a two-way stop control intersection to a roundabout. To convert to a roundabout and avoid major impacts to the north, maximizing the proposed 50' right-of-way dedication on the south side of Malabar Road should be considered (it will need to be verified if the right-of-way has been dedicated to the City of Palm Bay). Malabar Road could be shifted to the south starting at approximately Sta. 102+50 so the roundabout would have the proper deflections to reduce speeds. It is important to note that this is not currently shown in the preferred alternative concept plans, but a potential roundabout layout is provided in **Figure 53**.





MATCH LINE 181+70

MATCH LINE 196+70

**LEGEND**

	EXISTING PARCEL LINE		HISTORIC BUILDING
	SUBDIVISION PARCEL LINES		POTENTIAL MEDIUM RISK CONTAMINATION SITES
	EXISTING RIGHT OF WAY		CITY ACQUIRED PARCELS
	PROPOSED RIGHT OF WAY		FLOODPLAIN
	CITY BOUNDARY		UNAPPROVED DEVELOPMENT
	EXISTING BUS STOP LOCATIONS		RECOMMENDED PREFERRED POND/SWALE LOCATION
	PROPOSED BUS STOP LOCATIONS		RECOM. PEF. FLOODPLAIN COMPENSATION AREA

	HISTORIC BUILDING
	POTENTIAL MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PEF. FLOODPLAIN COMPENSATION AREA



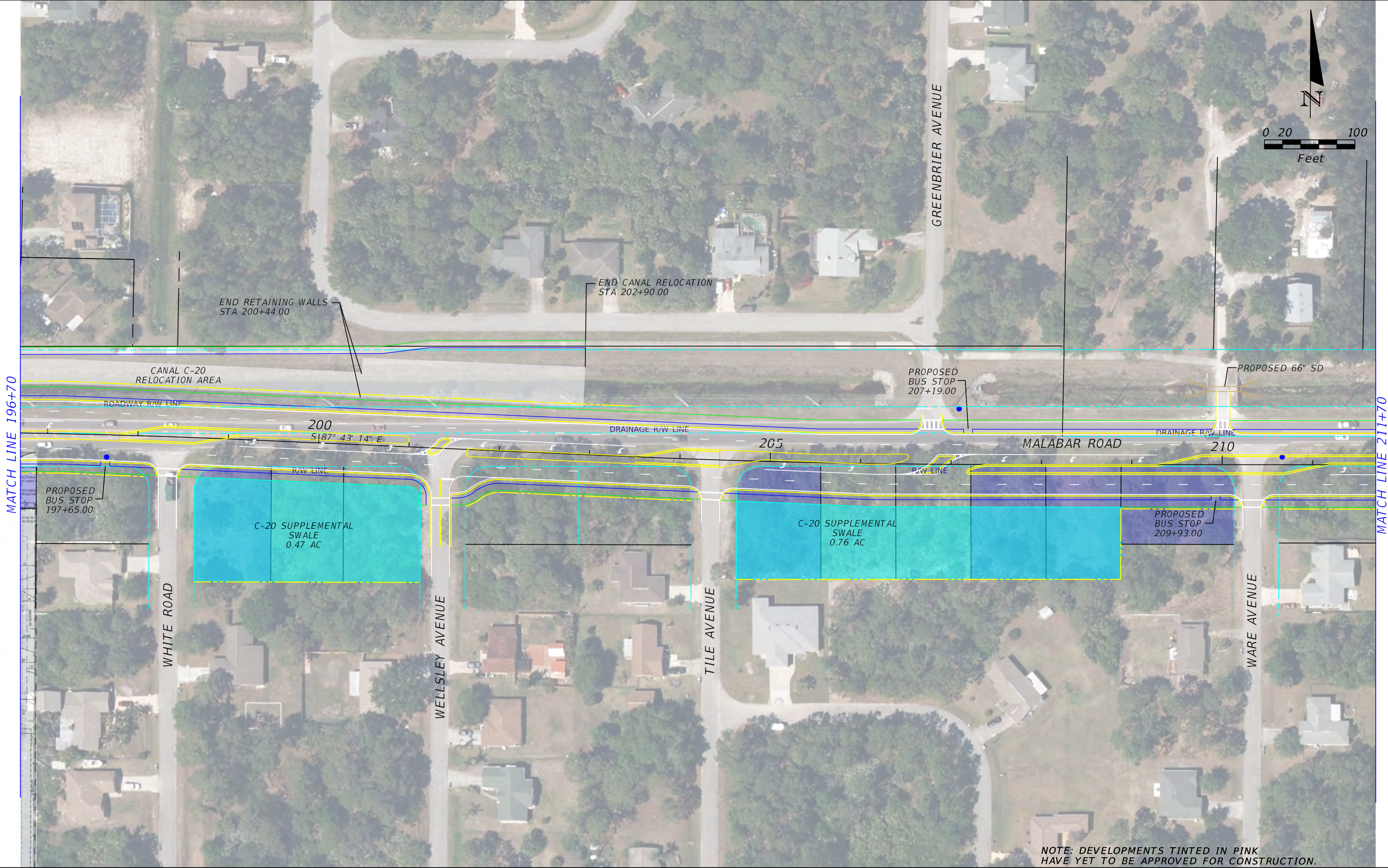
CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
PLAN SHEET  
PREFERRED ALTERNATIVE**

FIGURE NO.  
49

NOTE: DEVELOPMENTS TINTED IN PINK HAVE YET TO BE APPROVED FOR CONSTRUCTION.





NOTE: DEVELOPMENTS TINTED IN PINK HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

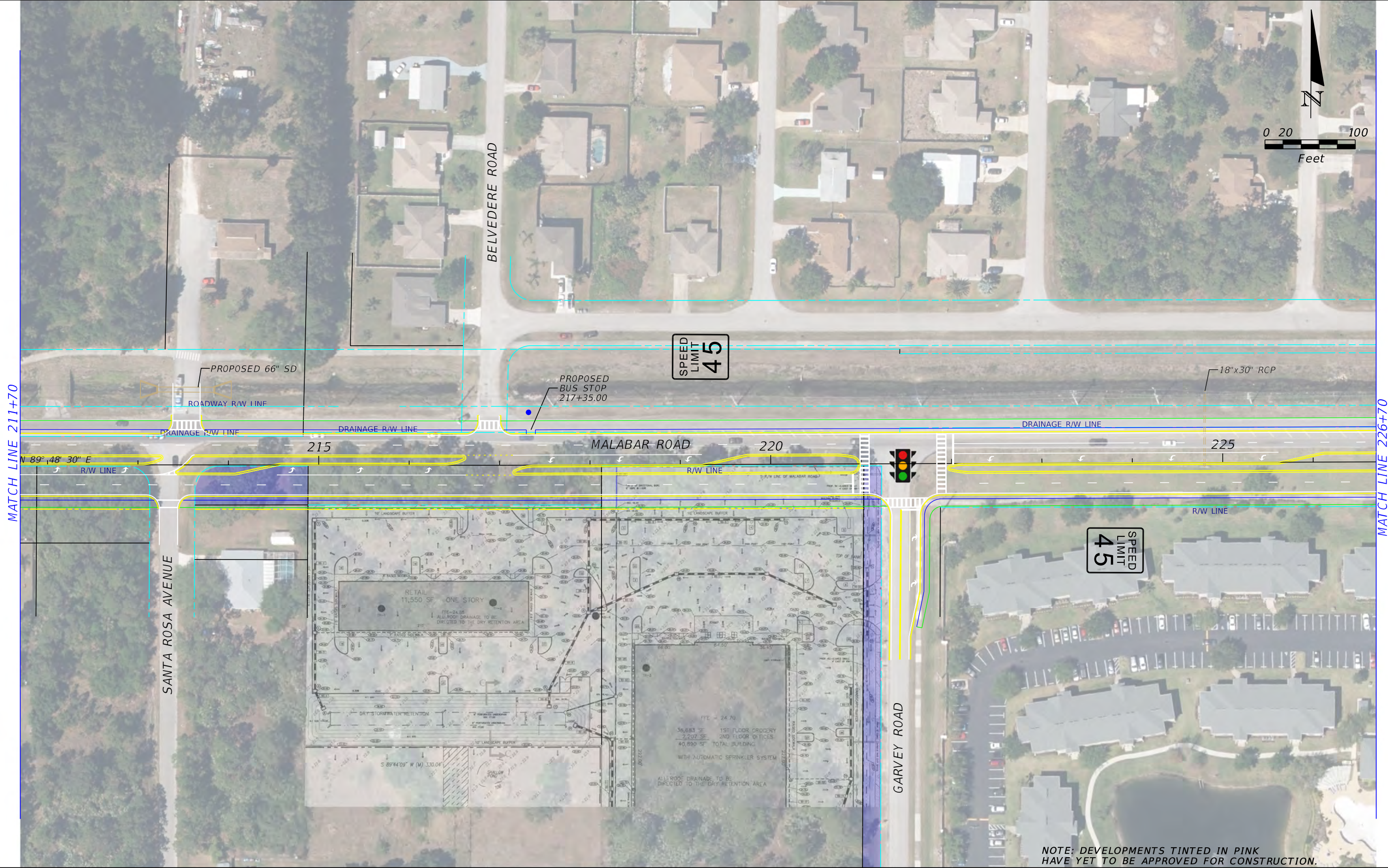
	EXISTING PARCEL LINE		POTENTIAL MEDIUM RISK CONTAMINATION SITES
	SUBDIVISION PARCEL LINES		CITY ACQUIRED PARCELS
	EXISTING RIGHT OF WAY		FLOODPLAIN
	PROPOSED RIGHT OF WAY		UNAPPROVED DEVELOPMENT
	CITY BOUNDARY		RECOMMENDED PREFERRED POND/SWALE LOCATION
	BUS STOP LOCATIONS		RECOM. PEF. FLOODPLAIN COMPENSATION AREA
	HISTORIC BUILDING		

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

<b>MALABAR ROAD PD&amp;E STUDY PLAN SHEET PREFERRED ALTERNATIVE</b>		
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FIGURE NO. 50
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NOTE: DEVELOPMENTS TINTED IN PINK HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	CITY BOUNDARY
	BUS STOP LOCATIONS
	HISTORIC BUILDING

	POTENTIAL MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

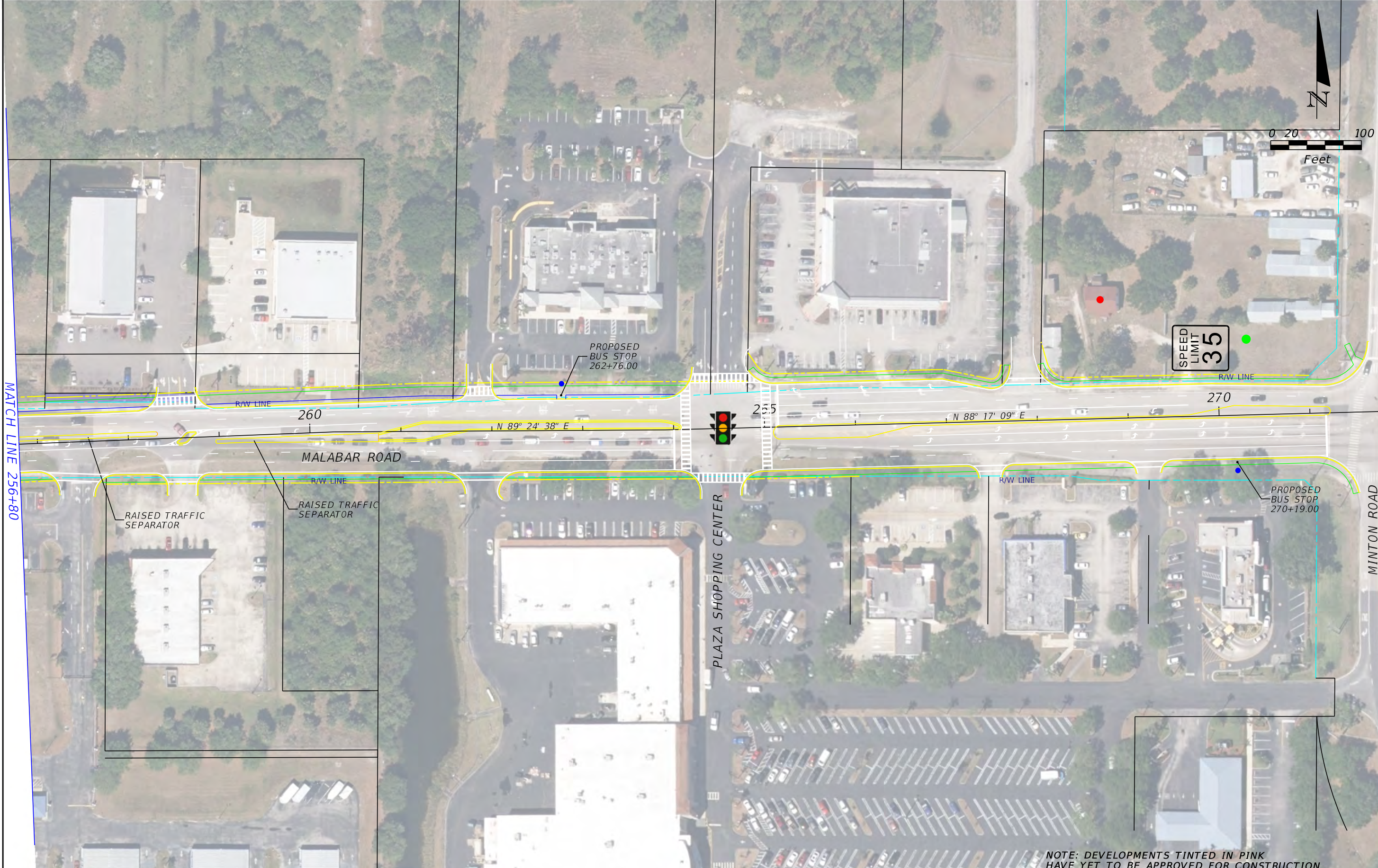


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
PLAN SHEET  
PREFERRED ALTERNATIVE**

FIGURE NO.
51





MATCH LINE 256+80

MATCH LINE SEE SHEET 16

LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	CITY BOUNDARY
	EXISTING BUS STOP LOCATIONS
	PROPOSED BUS STOP LOCATIONS
	POTENTIAL HISTORIC BUILDING
	MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA



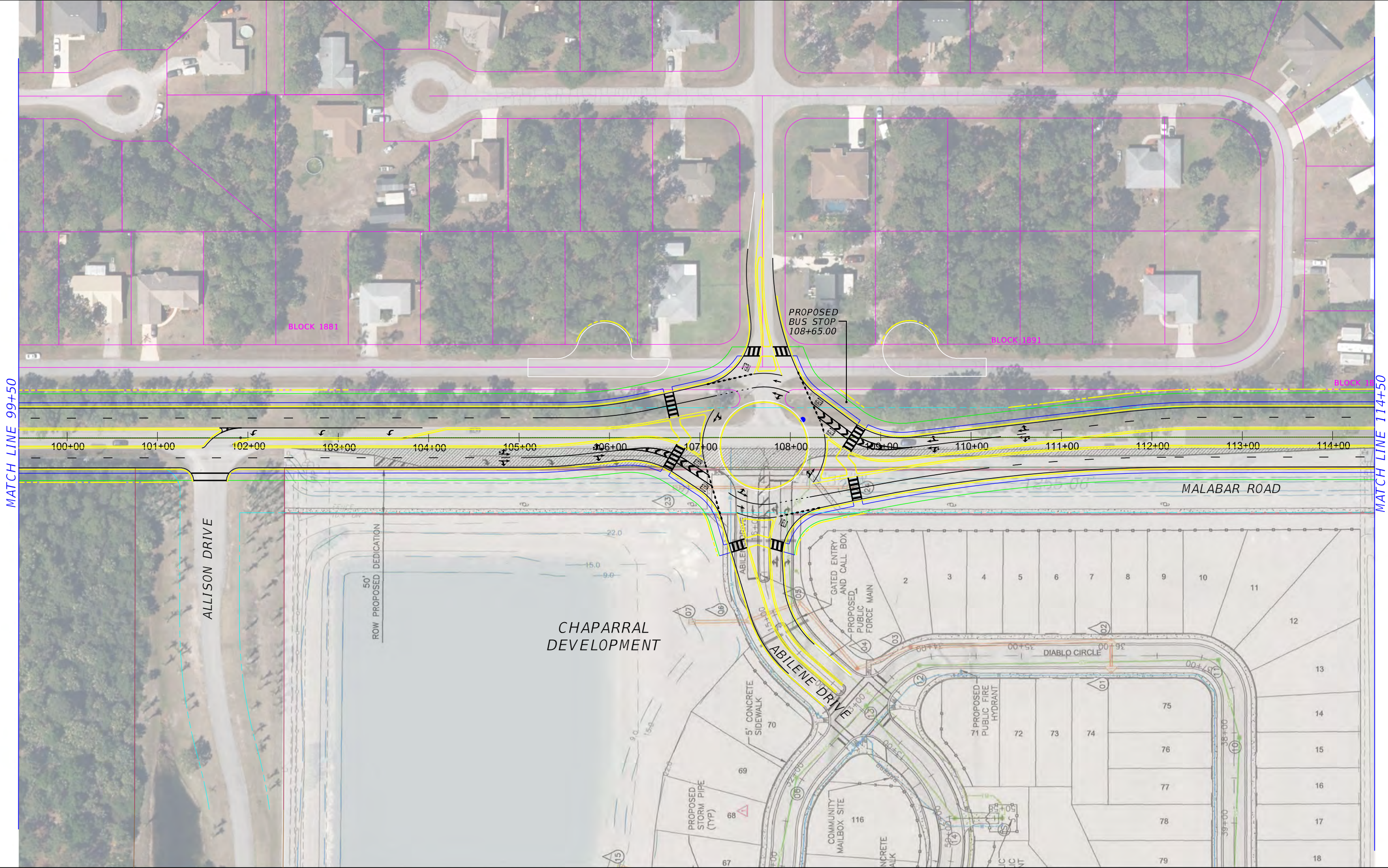
CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLAN SHEET**  
**PREFERRED ALTERNATIVE**

FIGURE NO.  
52

NOTE: DEVELOPMENTS TINTED IN PINK HAVE YET TO BE APPROVED FOR CONSTRUCTION.





**LEGEND**

	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	CITY BOUNDARY
	EXISTING BUS STOP LOCATIONS
	PROPOSED BUS STOP LOCATIONS

	HISTORIC BUILDING
	POTENTIAL MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA



CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
PLAN SHEET  
PREFERRED ALTERNATIVE**

FIGURE NO.  
53



*7.7.4 Malabar Road U-Turns*

While the overall truck traffic is low along the corridor (4 percent), the MTWCD expressed the desire to accommodate U-turns for their maintenance vehicles at multiple locations along Malabar Road, one such location being on the west side of Canal C-10. At Madison Road and Hoffer Avenue, U-turn bulb-outs are recommended to accommodate these larger MTWCD maintenance vehicles. Vehicles towing lawn maintenance equipment, boats, and other miscellaneous trailers are also common, necessitating these U-turn bulb-outs along the corridor.

The proposed access management plan will result in U-turns to access land uses located between full median openings. Throughout the remainder of the corridor, four U-turn bulb-outs (not including the two noted in the previous paragraph) are strategically located to facilitate these movements based upon where the highest traffic volumes are projected. These bulb-outs will also be designed to accommodate a Class 5 single unit truck to reduce ROW impacts and accommodate a majority of the trucks.

In addition to the U-turn locations discussed above, the four roundabouts also provide opportunities for U-turn movements for all vehicle types (especially larger trucks).

*7.7.5 New Minor Street Connections to Malabar Road*

The following minor streets are recommended to have new connections to Malabar Road to facilitate traffic movement or new planned development:

- Delk Avenue;
- Madison Road;
- Hoffer Avenue (crosses Canal C-20);
- Hillcrest Avenue (crosses Canal C-20); and
- Avery Springs planned development across from Watoga Avenue (crosses Canal C-20).

*7.7.6 Preferred Alternative Intersection Operations Summary*

**Table 37** displays the 2050 No-Build and Build delay/LOS for the key intersections along the Malabar Road study corridor:

**Table 37: Preferred Alternative Intersection Operations**

Intersection	Time Period	2050 No-Build Control Type/ LOS/Delay (sec)	2050 Build Control Type/ LOS/Delay (sec)
St. Johns Heritage Parkway	AM	TWSC C – 24.1	Roundabout D – 31.5
	PM	TWSC C – 18.1	Roundabout C – 16.2
Krassner Drive/ Bending Branch Lane	AM	Signal D – 38.3	Roundabout A – 8.4
	PM	Signal C – 31.6	Roundabout A – 7.9
Hurley Boulevard	AM	TWSC B – 11.6	Roundabout A – 8.1
	PM	TWSC B – 12.9	Roundabout A – 7.4
Jupiter Boulevard	AM	Signal F – 159.4	Signal E – 68.8
	PM	Signal F – 161.1	Signal D – 49.3
Garvey Road	AM	TWSC F – >50	Signal B – 12.9
	PM	TWSC F – >50	Signal B – 11.8
Maywood Avenue/ Daffodil Drive	AM	TWSC F – >50	Roundabout A – 8.9
	PM	TWSC F – >50	Roundabout A – 9.4
Plaza Shopping Center	AM	Signal F – 121.8	Signal A – 9.8
	PM	Signal F – 104.4	Signal B – 19.4
Minton Road	AM	Signal E – 58.7	Signal E – 77.5
	PM	Signal E – 69.3	Signal E – 75.5

## 7.8 Tolled Projects

This project is not proposing any tolling facilities.

## 7.9 Intelligent Transportation System and TSM&O Strategies

While the project's purpose and need is largely driven by needing additional capacity, the following ITS and/or TSM&O alternatives were considered as part of the preferred alternative:

- Signal Timing Coordination – The study evaluated and recommends signal timing optimization, including splits, cycle length, and offsets, at the following pairs of intersections:
  - Jupiter Boulevard and Garvey Road; and
  - Plaza Shopping Center and Minton Road.
- Roundabouts – The study evaluated roundabouts at each of the study intersections as discussed previously.
- Access Management – To better facilitate minor street turning movements and improve safety as the roadway is widened to four lanes, an access management plan for the corridor was developed as discussed in **Section 7.2**.

The SCTPO and FDOT have approved funding for the design of the Malabar Corridor ITS element from the SHJP to I-95, which will include communication, closed circuit television (CCTV), and integration of the system with the regional Brevard County and FDOT ITS system. FDOT is currently designing the system components and construction is anticipated to be funded in FY 2025.

## 7.10 Landscape

No specific landscape features are proposed as part of this project, but the proposed roundabouts at the St. Johns Heritage Parkway, Krassner Drive/Bending Branch Lane, and Hurley Boulevard provide an opportunity for future low-level landscaping.

## 7.11 Lighting

As part of the four-lane widening, lighting should be incorporated at signalized intersections to improve night-time safety along the Malabar Road corridor as discussed in FDM Section 231.3.2.1 and Table 231.2.1. Lighting should also be provided at the proposed roundabouts as discussed in FDM Sections 213.11 and 231.3.3. Roadway segments between intersections are also recommended for lighting because driving between lit and unlit sections of roadway can be difficult for the eye to adjust.

## 7.12 Wildlife Crossings

This project is not proposing any wildlife crossings.



### **7.13 Permits**

Permit applications are reviewed by regulatory agencies for their consistency with regulatory criteria and/or the project's effect on resources (e.g. wetland function, protected species, and their habitats). During the permit application process, the lead regulatory agencies may request input from other agencies to review that the project will not adversely impact a regulated or protected resource under their purview. For protected species, a species-specific permit may be required prior to issuance of the environmental permit. The following is a list of anticipated permits needed from state and federal agencies for the proposed project:

- General State 404 Permit (62-331.248);
- National Pollutant Discharge Elimination System Permit;
- Individual Environmental Resource Permit;
- Gopher Tortoise Relocation Permit; and
- Melbourne Tillman Water Control District Canal Permit.

### **7.14 Drainage and Stormwater Management Facilities**

As described in **Section 5.4.6**, stormwater pond and FPCA alternatives were evaluated and for most basins, 2 to 3 pond site alternatives were identified. For Basin A and the FPCA, only one alternative was initially identified. Factors considered in selecting these sites included existing and proposed land use, parcel availability, environmental impacts, floodplain impacts (and hydraulic connection to the floodplain for the FPCA), utility conflict potential, cultural resources, and potential contamination. All of these factors were entered into a pond alternatives matrix and utilized to estimate pond construction, mitigation, and right-of-way costs. In general, the preferred pond site for each basin or floodplain impact area was selected based on the estimated pond costs and potential environmental impacts.

#### *7.14.1 Preferred Pond Alternatives*

There are a total of five preferred pond alternatives and three supplemental swales. Three preferred ponds will be newly constructed, offsite wet detention ponds. One preferred pond site is located within an existing City of Palm Bay-owned parcel that has a small amount of additional capacity available. The final preferred pond site for Basin C-10 is a system of dry linear swales located adjacent to Malabar Road that will utilize remnant parcels created by the widening of Malabar Road. A supplemental linear swale in Basin C-20 will also utilize remnant parcels and will supplement the treatment and attenuation volume provided in the wet detention pond for Basin C-20.

In most cases, the pond site with the lowest estimated cost and least impact to the environment was selected as the preferred site, and an effort was made to utilize parcels already owned by the City of Palm Bay or other public agencies. One exception is the preferred pond for Basin C-8 and C-9, which has a slightly higher cost than the other alternative for this basin. The more expensive

## SECTION 7 – PREFERRED ALTERNATIVE

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pond was selected because it is located on a City owned parcel and the City expressed their desire to utilize this parcel as the preferred pond site for Basins C-8 and C-9.

The following offsite pond sites are preferred and are shown on the preferred alternative concept plans in **Appendix H**:

- Basin C-7 – Pond Alternative 3;
  - Pond Alternative 2 was originally selected for Basin C-7, but residential development plans were submitted and approved on the parcel where the pond alternative was located. Thus, an additional drainage analysis was performed to identify and recommend an additional pond location west of the St. Johns Heritage Parkway south of Malabar Road on a City owned parcel.
  - This pond alternative will require conveying stormwater runoff across the C-7 Canal to the pond. Preliminary geotechnical investigations and hydraulic calculations show that this pond can be dug to a depth of approximately 20 feet which will allow a 36-inch inflow pipe to cross underneath the C-7 Canal and the double 96-inch cross drain that conveys the canal across Malabar Road with one foot of vertical clearance between the pipes.
- Basin C-8 and C-9 – Combined Pond Alternative 1;
- Basins C-10 East – Three Dry Linear Swales Located Adjacent to Malabar Road; and
- Basin C-20 – Pond Alternative 1.
  - Supplemental swales are also proposed on the south side of Malabar Road for this basin.
  - Pond Alternative 2 was originally selected for Basin C-20, but contamination issues were identified thus Pond Alternative 1 was evaluated and selected.

The preferred pond site in Basin A (shown on sheet 16 in **Appendix H**) is located within an existing City of Palm Bay-owned parcel that has a small amount of additional capacity available. "Pond A" is located southeast of the Malabar Road/Minton Road intersection and outfalls to the Canal C-37 crossing underneath Malabar Road.

For more information on the preferred stormwater ponds, please refer to the project's *Pond Siting Report*.

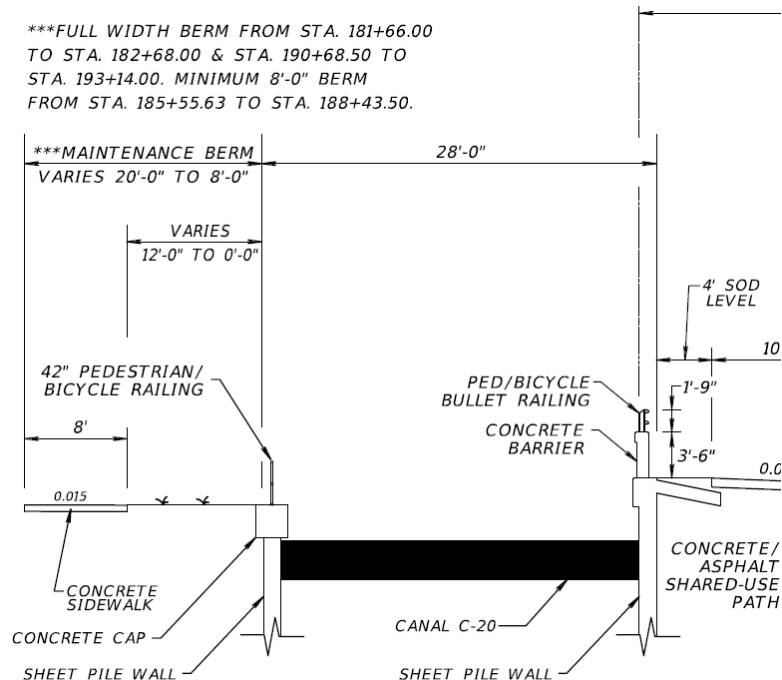
### 7.14.2 Canal C-20 Relocation

As discussed in **Section 7.7.2.1**, the Jupiter Boulevard intersection is being shifted to the north to eliminate right-of-way impacts at the USPS parcel in the Malabar Road/Jupiter Boulevard intersection's southwest corner. The roadway shift impacts Canal C-20 and the adjacent streets/residences to the north. Retaining walls are proposed from Sta. 181+66 to Sta. 200+44 with a small gap where Jupiter Boulevard crosses Canal C-20. These retaining walls would be provided on both the north and south sides of Canal C-20. Including these retaining walls in the

## SECTION 7 – PREFERRED ALTERNATIVE

concept will keep Canal C-20 within the MTWCD right-of-way, thus not impacting adjacent roadways or residences. A detail of the retaining wall from the typical section package is shown in **Figure 54**.

Additionally, the 8' sidewalk adjacent to the north side of Canal C-20 will be impacted by the canal relocation and will need to be reconstructed from Sta. 197+77 to Sta. 202+90. This sidewalk is also used by MTWCD maintenance vehicles to access Canal C-20, thus the sidewalk depth is proposed to be 6" to accommodate those vehicles.



**Figure 54: Canal C-20 Retaining Wall Detail**

### 7.15 Floodplain Analysis

According to the FEMA FIRMs (discussed in **Section 2.2.17**), portions of the project intersect Zone AE of the 100-year floodplain at the project limit's western end. These areas are associated with the Three Forks Conservation Area and Canal C-8 and have a 1 percent probability of flooding every year. The established flood water elevation is 20.0 feet NAVD. There are no federally regulated floodways within the project limits.

The MTWCD has a watershed model that includes the canals along the project. Additionally, a Stormwater Management Model (SWMM) was developed for the Canal C-1 by SJRWMD and the MTWCD. Canal C-1 is a main outfall canal for MTWCD and flows to the east approximately 1 mile north of Malabar Road. It collects water from Canals C-7, C-8, C-9, C-10, and C-20 (via C-10) and outfalls into the Indian River Lagoon. Results of this model were also utilized for data collection.

## SECTION 7 – PREFERRED ALTERNATIVE

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One initial preferred FPCA (Alternative 1) was identified for the project, consisting of an offsite scraped down area adjacent to the floodplain. The initial preferred FPCA was located adjacent to Basin C-7 Pond Alternative 2 but as noted above, residential development plans were submitted and approved on the parcel where the pond/FPCA alternative was located. Thus, an additional floodplain analysis was performed to identify and recommend an FPCA (Alternative 2) adjacent to Basin C-7 Pond Alternative 3 west of the St. Johns Heritage Parkway south of Malabar Road on a City owned parcel (shown on sheet 1A in **Appendix H**). During the design phase, it is recommended that alternative approaches to traditional FPCAs be considered, including creating a floodplain model or modifying the existing model(s) with the proposed improvement to demonstrate no increase in the 100-year floodplain elevation. Floodplain compensation may also be provided within the stormwater management ponds.

An existing double 96" culvert under Malabar Road at Station 62+80 provides conveyance for MTWCD Canal C-7. The existing culvert's length is approximately 120 feet. This culvert is proposed to be extended 12 feet to the north and 39 feet to the south for a total proposed length of 167 feet. The extension will use the same configuration and diameter (double 96") as the existing culvert to accommodate the proposed roundabout. A preliminary hydraulic analysis was conducted for this culvert indicating the double 96" diameter pipes to be adequate for Canal C-7 flows and proposed roadway improvements.

An existing 8' x 6' concrete box culvert under Malabar Road at Station 89+18 provides conveyance for MTWCD Canal C-8. The existing culvert's length is approximately 45'. This culvert is proposed to be extended 30' to the north and 27' to the south for a total proposed length of 102'. The extension will use the same dimensions as the existing culvert to accommodate the proposed roadway improvements, including the proposed shared-use path on Malabar Road's north side. A preliminary hydraulic analysis was conducted for this culvert indicating the 8' x 6' dimensions to be adequate for Canal C-8 flows and proposed roadway improvements.

An existing 54" culvert under Malabar Road at Station 115+71 provides conveyance for MTWCD Canal C-9. The existing culvert's length is approximately 44'. This culvert is proposed to be extended 35' to the north and 23' to the south for a total proposed length of 102'. The extension will use the same diameter (54") as the existing pipe to accommodate the proposed roadway improvements, including the proposed shared-use path on Malabar Road's north side. A preliminary hydraulic analysis was conducted for this culvert indicating the 54" diameter to be adequate for Canal C-9 flows and proposed roadway improvements.

The MTWCD does not allow multi-barrel pipes, thus the piping either needs to be single barrel or a box culvert. A preliminary hydraulic sizing analysis determined that single 8' x 6' box culverts would be needed at crossings under Hoffer Avenue, Hurley Boulevard, Hillcrest Avenue, across from the western Palm Bay Public Works driveway, the driveway for the Methodist Church (~500' west of Jupiter Boulevard), and Jupiter Boulevard.

## SECTION 7 – PREFERRED ALTERNATIVE

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It should also be noted that coordination with MTWCD indicated that flooding occurs around Belvedere Road during large storm events, where Canal C-20 overtops into nearby streets and yards. A review of the MTWCD data indicates that two of the downstream culverts (located at the entrances to the Hoyle property (Sta. 210+00) and Cox property (Sta. 213+50)) are undersized (only 48" diameter) relative to the upstream culverts, which is likely contributing to the overtopping. It is recommended to replace these two undersized culverts with 66" diameter culverts to alleviate some of the flooding concern.

An existing 58" x 36" elliptical culvert underneath Maywood Avenue (approximately Station 245+40) provides conveyance for MTWCD Canal C-20. The existing culvert's length is approximately 158'. The culvert is proposed to be extended 154' to the west for a total proposed length of 312'. A hydraulic analysis was not performed on this culvert since it serves as a side drain to Malabar Road; however, due to the extension and known flooding issues in this area, a replacement culvert is proposed with a 54" diameter which has approximately the same cross sectional area as the next downstream culvert. During the design phase, hydraulic modeling should be performed for all culverts within Canal C-20.

It was concluded that the project will impact approximately 1.41 ac-ft of floodplain based on the proposed roadway alignment and an additional 0.50 ac-ft for the recommended preferred pond alternative (total of 1.91 ac-ft). These impacts are minimal compared to the overall extent of the floodplain, therefore, it was determined that the floodplain encroachment is classified as "minimal". Minimal encroachments on a floodplain occur when there is a floodplain involvement, but the impacts on human life, transportation facilities, and natural and beneficial floodplain values are not significant and can be resolved with minimal efforts.

As concluded in the *Location Hydraulics Report*, the following floodplain statement is a slightly modified version of statement Number 4 in the FDOT PD&E Manual (Part 2, Chapter 13 "Floodplains"), tailored for this project:

*"The proposed cross drains and floodplain compensation area will perform hydraulically in a manner equal to or greater than the existing condition, and backwater surface elevations are not expected to increase. As a result, there will be no significant change in flood risk, and there will not be a significant change in the potential for interruption or termination of emergency service or in emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant."*

Please refer to the project's *Location Hydraulics Report* for additional information regarding the floodplain analysis.



## 7.16 Bridge and Structure Analysis

### 7.16.1 Canal C-10 Bridge

The preferred bridge alternative is a 3-span bridge with a length of approximately 152'. The proposed bridge length was established by offsetting the proposed begin/end bridge approximately 6' from the existing begin/end bridge to avoid conflicts between the existing and proposed piles. The proposed superstructure consists of 15" Florida Slab Beams (FSB) with a 6½" cast-in-place concrete topping slab (FDOT SPI 450-452) for a total structure depth of 1'9½" (an additional 3" is added to this depth to allow for concrete build-up due to camber and vertical geometry, resulting in a depth of 2'0½" used to establish final vertical geometry). A 3-span 15" FSB alternative was chosen to minimize the superstructure depth, as opposed to the shallowest Florida-I Beam (FIB) which has a total superstructure depth of 3'8½" (36" FIB with an 8½" cast-in-place concrete deck). Additionally, a 3-span FSB arrangement, as opposed to 5-span FSB or cast-in-place concrete flat slab option, limits the number of piles in the water. An odd number of spans was chosen to place a clear span at the center of the canal to eliminate piles at the centerline of the channel and maximize horizontal and draft clearance for maintenance vehicles traversing under the bridge. The superstructure is supported by concrete abutments along the canal banks and intermediate pile bents within the canal. Both the abutments and pile bents utilize either 18"-square or 24"-square prestressed concrete piles (FDOT SPI 455-018 & 455-024, respectively). The slopes in front of the abutments match the existing canal slopes and are protected by rubble riprap.

In order to establish the minimum bottom of low member elevation, three minimum vertical clearance conditions were reviewed: Navigation, Debris Passage, and MTWCD Maintenance Equipment. It was determined Canal C-10 is a non-navigable waterway; therefore, navigational clearance is not required.

Based on FDM Section 260.8.1, a minimum clearance of 2' is required to permit the passage of debris during the design flood event. Based on MTWCD criteria, the design flood event for Canal C-10 is the 25-year/24-hour storm event which results in a design flood stage elevation of 18.11' (NGVD 29) and a corresponding bottom of low member elevation of 20.11' (NGVD 29).

Based on discussions with the MTWCD, two different pieces of maintenance equipment are currently being utilized within the canal system: (1) Aquatic Harvester, Model AT-9150 V-4; and (2) BERKY 6740 Trex-Duke (specifications for each of these machines can be found in **Appendix J**). The MTWCD noted that the harvester machine controls vertical clearance with a dimension of approximately 12' measured from the waterline to the top of the permanent steel handrail at the driver's cab (Note: The driver's cab canopy extends above the handrail; however, the canopy is retractable and can be collapsed during passage under the bridge). Based on recent canal maintenance at the bridge site, the MTWCD noted that the harvester just cleared the existing

pedestrian bridge located immediately to the north of the vehicular bridge, but could not clear the existing vehicular bridge. The MTWCD requested an additional 6" of vertical clearance for this reason. From existing partial bridge plans, the existing bottom of low member elevation at the pedestrian bridge is 22.60' (NGVD 29). Providing an additional 6" of vertical clearance places the minimum bottom of low member elevation at 23.10' (NGVD 29) which controls over the lower debris clearance elevation of 20.11' (NGVD 29). **Figure 55** displays the vertical profile for the proposed bridge over Canal C-10.

During the most recent underwater bridge inspection, divers documented several timber pile stubs extending above the mudline between some of the existing pile bents. This condition was confirmed with MTWCD personnel who noted that maintenance equipment had struck some of these same piles. The presence of these timber piles should be accounted for in any new bridge design. It is recommended that existing piles either be extracted or cut off a minimum of 2' below the proposed finish ground line. In addition, new bridge piles should be located to avoid existing piles to minimize conflicts during pile installation.

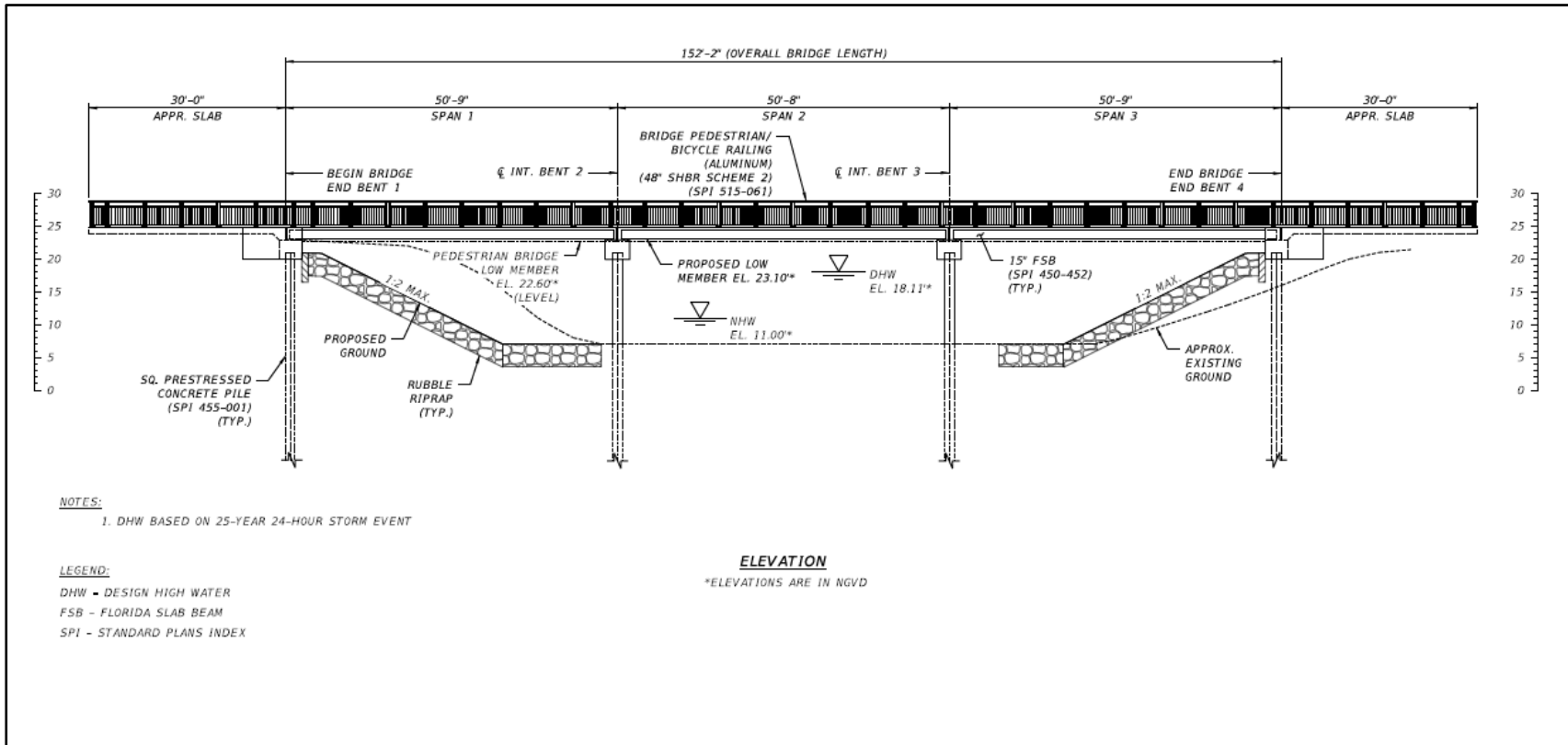
### *7.16.2 Concrete Box Culvert at Canal C-8*

The existing single barrel 51' L x 6' H x 8' W box culvert (CD-2 at C-8 Canal – Sta. 89+25) will need to be lengthened to accommodate the preferred typical section. The box culvert was constructed with wingwalls parallel to the roadway and has rubble riprap at both the entrance and exit to the box culvert. The box culvert will need to be extended approximately 33' to the north and 19' to the south to accommodate the preferred typical section. The wingwalls for the proposed south extension will need to be coordinated with roadway geometry during the design phase. In addition, any potential temporary impacts to drainage caused by the construction of the culvert extensions will need to be addressed during the design phase.

### *7.16.3 Pedestrian Bridges*

There are three existing pedestrian bridges carrying the north side sidewalk over Canal C-8, C-9, and C-10 within the project limits. To accommodate the preferred alternative typical section, the existing pedestrian bridges over Canal C-8 and Canal C-9 would need to be removed. East of Canal C-10, there are two parallel pedestrian facilities on the north side of Malabar Road in the preferred alternative: The existing 8' sidewalk and the proposed 10' shared-use path. East of Canal C-10, these facilities are proposed to merge into one facility and cross Canal C-10 on the new four-lane roadway bridge. West of Canal C-10 there is a single shared-use path to the St. Johns Heritage Parkway. For this reason, and the aforementioned issue with the MTWCD's harvester machine, Canal C-10 pedestrian bridge is proposed to be removed.

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**Figure 55: Vertical Profile for Proposed Bridge over Canal C-10**

### **7.17 Transportation Management Plan**

The Malabar Road four lane widening is going to be a complex construction project due to the drainage features/canals along the study corridor, especially near the Jupiter Boulevard intersection. Also, some of the existing roadway is centered in the new construction, so utilizing the existing two-lane roadway for maintenance of traffic (MOT) may not be feasible in some sections. With that being said, two lanes of traffic will be provided at all times during construction so no detours will be necessary. Access to driveways and businesses will always be maintained during all phases as well.

### **7.18 Constructability**

The general sequence of construction for the four-lane widening is detailed below:

Phase I: Two caracara nests are present just west of Heritage High School, west of the St. Johns Heritage Parkway. Before construction begins on the western end of the corridor, a caracara survey will be conducted to determine if the nests are still present and their level of activity. If the nests are still present, construction within 1,500 meters of the nests (likely at the Malabar Road at St. Johns Heritage Parkway intersection) will need to occur between May and October. Install temporary pavement to Jupiter Boulevard's west side over the box culvert to accommodate a lane shift to the west. This allows for the new box culvert's partial installation. Once the first half is completed, rebuild the roadway (without the curb) over the box culvert's new portion with temporary pavement to allow for the Jupiter Boulevard traffic shift to the east. Complete installation of the new box culvert's remaining portion. Rebuild Jupiter Boulevard's remaining portion over the culvert, including curb and gutters and sidewalks. While maintaining traffic on existing roadway, install drainage on Malabar Road's north side, including adjusted drainage ditch with walls, and any pipe extensions called for in the plans. Add temporary pavement as needed to allow for roadway restriping, to allow traffic to be shifted to Malabar Road's north side, creating two lanes of bi-directional traffic in the next phase. Access to driveways and businesses will always be maintained during all phases. The proposed bridge will require phased construction to maintain existing travel lanes on Malabar Road during construction. Phase I also includes the construction of the proposed bridge's southern portion with existing traffic maintained on the existing bridge.

Phase II: Install MOT devices, restripe, and shift traffic to the pavement's northern part. Close south side sidewalk, where present, and detour pedestrian to the north side sidewalk. Construct the proposed eastbound lanes, outside curb and gutter and proposed south side sidewalk. Construct inside curb and gutter where possible, but do not construct any inside curb and gutter where right turns will be obstructed

when bi-directional traffic is shifted to new roadway in the next phase. Install temporary pavement if needed. Do not construct curb and gutter/separators in roundabout envelopes including center circles as these will be constructed in a later phase. Temporary pavement should be placed in roundabout envelopes where curb and gutter/separators and inner circle were not constructed to allow for smoother traffic flow through the roundabout envelope in the next phase. Construct half of the roundabout's north-south legs at a time and construct temporary pavement if needed to allow for two-way traffic access.

Phase III: Adjust MOT devices, add temporary striping, and shift bi-directional traffic to newly constructed section of roadway and newly constructed southern portion of the proposed bridge. The existing bridge will be demolished. Construct WB sections of proposed roadway, curb and gutter, and sidewalk. This includes the construction of the proposed bridge's northern portion.

Phase IV: Temporary restripe for final lane configurations. Relocate MOT devices. Remove temporary pavement and complete construction of curb and gutter/traffic separators and round about inner circles during overnight lane closures.

Phase V: Remove MOT devices. Place final striping.

Typical sections showing Phases II and III of the Transportation Management Plan can be found in **Appendix N**.

### 7.19 Construction Impacts

Impacts resulting from the construction of the proposed project are discussed below:

- Based on the existing land use within the limits of this project, construction of the proposed roadway improvements may have temporary noise and vibration impacts. It is anticipated that the application of the ***FDOT Standard Specifications for Road and Bridge Construction*** will minimize or eliminate most of the potential construction noise and vibration impacts. However, should unanticipated noise or vibration issues arise during the construction process, the Project Manager, in concert with the City's Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts.
- Construction activities may cause short-term air quality impacts in the form of dust from earthwork and unpaved roads. These impacts will be minimized by adherence to applicable state regulations and to applicable ***FDOT Standard Specifications for Road and Bridge Construction***.
- Specific Best Management Practices (BMPs) during construction will follow the standard Stormwater Pollution Prevention Plan (SWPPP) and Erosion Control Plans to be developed by the contractor. BMPs will also follow guidelines established in the State of Florida



Erosion and Sediment Control Designer and Reviewer Manual (June 2007, updated July 2013).

- BMPs will consist of both stabilization and structural practices to manage and control stormwater runoff during construction. Stabilization practices will include artificial covering such as turf or sod (temporary condition) and asphalt or concrete surface, and sod (permanent condition). Structural practices for temporary construction site BMPs include sediment barriers (such as perimeter silt fence and turbidity barriers), inlet protection systems and sediment containment systems. These BMPs are further discussed in Section V “Temporary Construction Site BMPs” in the Erosion and Sediment Control Manual.
- Relocation of Canal C-20 will require temporary erosion control measures such as staked and floating turbidity barriers (as appropriate). Temporary drainage shall be maintained during all aspects and phases of construction.
- Species and habitat protections are discussed in **Section 1.3**.
- Maintenance of traffic and access impacts are discussed in **Section 7.18**.

### 7.20 Special Features

As discussed in **Section 7.14.2**, retaining walls are needed for the Canal C-20 relocation area west and east of the Jupiter Boulevard intersection. Detail on these retaining walls is provided in that section.

### 7.21 Utilities

Based on information provided by the UAOs, the existing utilities identified on the project were evaluated and potential utility impacts due to the preferred alternative were quantified. From Sta. 181+66 to 202+90 within the Canal C-20 relocation area (as discussed in **Section 7.14.2**), there is only 4 feet between proposed back of the shared-use path to the front of the retaining wall on the south side of Canal C-20. For this reason, the overhead utility poles on the north side of Malabar Road are proposed to be relocated to the south side of Malabar Road in this section.

**Table 38** outlines the preferred alternative potential utility impacts and associated relocation costs and **Table 39** identifies the specific UOA contacts.

To minimize existing utility’s impacts to the fullest extent possible, mitigation measures would be taken during the project’s design phase. If impacts are unavoidable, design alternatives would be reviewed to allow for impacted facilities relocation in a manner minimizing cost to the UAO and minimizing customer disruption.

Since relocations of facilities located in easements would likely be eligible for reimbursement, measures will be taken to avoid impacting facilities identified in lands of compensable interest. Utility companies identified as having potential easements on the project are listed in the *Utility*

**SECTION 7 – PREFERRED ALTERNATIVE**

*Assessment Package.* Utility coordination should be performed during the project’s design phase to clearly identify all utility easements and potential reimbursable relocations.

**Table 38: Potential Utility Impacts and Relocation Costs**

<b>Utility Company</b>	<b>Description</b>	<b>Relocation Cost</b>
AT&T Distribution	<ul style="list-style-type: none"> <li>Multiple buried, overhead and other lines on both the north and south sides of Malabar Road</li> </ul>	\$1,935,000
Bright House Networks, LLC	<ul style="list-style-type: none"> <li>Existing overhead and buried CATV on north and south side of Malabar Road</li> </ul>	\$150,000
City of Palm Bay Utilities Department	<ul style="list-style-type: none"> <li>Existing 16" sewer force main south of Malabar Road</li> <li>Approximately 1,200 ft of existing 8" sanitary sewer runs parallel to the south side of Malabar Road. west of Minton Road</li> <li>Existing 16" – 20" water on north side of Malabar Road</li> </ul>	\$6,882,400
Crown Castle Fiber	<ul style="list-style-type: none"> <li>Two 1.5" HDPE Conduits cross Malabar Road near STA. 175+50</li> </ul>	\$5,000
Florida Power and Light-Distribution	<ul style="list-style-type: none"> <li>Poles in easement impacts throughout the project. Primarily runs that branch off north and south of Malabar</li> </ul>	\$750,000
Florida Power and Light-Transmission	<ul style="list-style-type: none"> <li>No reimbursable impacts anticipated</li> </ul>	\$0
Hotwire Communications	<ul style="list-style-type: none"> <li>No reimbursable impacts anticipated</li> </ul>	\$0
Uniti Fiber LLC	<ul style="list-style-type: none"> <li>No reimbursable impacts anticipated</li> </ul>	\$0
<b>Project Utility Relocation Total</b>		<b>\$9,722,400</b>

**Table 39: UAO Contacts**

Utility Company	Contact	Email Address	Phone Number
AT&T Distribution	Luke Folkerts	LF2490@att.com	407-496-6041
Bright House Networks, LLC	Paul Rymer	Paul.Rymer@charter.com	321-757-6503
City of Palm Bay Utilities Department	Christopher Little	Christopher.little@palmbayflorida.org	321-952-3410
Crown Castle Fiber	Danny Haskett	Danny.Haskett@crowncastle.com	786-246-7827
Florida Power and Light-Distribution	Andrew Zicker	AndrewZicker@fpl.com	321-726-4833
Florida Power and Light-Transmission	Beau Bentley	Beau.Bentley@fpl.com	803-835-5982
Hotwire Communications	Eddie Miranda	EMiranda@Hotwiremail.com	321-710-1733
Uniti Fiber LLC	James Mosley	James.Mosley@uniti.com	251-654-8216

## 7.22 Cost Estimates

**Table 40** displays the construction cost estimates for the preferred alternative four lane widening. The maintenance of traffic (MOT) was calculated as 15 percent of the base construction cost and mobilization (MOB) was calculated as 10 percent of the base construction cost. The project unknowns were calculated as 15 percent of the base construction cost. As displayed in the table, the total construction cost for the project is approximately \$110 million. On a per mile cost estimate basis, the construction cost is approximately \$27.5 million/mile.

**Table 40: Construction Cost Estimates**

Limits	Base Const. Cost	MOT	MOB	Project Unknowns	Total Const. Cost
St. Johns Heritage Parkway to Minton Road	\$79,683,600	\$10,390,700	\$7,968,400	\$11,952,500	\$109,995,200

The estimated total project cost, as shown in **Table 41**, displays the total construction cost, the utility relocation cost, the wetland mitigation cost (calculated as \$120K per acre impacted), the anticipated right-of-way cost, the design cost (calculated as 9 percent of the total construction cost), and the CEI cost (calculated as 15 percent of the total construction cost) for the Malabar

Road four lane widening from St. Johns Heritage Parkway to Minton Road. The final long-range estimates (LREs) for the project can be found in the project files.

**Table 41: Malabar Road Total Project Cost Estimates**

Cost Element	Cost
Total Construction Cost	\$109,995,200
Utility Relocation Cost	\$9,722,400
Wetland Mitigation Cost	\$660,000
ROW Cost	\$2,403,800
Design Cost	\$10,000,000
CEI Cost	\$16,499,000
<b>Total Project Cost</b>	<b>\$149,280,400</b>

## 7.23 Summary of Environmental Impacts of the Preferred Alternative

### 7.23.1 Future Land Use

**Figure 56** shows the future land use along study corridor. The ETDM Summary Report includes an “Enhanced” Degree of Effect for land use changes. The project is compatible with community development goals, and City of Palm Bay/Brevard County comprehensive plans. Overall, future land uses around the study corridor continue to support the existing land use. Future land use categories surrounding the project corridor include single and multi-family residential, commercial, institutional, and recreational land uses.

### 7.23.2 Farmlands

As discussed in **Section 7.23.1** and shown in **Figure 56**, the existing agricultural land adjacent to Malabar Road is being redeveloped to either residential, commercial, or industrial land uses. The closest agricultural lands on the future land use map are approximately one mile south of Malabar Road (currently a cattle farm).

The Farmland Conversion Impact Rating was completed in January 2022 and forwarded to NRCS for review. The total assessment points assigned were 65.4, 48.4 points were assigned by NRCS for the relative value of the farmland and an additional 17 points were assigned for the site assessment criteria. The 17 points for the site assessment were broken down by percent of site being farmed (8 points), availability of farm support services (5 points), on-farm investments (3 points), and compatibility with existing agricultural use (1 point). The NRCS concluded the Farmland Protection Policy Act (FPPA) review and confirmed that their review was complete via email on 4/18/22. The farmlands documentation is provided in the project file.

### 7.23.3 Section 4(f)

The only Section 4(f) protected resource in the Malabar Road study area is the City of Palm Bay Fred Poppe Regional Park. This park is located approximately 0.25 miles north of Malabar Road with access via Championship Circle on the west end of the study corridor. The preferred alternative is not going to impact this resource. There are no wildlife refuges, waterfowl refuges, historic sites, or archaeological sites within the Malabar Road study area.

### 7.23.4 Cultural Resources

The Malabar Road study area has never been comprehensively surveyed. The Cultural Resources Assessment Survey (CRAS) was conducted in four phases: 1. Existing and proposed roadway right-of-way review; 2. Stormwater ponds review; 3. C-20 Alt. 1 Stormwater Pond Review; and 4. C-7 Alt. 3 Stormwater Pond Review.

#### 7.23.4.1 Phase 1 – Roadway Right-of-Way Review

For phase 1, the area of potential effects (APE) was defined from approximately 984 feet west of the St. Johns Heritage Parkway to the intersection with Minton Road and the archaeological survey was conducted within the existing and proposed right-of-way. The historic structure survey was conducted within the entire APE.

The archaeological survey consisted of the excavation of 30 shovel test and pedestrian survey with the archaeological APE. One previously recorded archaeological site, 8BR00025, is located within the overall APE, but outside the archaeological APE and outside the project limits. No artifacts were recovered during the archaeological survey, and no archaeological sites or occurrences were identified within the archaeological APE. The CRAS recommended no further archaeological surveys for this project and the SHPO concurred with this recommendation on August 2, 2021.

The architectural survey resulted in the identification and evaluation of eight historic resources within the Malabar Road APE. There was one previously recorded linear resource (8BR03535; Melbourne-Tillman Canal No. 20) which was determined ineligible for the National Register of Historic Places (NRHP) by SHPO in 2017. The other resources were judged to be ineligible for the NRHP due to the lack of significant historic associations and architectural and/or engineering distinction. SHPO also concurred with this recommendation.

#### 7.23.4.2 Phase 2 – Stormwater Ponds Review

The second phase in the CRAS was to prepare a Technical Memorandum for the stormwater ponds, swales, and FPCA. This included one FPCA, four stormwater pond locations, and five swale locations totaling 52.42 acres. The APE included the proposed FPCA, pond and swale footprints plus a 100-foot buffer. The archaeological survey was conducted within the proposed footprints and the architectural history survey included the entire APE. No archaeological sites, features, or



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occurrences were identified during archaeological survey and no further survey was recommended. SHPO concurred with this recommendation on February 22, 2022.

The architectural survey for the Pond CRAS identified and evaluated one newly recorded historic resource within the ponds APE. This resource is Melbourne-Tillman Canal No. 8 (8BR04375) which was recommended as ineligible for the NRHP due to the lack of significant historic associations and architectural distinction. SHPO concurred with this recommendation.

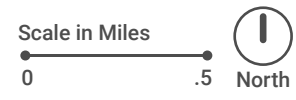
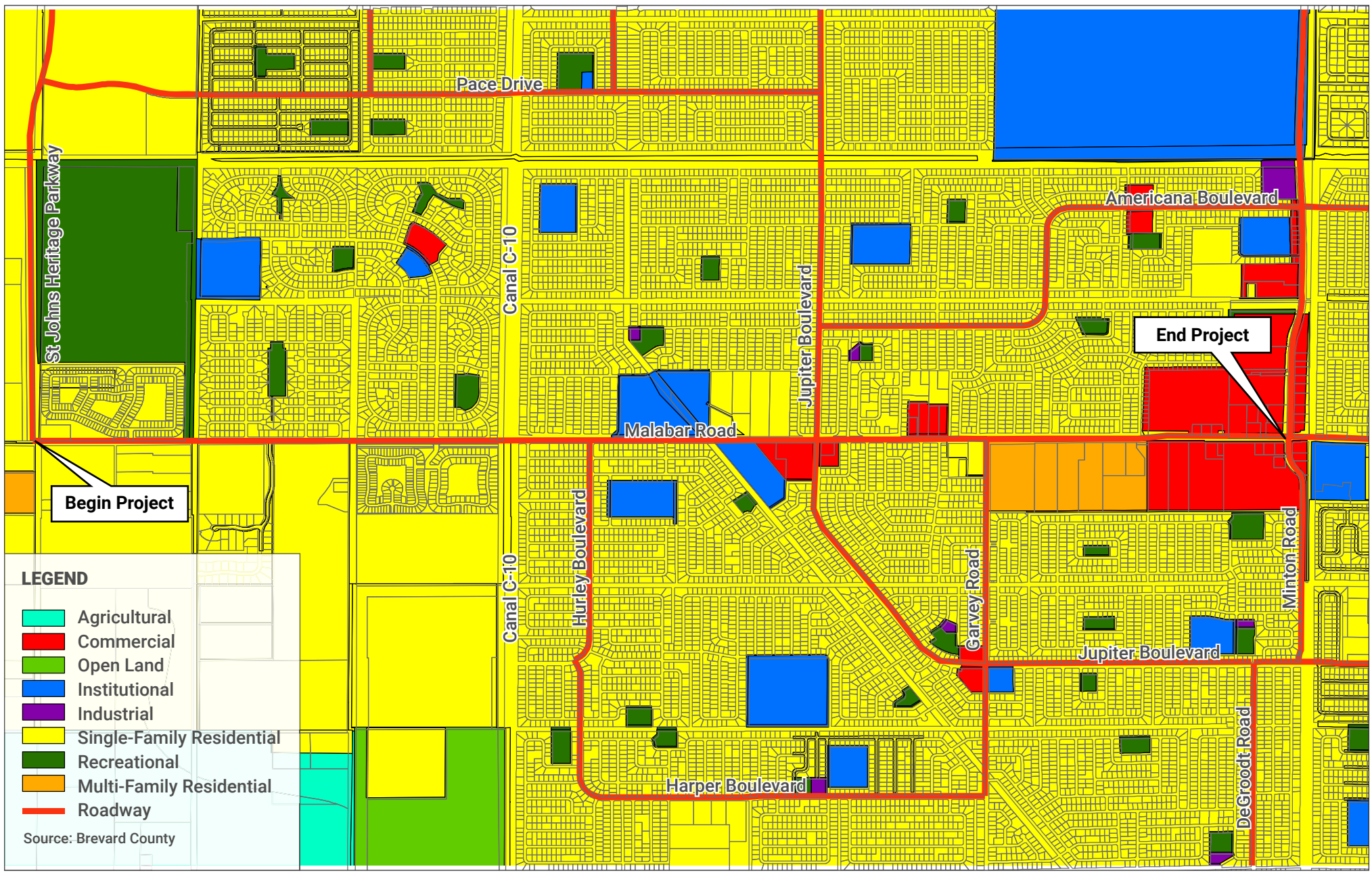
### 7.23.4.3 Phase 3 – C-20 Alt. 1 Stormwater Pond Review

The third step in the CRAS was to prepare an addendum to the stormwater ponds Technical Memorandum focused on the proposed C-20 Alt. 1 pond location. During the original pond analysis as discussed in the second phase, the C-20 Alt. 1 pond location was located adjacent to Malabar Road. Based on additional drainage analysis, the C-20 Alt. 1 pond location was moved further south within the same parcel. The APE for this additional analysis was defined to include the revised proposed C-20 Alt. 1 pond footprint, totaling 7.04 acres. The archaeological survey consisted of the excavation of three shovel tests within the APE. No archaeological sites, features, or occurrences were identified during archaeological survey and no further survey was recommended. SHPO concurred with this recommendation on February 22, 2022.

### 7.23.4.4 Phase 4 – C-7 Alt. 3 Stormwater Pond Review

The fourth step in the CRAS was to prepare an addendum to the stormwater ponds Technical Memorandum focused on the proposed C-7 Alt. 3 pond location and FPCA. Towards the end of the project, the City approved a residential development in the proposed C-7 Alt. 2 and FPCA location. An additional drainage analysis was performed to identify a third alternative pond site and FPCA location in the southwest corner of the Malabar Road/St. Johns Heritage Parkway intersection. The APE for this additional analysis was defined to include the proposed C-7 Alt. 3 pond and FPCA footprint, totaling 5.52 acres. The archaeological survey consisted of the excavation of nine shovel tests within the APE. No archaeological sites, features, or occurrences were identified during archaeological survey and no further survey was recommended. SHPO concurred with this recommendation on August 1, 2023.

The proposed construction will have no effect on cultural resources listed or eligible for listing in the NRHP.



# Malabar Road PD&E Study

FPID: 437210-1-28-01

FUTURE LAND USE

**FIGURE 56**

### 7.23.5 Wetlands

As noted in **Section 7.14.1**, two pond site changes occurred after the preferred pond sites were selected (C-7 and C-20) thus the wetland and other surface waters evaluation was updated to account for these preferred pond site changes. The project's *Natural Resources Evaluation* update includes the assessment of the additional area associated with pond C-7 Alternative 3 and the additional FPCA. Pond C-7 Alternative 3 and the FPCA will result in additional impacts to wetlands and other surface waters that were not included in the original *Natural Resources Evaluation*.

Wetlands and other surface waters with potential to be affected by the proposed project were identified within the study area. A wetland assessment was performed for these wetlands and other surface waters in accordance with the Uniform Mitigation Assessment Method (UMAM) as described in Chapter 62-345, FAC to determine the functional value provided by the wetlands and other surface waters and determine the amount of mitigation required to offset adverse impacts. Other surface waters classified as upland cut ditches and permitted reservoirs were included in the assessment; however, mitigation will not be required for impacts to these other surface waters. The Preferred Alternative, including the preferred pond sites, will directly impact 1.35 acres of wetlands, 4.12 acres of other surface waters, and have 0.11 acres of secondary impacts, for a total impact of 5.58 acres. Additional information regarding wetlands are documented in the project's *Natural Resources Evaluation*.

The Preferred Alternative has been evaluated in accordance with Federal Executive Order 11990- "Protection of Wetlands." Based upon the above considerations, it is determined that there are no practicable alternatives to the proposed construction in wetlands and that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use. As the project advances through subsequent phases, avoidance and minimization of wetland impacts will continue to be considered to the maximum extent practicable. Therefore, with proper mitigation, the proposed project is expected to result in no significant short or long term impacts to wetlands.

### 7.23.6 Protected Species and Habitat

The project's original *Natural Resources Evaluation* was approved by the USFWS on December 17, 2021, and the FWC on December 29, 2021. Based on this evaluation, the preferred alternative is located within the following USFWS Consultation Areas:

- Audubon's crested caracara (*Polyborus plancus audubonii*);
- Everglade snail kite (*Rostrhamus sociabilis plumbeus*);
- Florida grasshopper sparrow (*Ammodramus savannarum floridanus*);
- Florida scrub-jay (*Aphelocoma coerulescens*); and
- Red-cockaded woodpecker (*Dryobates borealis*).

The preferred alternative falls within Core Foraging Areas (CFA) for seven wood stork colonies. The study area's existing habitats may also support other federally protected species, as well as many state protected species. Based on the results of the general wildlife and species-specific surveys, data collection and USFWS' effect determination key, the preferred alternative will not jeopardize the continued protected species' existence and/or result in the destruction or adverse modification of critical habitat. However, additional coordination with wildlife agencies will be required during the design and permitting phase and additional wildlife surveys may be required prior to or during construction. **Appendix O** identifies the protected species that were evaluated as part of this PD&E Study, their regulatory status, and the effect determination under the preferred alternative.

As noted in **Section 7.14.1**, two pond site changes occurred after the preferred pond sites were selected (C-7 and C-20) thus the protected species and habitat evaluation was updated to account for these preferred pond site changes. The project's *Natural Resources Evaluation* was also updated to include a revised listed species list to reflect current status as there have been changes since the initial *Natural Resources Evaluation* was approved. These include the gopher tortoise no longer considered a candidate species for federal listing, and the addition of the tricolored bat and monarch butterfly as a candidate species proposed for federal listing. Additionally, the eastern black rail has been included in this evaluation due to the presence of suitable black rail habitat within the updated preferred pond sites. No Critical Habitat occurs within the project limits and the project will therefore not result in destruction or adverse modification of designated Critical Habitat.

The project corridor was evaluated for the presence of potentially occurring protected species. The westernmost portion of the proposed project corridor occurs within the secondary protection zone (1,500 meters) of two Audubon's crested caracara nests, the preferred alternative "**may affect, but is unlikely to adversely affect**" the continued existence of the caracara. One of the project commitments is construction activities associated with the Malabar Road and St. Johns Heritage Parkway intersection. The construction activities occurring within the caracara's secondary protection zone will be conducted during the May to October non-nesting season. The project "**may effect**" the eastern black rail based on anticipated wetland impacts. Due to the lack of suitable habitat or defined conservation measures for the species, the preferred alternative "**may affect, but is not likely to adversely affect**" the continued existence of the Florida scrub-jay, wood stork, and eastern indigo snake. The project is considered to have "**no effect**" on the Everglades snail kite, Florida grasshopper sparrow, red-cockaded woodpecker, and federally protected plant species. Similarly, "**no adverse effect is anticipated**" for the gopher tortoise, Florida burrowing owl, Florida pine snake, Florida sandhill crane, southeastern American kestrel, wading birds, and state listed plant species. "**No effect anticipated**" for numerous state listed plant species as well.

Additional information regarding protected species and habitat is documented in the project's *Natural Resources Evaluation*.

### 7.23.7 Essential Fish Habitat

No Essential Fish Habitat (EFH) has been identified within the study area. According to ETDM Summary Report No. 14396, dated October 25, 2019, National Marine Fisheries Service (NMFS) staff concluded that the project will not impact EFH; therefore, an EFH assessment is not required.

### 7.23.8 Highway Traffic Noise

Highway traffic noise was evaluated using the FDOT noise guidelines. The study conducted noise impact analysis for 354 noise-sensitive sites for the 2020 existing condition and the 2050 no-build and build alternatives. Only one of these analyzed sites is currently experiencing noise levels that meet or exceed the FDOT Noise Abatement Criterion (NAC). Four receptor sites are predicted to meet or exceed the NAC for the no-build alternative. The proposed project increases noise levels throughout the corridor by an average of 3.2 dB(A). While none of the noise increases are considered substantial (i.e., 15 or more decibels over existing levels), project noise levels for the preferred alternative are predicted to meet or exceed the NAC for five receptors.

To mitigate these impacts, noise barriers were considered as an abatement measure. Two noise barriers were analyzed, one for the two impacted residences and one for the three outdoor benches at the Madalyn Landing Apartments. Despite both noise barriers meeting the FDOT required 7.0 dB(A) noise reduction goal, neither barrier meets the cost-reasonableness criterion and are not feasible. Additional information regarding highway traffic noise is documented in the project's *Noise Study Report*.

### 7.23.9 Contamination

As discussed in **Section 2.4.3**, a *Level I Contamination Screening Evaluation Report* (CSER) assessed the risk of encountering petroleum or hazardous substance contamination of soil, groundwater, surface water, or sediment that could adversely affect the Malabar Road widening. Using the FDOT Risk Ratings, nine Medium Risk sites were identified as shown in **Table 42**. In reviewing these sites in proximity to the Malabar Road widening, Level II Impact to Construction Assessments (ICA) may be required for sites 2, 3, and 7. **Table 42** details the reasoning for whether a Level II ICA may or may not be required, but each site should be reviewed during design to confirm.

In addition to the sites reviewed in the existing conditions, each of the preferred alternative pond sites were reviewed for risk potential (pond sites shown in **Figure 57**). Seven pond sites have low risk potential and one pond site has medium risk potential, as shown in **Table 43**.

As noted in **Section 7.14.1**, two pond site changes occurred after the preferred pond sites were selected (C-7 and C-20) thus the contamination evaluation was updated to account for these preferred pond site changes. The preferred C-7 Alternative 3 pond site and FPCA now has low risk



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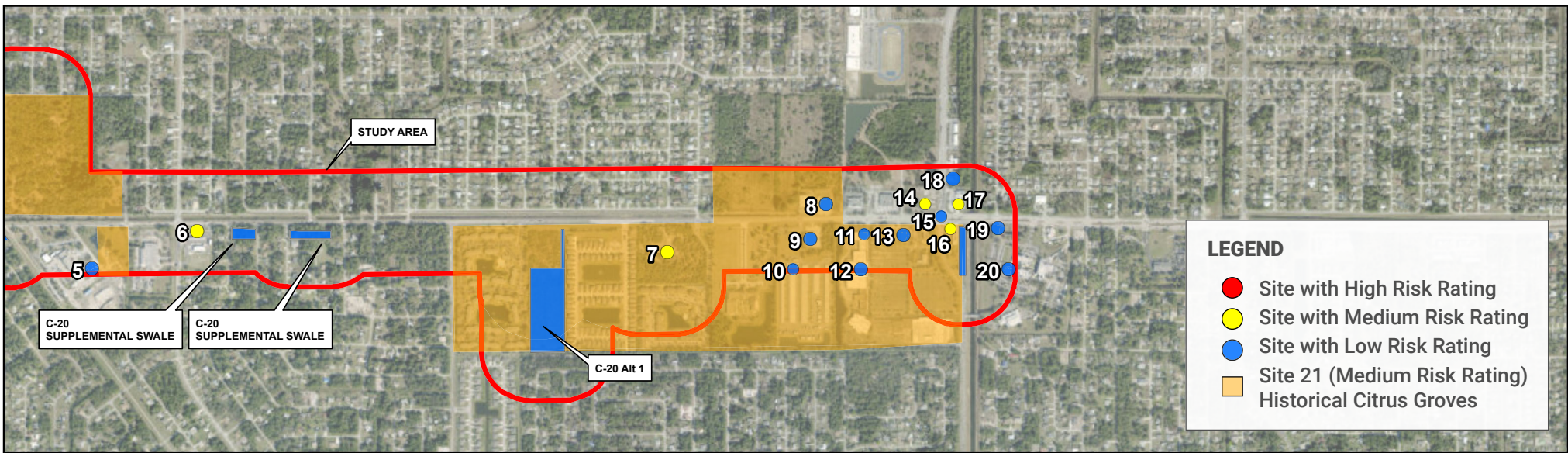
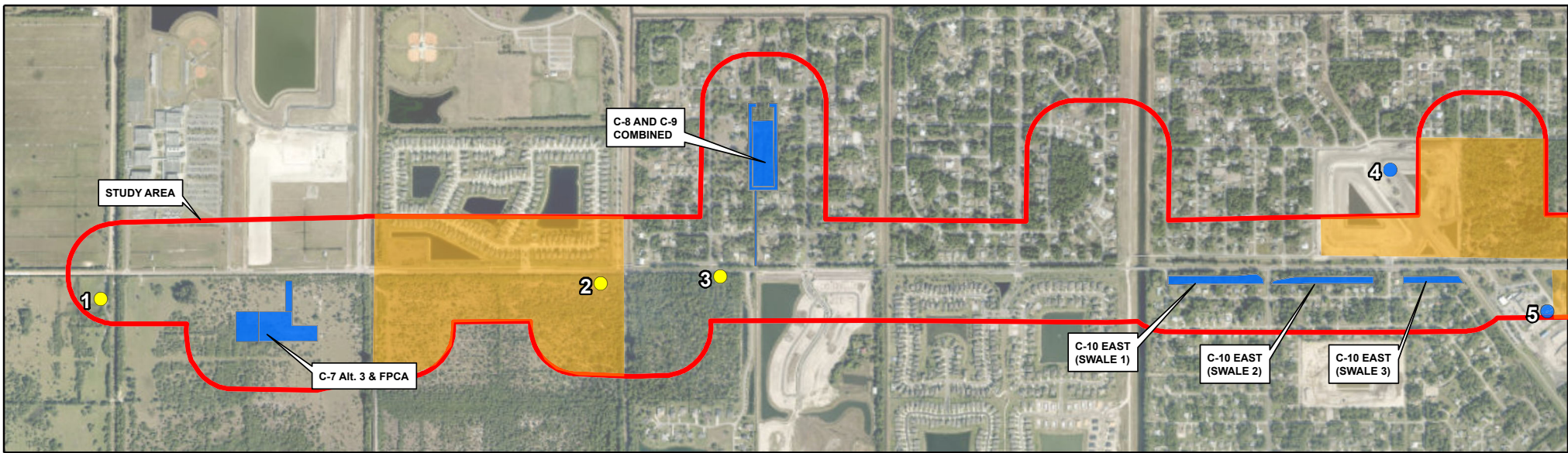
potential (was previously medium risk). The preferred C-20 Alternative 1 pond site has medium risk potential and a Level II ICA was performed due to its historical citrus grove/agricultural land use. Based on the Level II ICA findings, C-20 Alternative 1 pond construction activities should not require special handling, characterization, and disposal provisions.

**Table 42: Medium Risk Contamination Sites from Level 1 CSER**

Site Number	Site Name	Level II Assessment ?	Justification
1	Cattle Pen	No	Site not located within widening limits
2	Agricultural Barn	Yes	Site located near widening limits
3	Cattle Pen	Yes	Site located near widening limits
6	Circle K #2726513	No	Site recently constructed; land already dedicated for widening
7	Malabar Cove	Yes	Site located near widening limits
14	Bob Youtzy Landclearing	No	Site not impacted by widening
16	7-Eleven Food Store #32756	No	Site not impacted by widening
17	Cumberland Farms	No	Site not impacted by widening
21	Historical Citrus	TBD	Historical citrus found throughout project area, determine if Level II ICA is required on a parcel-by-parcel basis

**Table 43: Preferred Alternative Pond Site Risk Potential from Level 1 CSER**

Pond Name	Location	Risk Potential	Relevant Site Number
C-7 Alt. 3	Station 53+80 – 55+53 Right	Low	N/A
C-7 Alt. 3 FPCA	Station 53+80 – 55+53 Right	Low	N/A
C-8 & C-9 Combined	Station 102+00 – 104+40 Left	Low	N/A
C-10 East (Swale 1)	Station 145+00 – 155+00 Right	Low	N/A
C-10 East (Swale 2)	Station 155+70 – 166+20 Right	Low	N/A
C-10 East (Swale 3)	Station 169+15 – 175+45 Right	Low	N/A
C-20 Supplemental Swale	Station 198+45 – 201+00 Right Station 204+40 – 208+70 Right	Low	N/A
C-20 Alt. 1	Station 229+00 – 231+85 Right	Medium	21



**LEGEND**

- Site with High Risk Rating
- Site with Medium Risk Rating
- Site with Low Risk Rating
- Site 21 (Medium Risk Rating) Historical Citrus Groves

Not to Scale

# Appendix A – Transit Information

2019-2020 Space Coast Area Transit Ridership

MONTH	1	2	3	4	5	6	7	8	9	20	21	22	23	24	25	26	27	28	29	33	TOTAL
OCTOBER	17266	7762	4201	25741	3089	19059	2941	2663	17238	2167	8091	5094	5719	5693	11195	2978	7309	8886	10214	64	167370
NOVEMBER	14967	6584	3461	22546	3021	15669	2345	2564	14928	1761	6690	4095	4397	4124	9125	2349	5968	7133	8695	49	140474
DECEMBER	14342	6782	3345	19620	3072	15205	2253	2661	15278	1809	7032	3842	4033	4482	10074	2534	6055	7162	9097	68	138745
JANUARY	16360	7652	3534	23799	3280	16361	2677	3064	16411	2184	8952	4539	4797	5281	10013	3090	7669	8159	10886	88	158798
FEBRUARY	15592	7022	2783	21599	2943	16364	2697	2470	15297	1918	7254	4266	5476	5029	10237	2463	6758	7685	11485	57	149395
MARCH	12001	6211	2666	18078	2513	14888	2371	2309	13091	1483	5926	3600	3883	3756	7833	2005	6081	5883	7818	91	122487
APRIL	6382	2713	1668	9550	1670	7403	1097	1409	5674	604	2318	2226	1799	1952	4617	1297	2737	3164	3355	9	61643
MAY	6561	3220	1730	12964	2192	7221	1171	1874	8104	793	3848	3426	1926	2660	5028	1309	3382	4147	3598	0	75154
JUNE	8429	3895	2145	15106	2187	9133	1284	2180	10172	897	5448	3058	2206	2337	6139	1586	3690	4749	4680	0	89320
JULY	10574	5443	2185	15632	2235	11446	1418	2338	10267	1111	6584	3484	2970	3543	6435	1923	5289	5590	7300	0	105767
AUGUST	9859	5508	2103	15121	2447	12069	1342	2280	7991	1357	5967	3452	2793	3394	5216	1846	4965	5192	7973	73	100948
SEPTEMBER	11796	6014	2538	15999	2651	13823	1528	2464	10706	1229	6479	3059	3277	3652	5494	2160	5578	5786	8839	97	113169
WEEKDAY	144130	68806	32360	215755	31300	158641	23123	28278	145158	17313	74590	44141	43276	45904	91405	25540	65480	73536	93939	596	1423269
WEEKEND	13920	8093	3898	39664	2902	15888	1833	4557	32253	2428	8273	4605	5193	5237	11198	3986	7606	7055	8235		186823
TOTAL	158050	76900	36258	255419	34202	174529	24956	32834	177411	19741	82862	48746	48469	51140	102603	29526	73085	80591	102174	596	1610093





### Holiday Schedules

Generally, the following holidays operate on modified schedules: New Year's Day, Martin Luther King Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the day after Thanksgiving, Christmas Eve, and Christmas Day. For updates, call **321.633.1878** or go to **321Transit.com/Holidays**.

BUS FARES	FULL FARE, 1-RIDE	REDUCED FARE, 1-RIDE	FULL FARE, 10-RIDE PASS	REDUCED FARE, 10-RIDE PASS	FULL FARE, 30 DAY PASS	REDUCED FARE, 30 DAY PASS
	..... \$1.50	..... \$0.75	..... \$12.00	..... \$6.00	..... \$42.00	..... \$21.00

### Eligibility For Reduced Fare

Those eligible for Reduced Fare include seniors (60+), disabled, veterans, and students. All Reduced Fare riders must register for a Reduced Fare ID Card at Space Coast Area Transit or on 321Transit.com. There is no charge for children under the age of five (5), or for transfers. EFSC students ride free with a valid EFSC Student ID. Due to a grant from the City of Melbourne, no fare is charged on Routes 21, 24, and 29 to Melbourne residents with valid ID who ride within the Melbourne city limits.

### Types Of Fares And How To Purchase

A new mobile ticketing system powered by Token Transit on 321Transit.com sends a 1-Ride, 10-Ride or 30-Day Pass directly and instantly to a smartphone. Payment with a credit or debit card is required.

Otherwise, **1-Ride** fares are paid when boarding. Exact change is required; the driver is not equipped to make change. Fare specials include a **10-Ride** and a **30 Day Pass**. Both must be purchased in advance. Additional purchase options include:

- At Space Coast Area Transit, 401 S. Varr Ave., Cocoa, Florida, 32922, or 460 S. Harbor City Blvd., Melbourne, Florida, 32901, and also at select Brevard County Libraries.
- Checks up to \$100.00, money orders, and credit cards are accepted by mail.
- Visa, MasterCard, and Discover cards are also accepted on **321Transit.com** or by calling **321.635.7815, option 2** or **321.952.4561, option 1**.

### How to Use the Route Maps and Schedules

The route maps and schedules are color coordinated. The numbered stops on the map match the numbered locations listed on the schedule. To determine what time a bus will stop at a specific location, read across. To determine how long it will take you to get from one location to another, read down. Transfer points indicate designated stops at which you may transfer to other routes. When transferring, check the schedule of the route you are transferring to for exact times and return trip availability.

### How to Ride

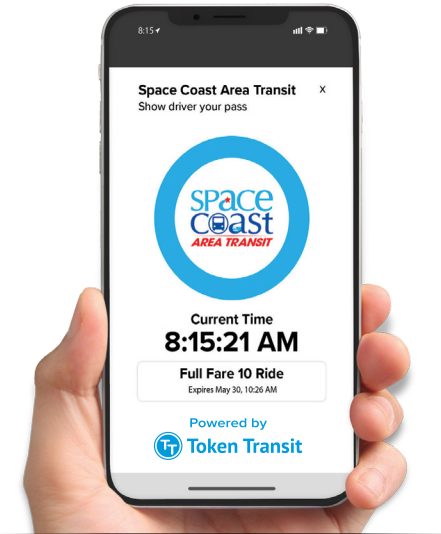
- The safety of our passengers is our #1 priority.**
- Please limit packages to those you can personally carry on the bus by yourself.
- Be at the stop at least 5 minutes prior to the scheduled arrival time.
- Do not approach a moving bus.
- If you need assistance to board the bus, please ask. It is part of the driver's duty to help.
- Have exact fare or pass ready prior to boarding the bus. Drivers cannot make change.
- Leave seats near the front for elderly or disabled riders, moving promptly to the next available seat.
- Only use audio devices with head phones activated.
- Eating, drinking, smoking, electronic cigarettes, and any materials that are flammable are not allowed on buses.
- Service animals are the only animals allowed.
- If available, use the stop bar or pull cord to signal your stop one block in advance. If one is not available, alert your driver at least one block in advance.
- Do not leave your seat until the bus is fully stopped.
- All buses are equipped with bike racks. Surfboards and bikes are permitted inside the bus when space is available.
- Proper attire is needed to board. Shirts and shoes are required. Bathing suits, except board shorts, must be covered.

**All scheduled times are approximate and depend on traffic and other conditions.**

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**ROUTE 20**  
space coast  
AREA TRANSIT

**HERITAGE / WEST MELBOURNE**  
MONDAY-SATURDAY  
April 3, 2021  
**321Transit.com**

# It's Time for Real Time!



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Vanpool Info ..... 321.952.4562  
**321Transit.com**

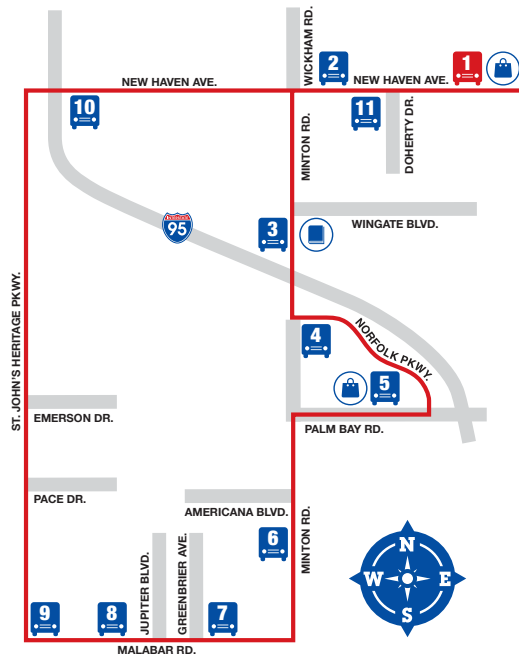
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That Your Bus Is On The Way**

-  EXPRESS ROUTE
-  REFERENCE ROADS
-  ROUTE DIRECTION
-  BUS STOP NUMBER
-  TRANSFER POINT
-  HOSPITAL
-  SHOPPING
-  AIRPORT
-  LIBRARY
-  COLLEGE



### ROUTE 20 • HERITAGE – WEST MELBOURNE • MONDAY-FRIDAY SCHEDULE

This route has DESIGNATED STOPS only. The bus will drop off and pick up ONLY at marked bus stops along the route. *TRANSFER STOPS* are indicated in bold italics.

MAP #	TIME POINTS	AM	AM	AM	AM	AM	AM	PM	PM	PM	PM	PM	PM	PM	PM	PM	PM	MAP #	TRANSFER TO ROUTE NUMBER
<b>1</b>	MELBOURNE SQUARE MALL (DEPART)	<b>6:25</b>	<b>7:25</b>	<b>8:25</b>	<b>9:25</b>	<b>10:25</b>	-	<b>12:25</b>	<b>1:25</b>	<b>2:25</b>	<b>3:25</b>	<b>4:25</b>	<b>5:25</b>	<b>6:25</b>	<b>7:25</b>	<b>8:25</b>	<b>9:25</b>	<b>1</b>	<b>#21 #25 #28</b>
2	WEST NEW HAVEN & PINE ST.	6:31	7:31	8:31	9:31	10:31	-	12:31	1:31	2:31	3:31	4:31	5:31	6:31	7:31	8:31	9:31	2	
3	MINTON RD. @ FIELD OF DREAMS	6:36	7:36	8:36	9:36	10:36	-	12:36	1:36	2:36	3:36	4:36	5:36	6:36	7:36	8:36	9:36	3	
4	NORFOLK PKWY ACROSS FROM PROMISE IN BREVARD	6:39	7:39	8:39	9:39	10:39	-	12:39	1:39	2:39	3:39	4:39	5:39	6:39	7:39	8:39	9:39	4	
5	HAMMOCK LANDING	6:41	7:41	8:41	9:41	10:41	-	12:41	1:41	2:41	3:41	4:41	5:41	6:41	7:41	8:41	9:41	5	
6	MINTON RD. & AMERICANA BLVD.	6:47	7:47	8:47	9:47	10:47	-	12:47	1:47	2:47	3:47	4:47	5:47	6:47	7:47	8:47	9:47	6	
7	MALABAR RD. / GREENBRIER AVE.	6:53	7:53	8:53	9:53	10:53	-	12:53	1:53	2:53	3:53	4:53	5:53	6:53	7:53	8:53	9:53	7	
8	MALABAR RD. @ FRED POPPE REGIONAL PARK	6:59	7:59	8:59	9:59	10:59	-	12:59	1:59	2:59	3:59	4:59	5:59	6:59	7:59	8:59	9:59	8	
9	MALABAR RD. / ST. JOHN'S HERITAGE PKWY.	7:00	8:00	9:00	10:00	11:00	-	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	9	
10	WEST NEW HAVEN AVE. @ GOODWILL	7:08	8:08	9:08	10:08	11:08	-	1:08	2:08	3:08	4:08	5:08	6:08	7:08	8:08	9:08	10:08	10	
11	NEW HAVEN AVE. @ WINDOVER SQUARE	7:17	8:17	9:17	10:17	11:17	-	1:17	2:17	3:17	4:17	5:17	6:17	7:17	8:17	9:17	10:17	11	
<b>1</b>	MELBOURNE SQUARE MALL (ARRIVE)	<b>7:20</b>	<b>8:20</b>	<b>9:20</b>	<b>10:20</b>	<b>11:20</b>	-	<b>1:20</b>	<b>2:20</b>	<b>3:20</b>	<b>4:20</b>	<b>5:20</b>	<b>6:20</b>	<b>7:20</b>	<b>8:20</b>	<b>9:20</b>	<b>10:20</b>	<b>1</b>	<b>#21 #25 #28</b>

### ROUTE 20 • HERITAGE – WEST MELBOURNE • SATURDAY SCHEDULE

MAP #	TIME POINTS	AM	AM	AM	AM	AM/PM	PM	PM	PM	PM	PM	PM	PM	MAP #	TRANSFER TO ROUTE NUMBER
1	MELBOURNE SQUARE MALL (DEPART)	7:25	8:25	9:25	10:25	11:25	-	1:25	2:25	3:25	4:25	5:25	6:25	1	
2	WEST NEW HAVEN & PINE ST.	7:31	8:31	9:31	10:31	11:31	-	1:31	2:31	3:31	4:31	5:31	6:31	2	
3	MINTON RD. @ FIELD OF DREAMS	7:36	8:36	9:36	10:36	11:36	-	1:36	2:36	3:36	4:36	5:36	6:36	3	
4	NORFOLK PKWY ACROSS FROM PROMISE IN BREVARD	7:39	8:39	9:39	10:39	11:39	-	1:39	2:39	3:39	4:39	5:39	6:39	4	
5	HAMMOCK LANDING	7:41	8:41	9:41	10:41	11:41	-	1:41	2:41	3:41	4:41	5:41	6:41	5	
6	MINTON RD. & AMERICANA BLVD.	7:47	8:47	9:47	10:47	11:47	-	1:47	2:47	3:47	4:47	5:47	6:47	6	
7	MALABAR RD. / GREENBRIER AVE.	7:53	8:53	9:53	10:53	11:53	-	1:53	2:53	3:53	4:53	5:53	6:53	7	
8	MALABAR RD. @ FRED POPPE REGIONAL PARK	7:59	8:59	9:59	10:59	11:59	-	1:59	2:59	3:59	4:59	5:59	6:59	8	
9	MALABAR RD. / ST. JOHN'S HERITAGE PKWY.	8:00	9:00	10:00	11:00	12:00	-	2:00	3:00	4:00	5:00	6:00	7:00	9	
10	WEST NEW HAVEN AVE. @ GOODWILL	8:08	9:08	10:08	11:08	12:08	-	2:08	3:08	4:08	5:08	6:08	7:08	10	
11	NEW HAVEN AVE. @ WINDOVER SQUARE	8:17	9:17	10:17	11:17	12:17	-	2:17	3:17	4:17	5:17	6:17	7:17	11	
1	MELBOURNE SQUARE MALL (ARRIVE)	8:20	9:20	10:20	11:20	12:20	-	2:20	3:20	4:20	5:20	6:20	7:20	1	

#### NOTES:

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RideLine.....321.633.1878  
 Vanpool Info ....321.952.4562  
**321Transit.com**



### Holiday Schedules

Generally, the following holidays operate on modified schedules: New Year's Day, Martin Luther King Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the day after Thanksgiving, Christmas Eve, and Christmas Day. For updates, call **321.633.1878** or go to **321Transit.com/Holidays**.

BUS FARES	FULL FARE, 1-RIDE	REDUCED FARE, 1-RIDE	FULL FARE, 10-RIDE PASS	REDUCED FARE, 10-RIDE PASS	FULL FARE, 30 DAY PASS	REDUCED FARE, 30 DAY PASS
	\$1.50	\$0.75	\$12.00	\$6.00	\$42.00	\$21.00

### Eligibility For Reduced Fare

Those eligible for Reduced Fare include seniors (60+), disabled, veterans, and students. All Reduced Fare riders must register for a Reduced Fare ID Card at Space Coast Area Transit or on 321Transit.com. There is no charge for children under the age of five (5), or for transfers. EFSC students ride free with a valid EFSC Student ID. Due to a grant from the City of Melbourne, no fare is charged on Routes 21, 24, and 29 to Melbourne residents with valid ID who ride within the Melbourne city limits.

### Types Of Fares And How To Purchase

A new mobile ticketing system powered by Token Transit on 321Transit.com sends a 1-Ride, 10-Ride or 30-Day Pass directly and instantly to a smartphone. Payment with a credit or debit card is required.

Otherwise, **1-Ride** fares are paid when boarding. Exact change is required; the driver is not equipped to make change. Fare specials include a **10-Ride** and a **30 Day Pass**. Both must be purchased in advance. Additional purchase options include:

- At Space Coast Area Transit, 401 S. Varr Ave., Cocoa, Florida, 32922, or 460 S. Harbor City Blvd., Melbourne, Florida, 32901, and also at select Brevard County Libraries.
- Checks up to \$100.00, money orders, and credit cards are accepted by mail.
- Visa, MasterCard, and Discover cards are also accepted on **321Transit.com** or by calling **321.635.7815, option 2** or **321.952.4561, option 1**.

### How to Use the Route Maps and Schedules

The route maps and schedules are color coordinated. The numbered stops on the map match the numbered locations listed on the schedule. To determine what time a bus will stop at a specific location, read across. To determine how long it will take you to get from one location to another, read down. Transfer points indicate designated stops at which you may transfer to other routes. When transferring, check the schedule of the route you are transferring to for exact times and return trip availability.

### How to Ride

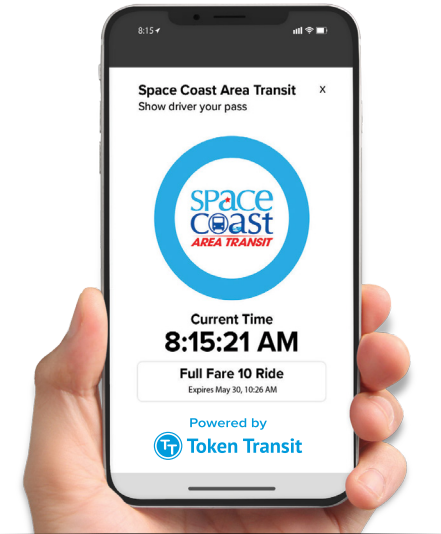
- The safety of our passengers is our #1 priority.**
- Please limit packages to those you can personally carry on the bus by yourself.
- Be at the stop at least 5 minutes prior to the scheduled arrival time.
- Do not approach a moving bus.
- If you need assistance to board the bus, please ask. It is part of the driver's duty to help.
- Have exact fare or pass ready prior to boarding the bus. Drivers cannot make change.
- Leave seats near the front for elderly or disabled riders, moving promptly to the next available seat.
- Only use audio devices with head phones activated.
- Eating, drinking, smoking, electronic cigarettes, and any materials that are flammable are not allowed on buses.
- Service animals are the only animals allowed.
- If available, use the stop bar or pull cord to signal your stop one block in advance. If one is not available, alert your driver at least one block in advance.
- Do not leave your seat until the bus is fully stopped.
- All buses are equipped with bike racks. Surfboards and bikes are permitted inside the bus when space is available.
- Proper attire is needed to board. Shirts and shoes are required. Bathing suits, except board shorts, must be covered.

**All scheduled times are approximate and depend on traffic and other conditions.**

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### New Website & App Featuring Contactless Mobile Ticketing



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**ROUTE 23**  
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AREA TRANSIT

**WEST PALM BAY**  
MONDAY-SATURDAY  
April 3, 2021  
**321Transit.com**

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### ROUTE 23 • WEST PALM BAY • MONDAY-FRIDAY SCHEDULE

This route has DESIGNATED STOPS only. The bus will drop off and pick up ONLY at marked bus stops along the route. *TRANSFER STOPS* are indicated in bold Italics.

MAP #	TIME POINTS	AM	AM	AM	AM	AM	AM/PM	PM	PM	PM	PM	PM	PM	PM	PM	PM	MAP #	TRANSFER TO ROUTE NUMBER
1	HAMMOCK LANDING (DEPART)	6:35	<b>7:35</b>	<b>8:35</b>	<b>9:35</b>	<b>10:35</b>	<b>11:35</b>	<b>12:35</b>	<b>1:35</b>	<b>2:35</b>	<b>3:35</b>	<b>4:35</b>	<b>5:35</b>	<b>6:35</b>	<b>7:35</b>	<b>8:30</b>	1	#22 #25 #27
2	MINTON RD. & EMERSON DR.	6:39	7:39	8:39	9:39	10:39	11:39	12:39	1:39	2:39	3:39	4:39	5:39	6:39	7:39		2	
3	EMERSON DR. & JUPITER BLVD.	6:41	7:41	8:41	9:41	10:41	11:41	12:41	1:41	2:41	3:41	4:41	5:41	6:41	7:41		3	
4	EMERSON DR. & GLENDALE AVE.	6:45	7:45	8:45	9:45	10:45	11:45	12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45		4	
5	PACE DR. & GLENDALE AVE.	6:47	7:47	8:47	9:47	10:47	11:47	12:47	1:47	2:47	3:47	4:47	5:47	6:47	7:47		5	
6	PACE DR. & JUPITER BLVD.	6:51	7:51	8:51	9:51	10:51	11:51	12:51	1:51	2:51	3:51	4:51	5:51	6:51	7:51		6	
7	MALABAR RD. & JUPITER BLVD.	6:55	7:55	8:55	9:55	10:55	11:55	12:55	1:55	2:55	3:55	4:55	5:55	6:55	7:55		7	
8	MALABAR RD. @ PALM BAY WEST	6:58	7:58	8:58	9:58	10:58	11:58	12:58	1:58	2:58	3:58	4:58	5:58	6:58	7:58		8	
9	MALABAR RD. @ WALMART	7:03	8:03	9:03	10:03	11:03	12:03	1:03	2:03	3:03	4:03	5:03	6:03	7:03	8:03		9	
10	EFSC - PALM BAY	7:08	8:08	9:08	10:08	11:08	12:08	1:08	2:08	3:08	4:08	5:08	6:08	7:08	8:08		10	
11	MALABAR RD. & EMERSON DR.	7:13	8:13	9:13	10:13	11:13	12:13	1:13	2:13	3:13	4:13	5:13	6:13	7:13	8:13		11	
12	EMERSON DR. & AMERICANA BLVD.	7:15	8:15	9:15	10:15	11:15	12:15	1:15	2:15	3:15	4:15	5:15	6:15	7:15	8:15		12	
13	CULVER DR. @ PALM BAY SENIOR CENTER	7:19	8:19	9:19	10:19	11:19	12:19	1:19	2:19	3:19	4:19	5:19	6:19	7:19	8:19		13	
1	HAMMOCK LANDING (ARRIVE)	<b>7:30</b>	<b>8:30</b>	<b>9:30</b>	<b>10:30</b>	<b>11:30</b>	<b>12:30</b>	<b>1:30</b>	<b>2:30</b>	<b>3:30</b>	<b>4:30</b>	<b>5:30</b>	<b>6:30</b>	<b>7:30</b>	<b>8:30</b>		1	#22 #25 #27

### ROUTE 23 • WEST PALM BAY • SATURDAY SCHEDULE

MAP #	TIME POINTS	AM	AM	AM	AM	AM/PM	PM	PM	PM	PM	PM	MAP #	TRANSFER TO ROUTE NUMBER
1	HAMMOCK LANDING (DEPART)	<b>7:35</b>	<b>8:35</b>	<b>9:35</b>	<b>10:35</b>	<b>11:35</b>	—	<b>1:35</b>	<b>2:35</b>	<b>3:35</b>	<b>4:35</b>	1	#22 #25 #27
2	MINTON RD. & EMERSON DR.	7:39	8:39	9:39	10:39	11:39	—	1:39	2:39	3:39	4:39	2	
3	EMERSON DR. & JUPITER BLVD.	7:41	8:41	9:41	10:41	11:41	—	1:41	2:41	3:41	4:41	3	
4	EMERSON DR. & GLENDALE AVE.	7:45	8:45	9:45	10:45	11:45	—	1:45	2:45	3:45	4:45	4	
5	PACE DR. & GLENDALE AVE.	7:47	8:47	9:47	10:47	11:47	—	1:47	2:47	3:47	4:47	5	
6	PACE DR. & JUPITER BLVD.	7:51	8:51	9:51	10:51	11:51	—	1:51	2:51	3:51	4:51	6	
7	MALABAR RD. & JUPITER BLVD.	7:55	8:55	9:55	10:55	11:55	—	1:55	2:55	3:55	4:55	7	
8	MALABAR RD. @ PALM BAY WEST	7:58	8:58	9:58	10:58	11:58	—	1:58	2:58	3:58	4:58	8	
9	MALABAR RD. @ WALMART	8:03	9:03	10:03	11:03	12:03	—	2:03	3:03	4:03	5:03	9	
10	EFSC - PALM BAY	8:08	9:08	10:08	11:08	12:08	—	2:08	3:08	4:08	5:08	10	
11	MALABAR RD. & EMERSON DR.	8:13	9:13	10:13	11:13	12:13	—	2:13	3:13	4:13	5:13	11	
12	EMERSON DR. & AMERICANA BLVD.	8:15	9:15	10:15	11:15	12:15	—	2:15	3:15	4:15	5:15	12	
13	CULVER DR. @ PALM BAY SENIOR CENTER	8:19	9:19	10:19	11:19	12:19	—	2:19	3:19	4:19	5:19	13	
1	HAMMOCK LANDING (ARRIVE)	<b>8:30</b>	<b>9:30</b>	<b>10:30</b>	<b>11:30</b>	<b>12:30</b>	—	<b>2:30</b>	<b>3:30</b>	<b>4:30</b>	<b>5:30</b>	1	#22 #25 #27

### NOTES:

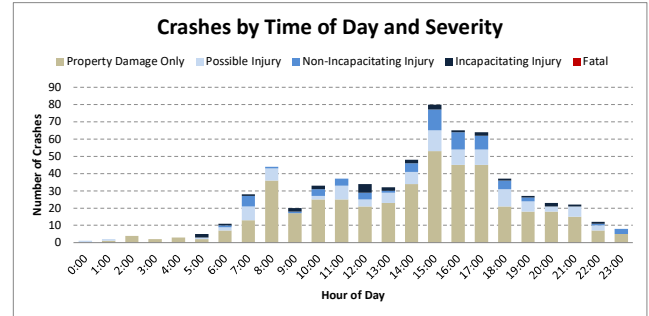
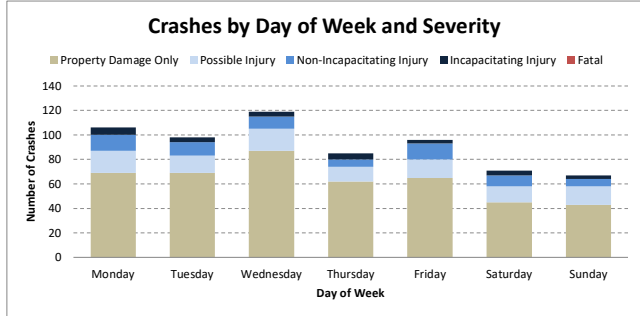
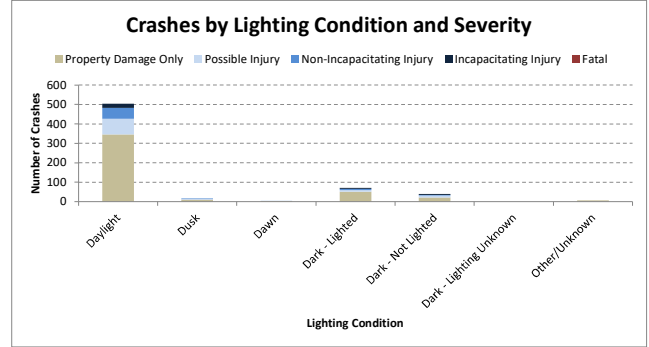
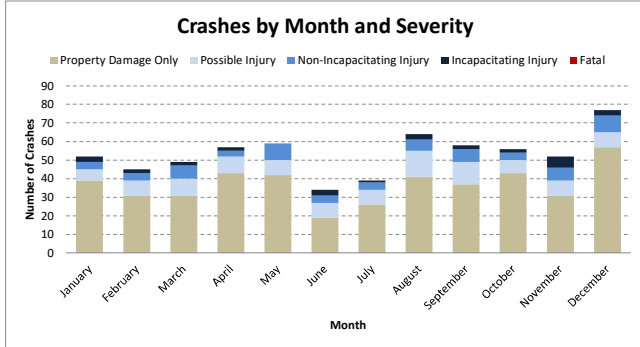
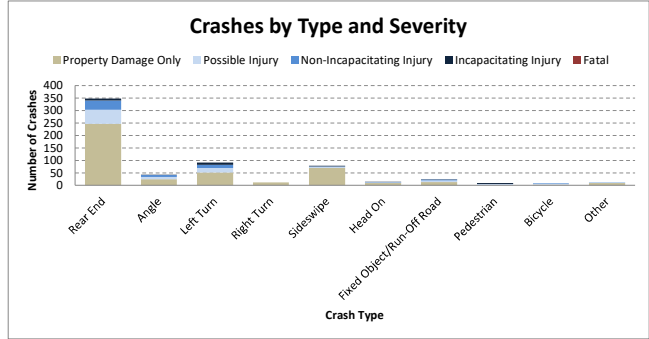
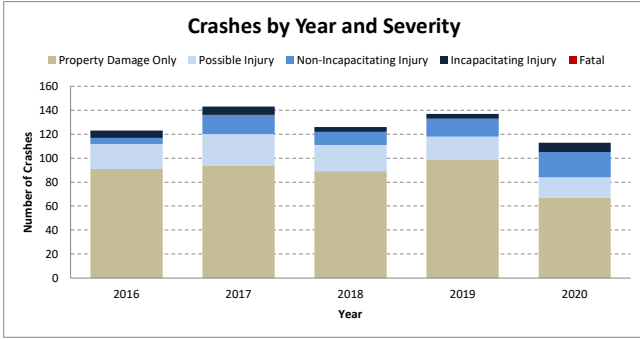
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## Appendix B – Crash Data

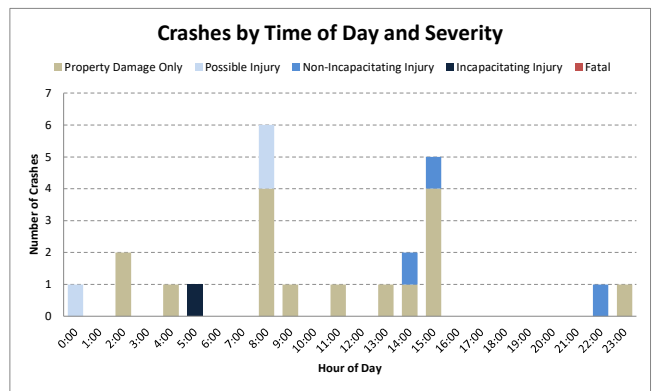
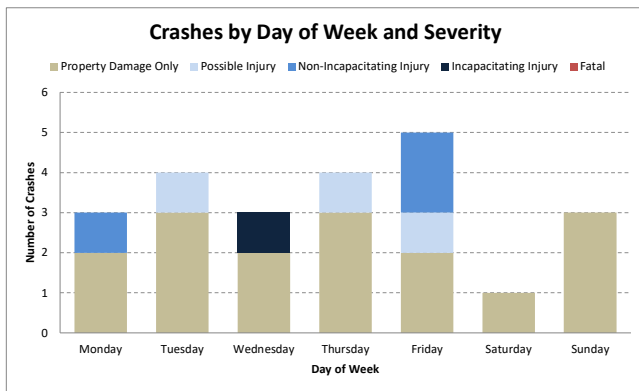
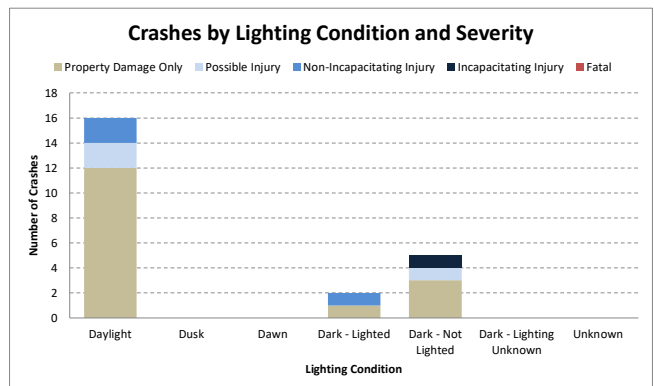
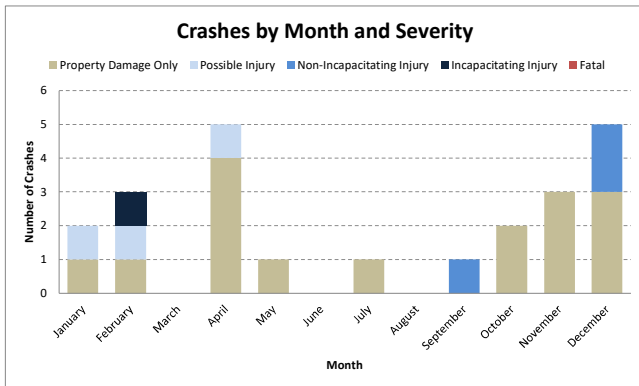
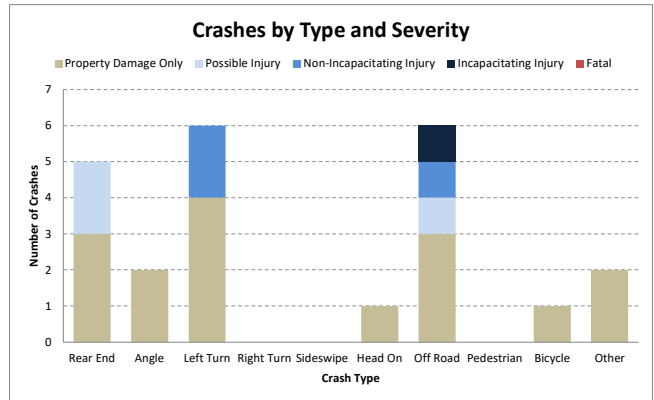
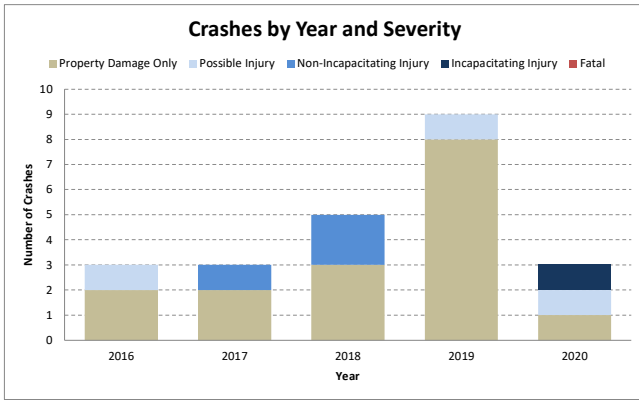
## CRASH ANALYSIS - Malabar Road from St. Johns Heritage Parkway to Minton Road



**CRASH ANALYSIS - Malabar Road from St. Johns Heritage Parkway to Minton Road**

	Analysis Year					Severity					Total	Average	Percent	
	2016	2017	2018	2019	2020	Property Damage Only	Possible Injury	Non-Incapacitating Injury	Incapacitating Injury	Fatal				
Type of Crash	Rear End	81	77	57	75	58	247	56	37	8	0	348	69.6	54.2%
	Angle	4	9	11	10	9	25	9	7	2	0	43	8.6	6.7%
	Left Turn	13	23	20	19	16	51	18	13	9	0	91	18.2	14.2%
	Right Turn	0	1	3	2	6	11	1	0	0	0	12	2.4	1.9%
	Sideswipe	16	15	17	16	15	70	5	1	3	0	79	15.8	12.3%
	Head On	2	3	4	3	3	9	3	1	2	0	15	3.0	2.3%
	Fixed Object/Run-Off Road	3	7	5	7	3	14	5	4	2	0	25	5.0	3.9%
	Pedestrian	2	3	2	2	0	1	5	0	3	0	9	1.8	1.4%
	Bicycle	0	2	3	2	1	3	2	3	0	0	8	1.6	1.2%
	Other	2	3	4	1	2	9	1	2	0	0	12	2.4	1.9%
	<b>Total Crashes</b>	<b>123</b>	<b>143</b>	<b>126</b>	<b>137</b>	<b>113</b>	<b>440</b>	<b>105</b>	<b>68</b>	<b>29</b>	<b>0</b>	<b>642</b>	<b>128.4</b>	<b>100.0%</b>
Crash Severity	Property Damage Only	91	94	89	99	67						440	88.0	68.5%
	Possible Injury	21	26	22	19	17						105	21.0	16.4%
	Non-Incapacitating Injury	5	16	11	15	21						68	13.6	10.6%
	Incapacitating Injury	6	7	4	4	8						29	5.8	4.5%
	Fatal	0	0	0	0	0						0	0.0	0.0%
Light Conditions	Daylight	99	112	93	104	95	346	81	56	20	0	503	100.6	78.3%
	Dusk	1	5	4	5	2	10	4	3	0	0	17	3.4	2.6%
	Dawn	0	1	2	1	1	4	1	0	0	0	5	1.0	0.8%
	Dark - Lighted	19	14	12	14	12	51	9	6	5	0	71	14.2	11.1%
	Dark - Not Lighted	4	9	12	11	3	22	10	3	4	0	39	7.8	6.1%
	Dark - Lighting Unknown	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0%
	Other/Unknown	0	2	3	2	0	7	0	0	0	0	7	1.4	1.1%
	<b>Total</b>	<b>106</b>	<b>121</b>	<b>110</b>	<b>114</b>	<b>93</b>	<b>380</b>	<b>81</b>	<b>60</b>	<b>23</b>	<b>0</b>	<b>544</b>	<b>108.8</b>	<b>84.7%</b>
Road Surface Condition	Dry	106	121	110	114	93	380	81	60	23	0	544	108.8	84.7%
	Wet	16	22	16	23	20	59	24	8	6	0	97	19.4	15.1%
	Other	1	0	0	0	0	1	0	0	0	0	1	0.2	0.2%
Month	January	8	10	11	11	12	39	6	4	3	0	52	10.4	8.1%
	February	6	12	6	13	8	31	8	4	2	0	45	9.0	7.0%
	March	9	9	9	12	10	31	9	7	2	0	49	9.8	7.6%
	April	11	11	18	9	8	43	9	3	2	0	57	11.4	8.9%
	May	14	15	11	10	9	42	8	9	0	0	59	11.8	9.2%
	June	4	14	6	8	2	19	8	4	3	0	34	6.8	5.3%
	July	13	7	5	5	9	26	8	4	1	0	39	7.8	6.1%
	August	17	11	10	15	11	41	14	6	3	0	64	12.8	10.0%
	September	11	14	10	12	11	37	12	7	2	0	58	11.6	9.0%
	October	10	17	11	9	9	43	7	4	2	0	56	11.2	8.7%
	November	8	13	12	10	9	31	8	7	6	0	52	10.4	8.1%
	December	12	10	17	23	15	57	8	9	3	0	77	15.4	12.0%
Day of Week	Monday	17	20	22	28	19	69	18	13	6	0	106	21.2	16.5%
	Tuesday	28	21	15	18	16	69	14	11	4	0	98	19.6	15.3%
	Wednesday	23	29	23	20	24	87	18	10	4	0	119	23.8	18.5%
	Thursday	9	19	17	25	15	62	12	6	5	0	85	17.0	13.2%
	Friday	20	23	19	15	19	65	15	13	3	0	96	19.2	15.0%
	Saturday	13	16	14	18	10	45	13	9	4	0	71	14.2	11.1%
	Sunday	13	15	16	13	10	43	15	6	3	0	67	13.4	10.4%
	<b>Total</b>	<b>170</b>	<b>197</b>	<b>170</b>	<b>200</b>	<b>160</b>	<b>640</b>	<b>160</b>	<b>100</b>	<b>40</b>	<b>0</b>	<b>900</b>	<b>180.0</b>	<b>142.9%</b>
Hour of Day	0:00	0	0	0	1	0	0	1	0	0	0	1	0.2	0.2%
	1:00	1	0	0	1	0	1	1	0	0	0	2	0.4	0.3%
	2:00	0	0	2	2	0	4	0	0	0	0	4	0.8	0.6%
	3:00	0	1	1	0	0	2	0	0	0	0	2	0.4	0.3%
	4:00	0	1	1	1	0	3	0	0	0	0	3	0.6	0.5%
	5:00	1	0	2	1	1	2	1	0	2	0	5	1.0	0.8%
	6:00	2	2	3	2	2	7	2	1	1	0	11	2.2	1.7%
	7:00	4	9	6	2	7	13	8	6	1	0	28	5.6	4.4%
	8:00	11	13	8	9	3	36	7	1	0	0	44	8.8	6.9%
	9:00	3	5	7	4	1	17	0	1	2	0	20	4.0	3.1%
	10:00	3	9	6	8	7	25	2	4	2	0	33	6.6	5.1%
	11:00	15	5	3	10	4	25	8	4	0	0	37	7.4	5.8%
	12:00	9	12	2	4	7	21	4	4	5	0	34	6.8	5.3%
	13:00	6	6	10	6	4	23	6	1	2	0	32	6.4	5.0%
	14:00	12	6	9	8	13	34	7	5	2	0	48	9.6	7.5%
	15:00	12	15	17	16	20	53	12	12	3	0	80	16.0	12.5%
	16:00	10	17	8	14	16	45	9	10	1	0	65	13.0	10.1%
	17:00	9	16	11	16	12	45	9	8	2	0	64	12.8	10.0%
	18:00	4	5	9	12	7	21	10	5	1	0	37	7.4	5.8%
	19:00	4	5	6	8	4	18	6	2	1	0	27	5.4	4.2%
	20:00	7	3	2	8	3	18	3	0	2	0	23	4.6	3.6%
	21:00	6	6	7	2	1	15	6	0	1	0	22	4.4	3.4%
	22:00	2	6	3	1	0	7	3	1	1	0	12	2.4	1.9%
	23:00	2	1	3	1	1	5	0	3	0	0	8	1.6	1.2%
Time Period	12AM-6AM	2	2	6	6	1	12	3	0	2	0	17	3.4	2.6%
	6AM-12PM	38	43	33	35	24	123	27	17	6	0	173	34.6	26.9%
	12PM-6PM	58	72	57	64	72	221	47	40	15	0	323	64.6	50.3%
	6PM-12AM	25	26	30	32	16	84	28	11	6	0	129	25.8	20.1%
Alcohol & Drugs	None	120	141	121	132	110	435	98	66	25	0	624	124.8	97.2%
	Alcohol Involved	3	1	5	4	0	4	5	1	3	0	13	2.6	2.0%
	Drugs Involved	0	1	0	1	1	1	1	0	1	0	3	0.6	0.5%
	Alcohol and Drugs	0	0	0	0	2	0	1	1	0	0	2	0.4	0.3%
	Undetermined	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0%
Age of Driver 1 (Typically Driver at Fault)	19 and Under	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0%
	20-24	1	1	0	0	0	2	0	0	0	0	2	0.4	0.3%
	25-29	1	0	0	0	0	1	0	0	0	0	1	0.2	0.2%
	30-34	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0%
	35-39	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0%
	40-44	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0%
	45-49	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0%
	50-54	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0%
	55-59	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0%
	60-64	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0%
	65-69	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0%
	70-74	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0%
	75-79	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0%
	80-84	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0%
	85 and Over	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0%
	Unknown	0	1	0	0	0	0	0	0	0	0	1	0.2	0.2%

## CRASH ANALYSIS - Malabar Road at St. Johns Heritage Parkway

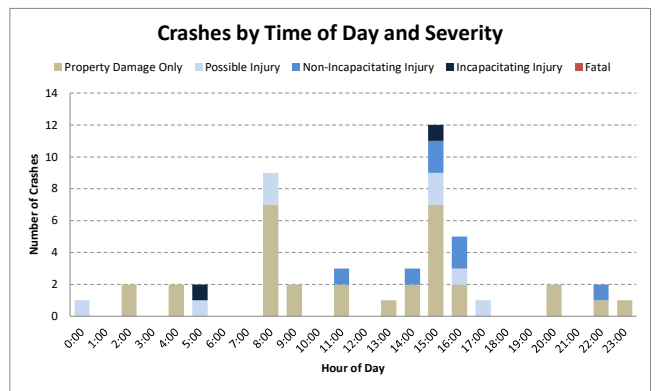
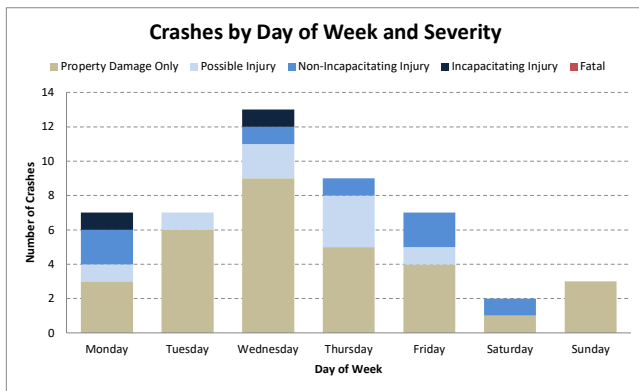
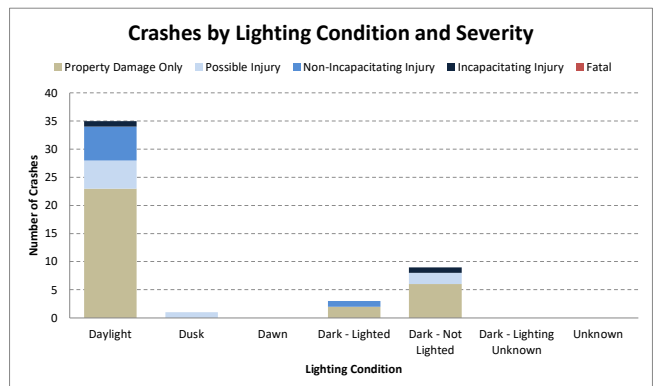
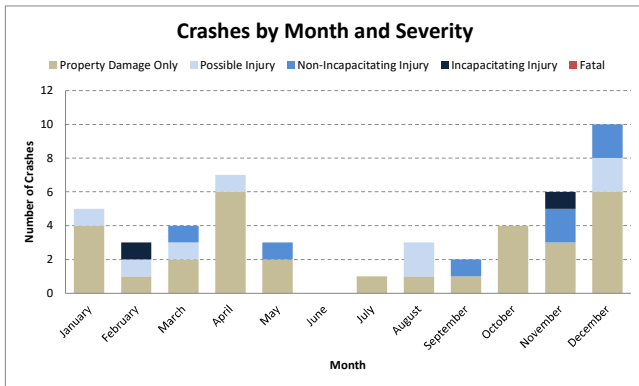
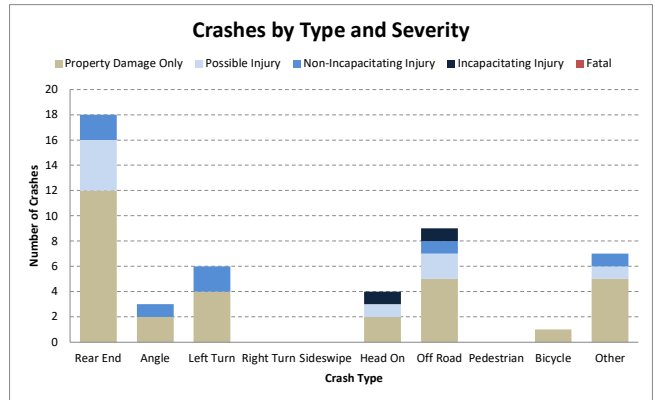
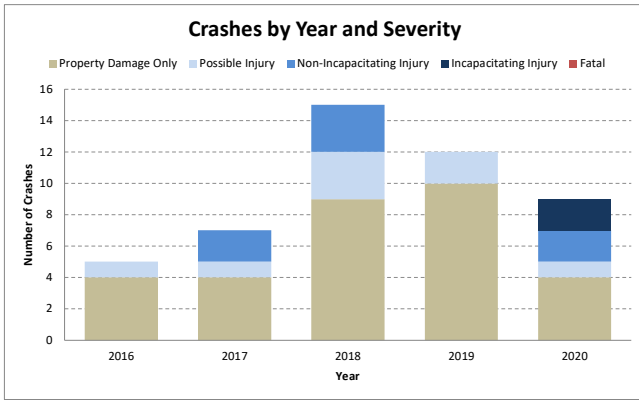


**CRASH ANALYSIS - Malabar Road at St. Johns Heritage Parkway**

		Analysis Year					Severity					Total	Average	Percent
		2016	2017	2018	2019	2020	Property Damage Only	Possible Injury	Non-Incapacitating Injury	Incapacitating Injury	Fatal			
Type of Crash	Rear End	2	0	1	1	1	3	2	0	0	0	5	1.00	21.7%
	Angle	0	0	1	1	0	2	0	0	0	0	2	0.40	8.7%
	Left Turn	0	1	2	3	0	4	0	2	0	0	6	1.20	26.1%
	Right Turn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Head On	0	0	0	0	1	1	0	0	0	0	1	0.20	4.3%
	Off Road	0	1	0	4	1	3	1	1	1	0	6	1.20	26.1%
	Pedestrian	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Bicycle	0	1	0	0	0	1	0	0	0	0	1	0.20	4.3%
	Other	1	0	1	0	0	2	0	0	0	0	2	0.40	8.7%
	<b>Total Crashes</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>9</b>	<b>3</b>	<b>16</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>23</b>	<b>5.00</b>	<b>100.0%</b>
Crash Severity	Property Damage Only	2	2	3	8	1					16	3.20	69.6%	
	Possible Injury	1	0	0	1	1					3	0.60	13.0%	
	Non-Incapacitating Injury	0	1	2	0	0					3	0.60	13.0%	
	Incapacitating Injury	0	0	0	0	1					1	0.20	4.3%	
	Fatal	0	0	0	0	0					0	0.00	0.0%	
Light Conditions	Daylight	3	2	4	5	2	12	2	2	0	0	16	3.20	69.6%
	Dusk	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Dawn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Dark - Lighted	0	1	0	1	0	1	0	1	0	0	2	0.40	8.7%
	Dark - Not Lighted	0	0	1	3	1	3	1	0	1	0	5	1.00	21.7%
	Dark - Lighting Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Surface Condition	Dry	2	3	5	5	3	12	2	3	1	0	18	3.60	78.3%
	Wet	0	0	0	4	0	3	1	0	0	0	4	0.80	17.4%
	Other	1	0	0	0	0	1	0	0	0	0	1	0.20	4.3%
Month	January	0	0	0	1	1	1	1	0	0	0	2	0.40	8.7%
	February	0	0	0	1	2	1	1	0	1	0	3	0.60	13.0%
	March	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	April	1	0	2	2	0	4	1	0	0	0	5	1.00	21.7%
	May	0	0	0	1	0	1	0	0	0	0	1	0.20	4.3%
	June	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	July	1	0	0	0	0	1	0	0	0	0	1	0.20	4.3%
	August	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	September	0	0	1	0	0	0	0	1	0	0	1	0.20	4.3%
	October	1	0	0	1	0	2	0	0	0	0	2	0.40	8.7%
	November	0	1	1	1	0	3	0	0	0	0	3	0.60	13.0%
	December	0	2	1	2	0	3	0	2	0	0	5	1.00	21.7%
Day of Week	Monday	0	0	1	1	1	2	0	1	0	0	3	0.60	13.0%
	Tuesday	2	1	1	0	0	3	1	0	0	0	4	0.80	17.4%
	Wednesday	0	0	0	2	1	2	0	0	1	0	3	0.60	13.0%
	Thursday	0	0	1	3	0	3	1	0	0	0	4	0.80	17.4%
	Friday	1	2	1	0	1	2	1	2	0	0	5	1.00	21.7%
	Saturday	0	0	0	1	0	1	0	0	0	0	1	0.20	4.3%
	Sunday	0	0	1	2	0	3	0	0	0	0	3	0.60	13.0%
	Hour of Day	0:00	0	0	0	1	0	0	1	0	0	0	1	0.20
1:00		0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
2:00		0	0	0	2	0	2	0	0	0	0	2	0.40	8.7%
3:00		0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
4:00		0	0	0	1	0	1	0	0	0	0	1	0.20	4.3%
5:00		0	0	0	0	1	0	0	0	1	0	1	0.20	4.3%
6:00		0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
7:00		0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
8:00		2	0	0	3	1	4	2	0	0	0	6	1.20	26.1%
9:00		0	0	1	0	0	1	0	0	0	0	1	0.20	4.3%
10:00		0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
11:00		0	0	1	0	0	1	0	0	0	0	1	0.20	4.3%
12:00		0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
13:00		0	0	0	1	0	1	0	0	0	0	1	0.20	4.3%
14:00		1	0	1	0	0	1	0	1	0	0	2	0.40	8.7%
15:00		0	2	1	1	1	4	0	1	0	0	5	1.00	21.7%
16:00		0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
17:00		0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
18:00		0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
19:00		0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
20:00		0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
21:00		0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
22:00		0	1	0	0	0	0	0	1	0	0	1	0.20	4.3%
23:00	0	0	1	0	0	1	0	0	0	0	1	0.20	4.3%	
Time Period	12AM-6AM	0	0	0	4	1	3	1	0	1	0	5	1.00	21.7%
	6AM-12PM	2	0	2	3	1	6	2	0	0	8	1.60	34.8%	
	12PM-6PM	1	2	2	2	1	6	0	2	0	8	1.60	34.8%	
	6PM-12AM	0	1	1	0	0	1	0	1	0	2	0.40	8.7%	
Alcohol & Drugs	None	3	3	5	7	2	15	2	3	0	0	20	4.00	87.0%
	Alcohol Involved	0	0	0	2	0	1	1	0	0	0	2	0.40	8.7%
	Drugs Involved	0	0	0	0	1	0	0	0	1	0	1	0.20	4.3%
	Alcohol and Drugs	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Distraction Related	Y	3	1	0	2	0	4	2	0	0	0	6	1.20	26.1%
	N	0	2	5	7	3	12	1	3	1	0	17	3.40	73.9%



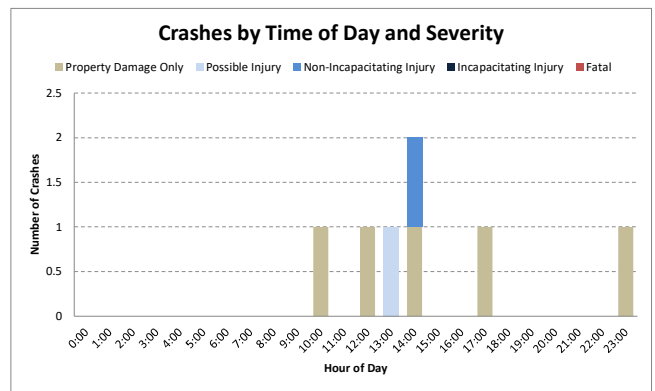
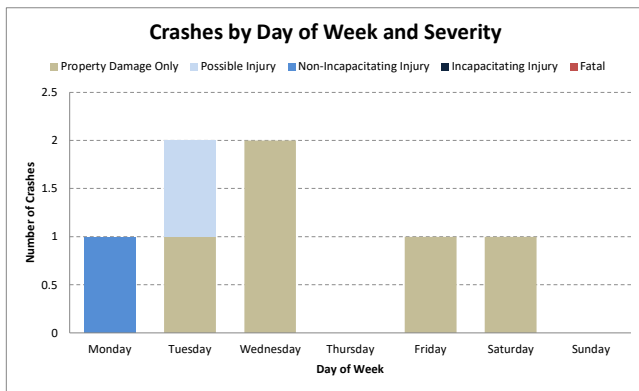
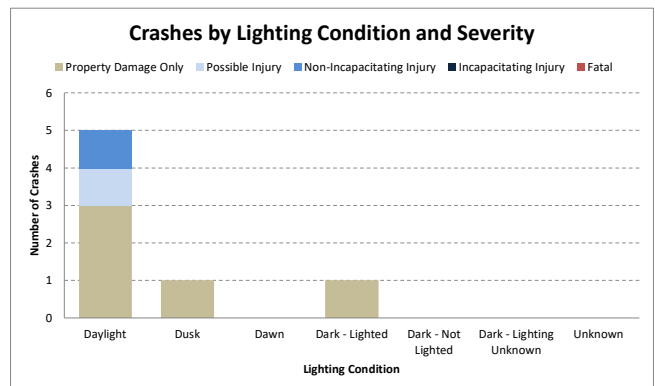
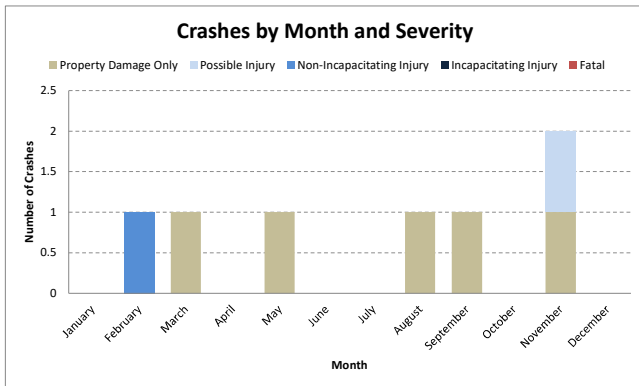
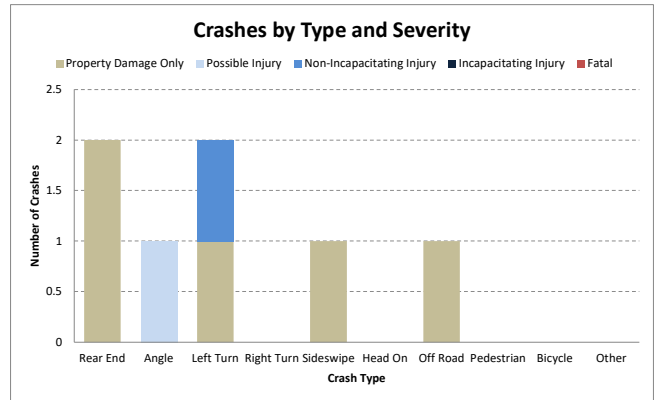
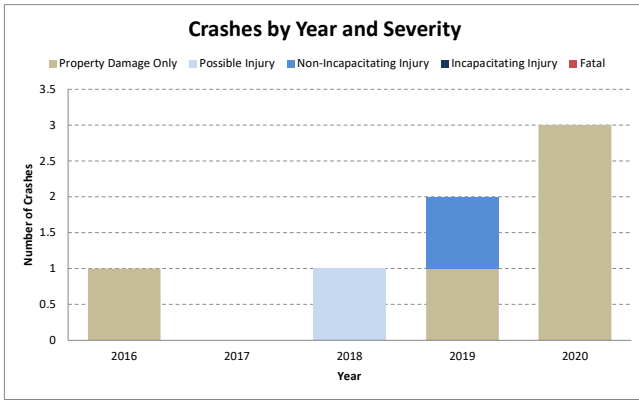
**CRASH ANALYSIS - Malabar Road from St. Johns Heritage Parkway to Krassner Drive**



**CRASH ANALYSIS - Malabar Road from St. Johns Heritage Parkway to Krassner Drive**

		Analysis Year					Severity					Total	Average	Percent
		2016	2017	2018	2019	2020	Property Damage Only	Possible Injury	Non-Incapacitating Injury	Incapacitating Injury	Fatal			
Type of Crash	Rear End	3	2	5	3	5	12	4	2	0	0	18	3.60	37.5%
	Angle	0	1	1	1	0	2	0	1	0	0	3	0.60	6.3%
	Left Turn	0	1	2	3	0	4	0	2	0	0	6	1.20	12.5%
	Right Turn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Head On	0	0	2	0	2	2	1	0	1	0	4	0.80	8.3%
	Off Road	0	1	2	5	1	5	2	1	1	0	9	1.80	18.8%
	Pedestrian	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Bicycle	0	1	0	0	0	1	0	0	0	0	1	0.20	2.1%
	Other	2	1	3	0	1	5	1	1	0	0	7	1.40	14.6%
	<b>Total Crashes</b>	<b>5</b>	<b>7</b>	<b>15</b>	<b>12</b>	<b>9</b>	<b>31</b>	<b>8</b>	<b>7</b>	<b>2</b>	<b>0</b>	<b>48</b>	<b>9.75</b>	<b>100.0%</b>
Crash Severity	Property Damage Only	4	4	9	10	4						31	6.20	64.6%
	Possible Injury	1	1	3	2	1						8	1.60	16.7%
	Non-Incapacitating Injury	0	2	3	0	2						7	1.40	14.6%
	Incapacitating Injury	0	0	0	0	2						2	0.40	4.2%
	Fatal	0	0	0	0	0						0	0.00	0.0%
Light Conditions	Daylight	4	5	10	8	8	23	5	6	1	0	35	7.00	72.9%
	Dusk	0	1	0	0	0	0	1	0	0	0	1	0.20	2.1%
	Dawn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Dark - Lighted	1	1	0	1	0	2	0	1	0	0	3	0.60	6.3%
	Dark - Not Lighted	0	0	5	3	1	6	2	0	1	0	9	1.80	18.8%
	Dark - Lighting Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Surface Condition	Dry	4	7	14	8	6	23	7	7	2	0	39	7.80	81.3%
	Wet	0	0	1	4	3	7	1	0	0	0	8	1.60	16.7%
	Other	1	0	0	0	0	1	0	0	0	0	1	0.20	2.1%
Month	January	0	0	0	1	4	4	1	0	0	0	5	1.00	10.4%
	February	0	0	0	1	2	1	1	0	1	0	3	0.60	6.3%
	March	2	1	0	1	0	2	1	1	0	0	4	0.80	8.3%
	April	1	0	4	2	0	6	1	0	0	0	7	1.40	14.6%
	May	0	0	1	1	1	2	0	1	0	0	3	0.60	6.3%
	June	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	July	1	0	0	0	0	1	0	0	0	0	1	0.20	2.1%
	August	0	1	2	0	0	1	2	0	0	0	3	0.60	6.3%
	September	0	0	1	1	0	1	0	1	0	0	2	0.40	4.2%
	October	1	0	2	1	0	4	0	0	0	0	4	0.80	8.3%
	November	0	1	2	1	2	3	0	2	1	0	6	1.20	12.5%
	December	0	4	3	3	0	6	2	2	0	0	10	2.00	20.8%
	Day of Week	Monday	0	0	3	1	3	3	1	2	1	0	7	1.40
Tuesday		3	1	3	0	0	6	1	0	0	0	7	1.40	14.6%
Wednesday		1	2	3	3	4	9	2	1	1	0	13	2.60	27.1%
Thursday		0	2	2	5	0	5	3	1	0	0	9	1.80	18.8%
Friday		1	2	3	0	1	4	1	2	0	0	7	1.40	14.6%
Saturday		0	0	0	1	1	1	0	1	0	0	2	0.40	4.2%
Sunday		0	0	1	2	0	3	0	0	0	0	3	0.60	6.3%
0:00		0	0	0	1	0	0	1	0	0	0	1	0.20	2.1%
1:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
2:00	0	0	0	2	0	2	0	0	0	0	2	0.40	4.2%	
3:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
4:00	0	0	1	1	0	2	0	0	0	0	2	0.40	4.2%	
5:00	0	0	1	0	1	0	1	0	1	0	2	0.40	4.2%	
6:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
7:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
8:00	2	1	1	4	1	7	2	0	0	0	9	1.80	18.8%	
9:00	0	0	2	0	0	2	0	0	0	0	2	0.40	4.2%	
10:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
11:00	1	0	1	0	1	2	0	1	0	0	3	0.60	6.3%	
12:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
13:00	0	0	0	1	0	1	0	0	0	0	1	0.20	2.1%	
14:00	1	0	2	0	0	2	0	1	0	0	3	0.60	6.3%	
15:00	0	3	3	3	3	7	2	2	1	0	12	2.40	25.0%	
16:00	0	1	1	0	3	2	1	2	0	0	5	1.00	10.4%	
17:00	0	1	0	0	0	0	1	0	0	0	1	0.20	2.1%	
18:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
19:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
20:00	1	0	1	0	0	2	0	0	0	0	2	0.40	4.2%	
21:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
22:00	0	1	1	0	0	1	0	1	0	0	2	0.40	4.2%	
23:00	0	0	1	0	0	1	0	0	0	0	1	0.20	2.1%	
Time Period	12AM-6AM	0	0	2	4	1	4	2	0	1	0	7	1.40	14.6%
	6AM-12PM	3	1	4	4	2	11	2	1	0	14	2.80	29.2%	
	12PM-6PM	1	5	6	4	6	12	4	5	1	0	22	4.40	45.8%
	6PM-12AM	1	1	3	0	0	4	0	1	0	0	5	1.00	10.4%
Alcohol & Drugs	None	5	7	15	10	8	30	7	7	1	0	45	9.00	93.8%
	Alcohol Involved	0	0	0	2	0	1	1	0	0	0	2	0.40	4.2%
	Drugs Involved	0	0	0	0	1	0	0	0	1	0	1	0.20	2.1%
	Alcohol and Drugs	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Distraction Related	Y	3	1	1	2	0	5	2	0	0	0	7	1.40	14.6%
	N	2	6	14	10	9	26	6	7	2	0	41	8.20	85.4%

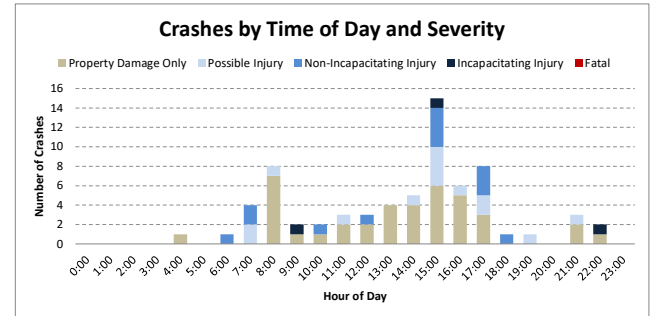
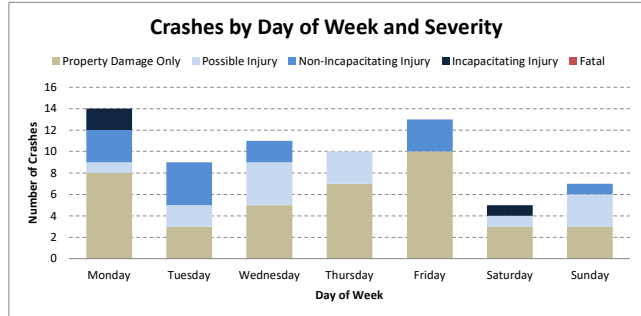
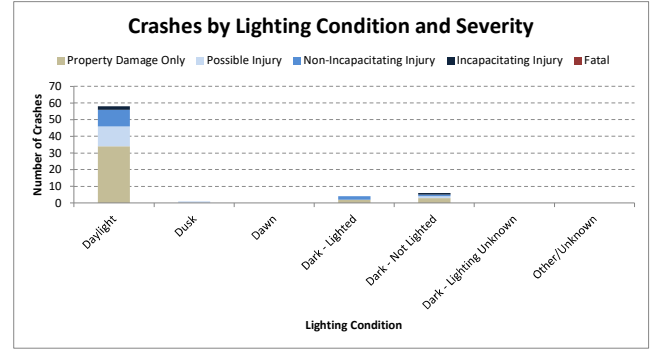
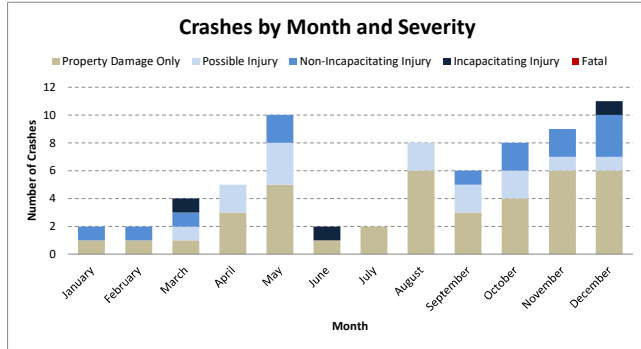
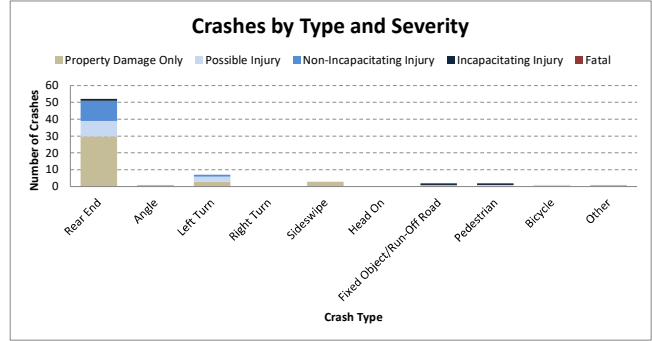
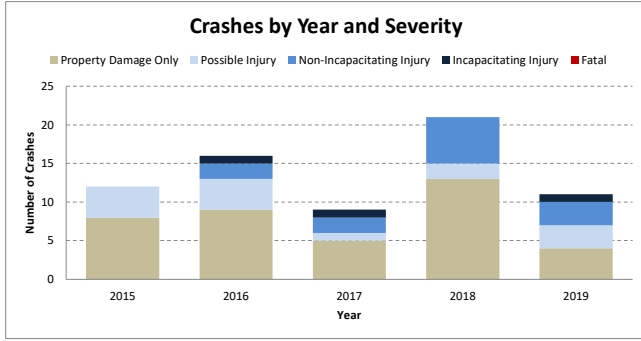
**CRASH ANALYSIS - Malabar Road at Krassner Drive/Bending Branch Lane**



**CRASH ANALYSIS - Malabar Road at Krassner Drive/Bending Branch Lane**

		Analysis Year					Severity					Total	Average	Percent
		2016	2017	2018	2019	2020	Property Damage Only	Possible Injury	Non-Incapacitating Injury	Incapacitating Injury	Fatal			
Type of Crash	Rear End	0	0	0	1	1	2	0	0	0	0	2	0.40	28.6%
	Angle	0	0	1	0	0	0	1	0	0	0	1	0.20	14.3%
	Left Turn	0	0	0	1	1	1	0	1	0	0	2	0.40	28.6%
	Right Turn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Sideswipe	1	0	0	0	0	1	0	0	0	0	1	0.20	14.3%
	Head On	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Off Road	0	0	0	0	1	1	0	0	0	0	1	0.20	14.3%
	Pedestrian	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Bicycle	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Other	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	<b>Total Crashes</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>1.00</b>	<b>100.0%</b>
Crash Severity	Property Damage Only	1	0	0	1	3						5	1.00	71.4%
	Possible Injury	0	0	1	0	0						1	0.20	14.3%
	Non-Incapacitating Injury	0	0	0	1	0						1	0.20	14.3%
	Incapacitating Injury	0	0	0	0	0						0	0.00	0.0%
	Fatal	0	0	0	0	0						0	0.00	0.0%
Light Conditions	Daylight	0	0	1	2	2	3	1	1	0	0	5	1.00	71.4%
	Dusk	1	0	0	0	0	1	0	0	0	0	1	0.20	14.3%
	Dawn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Dark - Lighted	0	0	0	0	1	1	0	0	0	0	1	0.20	14.3%
	Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Dark - Lighting Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Surface Condition	Dry	1	0	1	2	3	5	1	1	0	0	7	1.40	100.0%
	Wet	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Other	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Month	January	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	February	0	0	0	1	0	0	0	1	0	0	1	0.20	14.3%
	March	0	0	0	0	1	1	0	0	0	0	1	0.20	14.3%
	April	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	May	0	0	0	0	1	1	0	0	0	0	1	0.20	14.3%
	June	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	July	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	August	0	0	0	0	1	1	0	0	0	0	1	0.20	14.3%
	September	0	0	0	1	0	1	0	0	0	0	1	0.20	14.3%
	October	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	November	1	0	1	0	0	1	1	0	0	0	2	0.40	28.6%
	December	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Day of Week	Monday	0	0	0	1	0	0	0	1	0	0	1	0.20	14.3%
	Tuesday	0	0	1	0	1	1	1	0	0	0	2	0.40	28.6%
	Wednesday	1	0	0	0	1	2	0	0	0	0	2	0.40	28.6%
	Thursday	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Friday	0	0	0	0	1	1	0	0	0	0	1	0.20	14.3%
	Saturday	0	0	0	1	0	1	0	0	0	0	1	0.20	14.3%
	Sunday	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Hour of Day	0:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	1:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	2:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	3:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	4:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	5:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	6:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	7:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	8:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	9:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	10:00	0	0	0	1	0	1	0	0	0	0	1	0.20	14.3%
	11:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	12:00	0	0	0	0	1	1	0	0	0	0	1	0.20	14.3%
	13:00	0	0	1	0	0	0	1	0	0	0	1	0.20	14.3%
	14:00	0	0	0	1	1	1	0	1	0	0	2	0.40	28.6%
	15:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	16:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	17:00	1	0	0	0	0	1	0	0	0	0	1	0.20	14.3%
	18:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	19:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	20:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	21:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	22:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
23:00	0	0	0	0	1	1	0	0	0	0	1	0.20	14.3%	
Time Period	12AM-5AM	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	6AM-12PM	0	0	0	1	0	1	0	0	0	0	1	0.20	14.3%
	12PM-6PM	1	0	1	1	2	3	1	1	0	0	5	1.00	71.4%
	6PM-12AM	0	0	0	0	1	1	0	0	0	0	1	0.20	14.3%
	None	1	0	1	2	3	5	1	1	0	0	7	1.40	100.0%
Alcohol & Drugs	Alcohol Involved	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Drugs Involved	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Alcohol and Drugs	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Distraction Related	Y	0	0	0	0	1	1	0	0	0	0	1	0.20	14.3%
	N	1	0	1	2	2	4	1	1	0	0	6	1.20	85.7%

## CRASH ANALYSIS - Malabar Road from Krassner Drive to Jupiter Boulevard

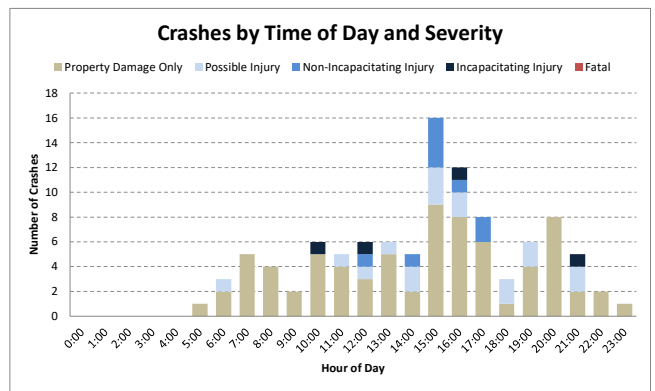
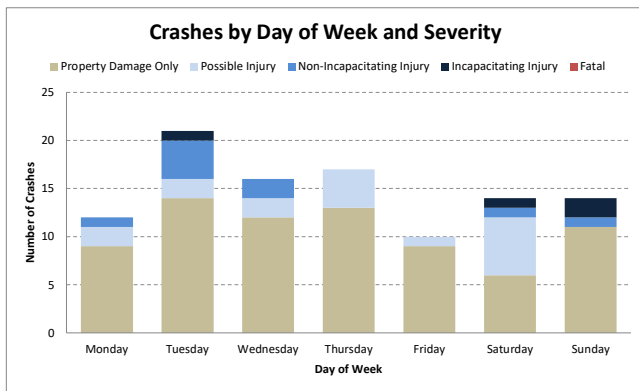
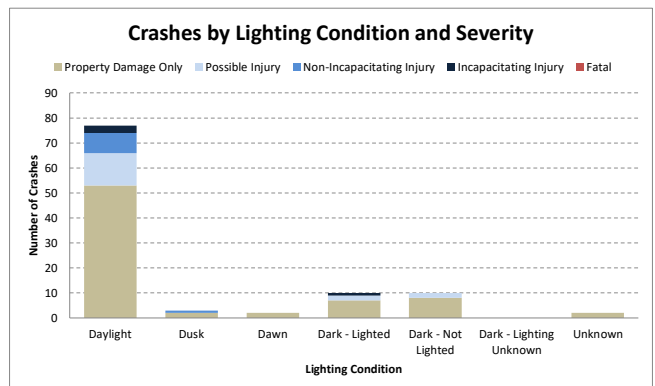
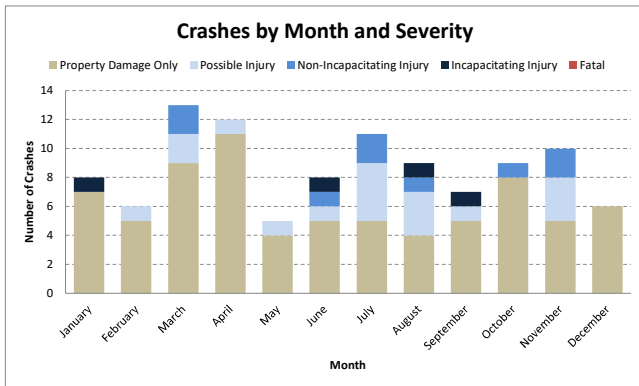
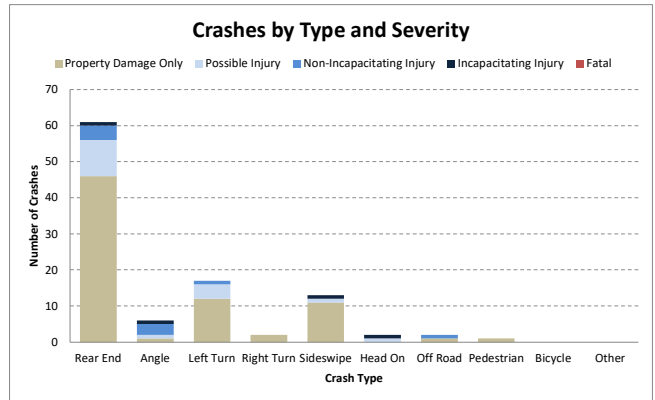
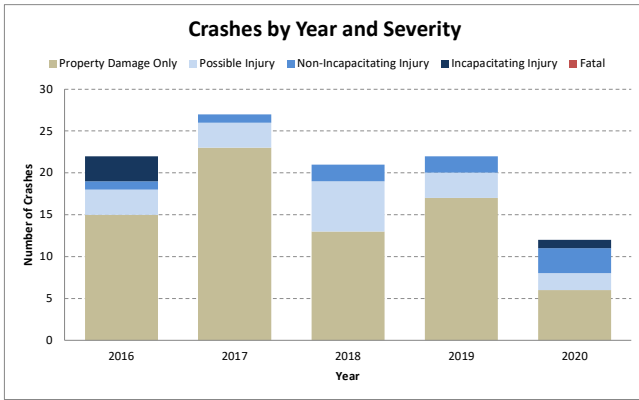




**CRASH ANALYSIS - Malabar Road from Krassner Drive to Jupiter Boulevard**

		Analysis Year					Severity					Total	Average	Percent
		2015	2016	2017	2018	2019	Property Damage Only	Possible Injury	Non-Incapacitating Injury	Incapacitating Injury	Fatal			
Type of Crash	Rear End	9	10	8	17	8	30	9	12	1	0	52	10.40	75.4%
	Angle	0	0	0	1	0	1	0	0	0	0	1	0.20	1.4%
	Left Turn	1	3	0	1	2	3	3	1	0	0	7	1.40	10.1%
	Right Turn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Sideswipe	1	1	0	1	0	3	0	0	0	0	3	0.60	4.3%
	Head On	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Fixed Object/Run-Off Road	0	1	1	0	0	1	0	0	1	0	2	0.40	2.9%
	Pedestrian	1	1	0	0	0	0	1	0	1	0	2	0.40	2.9%
	Bicycle	0	0	0	1	0	0	1	0	0	0	1	0.20	1.4%
	Other	0	0	0	0	1	1	0	0	0	0	1	0.20	1.4%
	<b>Total Crashes</b>	<b>12</b>	<b>16</b>	<b>9</b>	<b>21</b>	<b>11</b>	<b>39</b>	<b>14</b>	<b>13</b>	<b>3</b>	<b>69</b>	<b>13.80</b>	<b>100.0%</b>	
Crash Severity	Property Damage Only	8	9	5	13	4	0	0	0	0	39	7.80	56.5%	
	Possible Injury	4	4	1	2	3	0	0	0	0	14	2.80	20.3%	
	Non-Incapacitating Injury	0	2	2	6	3	0	0	0	0	13	2.60	18.8%	
	Incapacitating Injury	0	1	1	0	1	0	0	0	0	3	0.60	4.3%	
	Fatal	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
Light Conditions	Daylight	10	11	8	19	10	34	12	10	2	58	11.60	84.1%	
	Dusk	0	1	0	0	0	0	0	0	0	1	0.20	1.4%	
	Dawn	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	Dark - Lighted	1	1	0	1	1	2	0	2	0	4	0.80	5.8%	
	Dark - Not Lighted	1	3	1	1	0	3	1	1	1	6	1.20	8.7%	
	Dark - Lighting Unknown	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	Other/Unknown	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
Road Surface Condition	Dry	12	16	8	17	10	37	14	9	3	63	12.60	91.3%	
	Wet	0	0	1	4	1	2	0	4	0	6	1.20	8.7%	
	Other	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
Month	January	0	1	1	0	0	1	0	1	0	2	0.40	2.9%	
	February	0	0	0	2	0	1	0	1	0	2	0.40	2.9%	
	March	1	0	1	1	1	1	1	1	1	4	0.80	5.8%	
	April	1	2	1	1	0	3	2	0	0	5	1.00	7.2%	
	May	1	5	1	3	0	5	3	2	0	10	2.00	14.5%	
	June	0	0	2	0	0	1	0	0	1	2	0.40	2.9%	
	July	0	1	0	1	0	2	0	0	0	2	0.40	2.9%	
	August	2	0	2	3	1	6	2	0	0	8	1.60	11.6%	
	September	2	2	0	0	2	3	2	1	0	6	1.20	8.7%	
	October	2	3	1	1	1	4	2	2	0	8	1.60	11.6%	
	November	2	1	0	4	2	6	1	2	0	9	1.80	13.0%	
	December	1	1	0	5	4	6	1	3	1	11	2.20	15.9%	
Day of Week	Monday	3	1	2	6	2	8	1	3	2	14	2.80	20.3%	
	Tuesday	1	1	2	4	1	3	2	4	0	9	1.80	13.0%	
	Wednesday	2	2	1	3	3	5	4	2	0	11	2.20	15.9%	
	Thursday	2	1	3	1	3	7	3	0	0	10	2.00	14.5%	
	Friday	2	6	1	3	1	10	0	3	0	13	2.60	18.8%	
	Saturday	2	3	0	0	0	3	1	0	1	5	1.00	7.2%	
	Sunday	0	2	0	4	1	3	3	1	0	7	1.40	10.1%	
		0:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	1:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	2:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	3:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	4:00	0	1	0	0	0	1	0	0	0	1	0.20	1.4%	
	5:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	6:00	0	0	0	1	0	0	0	1	0	1	0.20	1.4%	
	7:00	1	0	0	0	3	0	2	0	0	4	0.80	5.8%	
	8:00	3	0	1	3	1	7	1	0	0	8	1.60	11.6%	
	9:00	0	0	1	1	0	1	0	1	0	2	0.40	2.9%	
	10:00	0	0	0	2	0	1	0	0	0	2	0.40	2.9%	
	11:00	0	2	0	1	0	2	1	0	0	3	0.60	4.3%	
	12:00	0	1	1	1	0	2	0	1	0	3	0.60	4.3%	
	13:00	2	0	0	2	0	4	0	0	0	4	0.80	5.8%	
	14:00	1	1	0	1	2	4	1	0	0	5	1.00	7.2%	
	15:00	2	4	3	3	3	6	4	4	1	15	3.00	21.7%	
	16:00	1	2	1	1	1	5	1	0	0	6	1.20	8.7%	
	17:00	0	1	1	5	1	3	2	3	0	8	1.60	11.6%	
	18:00	0	0	1	0	0	0	0	1	0	1	0.20	1.4%	
	19:00	0	1	0	0	0	0	1	0	0	1	0.20	1.4%	
	20:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	21:00	1	2	0	0	0	2	1	0	0	3	0.60	4.3%	
	22:00	1	1	0	0	0	1	0	1	0	2	0.40	2.9%	
	23:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
Alcohol & Drugs	None	12	16	8	21	10	39	14	12	2	67	13.40	97.1%	
	Alcohol Involved	0	0	1	0	0	0	0	0	1	1	0.20	1.4%	
	Drugs Involved	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	Alcohol and Drugs	0	0	0	0	1	0	0	1	0	1	0.20	1.4%	
	Undetermined	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	

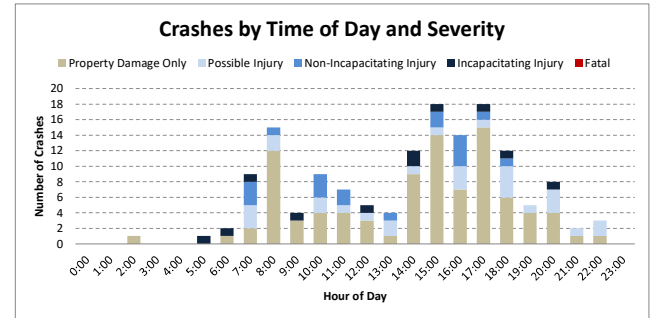
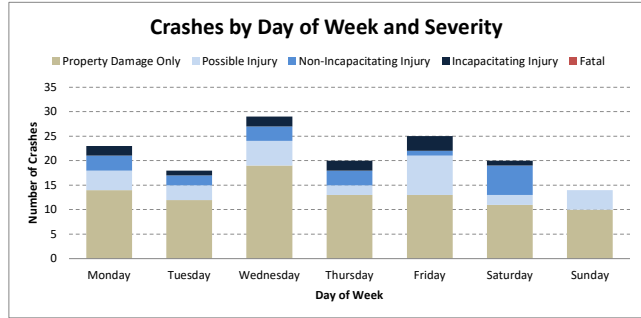
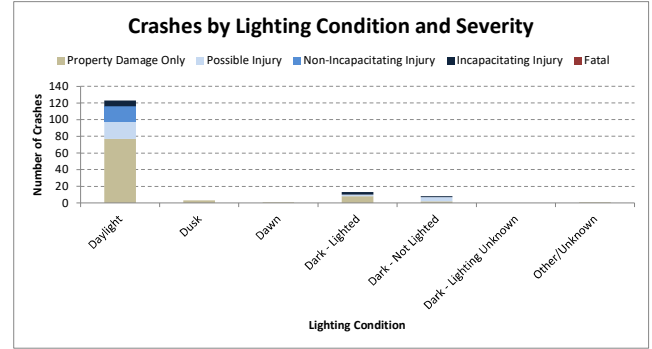
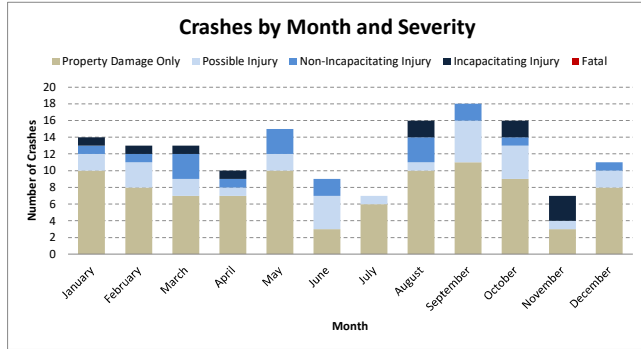
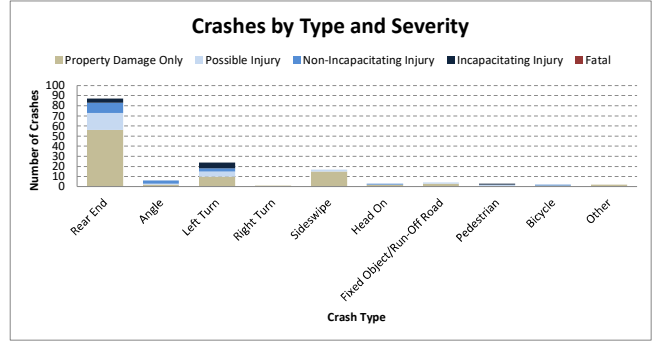
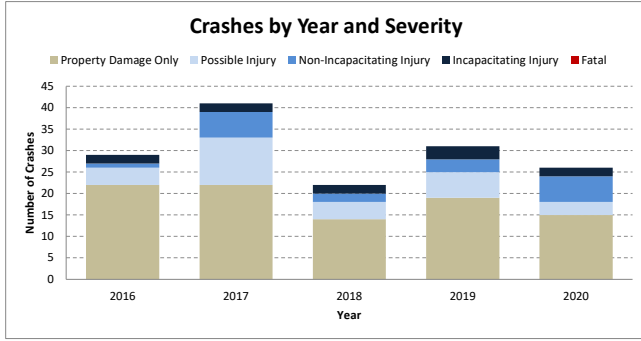
**CRASH ANALYSIS - Malabar Road at Jupiter Boulevard**



**CRASH ANALYSIS - Malabar Road at Jupiter Boulevard**

		Analysis Year					Severity					Total	Average	Percent
		2016	2017	2018	2019	2020	Property Damage Only	Possible Injury	Non-Incapacitating Injury	Incapacitating Injury	Fatal			
Type of Crash	Rear End	13	16	9	13	10	46	10	4	1	0	61	12.20	58.7%
	Angle	2	2	0	1	1	1	1	3	1	0	6	1.20	5.8%
	Left Turn	3	4	7	2	1	12	4	1	0	0	17	3.40	16.3%
	Right Turn	0	1	0	1	0	2	0	0	0	0	2	0.40	1.9%
	Sideswipe	3	3	3	4	0	11	1	0	1	0	13	2.60	12.5%
	Head On	1	0	1	0	0	0	1	0	1	0	2	0.40	1.9%
	Off Road	0	1	1	0	0	1	0	1	0	0	2	0.40	1.9%
	Pedestrian	0	0	0	1	0	1	0	0	0	0	1	0.20	1.0%
	Bicycle	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Other	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	<b>Total Crashes</b>	<b>22</b>	<b>27</b>	<b>21</b>	<b>22</b>	<b>12</b>	<b>74</b>	<b>17</b>	<b>9</b>	<b>4</b>	<b>0</b>	<b>104</b>	<b>23.00</b>	<b>100.0%</b>
Crash Severity	Property Damage Only	15	23	13	17	6					74	14.80	71.2%	
	Possible Injury	3	3	6	3	2					17	3.40	16.3%	
	Non-Incapacitating Injury	1	1	2	2	3					9	1.80	8.7%	
	Incapacitating Injury	3	0	0	0	1					4	0.80	3.8%	
	Fatal	0	0	0	0	0					0	0.00	0.0%	
Light Conditions	Daylight	17	22	13	13	12	53	13	8	3	0	77	15.40	74.0%
	Dusk	0	0	2	1	0	2	0	1	0	0	3	0.60	2.9%
	Dawn	0	1	1	0	0	2	0	0	0	0	2	0.40	1.9%
	Dark - Lighted	5	1	1	3	0	7	2	0	1	0	10	2.00	9.6%
	Dark - Not Lighted	0	2	3	5	0	8	2	0	0	0	10	2.00	9.6%
	Dark - Lighting Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Unknown	0	1	1	0	0	2	0	0	0	0	2	0.40	1.9%
Surface Condition	Dry	16	25	17	15	10	61	13	7	2	0	83	16.60	79.8%
	Wet	6	2	4	7	2	13	4	2	2	0	21	4.20	20.2%
	Other	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
		0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Month	January	2	1	2	2	1	7	0	0	1	0	8	1.60	7.7%
	February	0	2	1	3	0	5	1	0	0	0	6	1.20	5.8%
	March	1	1	4	4	3	9	2	2	0	0	13	2.60	12.5%
	April	3	5	1	1	2	11	1	0	0	0	12	2.40	11.5%
	May	1	2	2	0	0	4	1	0	0	0	5	1.00	4.8%
	June	2	2	0	3	1	5	1	1	1	0	8	1.60	7.7%
	July	3	2	2	2	2	5	4	2	0	0	11	2.20	10.6%
	August	5	0	1	2	1	4	3	1	1	0	9	1.80	8.7%
	September	1	3	2	1	0	5	1	0	1	0	7	1.40	6.7%
	October	2	2	1	2	2	8	0	1	0	0	9	1.80	8.7%
	November	2	5	3	0	0	5	3	2	0	0	10	2.00	9.6%
	December	0	2	2	2	0	6	0	0	0	0	6	1.20	5.8%
Day of Week	Monday	2	1	3	3	3	9	2	1	0	0	12	2.40	11.5%
	Tuesday	5	6	3	3	4	14	2	4	1	0	21	4.20	20.2%
	Wednesday	3	6	3	4	0	12	2	2	0	0	16	3.20	15.4%
	Thursday	3	6	3	4	1	13	4	0	0	0	17	3.40	16.3%
	Friday	4	1	3	2	0	9	1	0	0	0	10	2.00	9.6%
	Saturday	3	5	3	2	1	6	6	1	1	0	14	2.80	13.5%
	Sunday	2	2	3	4	3	11	0	1	2	0	14	2.80	13.5%
		0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Hour of Day	0:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	1:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	2:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	3:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	4:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	5:00	0	0	1	0	0	1	0	0	0	0	1	0.20	1.0%
	6:00	0	1	1	0	1	2	1	0	0	0	3	0.60	2.9%
	7:00	1	3	1	0	0	5	0	0	0	0	5	1.00	4.8%
	8:00	1	3	0	0	0	4	0	0	0	0	4	0.80	3.8%
	9:00	0	1	0	1	0	2	0	0	0	0	2	0.40	1.9%
	10:00	1	1	0	1	3	5	0	0	1	0	6	1.20	5.8%
	11:00	2	1	0	1	1	4	1	0	0	0	5	1.00	4.8%
	12:00	2	2	1	0	1	3	1	1	1	0	6	1.20	5.8%
	13:00	1	1	2	0	2	5	1	0	0	0	6	1.20	5.8%
	14:00	1	2	1	1	0	2	2	1	0	0	5	1.00	4.8%
	15:00	3	2	5	2	4	9	3	4	0	0	16	3.20	15.4%
	16:00	4	5	0	3	0	8	2	1	1	0	12	2.40	11.5%
	17:00	1	3	3	1	0	6	0	2	0	0	8	1.60	7.7%
	18:00	0	0	1	2	0	1	2	0	0	0	3	0.60	2.9%
	19:00	0	0	3	3	0	4	2	0	0	0	6	1.20	5.8%
	20:00	2	1	0	5	0	8	0	0	0	0	8	1.60	7.7%
	21:00	2	0	2	1	0	2	2	0	1	0	5	1.00	4.8%
	22:00	0	1	0	1	0	2	0	0	0	0	2	0.40	1.9%
23:00	1	0	0	0	0	1	0	0	0	0	1	0.20	1.0%	
Time Period	12AM-5AM	0	0	1	0	0	1	0	0	0	0	1	0.20	1.0%
	6AM-12PM	5	10	2	3	5	22	2	1	0	25	5.00	24.0%	
	12PM-6PM	12	15	12	7	7	33	9	9	2	0	53	10.60	51.0%
	6PM-12AM	5	2	6	12	0	18	6	0	1	0	25	5.00	24.0%
	None	22	27	20	22	12	74	16	9	4	0	103	20.60	99.0%
Alcohol & Drugs	Alcohol Involved	0	0	1	0	0	0	1	0	0	0	1	0.20	1.0%
	Drugs Involved	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Alcohol and Drugs	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
		0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Distraction Related	Y	5	9	2	2	2	12	2	4	2	0	20	4.00	19.2%
	N	17	18	19	20	10	62	15	5	2	0	84	16.80	80.8%

## CRASH ANALYSIS - Malabar Road from Jupiter Boulevard to Plaza Shopping Center

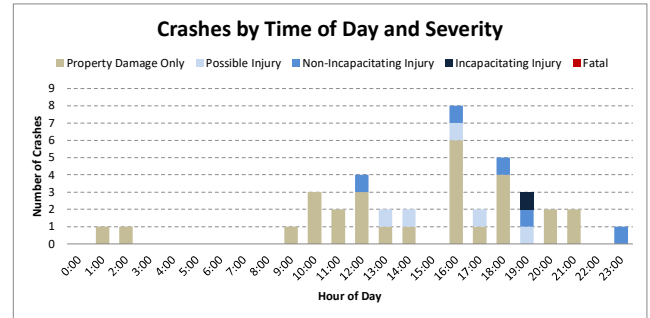
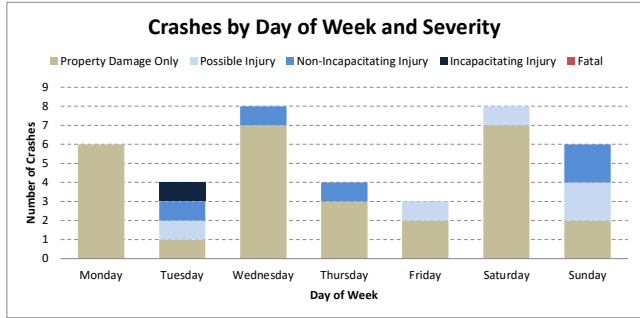
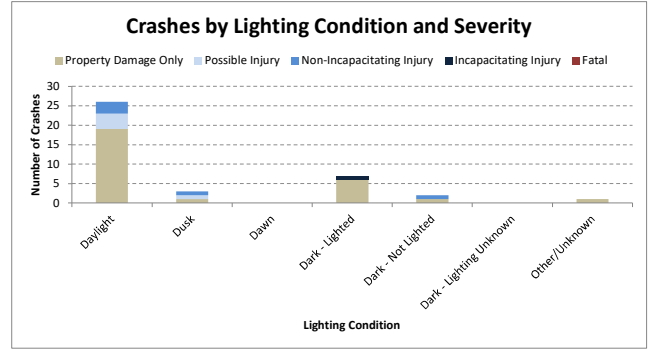
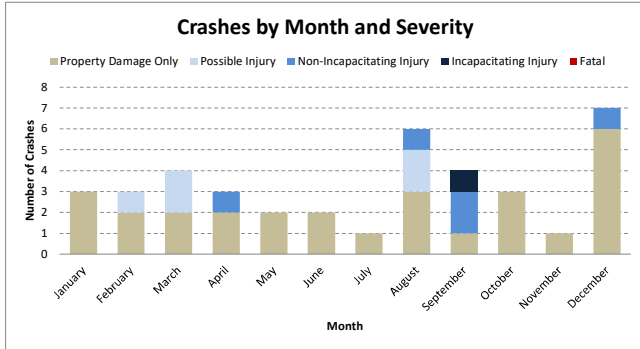
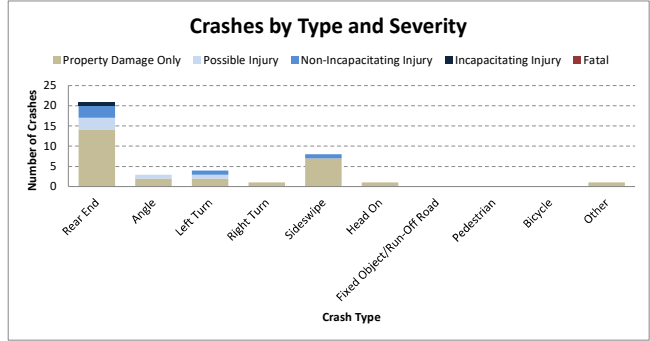
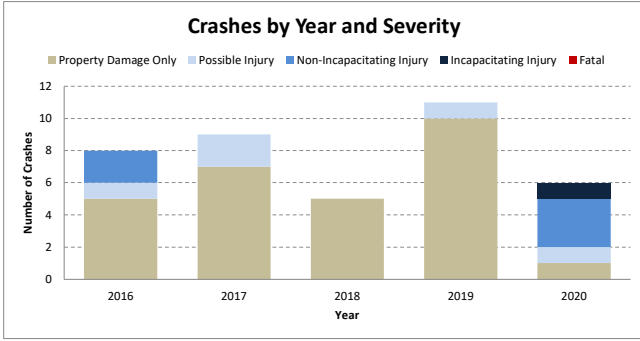


## CRASH ANALYSIS - Malabar Road from Jupiter Boulevard to Plaza Shopping Center

	Analysis Year					Severity					Total	Average	Percent	
	2016	2017	2018	2019	2020	Property Damage Only	Possible Injury	Non-Incapacitating Injury	Incapacitating Injury	Fatal				
Type of Crash	Rear End	20	26	8	20	13	56	17	10	4	0	87	17.40	58.4%
	Angle	0	3	2	1	0	2	1	3	0	0	6	1.20	4.0%
	Left Turn	5	4	6	4	5	10	5	3	6	0	24	4.80	16.1%
	Right Turn	0	0	0	1	0	1	0	0	0	0	1	0.20	0.7%
	Sideswipe	4	3	3	2	5	15	2	0	0	0	17	3.40	11.4%
	Head On	0	2	0	1	0	2	0	1	0	0	3	0.60	2.0%
	Fixed Object/Run-Off Road	0	2	0	1	1	3	1	0	0	0	4	0.80	2.7%
	Pedestrian	0	1	1	1	0	0	2	0	1	0	3	0.60	2.0%
	Bicyclist	0	0	1	0	1	1	0	0	1	0	2	0.40	1.3%
	Other	0	0	1	0	1	2	0	0	0	0	2	0.40	1.3%
	<b>Total Crashes</b>	<b>29</b>	<b>41</b>	<b>22</b>	<b>31</b>	<b>26</b>	<b>92</b>	<b>28</b>	<b>18</b>	<b>11</b>	<b>0</b>	<b>149</b>	<b>29.80</b>	<b>100.0%</b>
Crash Severity	Property Damage Only	22	22	14	19	15						92	18.40	61.7%
	Possible Injury	4	11	4	6	3						28	5.60	18.3%
	Non-Incapacitating Injury	1	6	2	3	6						18	3.60	12.1%
	Incapacitating Injury	2	2	2	3	2						11	2.20	7.4%
	Fatal	0	0	0	0	0						0	0.00	0.0%
Light Conditions	Daylight	25	32	19	26	21	77	21	18	7	0	123	24.60	82.6%
	Dusk	0	1	0	1	1	3	0	0	0	0	3	0.60	2.0%
	Dawn	0	0	0	1	0	1	0	0	0	0	1	0.20	0.7%
	Dark - Lighted	3	6	1	1	2	8	2	0	3	0	13	2.60	8.7%
	Dark - Not Lighted	1	1	2	2	2	2	5	0	1	0	8	1.60	5.4%
	Dark - Lighting Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Road Surface Condition	Other/Unknown	0	1	0	0	0	1	0	0	0	0	1	0.20	0.7%
	Dry	26	30	18	29	23	82	18	17	9	0	126	25.20	84.6%
	Wet	3	11	4	2	3	10	10	1	2	0	23	4.60	15.4%
Month	Other	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	January	2	1	4	3	4	10	2	1	1	0	14	2.80	9.4%
	February	1	7	2	2	1	8	3	1	1	0	13	2.60	8.7%
	March	3	4	1	2	3	7	2	3	1	0	13	2.60	8.7%
	April	2	1	2	2	3	7	1	1	1	0	10	2.00	6.7%
	May	4	4	1	3	3	10	2	3	0	0	15	3.00	10.1%
	June	0	5	1	2	1	3	4	2	0	0	9	1.80	6.0%
	July	5	0	0	1	1	6	1	0	0	0	7	1.40	4.7%
	August	4	3	0	8	1	10	1	3	2	0	16	3.20	10.7%
	September	3	6	3	3	3	11	5	2	0	0	18	3.60	12.1%
	October	2	8	1	3	2	9	4	1	2	0	16	3.20	10.7%
	November	1	1	3	1	1	3	1	0	3	0	7	1.40	4.7%
December	2	1	4	1	3	8	2	1	0	0	11	2.20	7.4%	
Day of Week	Monday	3	10	3	5	2	14	4	3	2	0	23	4.60	15.4%
	Tuesday	5	5	1	4	3	12	3	2	1	0	18	3.60	12.1%
	Wednesday	6	9	5	5	4	19	5	3	2	0	29	5.80	19.5%
	Thursday	1	5	3	7	4	13	2	3	2	0	20	4.00	13.4%
	Friday	5	6	3	4	7	13	8	1	3	0	25	5.00	16.8%
	Saturday	3	3	4	6	4	11	2	6	1	0	20	4.00	13.4%
	Sunday	6	3	3	0	2	10	4	0	0	0	14	2.80	9.4%
	0:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
1:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
2:00	0	0	1	0	0	1	0	0	0	0	1	0.20	0.7%	
3:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
4:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
5:00	1	0	0	0	0	0	0	0	1	0	1	0.20	0.7%	
6:00	0	1	0	1	0	1	0	0	1	0	2	0.40	1.3%	
7:00	1	3	2	1	2	2	3	3	3	0	9	1.80	6.0%	
8:00	2	7	3	2	1	12	2	1	0	0	15	3.00	10.1%	
9:00	2	0	1	0	1	3	0	0	1	0	4	0.80	2.7%	
10:00	1	6	0	2	0	4	2	3	0	0	9	1.80	6.0%	
11:00	3	1	0	3	0	4	1	2	0	0	7	1.40	4.7%	
12:00	2	2	0	0	1	3	1	0	1	0	5	1.00	3.4%	
13:00	2	0	1	0	1	1	2	1	0	0	4	0.80	2.7%	
14:00	2	2	2	2	4	9	1	0	2	0	12	2.40	8.1%	
15:00	3	5	2	3	5	14	1	2	1	0	18	3.60	12.1%	
16:00	3	2	2	4	3	7	3	4	0	0	14	2.80	9.4%	
17:00	2	3	3	6	4	15	1	1	1	0	18	3.60	12.1%	
18:00	1	3	3	4	1	6	4	1	1	0	12	2.40	8.1%	
19:00	2	1	0	2	0	4	1	0	0	0	5	1.00	3.4%	
20:00	2	1	1	1	3	4	3	0	1	0	8	1.60	5.4%	
21:00	0	2	0	0	0	1	1	0	0	0	2	0.40	1.3%	
22:00	0	2	1	0	0	1	2	0	0	0	3	0.60	2.0%	
23:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
Alcohol & Drugs	None	28	40	21	29	26	91	26	18	9	0	144	28.80	96.6%
	Alcohol Involved	1	1	1	1	0	1	1	0	2	0	4	0.80	2.7%
	Drugs Involved	0	0	0	1	0	0	1	0	0	0	1	0.20	0.7%
	Alcohol and Drugs	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Undetermined	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Age of Driver 1 (Typically Driver at Fault)	19 and Under	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	20-24	0	1	0	0	0	0	0	0	0	0	1	0.20	0.7%
	25-29	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	30-34	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	35-39	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	40-44	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	45-49	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	50-54	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	55-59	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	60-64	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	65-69	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	70-74	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	75-79	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	80-84	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	85 and Over	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%



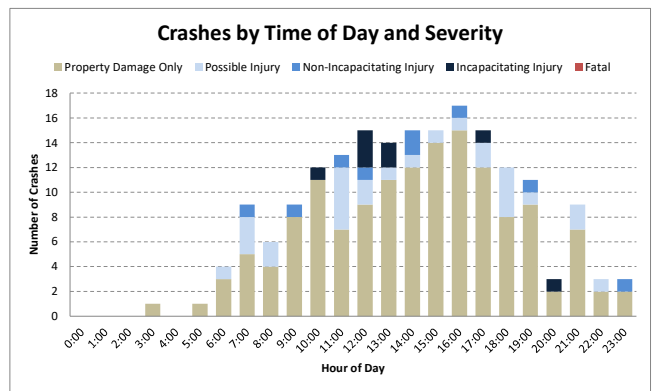
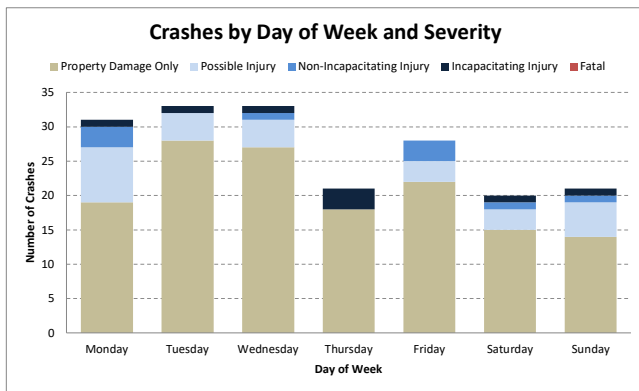
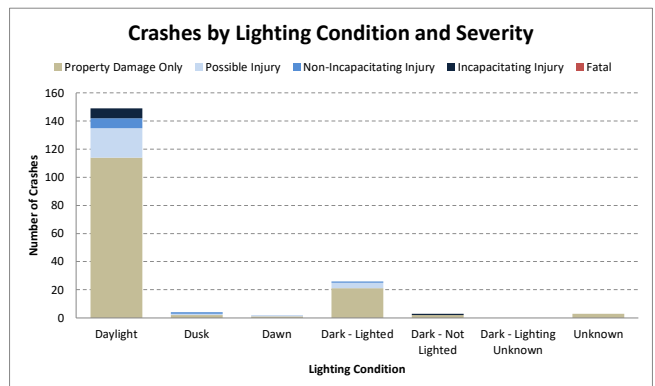
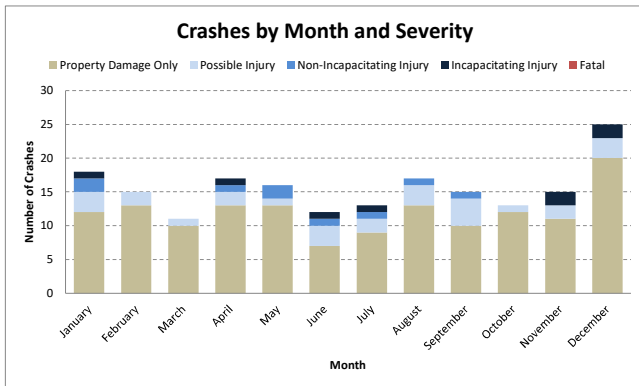
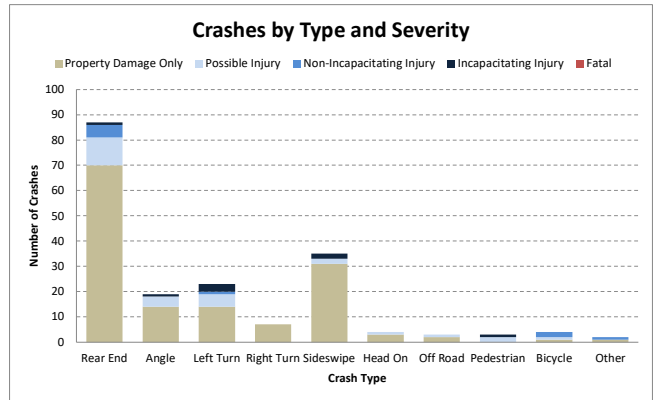
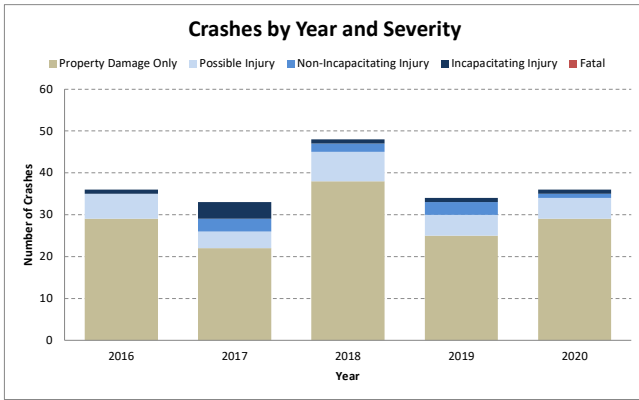
## CRASH ANALYSIS - Malabar Road at Plaza Shopping Center



**CRASH ANALYSIS - Malabar Road at Plaza Shopping Center**

		Analysis Year					Severity					Total	Average	Percent
		2016	2017	2018	2019	2020	Property Damage Only	Possible Injury	Non-Incapacitating Injury	Incapacitating Injury	Fatal			
Type of Crash	Rear End	5	6	2	4	4	14	3	3	1	0	21	4.20	53.8%
	Angle	0	1	0	1	1	2	1	0	0	0	3	0.60	7.7%
	Left Turn	1	0	0	2	1	2	1	1	0	0	4	0.80	10.3%
	Right Turn	0	0	1	0	0	1	0	0	0	0	1	0.20	2.6%
	Sideswipe	1	2	2	3	0	7	0	1	0	0	8	1.60	20.5%
	Head On	1	0	0	0	0	1	0	0	0	0	1	0.20	2.6%
	Fixed Object/Run-Off Road	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Pedestrian	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Bicycle	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Other	0	0	0	1	0	1	0	0	0	0	1	0.20	2.6%
	<b>Total Crashes</b>	<b>8</b>	<b>9</b>	<b>5</b>	<b>11</b>	<b>6</b>	<b>28</b>	<b>5</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>39</b>	<b>7.80</b>	<b>100.0%</b>
Crash Severity	Property Damage Only	5	7	5	10	1						28	5.60	71.8%
	Possible Injury	1	2	0	1	1						5	1.00	12.8%
	Non-Incapacitating Injury	2	0	0	0	3						5	1.00	12.8%
	Incapacitating Injury	0	0	0	0	1						1	0.20	2.6%
	Fatal	0	0	0	0	0						0	0.00	0.0%
Light Conditions	Daylight	5	7	4	6	4	19	4	3	0	0	26	5.20	66.7%
	Dusk	0	0	0	2	1	1	1	1	0	0	3	0.60	7.7%
	Dawn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Dark - Lighted	2	1	1	2	1	6	0	0	1	0	7	1.40	17.9%
	Dark - Not Lighted	1	1	0	0	0	1	0	1	0	0	2	0.40	5.1%
	Dark - Lighting Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Other/Unknown	0	0	0	1	0	1	0	0	0	0	1	0.20	2.6%
Road Surface Condition	Dry	7	8	5	11	4	26	5	4	0	0	35	7.00	89.7%
	Wet	1	1	0	0	2	2	0	1	1	0	4	0.80	10.3%
	Other	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Month	January	0	1	0	2	0	3	0	0	0	0	3	0.60	7.7%
	February	1	1	0	1	0	2	1	0	0	0	3	0.60	7.7%
	March	1	2	0	0	1	2	2	0	0	0	4	0.80	10.3%
	April	0	1	1	0	1	2	0	1	0	0	3	0.60	7.7%
	May	0	0	0	2	0	2	0	0	0	0	2	0.40	5.1%
	June	0	0	1	1	0	2	0	0	0	0	2	0.40	5.1%
	July	0	1	0	0	0	1	0	0	0	0	1	0.20	2.6%
	August	3	1	2	0	0	3	2	1	0	0	6	1.20	15.4%
	September	1	0	0	1	2	1	0	2	1	0	4	0.80	10.3%
	October	0	1	1	0	1	3	0	0	0	0	3	0.60	7.7%
	November	0	0	0	1	0	1	0	0	0	0	1	0.20	2.6%
	December	2	1	0	3	1	6	0	1	0	0	7	1.40	17.9%
Day of Week	Monday	1	1	0	3	1	6	0	0	0	0	6	1.20	15.4%
	Tuesday	1	0	0	1	2	1	1	1	0	0	4	0.80	10.3%
	Wednesday	2	2	2	1	1	7	0	1	0	0	8	1.60	20.5%
	Thursday	1	1	1	0	1	3	0	1	0	0	4	0.80	10.3%
	Friday	1	0	1	1	0	2	1	0	0	0	3	0.60	7.7%
	Saturday	1	3	0	4	0	7	1	0	0	0	8	1.60	20.5%
	Sunday	1	2	1	1	1	2	2	2	0	0	6	1.20	15.4%
	0:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
1:00	0	0	0	1	0	1	0	0	0	0	1	0.20	2.6%	
2:00	0	0	1	0	0	1	0	0	0	0	1	0.20	2.6%	
3:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
4:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
5:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
6:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
7:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
8:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
9:00	0	0	1	0	0	1	0	0	0	0	1	0.20	2.6%	
10:00	0	1	2	0	0	3	0	0	0	0	3	0.60	7.7%	
11:00	1	0	0	1	0	2	0	0	0	0	2	0.40	5.1%	
12:00	1	0	0	2	1	3	0	1	0	0	4	0.80	10.3%	
13:00	0	1	0	1	0	1	1	0	0	0	2	0.40	5.1%	
14:00	1	0	0	0	1	1	1	0	0	0	2	0.40	5.1%	
15:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
16:00	1	4	0	2	1	6	1	1	0	0	8	1.60	20.5%	
17:00	0	0	0	2	0	1	1	0	0	0	2	0.40	5.1%	
18:00	1	2	1	0	1	4	0	1	0	0	5	1.00	12.8%	
19:00	1	0	0	0	2	0	1	1	1	0	3	0.60	7.7%	
20:00	1	0	0	1	0	2	0	0	0	0	2	0.40	5.1%	
21:00	0	1	0	1	0	2	0	0	0	0	2	0.40	5.1%	
22:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
23:00	1	0	0	0	0	0	0	1	0	0	1	0.20	2.6%	
Alcohol & Drugs	None	7	8	5	11	0	3	0	0	0	0	31	6.20	79.5%
	Alcohol Involved	1	0	0	0	0	6	0	0	0	0	1	0.20	2.6%
	Drugs Involved	0	1	0	0	3	11	4	2	0	0	4	0.80	10.3%
	Alcohol and Drugs	0	0	0	0	3	8	1	3	1	0	3	0.60	7.7%
	Undetermined	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Age of Driver 1 (Typically Driver at Fault)	19 and Under	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	20-24	1	0	0	0	0	0	0	0	0	0	1	0.20	2.6%
	25-29	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	30-34	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	35-39	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	40-44	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	45-49	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	50-54	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	55-59	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	60-64	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	65-69	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	70-74	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	75-79	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	80-84	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
85 and Over	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	

## CRASH ANALYSIS - Malabar Road at Minton Road



**CRASH ANALYSIS - Malabar Road at Minton Road**

		Analysis Year					Severity					Total	Average	Percent
		2016	2017	2018	2019	2020	Property Damage Only	Possible Injury	Non-Incapacitating Injury	Incapacitating Injury	Fatal			
Type of Crash	Rear End	25	15	22	13	12	70	11	5	1	0	87	17.40	46.5%
	Angle	1	1	7	5	5	14	4	0	1	0	19	3.80	10.2%
	Left Turn	3	8	3	6	3	14	5	1	3	0	23	4.60	12.3%
	Right Turn	0	0	2	0	5	7	0	0	0	0	7	1.40	3.7%
	Sideswipe	5	6	9	6	9	31	2	0	2	0	35	7.00	18.7%
	Head On	0	0	1	2	1	3	1	0	0	0	4	0.80	2.1%
	Off Road	1	0	1	1	0	2	1	0	0	0	3	0.60	1.6%
	Pedestrian	1	1	1	0	0	0	2	0	1	0	3	0.60	1.6%
	Bicycle	0	1	2	1	0	1	1	2	0	0	4	0.80	2.1%
	Other	0	1	0	0	1	1	0	1	0	0	2	0.40	1.1%
	<b>Total Crashes</b>		<b>36</b>	<b>33</b>	<b>48</b>	<b>34</b>	<b>36</b>	<b>143</b>	<b>27</b>	<b>9</b>	<b>8</b>	<b>187</b>	<b>37.75</b>	<b>100.0%</b>
Crash Severity	Property Damage Only	29	22	38	25	29						143	28.60	76.5%
	Possible Injury	6	4	7	5	5						27	5.40	14.4%
	Non-Incapacitating Injury	0	3	2	3	1						9	1.80	4.8%
	Incapacitating Injury	1	4	1	1	1						8	1.60	4.3%
	Fatal	0	0	0	0	0						0	0.00	0.0%
Light Conditions	Daylight	29	27	35	26	32	114	21	7	7	0	149	29.80	79.7%
	Dusk	0	2	1	1	0	2	1	1	0	0	4	0.80	2.1%
	Dawn	0	0	1	0	1	1	1	0	0	0	2	0.40	1.1%
	Dark - Lighted	6	3	8	6	3	21	4	1	0	0	26	5.20	13.9%
	Dark - Not Lighted	1	1	1	0	0	2	0	0	1	0	3	0.60	1.6%
	Dark - Lighting Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Unknown	0	0	2	1	0	3	0	0	0	0	3	0.60	1.6%
Surface Condition	Dry	30	27	42	29	29	122	19	9	7	0	157	31.40	84.0%
	Wet	6	6	6	5	7	21	8	0	1	0	30	6.00	16.0%
	Other	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Month	January	4	5	4	2	3	12	3	2	1	0	18	3.60	9.6%
	February	4	2	3	3	3	13	2	0	0	0	15	3.00	8.0%
	March	2	1	3	4	1	10	1	0	0	0	11	2.20	5.9%
	April	3	1	8	3	2	13	2	1	1	0	17	3.40	9.1%
	May	5	1	6	1	3	13	1	2	0	0	16	3.20	8.6%
	June	2	6	2	2	0	7	3	1	1	0	12	2.40	6.4%
	July	2	2	3	1	5	9	2	1	1	0	13	2.60	7.0%
	August	3	4	3	2	5	13	3	1	0	0	17	3.40	9.1%
	September	3	3	4	2	3	10	4	1	0	0	15	3.00	8.0%
	October	3	3	2	2	3	12	1	0	0	0	13	2.60	7.0%
	November	1	4	3	3	4	11	2	0	2	0	15	3.00	8.0%
	December	4	1	7	9	4	20	3	0	2	0	25	5.00	13.4%
Day of Week	Monday	6	4	9	6	6	19	8	3	1	0	31	6.20	16.6%
	Tuesday	12	6	5	6	4	28	4	0	1	0	33	6.60	17.6%
	Wednesday	6	8	7	3	9	27	4	1	1	0	33	6.60	17.6%
	Thursday	1	3	5	8	4	18	0	0	3	0	21	4.20	11.2%
	Friday	5	5	7	5	6	22	3	3	0	0	28	5.60	15.0%
	Saturday	3	2	7	4	4	15	3	1	1	0	20	4.00	10.7%
	Sunday	3	5	8	2	3	14	5	1	1	0	21	4.20	11.2%
Hour of Day	0:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	1:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	2:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	3:00	0	0	1	0	0	1	0	0	0	0	1	0.20	0.5%
	4:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	5:00	0	0	0	1	0	1	0	0	0	0	1	0.20	0.5%
	6:00	2	0	1	0	1	3	1	0	0	0	4	0.80	2.1%
	7:00	1	3	3	1	1	5	3	1	0	0	9	1.80	4.8%
	8:00	3	0	3	0	0	4	2	0	0	0	6	1.20	3.2%
	9:00	1	4	2	2	0	8	0	1	0	0	9	1.80	4.8%
	10:00	1	1	4	2	4	11	0	0	1	0	12	2.40	6.4%
	11:00	5	1	2	3	2	7	5	1	0	0	13	2.60	7.0%
	12:00	4	7	0	1	3	9	2	1	3	0	15	3.00	8.0%
	13:00	1	4	6	2	1	11	1	0	2	0	14	2.80	7.5%
	14:00	6	0	3	2	4	12	1	2	0	0	15	3.00	8.0%
	15:00	3	1	3	5	3	14	1	0	0	0	15	3.00	8.0%
	16:00	1	3	4	2	7	15	1	1	0	0	17	3.40	9.1%
	17:00	1	3	4	2	5	12	2	0	1	0	15	3.00	8.0%
	18:00	1	0	2	6	3	8	4	0	0	0	12	2.40	6.4%
	19:00	1	3	2	3	2	9	1	1	0	0	11	2.20	5.9%
	20:00	1	1	0	1	0	2	0	0	1	0	3	0.60	1.6%
	21:00	3	1	5	0	0	7	2	0	0	0	9	1.80	4.8%
	22:00	1	1	1	0	0	2	1	0	0	0	3	0.60	1.6%
23:00	0	0	2	1	0	2	0	1	0	0	3	0.60	1.6%	
Time Period	12AM-5AM	0	0	1	1	0	2	0	0	0	0	2	0.40	1.1%
	6AM-12PM	13	9	15	8	8	38	11	3	1	0	53	10.60	28.3%
	12PM-6PM	16	18	20	14	23	73	8	4	6	0	91	18.20	48.7%
	6PM-12AM	7	6	12	11	5	30	8	2	1	0	41	8.20	21.9%
Alcohol & Drugs	None	35	33	46	33	35	141	25	8	8	0	182	36.40	97.3%
	Alcohol Involved	1	0	2	1	0	2	1	1	0	0	4	0.80	2.1%
	Drugs Involved	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Alcohol and Drugs	0	0	0	0	1	0	1	0	0	0	1	0.20	0.5%
Distraction Related	Y	8	9	4	5	4	20	4	5	1	0	30	6.00	16.0%
	N	28	24	44	29	32	123	23	4	7	0	157	31.40	84.0%

Malabar Road from St. Johns Heritage Parkway to Krassner Drive/Bending Branch Lane: District 5 Average Crash Rate										
Year	Number of Crashes	ADT	Actual Crash Rate (ACR) (crashes/MVMT)	D5 Average Crash Rate (AVG) (crashes/MVMT)	Vehicle Exposure (M) (MVMT)	Critical Crash Rate (CCR) (crashes/MVMT)	Safety Ratio	Statistical Significance	Confidence Level	
2016	5	12,300	0.920	3.480	5.432	6.022	✓ 0.153	-3.083	0.1025%	
2017	7	11,400	1.390	2.715	5.035	5.032	✓ 0.276	-1.669	4.7605%	
2018	15	11,100	3.060	2.697	4.902	5.035	✓ 0.608	0.627	73.4721%	

$$CCR = AVG + K * \sqrt{\frac{AVG}{M} - \frac{1}{2M}}$$

Where,

CCR = Critical Crash Rate

AVG = District 5/Statewide Average Crash Rate (by facility)

K = Test Factor, for critical rate in urban area = 3.291

M = Exposure (million vehicle miles travelled)



Malabar Road from St. Johns Heritage Parkway to Krassner Drive/Bending Branch Lane: Statewide Average Crash Rate									
Year	Number of Crashes	ADT	Actual Crash Rate (ACR) (crashes/MVMT)	Statewide Average Crash Rate (AVG) (crashes/MVMT)	Vehicle Exposure (M) (MVMT)	Critical Crash Rate (CCR) (crashes/MVMT)	Safety Ratio	Statistical Significance	Confidence Level
2016	5	12,300	0.920	3.892	5.432	6.586	✓0.140	-3.402	0.0334%
2017	7	11,400	1.390	4.246	5.035	7.169	✓0.194	-3.002	0.1343%
2018	15	11,100	3.060	4.062	4.902	6.956	✓0.440	-0.989	16.1243%

$$CCR = AVG + K * \sqrt{\frac{AVG}{M} - \frac{1}{2M}}$$

Where,

CCR = Critical Crash Rate

AVG = District 5/Statewide Average Crash Rate (by facility)

K = Test Factor, for critical rate in urban area = 3.291

M = Exposure (million vehicle miles travelled)

Malabar Road at Krassner Drive/Bending Branch Lane: District 5 Average Crash Rate										
Year	Number of Crashes	ADT	Actual Crash Rate (ACR) (crashes/MVMT)	D5 Average Crash Rate (AVG) (crashes/MVMT)	Vehicle Exposure (M) (MVMT)	Critical Crash Rate (CCR) (crashes/MVMT)	Safety Ratio	Statistical Significance	Confidence Level	
2016	1	14,234	0.192	0.287	5.195	0.963	✓ 0.200	0.009	50.3547%	
2017	0	13,334	0.000	0.260	4.867	0.917	✓ 0.000	-0.679	24.8537%	
2018	1	13,034	0.210	0.250	4.757	0.899	✓ 0.234	0.285	61.2138%	

$$CCR = AVG + K * \sqrt{\frac{AVG}{M} - \frac{1}{2M}}$$

Where,

CCR = Critical Crash Rate

AVG = District 5/Statewide Average Crash Rate (by facility)

K = Test Factor, for critical rate in urban area = 3.291

M = Exposure (million vehicle miles travelled)

Malabar Road at Krassner Drive/Bending Branch Lane: Statewide Average Crash Rate									
Year	Number of Crashes	ADT	Actual Crash Rate (ACR) (crashes/MVMT)	Statewide Average Crash Rate (AVG) (crashes/MVMT)	Vehicle Exposure (M) (MVMT)	Critical Crash Rate (CCR) (crashes/MVMT)	Safety Ratio	Statistical Significance	Confidence Level
2016	1	14,234	0.192	0.344	5.195	1.094	✔0.176	-0.215	41.5065%
2017	0	13,334	0.000	0.397	4.867	1.235	✔0.000	-1.031	15.1250%
2018	1	13,034	0.210	0.370	4.757	1.184	✔0.178	-0.198	42.1713%

$$CCR = AVG + K * \sqrt{\frac{AVG}{M} - \frac{1}{2M}}$$

Where,

CCR = Critical Crash Rate

AVG = District 5/Statewide Average Crash Rate (by facility)

K = Test Factor, for critical rate in urban area = 3.291

M = Exposure (million vehicle miles travelled)

Malabar Road from Krassner Drive/Bending Branch Lane to Jupiter Boulevard: District 5 Average Crash Rate

Year	Number of Crashes	ADT	Actual Crash Rate (ACR) (crashes/MVMT)	D5 Average Crash Rate (AVG) (crashes/MVMT)	Vehicle Exposure (M) (MVMT)	Critical Crash Rate (CCR) (crashes/MVMT)	Safety Ratio	Statistical Significance	Confidence Level
2016	12	12,300	2.546	3.480	4.714	6.202	✓ 0.410	-0.964	16.7496%
2017	16	11,400	3.662	2.715	4.369	5.195	✓ 0.705	1.347	91.0988%
2018	9	11,100	2.116	2.697	4.254	5.199	✓ 0.407	-0.582	28.0239%

$$CCR = AVG + K * \sqrt{\frac{AVG}{M} - \frac{1}{2M}}$$

Where,

CCR = Critical Crash Rate

AVG = District 5/Statewide Average Crash Rate (by facility)

K = Test Factor, for critical rate in urban area = 3.291

M = Exposure (million vehicle miles travelled)

Malabar Road from Krassner Drive/Bending Branch Lane to Jupiter Boulevard: Statewide Average Crash Rate									
Year	Number of Crashes	ADT	Actual Crash Rate (ACR) (crashes/MVMT)	Statewide Average Crash Rate (AVG) (crashes/MVMT)	Vehicle Exposure (M) (MVMT)	Critical Crash Rate (CCR) (crashes/MVMT)	Safety Ratio	Statistical Significance	Confidence Level
2016	12	12,300	2.546	3.892	4.714	6.776	✔0.376	-1.365	8.6111%
2017	16	11,400	3.662	4.246	4.369	7.376	✔0.496	-0.476	31.6929%
2018	9	11,100	2.116	4.062	4.254	7.161	✔0.295	-1.872	3.0610%

$$CCR = AVG + K * \sqrt{\frac{AVG}{M} - \frac{1}{2M}}$$

Where,

CCR = Critical Crash Rate

AVG = District 5/Statewide Average Crash Rate (by facility)

K = Test Factor, for critical rate in urban area = 3.291

M = Exposure (million vehicle miles travelled)



Malabar Road at Jupiter Boulevard: District 5 Average Crash Rate									
Year	Number of Crashes	ADT	Actual Crash Rate (ACR) (crashes/MVMT)	D5 Average Crash Rate (AVG) (crashes/MVMT)	Vehicle Exposure (M) (MVMT)	Critical Crash Rate (CCR) (crashes/MVMT)	Safety Ratio	Statistical Significance	Confidence Level
2016	22	23,520	2.563	0.287	8.585	0.830	⊗ 3.089	12.775	99.9999%
2017	27	23,920	3.093	0.260	8.731	0.770	⊗ 4.018	16.762	99.9999%
2018	21	24,950	2.306	0.250	9.107	0.740	⊗ 3.115	12.740	99.9999%

$$CCR = AVG + K * \sqrt{\frac{AVG}{M} - \frac{1}{2M}}$$

Where,

CCR = Critical Crash Rate

AVG = District 5/Statewide Average Crash Rate (by facility)

K = Test Factor, for critical rate in urban area = 3.291

M = Exposure (million vehicle miles travelled)

Malabar Road at Jupiter Boulevard: Statewide Average Crash Rate									
Year	Number of Crashes	ADT	Actual Crash Rate (ACR) (crashes/MVMT)	Statewide Average Crash Rate (AVG) (crashes/MVMT)	Vehicle Exposure (M) (MVMT)	Critical Crash Rate (CCR) (crashes/MVMT)	Safety Ratio	Statistical Significance	Confidence Level
2016	22	23,520	2.563	0.344	8.585	0.944	⊗ 2.714	11.376	99.9999%
2017	27	23,920	3.093	0.397	8.731	1.042	⊗ 2.967	12.902	99.9999%
2018	21	24,950	2.306	0.370	9.107	0.979	⊗ 2.355	9.869	99.9999%

$$CCR = AVG + K * \sqrt{\frac{AVG}{M} - \frac{1}{2M}}$$

Where,

CCR = Critical Crash Rate

AVG = District 5/Statewide Average Crash Rate (by facility)

K = Test Factor, for critical rate in urban area = 3.291

M = Exposure (million vehicle miles travelled)

Malabar Road from Jupiter Boulevard to Plaza Shopping Center: District 5 Average Crash Rate										
Year	Number of Crashes	ADT	Actual Crash Rate (ACR) (crashes/MVMT)	D5 Average Crash Rate (AVG) (crashes/MVMT)	Vehicle Exposure (M) (MVMT)	Critical Crash Rate (CCR) (crashes/MVMT)	Safety Ratio	Statistical Significance	Confidence Level	
2016	29	19,000	3.372	3.480	8.599	5.515	✓ 0.611	-0.078	46.8934%	
2017	41	20,200	4.485	2.715	9.143	4.454	✗ 1.007	3.348	99.9593%	
2018	22	20,000	2.430	2.697	9.052	4.438	✓ 0.548	-0.387	34.9538%	

$$CCR = AVG + K * \sqrt{\frac{AVG}{M} - \frac{1}{2M}}$$

Where,

CCR = Critical Crash Rate

AVG = District 5/Statewide Average Crash Rate (by facility)

K = Test Factor, for critical rate in urban area = 3.291

M = Exposure (million vehicle miles travelled)

Malabar Road from Jupiter Boulevard to Plaza Shopping Center: Statewide Average Crash Rate									
Year	Number of Crashes	ADT	Actual Crash Rate (ACR) (crashes/MVMT)	Statewide Average Crash Rate (AVG) (crashes/MVMT)	Vehicle Exposure (M) (MVMT)	Critical Crash Rate (CCR) (crashes/MVMT)	Safety Ratio	Statistical Significance	Confidence Level
2016	29	19,000	3.372	3.892	8.599	6.048	✔0.558	-0.686	24.6306%
2017	41	20,200	4.485	4.246	9.143	6.434	✔0.697	0.430	66.6438%
2018	22	20,000	2.430	4.062	9.052	6.212	✔0.391	-2.354	0.9294%

$$CCR = AVG + K * \sqrt{\frac{AVG}{M} - \frac{1}{2M}}$$

Where,

CCR = Critical Crash Rate

AVG = District 5/Statewide Average Crash Rate (by facility)

K = Test Factor, for critical rate in urban area = 3.291

M = Exposure (million vehicle miles travelled)

Malabar Road at Plaza Shopping Center: District 5 Average Crash Rate										
Year	Number of Crashes	ADT	Actual Crash Rate (ACR) (crashes/MVMT)	D5 Average Crash Rate (AVG) (crashes/MVMT)	Vehicle Exposure (M) (MVMT)	Critical Crash Rate (CCR) (crashes/MVMT)	Safety Ratio	Statistical Significance	Confidence Level	
2016	8	21,422	1.023	0.287	7.819	0.853	⊗ 1.200	4.181	99.9985%	
2017	9	22,622	1.090	0.260	8.257	0.783	⊗ 1.393	5.025	99.9999%	
2018	5	22,422	0.611	0.250	8.184	0.764	⚠ 0.800	2.415	99.2126%	

$$CCR = AVG + K * \sqrt{\frac{AVG}{M} - \frac{1}{2M}}$$

Where,

CCR = Critical Crash Rate

AVG = District 5/Statewide Average Crash Rate (by facility)

K = Test Factor, for critical rate in urban area = 3.291

M = Exposure (million vehicle miles travelled)

Malabar Road at Plaza Shopping Center: Statewide Average Crash Rate									
Year	Number of Crashes	ADT	Actual Crash Rate (ACR) (crashes/MVMT)	Statewide Average Crash Rate (AVG) (crashes/MVMT)	Vehicle Exposure (M) (MVMT)	Critical Crash Rate (CCR) (crashes/MVMT)	Safety Ratio	Statistical Significance	Confidence Level
2016	8	21,422	1.023	0.344	7.819	0.970	✘ 1.055	3.543	99.9803%
2017	9	22,622	1.090	0.397	8.257	1.059	✘ 1.029	3.433	99.9702%
2018	5	22,422	0.611	0.370	8.184	1.009	✔ 0.605	1.418	92.1863%

$$CCR = AVG + K * \sqrt{\frac{AVG}{M} - \frac{1}{2M}}$$

Where,

CCR = Critical Crash Rate

AVG = District 5/Statewide Average Crash Rate (by facility)

K = Test Factor, for critical rate in urban area = 3.291

M = Exposure (million vehicle miles travelled)



Malabar Road at Minton Road: District 5 Average Crash Rate										
Year	Number of Crashes	ADT	Actual Crash Rate (ACR) (crashes/MVMT)	D5 Average Crash Rate (AVG) (crashes/MVMT)	Vehicle Exposure (M) (MVMT)	Critical Crash Rate (CCR) (crashes/MVMT)	Safety Ratio	Statistical Significance	Confidence Level	
2016	36	39,300	2.510	0.287	14.345	0.717	⊗ 3.500	15.973	99.9999%	
2017	33	40,150	2.252	0.260	14.655	0.663	⊗ 3.394	15.226	99.9999%	
2018	48	40,100	3.279	0.250	14.637	0.646	⊗ 5.077	23.442	99.9999%	

$$CCR = AVG + K * \sqrt{\frac{AVG}{M} - \frac{1}{2M}}$$

Where,

CCR = Critical Crash Rate

AVG = District 5/Statewide Average Crash Rate (by facility)

K = Test Factor, for critical rate in urban area = 3.291

M = Exposure (million vehicle miles travelled)

Malabar Road at Minton Road: Statewide Average Crash Rate									
Year	Number of Crashes	ADT	Actual Crash Rate (ACR) (crashes/MVMT)	Statewide Average Crash Rate (AVG) (crashes/MVMT)	Vehicle Exposure (M) (MVMT)	Critical Crash Rate (CCR) (crashes/MVMT)	Safety Ratio	Statistical Significance	Confidence Level
2016	36	39,300	2.510	0.344	14.345	0.819	⊗ 3.066	14.212	99.9999%
2017	33	40,150	2.252	0.397	14.655	0.905	⊗ 2.488	11.469	99.9999%
2018	48	40,100	3.279	0.370	14.637	0.860	⊗ 3.814	18.501	99.9999%

$$CCR = AVG + K * \sqrt{\frac{AVG}{M} - \frac{1}{2M}}$$

Where,

CCR = Critical Crash Rate

AVG = District 5/Statewide Average Crash Rate (by facility)

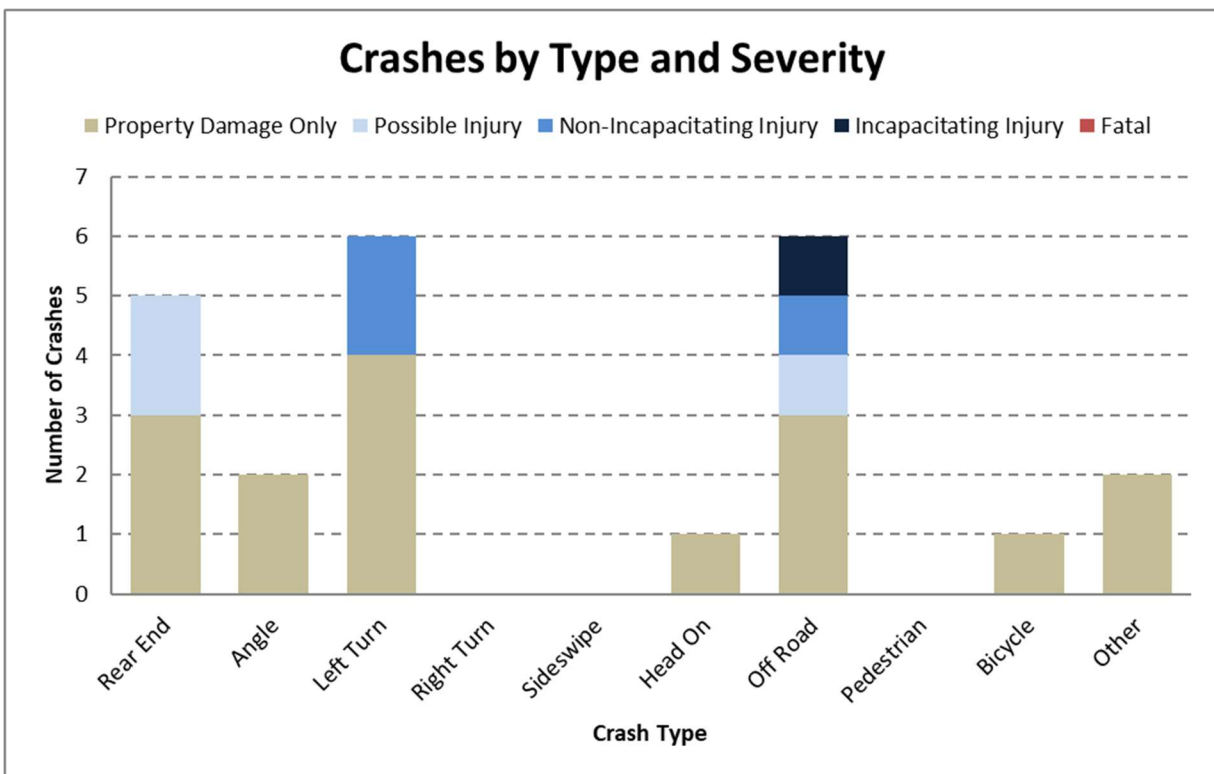
K = Test Factor, for critical rate in urban area = 3.291

M = Exposure (million vehicle miles travelled)

## 1.0 High Crash Locations Detailed Summary

### 1.1 Malabar Road at the St. Johns Heritage Parkway (23 crashes)

The unsignalized intersection of Malabar Road at the St. Johns Heritage Parkway accounted for 23 of the 642 crashes (4 percent) along the study corridor. **Figure 1** displays the crashes by type and severity at the intersection. The highest crash type observed was left turn, comprising 26 percent of the total crashes. Contributing causes for the left turn crashes may be the high turning volume to/from the St. Johns Heritage Parkway and large influxes of traffic during Heritage High School’s pick up/drop off times. Off-road (26 percent), rear end (22 percent), and angle (9 percent) were the other highest crash types. There were seven injury crashes (30 percent) at the intersection. A more detailed summary of the Malabar Road at the St. Johns Heritage Parkway crash data set in tabular and graphical format is provided in this appendix.

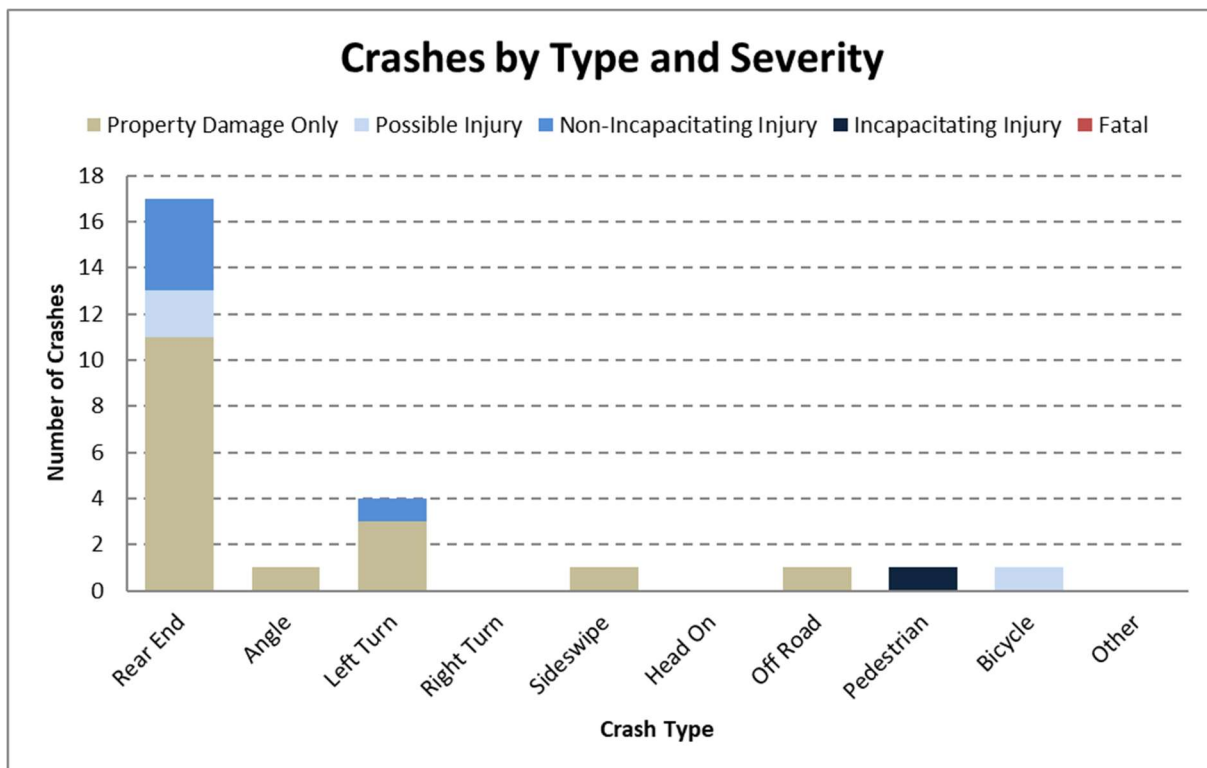


**Figure 1: Crashes by Type and Severity (Malabar Road at the St. Johns Heritage Parkway)**

## Malabar Road PD&E – Supporting Safety Information for PER

### 1.2 Malabar Road at Hurley Boulevard and Hillock Road (26 crashes)

The unsignalized offset intersections of Malabar Road at Hurley Boulevard and Hillock Road accounted for 26 of the 642 crashes (4 percent) along the study corridor. **Figure 2** displays the crashes by type and severity at the intersection. The highest crash type observed was rear end, comprising 65 percent of the total crashes. Contributing causes for the rear end crashes may be the lack of left turn lanes along Malabar Road leading to overlapping queueing for the eastbound/westbound left turn movements at these intersections. Left turn (15 percent) was the second highest crash type. There were nine injury crashes (35 percent) at the intersection. A more detailed summary of the Malabar Road at Hurley Boulevard and Hillock Road crash data set in tabular and graphical format is provided in this appendix.

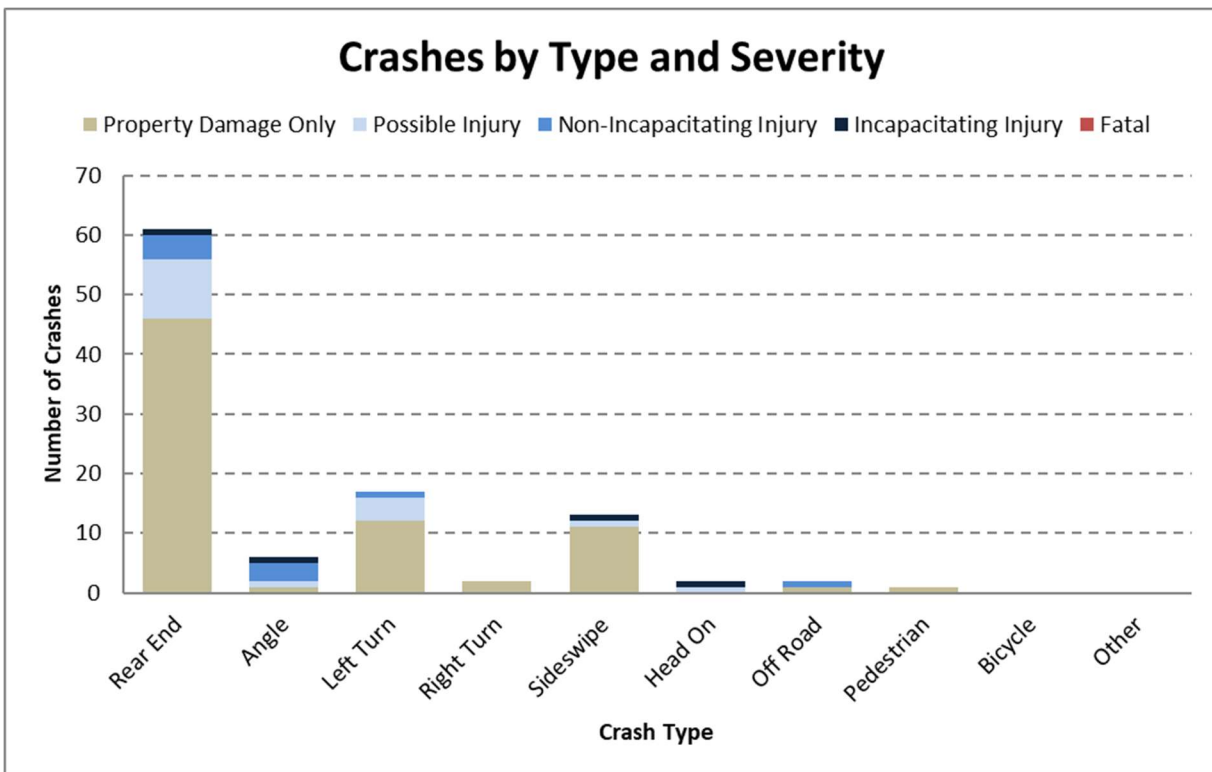


**Figure 2: Crashes by Type and Severity (Malabar Road at Hurley Boulevard and Hillock Road)**

## Malabar Road PD&E – Supporting Safety Information for PER

### 1.3 Malabar Road at Jupiter Boulevard (104 crashes)

The signalized intersection of Malabar Road at Jupiter Boulevard accounted for 104 of the 642 crashes (16 percent) along the study corridor. **Figure 3** displays the crashes by type and severity at the intersection. The highest crash type observed was rear end, comprising 59 percent of the total crashes. Contributing causes for the rear end crashes may be the amount of congestion observed during the AM and PM peak hours at the intersection. Left turn (16 percent), sideswipe (13 percent), and angle (6 percent) were the other highest crash types. There were 30 injury crashes (29 percent) at the intersection. A more detailed summary of the Malabar Road at Jupiter Boulevard crash data set in tabular and graphical format is provided in this appendix.

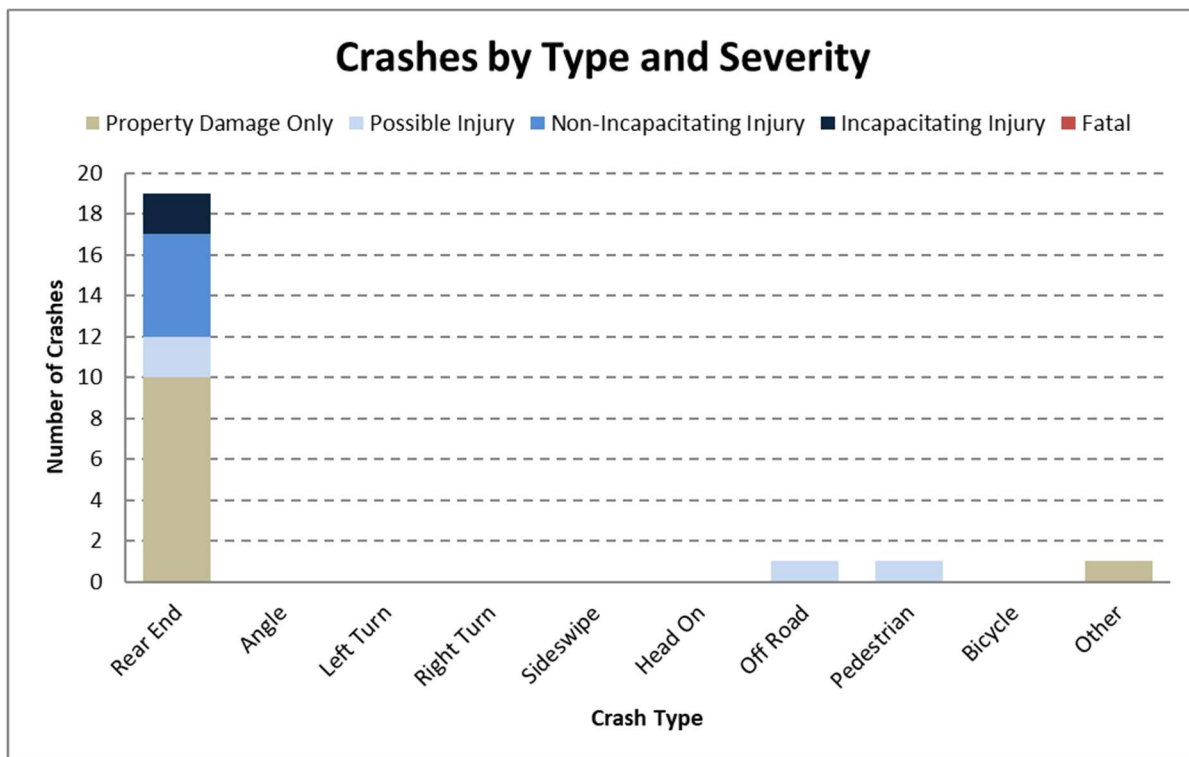


**Figure 3: Crashes by Type and Severity (Malabar Road at Jupiter Boulevard)**

## Malabar Road PD&E – Supporting Safety Information for PER

### 1.4 Malabar Road from Jupiter Boulevard to Santa Rosa Avenue (22 crashes)

The section of Malabar Road from 0.05 east of Jupiter Boulevard to 0.05 west of Santa Rosa Avenue accounted for 22 of the 642 crashes (3 percent) along the study corridor. **Figure 4** displays the crashes by type and severity at the intersection. The highest crash type observed was rear end, comprising 86 percent of the total crashes. Contributing causes for the rear end crashes may be due to congestion on the east leg of the Jupiter Boulevard intersection and the lack of left turn lanes along Malabar Road for the five public street intersections between Jupiter Boulevard and Santa Rosa Avenue. There were 11 injury crashes (50 percent) at the intersection. A more detailed summary of the Malabar Road from Jupiter Boulevard to Santa Rosa Avenue crash data set in tabular and graphical format is provided in this appendix.



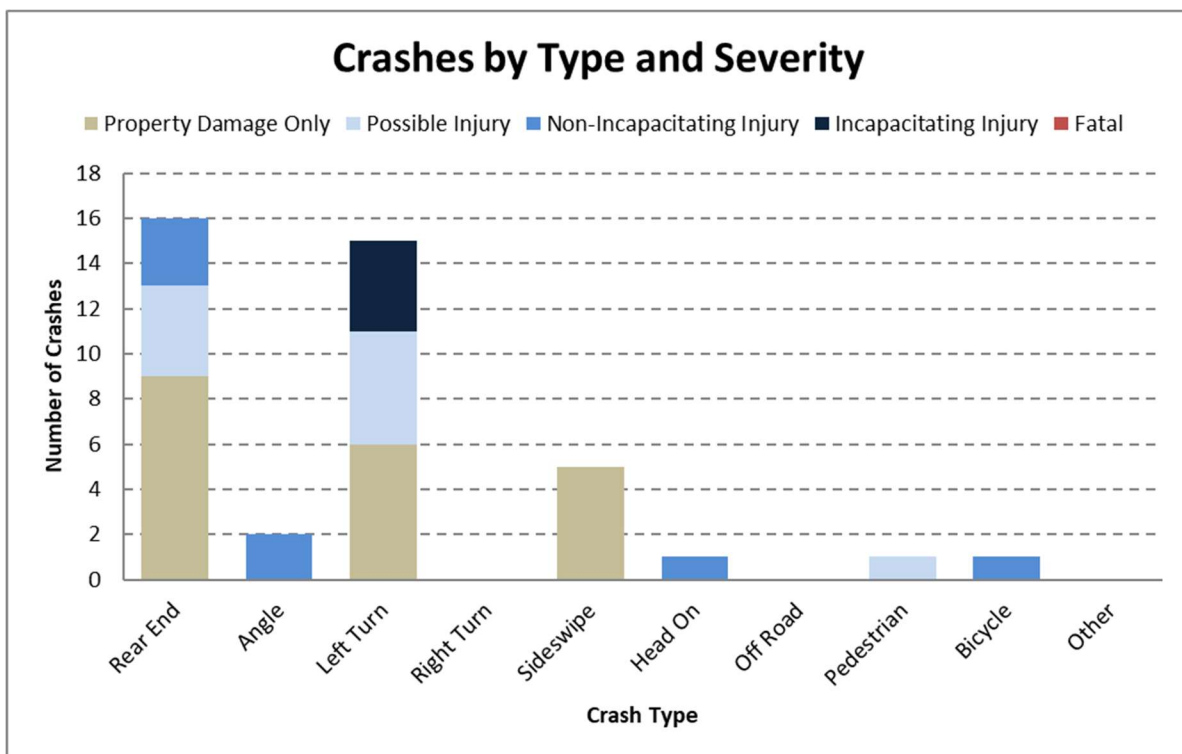
**Figure 4: Crashes by Type and Severity (Malabar Road from Jupiter Boulevard to Santa Rosa Avenue)**



## Malabar Road PD&E – Supporting Safety Information for PER

### 1.5 Malabar Road at Maywood Avenue/Daffodil Drive (41 crashes)

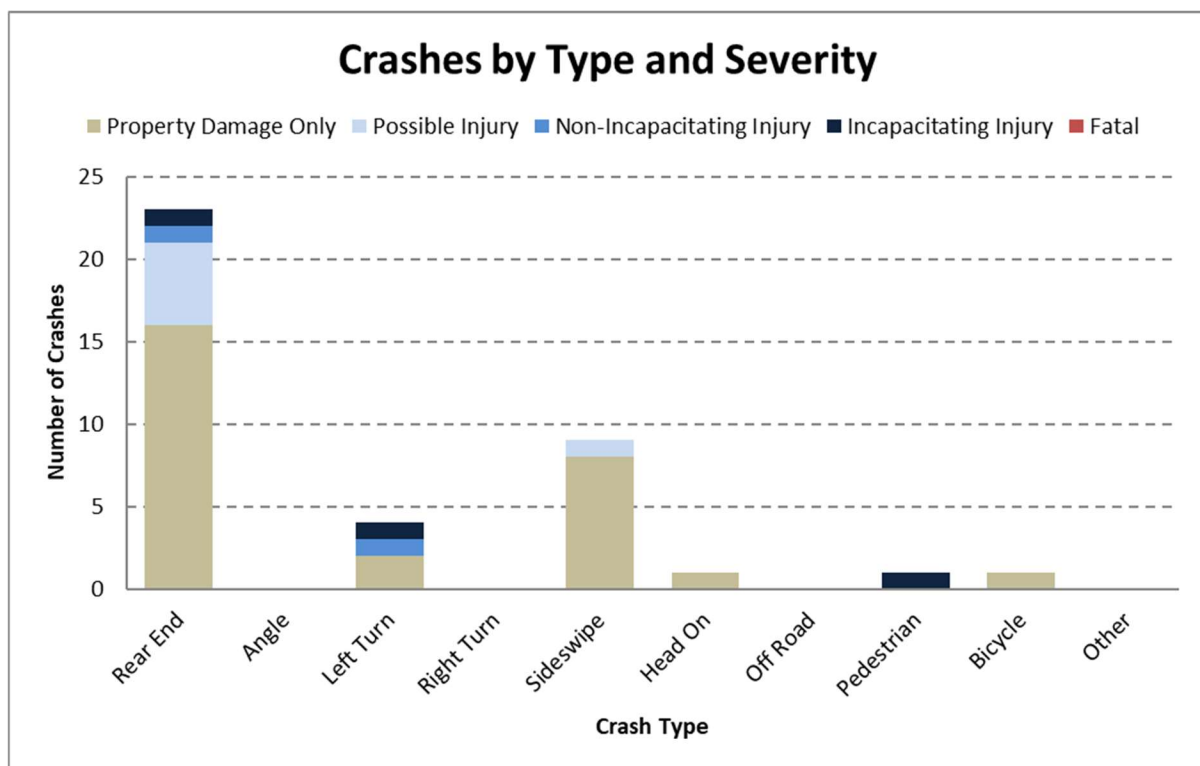
The unsignalized intersection of Malabar Road at Maywood Avenue/Daffodil Drive accounted for 41 of the 642 crashes (6 percent) along the study corridor. **Figure 5** displays the crashes by type and severity at the intersection. The highest crash type observed was rear end, comprising 39 percent of the total crashes. Left turn (37 percent) was the second highest crash type. Contributing causes for the rear end crashes may be due to vehicles slowing down to make eastbound/westbound right turn movements. Contributing causes for the left turn crashes may be due to the relatively high southbound left turn and westbound left turn movements conflicting with east/west through traffic. There were 21 injury crashes (51 percent) at the intersection. A more detailed summary of the Malabar Road at Maywood Avenue/Daffodil Drive crash data set in tabular and graphical format is provided in this appendix.



**Figure 5: Crashes by Type and Severity (Malabar Road at Maywood Avenue/Daffodil Drive)**

**1.6 Malabar Road from Maywood Avenue/Daffodil Drive to the Plaza Shopping Center (39 crashes)**

The section of Malabar Road from 0.05 miles east of Maywood Avenue/Daffodil Drive to 0.05 west of the Plaza Shopping Center accounted for 39 of the 642 crashes (6 percent) along the study corridor. **Figure 6** displays the crashes by type and severity at the intersection. The highest crash type observed was rear end, comprising 59 percent of the total crashes. Contributing causes for the rear end crashes may be due to the increased number of access points/driveways and the speed limit transition from 35 mph to 45 mph. Sideswipe (23 percent) and left turn (10 percent) were the other highest crash types. There were 11 injury crashes (28 percent) at the intersection. A more detailed summary of the Malabar Road from Maywood Avenue/Daffodil Drive to the Plaza Shopping Center crash data set in tabular and graphical format is provided in this appendix.

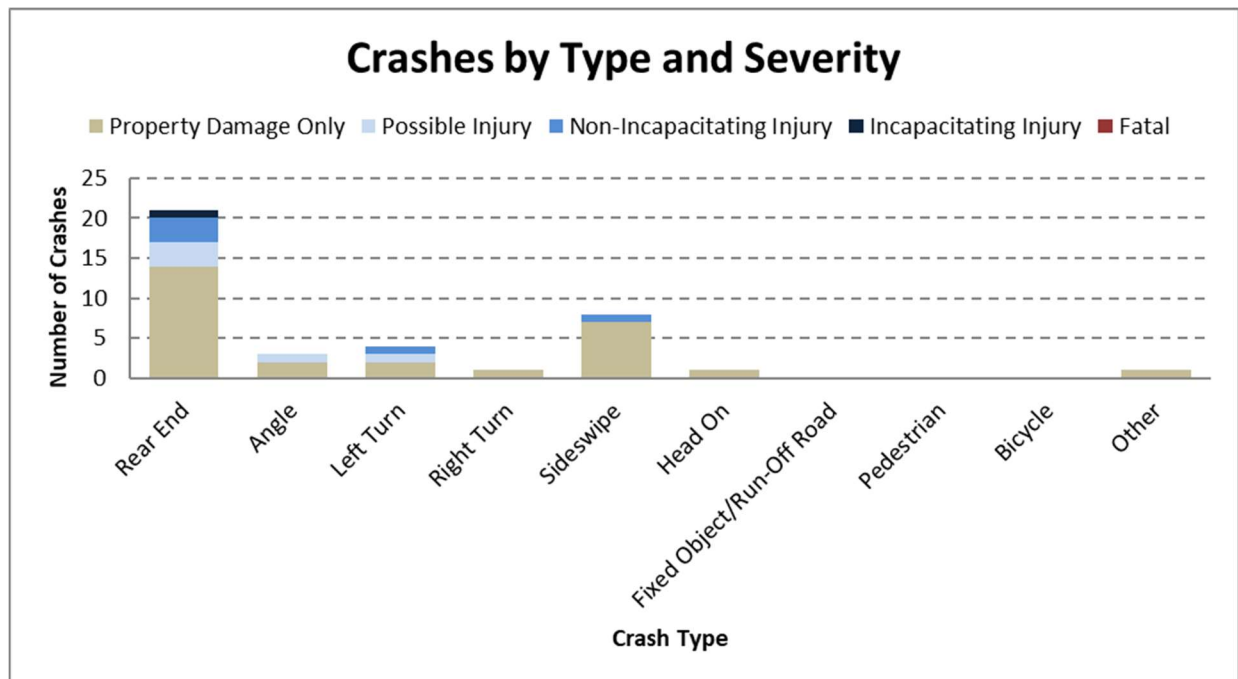


**Figure 6: Crashes by Type and Severity (Malabar Road from Maywood Avenue/Daffodil Drive to the Plaza Shopping Center)**

## Malabar Road PD&E – Supporting Safety Information for PER

### 1.7 Malabar Road at the Plaza Shopping Center (39 crashes)

The signalized intersection of Malabar Road at the Plaza Shopping Center accounted for 39 of the 642 crashes (6 percent) along the study corridor. **Figure 7** displays the crashes by type and severity at the intersection. The highest crash type observed was rear end, comprising 54 percent of the total crashes. Sideswipe (21 percent) was the second highest crash type. Contributing causes for the rear end crashes may be the amount of congestion observed during the AM and PM peak hours at the intersection. There were 11 injury crashes (28 percent) at the intersection. A more detailed summary of the Malabar Road at the Plaza Shopping Center crash data set in tabular and graphical format is provided in this appendix.

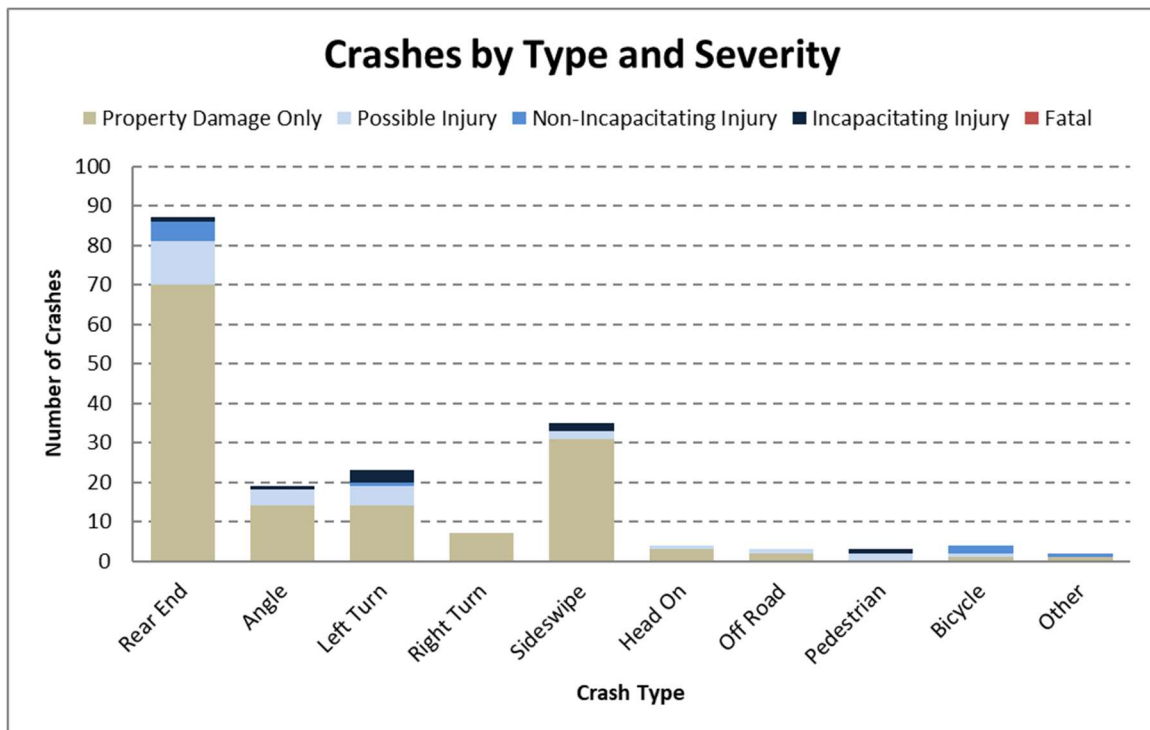


**Figure 7: Crashes by Type and Severity (Malabar Road at the Plaza Shopping Center)**

## Malabar Road PD&E – Supporting Safety Information for PER

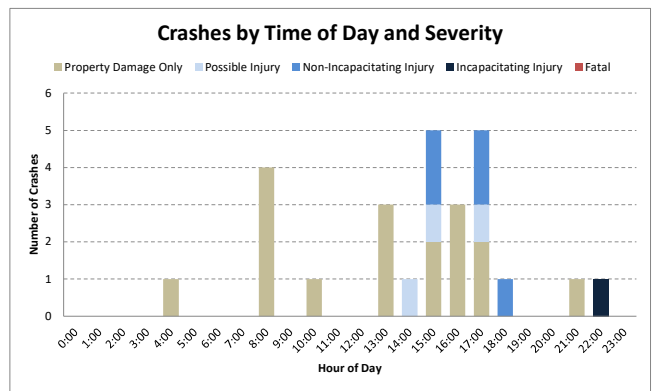
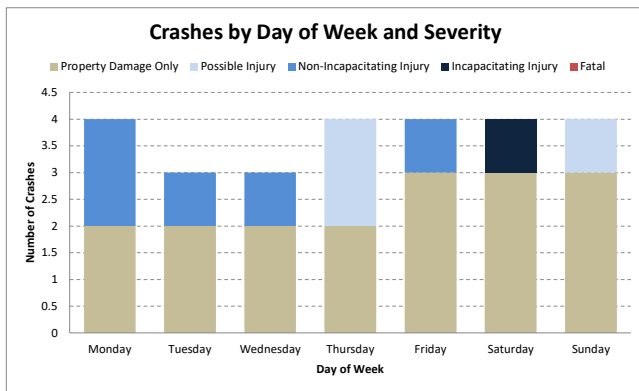
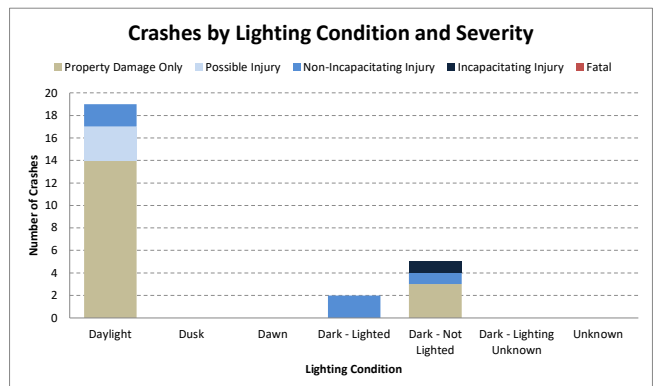
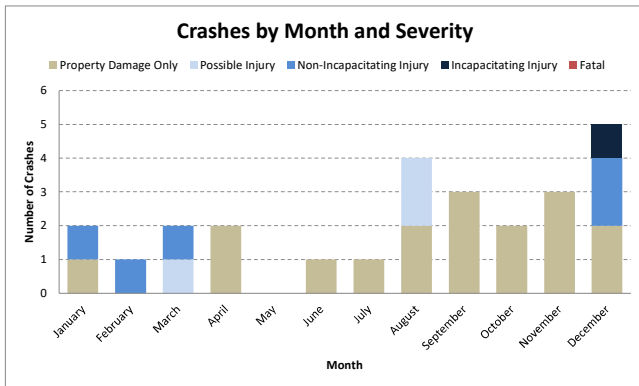
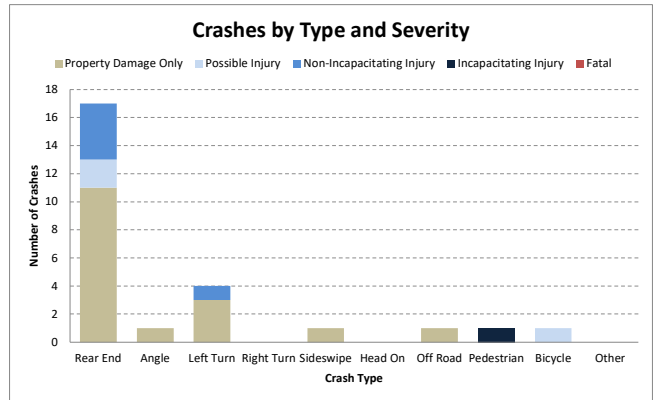
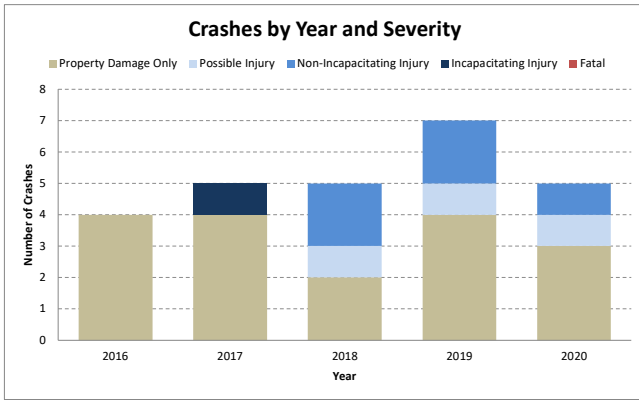
### 1.8 Malabar Road at Minton Road (187 crashes)

The signalized intersection of Malabar Road at Minton Road accounted for 187 of the 642 crashes (29 percent) along the study corridor. **Figure 8** displays the crashes by type and severity at the intersection. The highest crash type observed was rear end, comprising 47 percent of the total crashes. Contributing causes for the rear end crashes may be the amount of congestion observed during the AM and PM peak hours at the intersection. Sideswipe (19 percent), left turn (12 percent), and angle (10 percent) were the other highest crash types. There were 44 injury crashes (24 percent) at the intersection. A more detailed summary of the Malabar Road at Minton Road crash data set in tabular and graphical format is provided in this appendix.



**Figure 8: Crashes by Type and Severity (Malabar Road at Minton Road)**

**CRASH ANALYSIS - Malabar Road at Hurley Boulevard/Hillock Avenue**

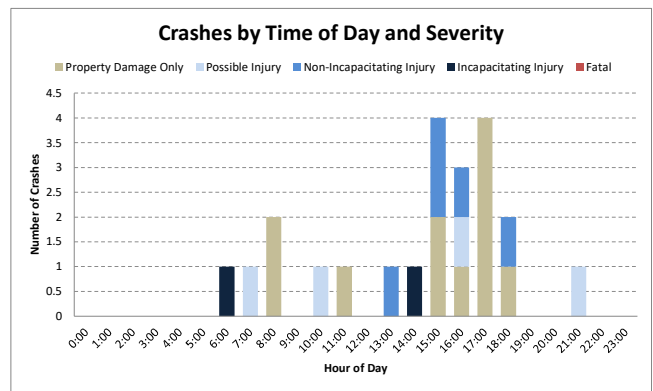
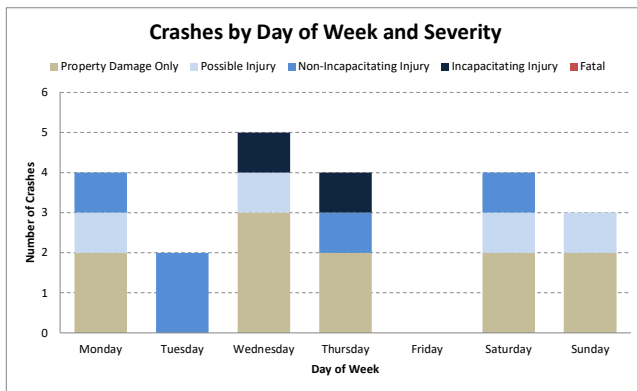
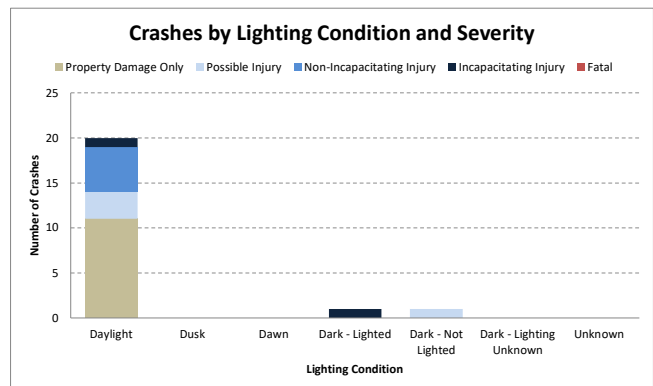
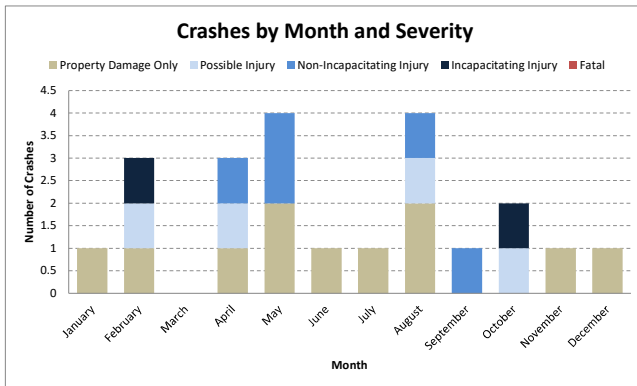
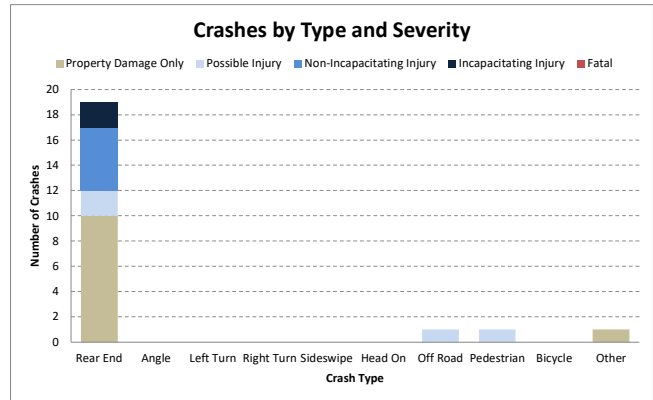
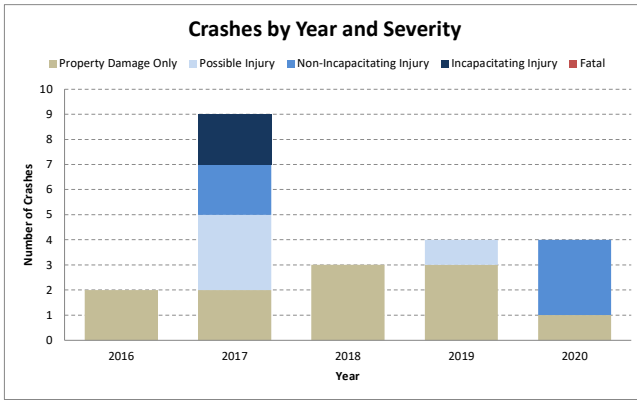


**CRASH ANALYSIS - Malabar Road at Hurley Boulevard/Hillock Avenue**

		Analysis Year					Severity					Total	Average	Percent
		2016	2017	2018	2019	2020	Property Damage Only	Possible Injury	Non-Incapacitating Injury	Incapacitating Injury	Fatal			
Type of Crash	Rear End	4	2	5	3	3	11	2	4	0	0	17	3.40	65.4%
	Angle	0	0	0	1	0	1	0	0	0	0	1	0.20	3.8%
	Left Turn	0	1	0	1	2	3	0	1	0	0	4	0.80	15.4%
	Right Turn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Sideswipe	0	0	0	1	0	1	0	0	0	0	1	0.20	3.8%
	Head On	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Off Road	0	1	0	0	0	1	0	0	0	0	1	0.20	3.8%
	Pedestrian	0	1	0	0	0	0	0	0	1	0	1	0.20	3.8%
	Bicycle	0	0	0	1	0	0	1	0	0	0	1	0.20	3.8%
	Other	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	<b>Total Crashes</b>	<b>4</b>	<b>5</b>	<b>5</b>	<b>7</b>	<b>5</b>	<b>17</b>	<b>3</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>26</b>	<b>5.25</b>	<b>100.0%</b>
Crash Severity	Property Damage Only	4	4	2	4	3					17	3.40	65.4%	
	Possible Injury	0	0	1	1	1					3	0.60	11.5%	
	Non-Incapacitating Injury	0	0	2	2	1					5	1.00	19.2%	
	Incapacitating Injury	0	1	0	0	0					1	0.20	3.8%	
	Fatal	0	0	0	0	0					0	0.00	0.0%	
Light Conditions	Daylight	4	2	4	5	4	14	3	2	0	0	19	3.80	73.1%
	Dusk	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Dawn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Dark - Lighted	0	0	0	1	1	0	0	2	0	0	2	0.40	7.7%
	Dark - Not Lighted	0	3	1	1	0	3	0	1	1	0	5	1.00	19.2%
	Dark - Lighting Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Surface Condition	Dry	4	5	4	4	4	15	3	2	1	0	21	4.20	80.8%
	Wet	0	0	1	3	1	2	0	3	0	0	5	1.00	19.2%
	Other	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Month	January	0	1	1	0	0	1	0	1	0	0	2	0.40	7.7%
	February	0	0	0	1	0	0	0	1	0	0	1	0.20	3.8%
	March	0	0	1	1	0	0	1	1	0	0	2	0.40	7.7%
	April	0	1	1	0	0	2	0	0	0	0	2	0.40	7.7%
	May	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	June	0	0	1	0	0	1	0	0	0	0	1	0.20	3.8%
	July	0	0	0	1	0	1	0	0	0	0	1	0.20	3.8%
	August	2	0	1	0	1	2	2	0	0	0	4	0.80	15.4%
	September	1	2	0	0	0	3	0	0	0	0	3	0.60	11.5%
	October	1	0	0	0	1	2	0	0	0	0	2	0.40	7.7%
	November	0	0	0	1	2	3	0	0	0	0	3	0.60	11.5%
	December	0	1	0	3	1	2	0	2	1	0	5	1.00	19.2%
Day of Week	Monday	0	0	1	2	1	2	0	2	0	0	4	0.80	15.4%
	Tuesday	0	0	2	1	0	2	0	1	0	0	3	0.60	11.5%
	Wednesday	0	0	1	1	1	2	0	1	0	0	3	0.60	11.5%
	Thursday	1	0	1	0	2	2	2	0	0	0	4	0.80	15.4%
	Friday	1	2	0	0	1	3	0	1	0	0	4	0.80	15.4%
	Saturday	2	2	0	0	0	3	0	0	1	0	4	0.80	15.4%
	Sunday	0	1	0	3	0	3	1	0	0	0	4	0.80	15.4%
Hour of Day	0:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	1:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	2:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	3:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	4:00	0	1	0	0	0	1	0	0	0	0	1	0.20	3.8%
	5:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	6:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	7:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	8:00	2	0	0	1	1	4	0	0	0	0	4	0.80	15.4%
	9:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	10:00	0	0	0	1	0	1	0	0	0	0	1	0.20	3.8%
	11:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	12:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	13:00	2	0	0	1	0	3	0	0	0	0	3	0.60	11.5%
	14:00	0	0	0	0	1	0	1	0	0	0	1	0.20	3.8%
	15:00	0	1	2	1	1	2	1	2	0	0	5	1.00	19.2%
	16:00	0	1	1	0	1	3	0	0	0	0	3	0.60	11.5%
	17:00	0	0	1	3	1	2	1	2	0	0	5	1.00	19.2%
	18:00	0	0	1	0	0	0	0	1	0	0	1	0.20	3.8%
	19:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	20:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	21:00	0	1	0	0	0	1	0	0	0	0	1	0.20	3.8%
	22:00	0	1	0	0	0	0	0	0	1	0	1	0.20	3.8%
23:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
Time Period	12AM-5AM	0	1	0	0	0	1	0	0	0	0	1	0.20	3.8%
	6AM-12PM	2	0	0	2	1	5	0	0	0	0	5	1.00	19.2%
	12PM-6PM	2	2	4	5	4	10	3	4	0	0	17	3.40	65.4%
	6PM-12AM	0	2	1	0	0	0	0	1	0	0	3	0.60	11.5%
Alcohol & Drugs	None	4	5	5	7	4	17	3	4	1	0	25	5.00	96.2%
	Alcohol Involved	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Drugs Involved	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Distraction Related	Alcohol and Drugs	0	0	0	0	1	0	0	1	0	0	1	0.20	3.8%
	Y	2	1	1	0	2	6	0	0	0	0	6	1.20	23.1%
	N	2	4	4	7	3	11	3	5	1	0	20	4.00	76.9%



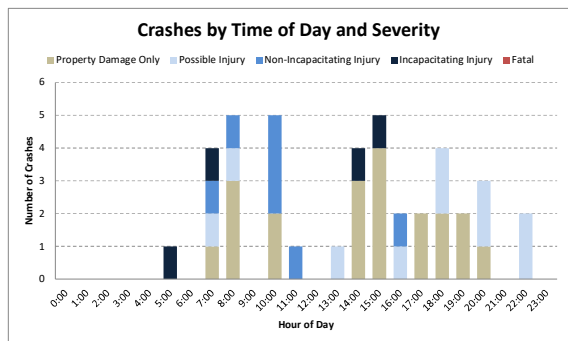
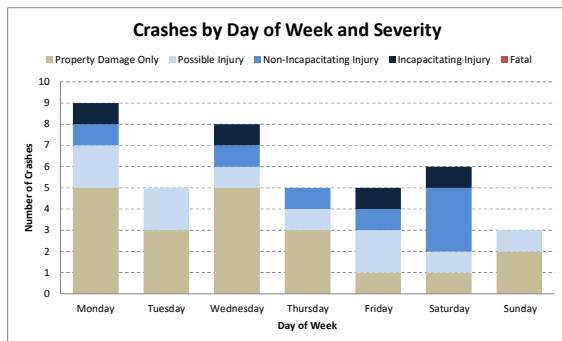
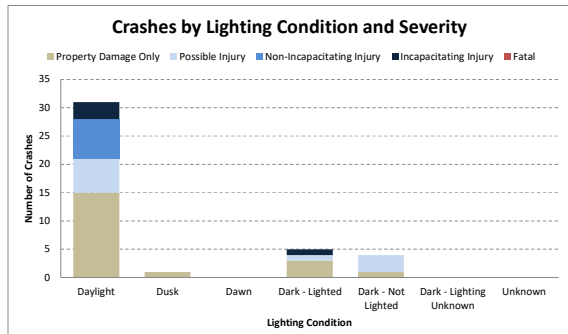
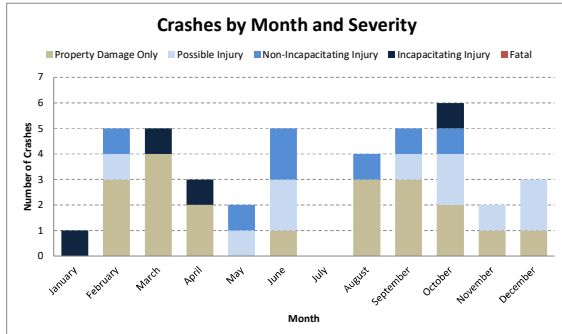
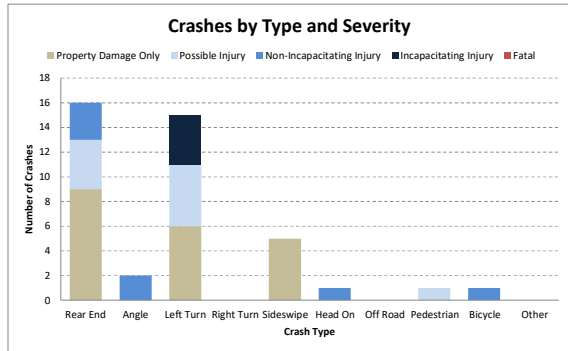
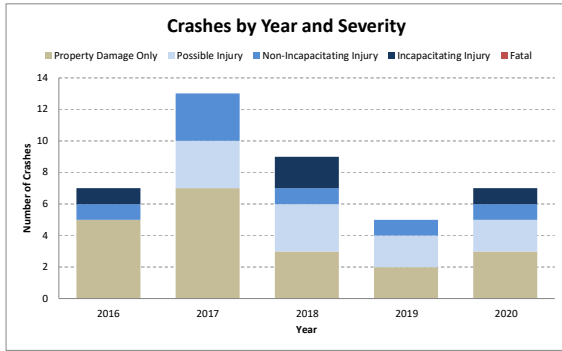
**CRASH ANALYSIS - Malabar Road from Jupiter Blvd. to Santa Rosa Ave.**



**CRASH ANALYSIS - Malabar Road from Jupiter Blvd. to Santa Rosa Ave.**

		Analysis Year					Severity					Total	Average	Percent
		2016	2017	2018	2019	2020	Property Damage Only	Possible Injury	Non-Incapacitating Injury	Incapacitating Injury	Fatal			
Type of Crash	Rear End	2	7	3	4	3	10	2	5	2	0	19	3.80	86.4%
	Angle	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Left Turn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Right Turn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Head On	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Off Road	0	1	0	0	0	0	1	0	0	0	1	0.20	4.5%
	Pedestrian	0	1	0	0	0	0	1	0	0	0	1	0.20	4.5%
	Bicycle	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Other	0	0	0	0	1	1	0	0	0	0	1	0.20	4.5%
	<b>Total Crashes</b>	<b>2</b>	<b>9</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>11</b>	<b>4</b>	<b>5</b>	<b>2</b>	<b>0</b>	<b>22</b>	<b>4.50</b>	<b>100.0%</b>
Crash Severity	Property Damage Only	2	2	3	3	1						11	2.20	50.0%
	Possible Injury	0	3	0	1	0						4	0.80	18.2%
	Non-Incapacitating Injury	0	2	0	0	3						5	1.00	22.7%
	Incapacitating Injury	0	2	0	0	0						2	0.40	9.1%
Fatal	0	0	0	0	0						0	0.00	0.0%	
Light Conditions	Daylight	2	7	3	4	4	11	3	5	1	0	20	4.00	90.9%
	Dusk	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Dawn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Dark - Lighted	0	1	0	0	0	0	0	0	1	0	1	0.20	4.5%
	Dark - Not Lighted	0	1	0	0	0	0	1	0	0	0	1	0.20	4.5%
	Dark - Lighting Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Surface Condition	Dry	2	6	2	3	4	9	2	5	1	0	17	3.40	77.3%
	Wet	0	3	1	1	0	2	2	0	1	0	5	1.00	22.7%
	Other	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Month	January	0	0	1	0	0	1	0	0	0	0	1	0.20	4.5%
	February	0	3	0	0	0	1	1	0	1	0	3	0.60	13.6%
	March	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	April	0	1	0	1	1	1	1	1	0	0	3	0.60	13.6%
	May	1	1	0	0	2	2	0	2	0	0	4	0.80	18.2%
	June	0	0	0	1	0	1	0	0	0	0	1	0.20	4.5%
	July	1	0	0	0	0	1	0	0	0	0	1	0.20	4.5%
	August	0	1	0	2	1	2	1	1	0	0	4	0.80	18.2%
	September	0	1	0	0	0	0	0	1	0	0	1	0.20	4.5%
	October	0	2	0	0	0	0	1	0	1	0	2	0.40	9.1%
	November	0	0	1	0	0	1	0	0	0	0	1	0.20	4.5%
	December	0	0	1	0	0	1	0	0	0	0	1	0.20	4.5%
Day of Week	Monday	0	2	1	1	0	2	1	1	0	0	4	0.80	18.2%
	Tuesday	0	1	0	0	1	0	0	2	0	0	2	0.40	9.1%
	Wednesday	0	4	1	0	0	3	1	0	1	0	5	1.00	22.7%
	Thursday	0	1	1	1	1	2	0	1	1	0	4	0.80	18.2%
	Friday	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Saturday	1	0	0	2	1	2	1	1	0	0	4	0.80	18.2%
	Sunday	1	1	0	0	1	2	1	0	0	0	3	0.60	13.6%
Hour of Day	0:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	1:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	2:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	3:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	4:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	5:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	6:00	0	1	0	0	0	0	0	0	1	0	1	0.20	4.5%
	7:00	0	1	0	0	0	0	1	0	0	0	1	0.20	4.5%
	8:00	0	1	1	0	0	2	0	0	0	0	2	0.40	9.1%
	9:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	10:00	0	1	0	0	0	0	1	0	0	0	1	0.20	4.5%
	11:00	1	0	0	0	0	1	0	0	0	0	1	0.20	4.5%
	12:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	13:00	0	0	0	0	1	0	0	1	0	0	1	0.20	4.5%
	14:00	0	1	0	0	0	0	0	0	1	0	1	0.20	4.5%
	15:00	0	0	1	1	2	2	0	2	0	0	4	0.80	18.2%
	16:00	1	1	0	1	0	1	1	1	0	0	3	0.60	13.6%
	17:00	0	1	1	1	1	4	0	0	0	0	4	0.80	18.2%
	18:00	0	1	0	1	0	1	0	1	0	0	2	0.40	9.1%
	19:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	20:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	21:00	0	1	0	0	0	0	1	0	0	0	1	0.20	4.5%
	22:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
23:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
Time Period	12AM-5AM	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	6AM-12PM	1	4	1	0	0	3	2	1	0	6	1.20	27.3%	
	12PM-6PM	1	3	2	3	4	7	1	4	1	0	13	2.60	59.1%
	6PM-12AM	0	2	0	1	0	1	1	1	0	0	3	0.60	13.6%
Alcohol & Drugs	None	2	9	3	3	4	11	3	5	2	0	21	4.20	95.5%
	Alcohol Involved	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Drugs Involved	0	0	0	1	0	0	1	0	0	0	1	0.20	4.5%
Distraction Related	Alcohol and Drugs	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Y	0	4	0	0	2	1	0	3	2	0	6	1.20	27.3%
N	2	5	3	4	2	10	4	2	0	0	16	3.20	72.7%	

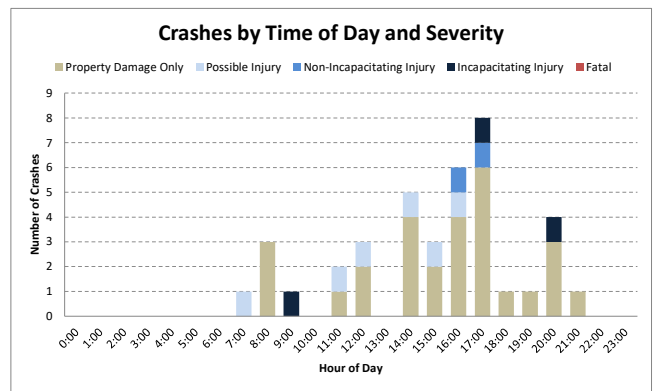
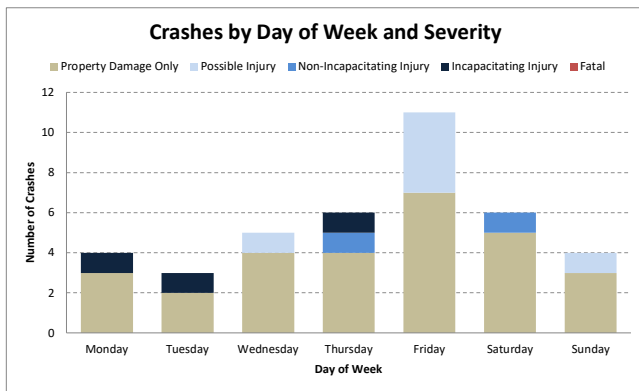
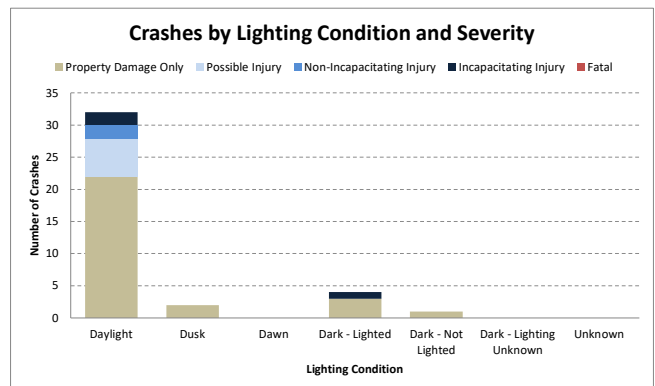
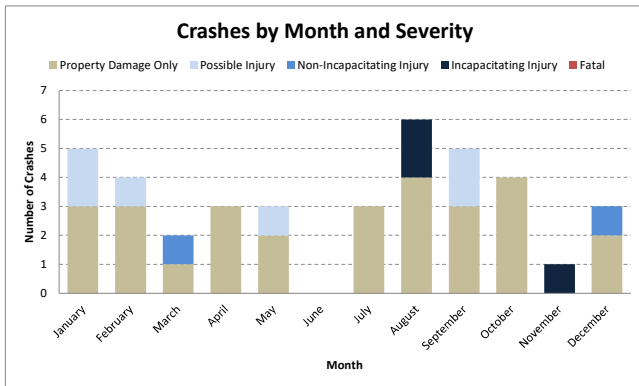
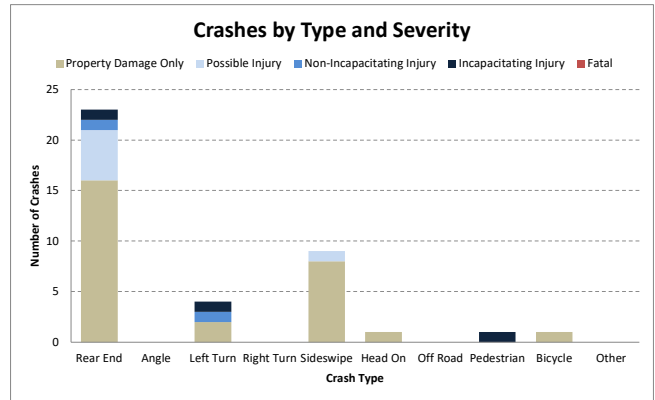
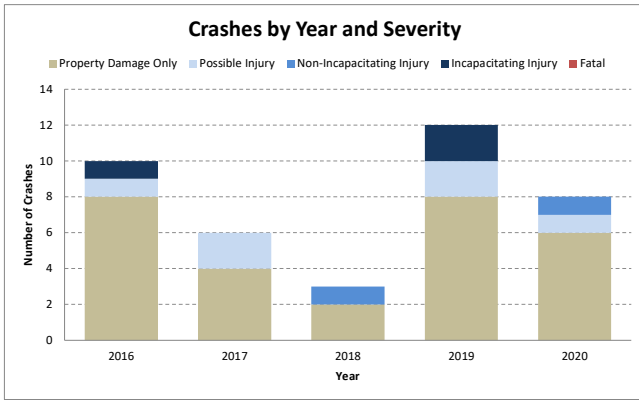
**CRASH ANALYSIS - Malabar Road at Maywood Avenue/Daffodil Drive**



**CRASH ANALYSIS - Malabar Road at Maywood Avenue/Daffodil Drive**

		Analysis Year					Severity					Total	Average	Percent
		2016	2017	2018	2019	2020	Property Damage Only	Possible Injury	Non-Incapacitating Injury	Incapacitating Injury	Fatal			
Type of Crash	Rear End	4	6	2	3	1	9	4	3	0	0	16	3.20	39.0%
	Angle	0	0	1	1	0	0	0	2	0	0	2	0.40	4.9%
	Left Turn	2	4	4	1	4	6	5	0	4	0	15	3.00	36.6%
	Right Turn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Sideswipe	1	2	1	0	1	5	0	0	0	0	5	1.00	12.2%
	Head On	0	1	0	0	0	0	0	1	0	0	1	0.20	2.4%
	Off Road	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Pedestrian	0	0	1	0	0	0	1	0	0	0	1	0.20	2.4%
	Bicycle	0	0	0	0	1	0	0	1	0	0	1	0.20	2.4%
	Other	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	<b>Total Crashes</b>	<b>7</b>	<b>13</b>	<b>9</b>	<b>5</b>	<b>7</b>	<b>20</b>	<b>10</b>	<b>7</b>	<b>4</b>	<b>0</b>	<b>41</b>	<b>8.50</b>	<b>100.0%</b>
Crash Severity	Property Damage Only	5	7	3	2	3						20	4.00	48.8%
	Possible Injury	0	3	3	2	2						10	2.00	24.4%
	Non-Incapacitating Injury	1	3	1	1	1						7	1.40	17.1%
	Incapacitating Injury	1	0	2	0	1						4	0.80	9.8%
	Fatal	0	0	0	0	0						0	0.00	0.0%
Light Conditions	Daylight	4	10	8	5	4	15	6	7	3	0	31	6.20	75.6%
	Dusk	0	1	0	0	0	1	0	0	0	0	1	0.20	2.4%
	Dawn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Dark - Lighted	2	2	0	0	1	3	1	0	1	0	5	1.00	12.2%
	Dark - Not Lighted	1	0	1	0	2	1	3	0	0	0	4	0.80	9.8%
	Dark - Lighting Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Surface Condition	Dry	7	10	7	5	7	18	7	7	4	0	36	7.20	87.8%
	Wet	0	3	2	0	0	2	3	0	0	0	5	1.00	12.2%
	Other	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
		0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Month	January	1	0	0	0	0	0	0	0	1	0	1	0.20	2.4%
	February	1	3	1	0	0	3	1	1	0	0	5	1.00	12.2%
	March	1	2	1	0	1	4	0	0	1	0	5	1.00	12.2%
	April	1	0	2	0	0	2	0	0	1	0	3	0.60	7.3%
	May	0	1	1	0	0	0	1	1	0	0	2	0.40	4.9%
	June	0	3	0	1	1	1	2	2	0	0	5	1.00	12.2%
	July	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	August	2	1	0	1	0	3	0	1	0	0	4	0.80	9.8%
	September	0	1	2	1	1	3	1	1	0	0	5	1.00	12.2%
	October	1	2	0	1	2	2	2	1	1	0	6	1.20	14.6%
	November	0	0	2	0	0	1	1	0	0	0	2	0.40	4.9%
	December	0	0	0	1	2	1	2	0	0	0	3	0.60	7.3%
Day of Week	Monday	1	4	1	1	2	5	2	1	1	0	9	1.80	22.0%
	Tuesday	1	1	1	2	0	3	2	0	0	0	5	1.00	12.2%
	Wednesday	1	3	2	0	2	5	1	1	1	0	8	1.60	19.5%
	Thursday	0	2	0	2	1	3	1	1	0	0	5	1.00	12.2%
	Friday	1	1	2	0	1	1	2	1	1	0	5	1.00	12.2%
	Saturday	1	2	2	0	1	1	1	3	1	0	6	1.20	14.6%
	Sunday	2	0	1	0	0	2	1	0	0	0	3	0.60	7.3%
		0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Hour of Day	0:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	1:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	2:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	3:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	4:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	5:00	1	0	0	0	0	0	0	0	1	0	1	0.20	2.4%
	6:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	7:00	0	2	2	0	0	1	1	1	1	0	4	0.80	9.8%
	8:00	1	2	1	1	0	3	1	1	0	0	5	1.00	12.2%
	9:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	10:00	1	2	0	2	0	2	0	3	0	0	5	1.00	12.2%
	11:00	0	1	0	0	0	0	0	1	0	0	1	0.20	2.4%
	12:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	13:00	0	0	1	0	0	0	1	0	0	0	1	0.20	2.4%
	14:00	0	1	2	0	1	3	0	0	1	0	4	0.80	9.8%
	15:00	2	1	0	0	2	4	0	0	1	0	5	1.00	12.2%
	16:00	0	0	0	1	1	0	1	1	0	0	2	0.40	4.9%
	17:00	0	1	1	0	0	2	0	0	0	0	2	0.40	4.9%
	18:00	0	1	1	1	1	2	2	0	0	0	4	0.80	9.8%
	19:00	1	1	0	0	0	2	0	0	0	0	2	0.40	4.9%
	20:00	1	0	0	0	2	1	2	0	0	0	3	0.60	7.3%
	21:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	22:00	0	1	1	0	0	0	2	0	0	0	2	0.40	4.9%
23:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
Time Period	12AM-5AM	1	0	0	0	0	0	0	1	0	1	0.20	2.4%	
	6AM-12PM	2	7	3	3	0	6	2	6	1	15	3.00	36.6%	
	12PM-6PM	2	3	4	1	4	9	2	1	2	0	14	2.80	34.1%
	6PM-12AM	2	3	2	1	3	5	6	0	0	0	11	2.20	26.8%
	None	6	12	9	5	7	20	9	7	3	0	39	7.80	95.1%
Alcohol & Drugs	Alcohol Involved	1	1	0	0	0	0	1	0	1	0	2	0.40	4.9%
	Drugs Involved	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Alcohol and Drugs	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Distraction Related	Y	0	4	1	0	1	2	2	2	0	0	6	1.20	14.6%
	N	7	9	8	5	6	18	8	5	4	0	35	7.00	85.4%

**CRASH ANALYSIS - Malabar Road from Maywood Avenue/Daffodil Drive to Plaza Shopping Center**

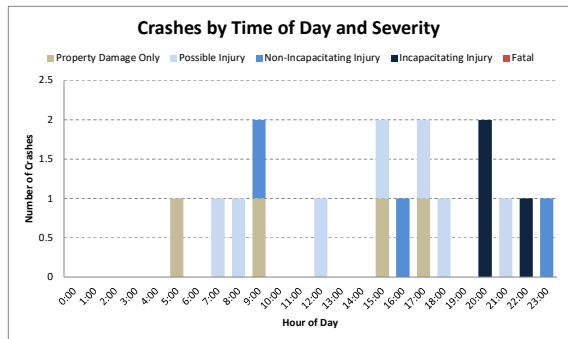
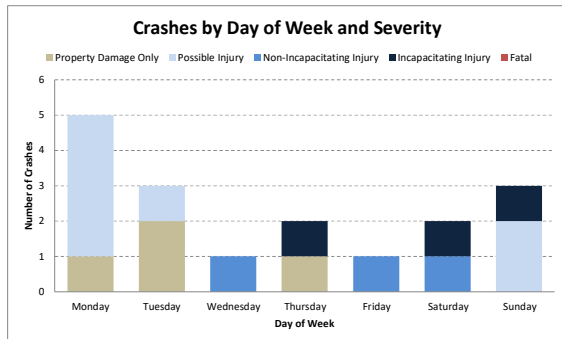
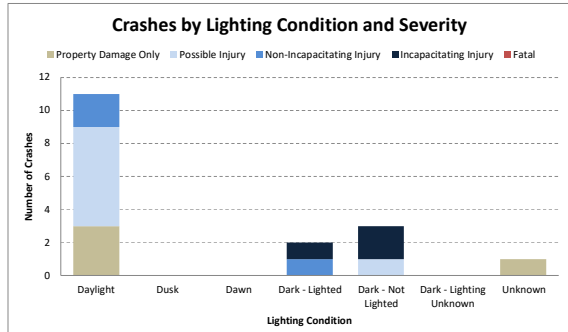
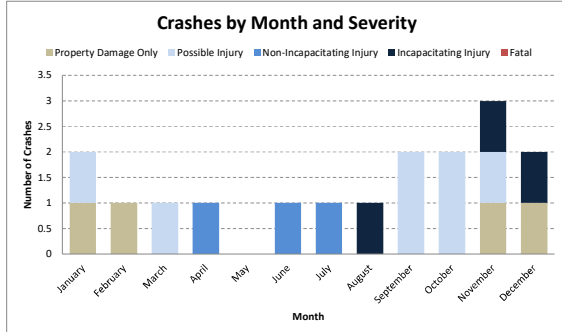
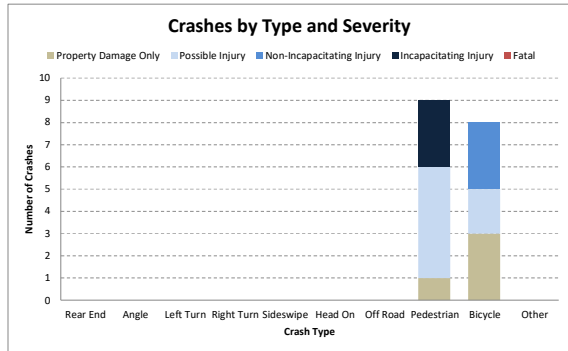
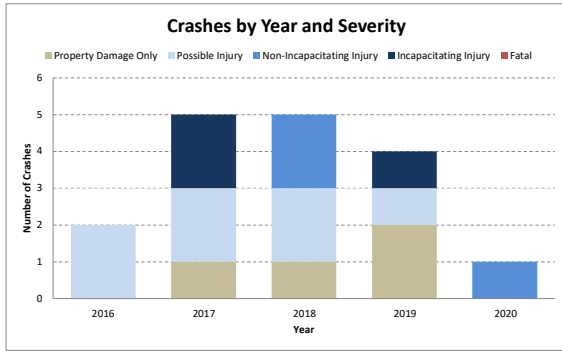


**CRASH ANALYSIS - Malabar Road from Maywood Avenue/Daffodil Drive to Plaza Shopping Center**

		Analysis Year					Severity					Total	Average	Percent
		2016	2017	2018	2019	2020	Property Damage Only	Possible Injury	Non-Incapacitating Injury	Incapacitating Injury	Fatal			
Type of Crash	Rear End	7	5	0	8	3	16	5	1	1	0	23	4.60	59.0%
	Angle	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Left Turn	2	0	1	0	1	2	0	1	1	0	4	0.80	10.3%
	Right Turn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Sideswipe	1	1	1	2	4	8	1	0	0	0	9	1.80	23.1%
	Head On	0	0	0	1	0	1	0	0	0	0	1	0.20	2.6%
	Off Road	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Pedestrian	0	0	0	1	0	0	0	0	1	0	1	0.20	2.6%
	Bicycle	0	0	1	0	0	1	0	0	0	0	1	0.20	2.6%
	Other	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	<b>Total Crashes</b>	<b>10</b>	<b>6</b>	<b>3</b>	<b>12</b>	<b>8</b>	<b>28</b>	<b>6</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>39</b>	<b>7.75</b>	<b>100.0%</b>
Crash Severity	Property Damage Only	8	4	2	8	6					28	5.60	71.8%	
	Possible Injury	1	2	0	2	1					6	1.20	15.4%	
	Non-Incapacitating Injury	0	0	1	0	1					2	0.40	5.1%	
	Incapacitating Injury	1	0	0	2	0					3	0.60	7.7%	
	Fatal	0	0	0	0	0					0	0.00	0.0%	
Light Conditions	Daylight	9	5	2	9	7	22	6	2	2	0	32	6.40	82.1%
	Dusk	0	0	0	1	1	2	0	0	0	0	2	0.40	5.1%
	Dawn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Dark - Lighted	1	0	1	2	0	3	0	0	1	0	4	0.80	10.3%
	Dark - Not Lighted	0	1	0	0	0	1	0	0	0	0	1	0.20	2.6%
	Dark - Lighting Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Surface Condition	Dry	8	5	3	11	7	27	3	2	2	0	34	6.80	87.2%
	Wet	2	1	0	1	1	1	3	0	1	0	5	1.00	12.8%
	Other	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Month	January	1	0	0	2	2	3	2	0	0	0	5	1.00	12.8%
	February	0	1	1	2	0	3	1	0	0	0	4	0.80	10.3%
	March	0	0	0	1	1	1	0	1	0	0	2	0.40	5.1%
	April	1	0	0	1	1	3	0	0	0	0	3	0.60	7.7%
	May	1	1	0	1	0	2	1	0	0	0	3	0.60	7.7%
	June	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	July	2	0	0	0	1	3	0	0	0	0	3	0.60	7.7%
	August	2	1	0	3	0	4	0	0	2	0	6	1.20	15.4%
	September	1	1	0	1	2	3	2	0	0	0	5	1.00	12.8%
	October	1	2	1	0	0	4	0	0	0	0	4	0.80	10.3%
	November	1	0	0	0	0	0	0	0	1	0	1	0.20	2.6%
	December	0	0	1	1	1	2	0	1	0	0	3	0.60	7.7%
Day of Week	Monday	1	1	0	2	0	3	0	0	1	0	4	0.80	10.3%
	Tuesday	2	0	0	1	0	2	0	0	1	0	3	0.60	7.7%
	Wednesday	2	0	0	3	0	4	1	0	0	0	5	1.00	12.8%
	Thursday	0	1	1	2	2	4	0	1	1	0	6	1.20	15.4%
	Friday	3	2	0	3	3	7	4	0	0	0	11	2.20	28.2%
	Saturday	1	1	1	1	2	5	0	1	0	0	6	1.20	15.4%
	Sunday	1	1	1	0	1	3	1	0	0	0	4	0.80	10.3%
		0:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Hour of Day	1:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	2:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	3:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	4:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	5:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	6:00	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	7:00	0	0	0	0	1	0	1	0	0	0	1	0.20	2.6%
	8:00	1	2	0	0	0	3	0	0	0	0	3	0.60	7.7%
	9:00	1	0	0	0	0	0	0	0	1	0	1	0.20	2.6%
	10:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	11:00	2	0	0	0	0	1	1	0	0	0	2	0.40	5.1%
	12:00	2	1	0	0	0	2	1	0	0	0	3	0.60	7.7%
	13:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	14:00	0	0	0	2	3	4	1	0	0	0	5	1.00	12.8%
	15:00	1	2	0	0	0	2	1	0	0	0	3	0.60	7.7%
	16:00	2	0	1	2	1	4	1	1	0	0	6	1.20	15.4%
	17:00	0	0	1	4	3	6	0	1	1	0	8	1.60	20.5%
	18:00	0	0	0	1	0	1	0	0	0	0	1	0.20	2.6%
	19:00	0	0	0	1	0	1	0	0	0	0	1	0.20	2.6%
	20:00	1	0	1	2	0	3	0	0	1	0	4	0.80	10.3%
	21:00	0	1	0	0	0	1	0	0	0	0	1	0.20	2.6%
	22:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	23:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Time Period	12AM-5AM	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	6AM-12PM	4	2	0	0	1	4	2	1	0	7	1.40	17.9%	
	12PM-6PM	5	3	2	8	7	18	4	2	1	25	5.00	64.1%	
	6PM-12AM	1	1	1	4	0	6	0	1	0	7	1.40	17.9%	
Alcohol & Drugs	None	10	6	3	11	8	28	6	2	2	38	7.60	97.4%	
	Alcohol Involved	0	0	0	1	0	0	0	1	0	1	0.20	2.6%	
	Drugs Involved	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
	Alcohol and Drugs	0	0	0	0	0	0	0	0	0	0	0.00	0.0%	
Distraction Related	Y	1	3	0	1	1	3	2	1	0	6	1.20	15.4%	
	N	9	3	3	11	7	25	4	1	3	33	6.60	84.6%	



**CRASH ANALYSIS - Malabar Road from St. Johns Heritage Pkwy. to Minton Rd. (Pedestrian and Bicycle Crashes)**



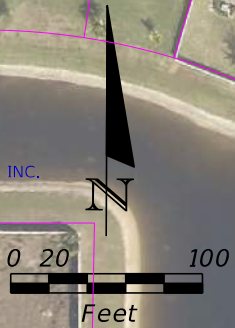
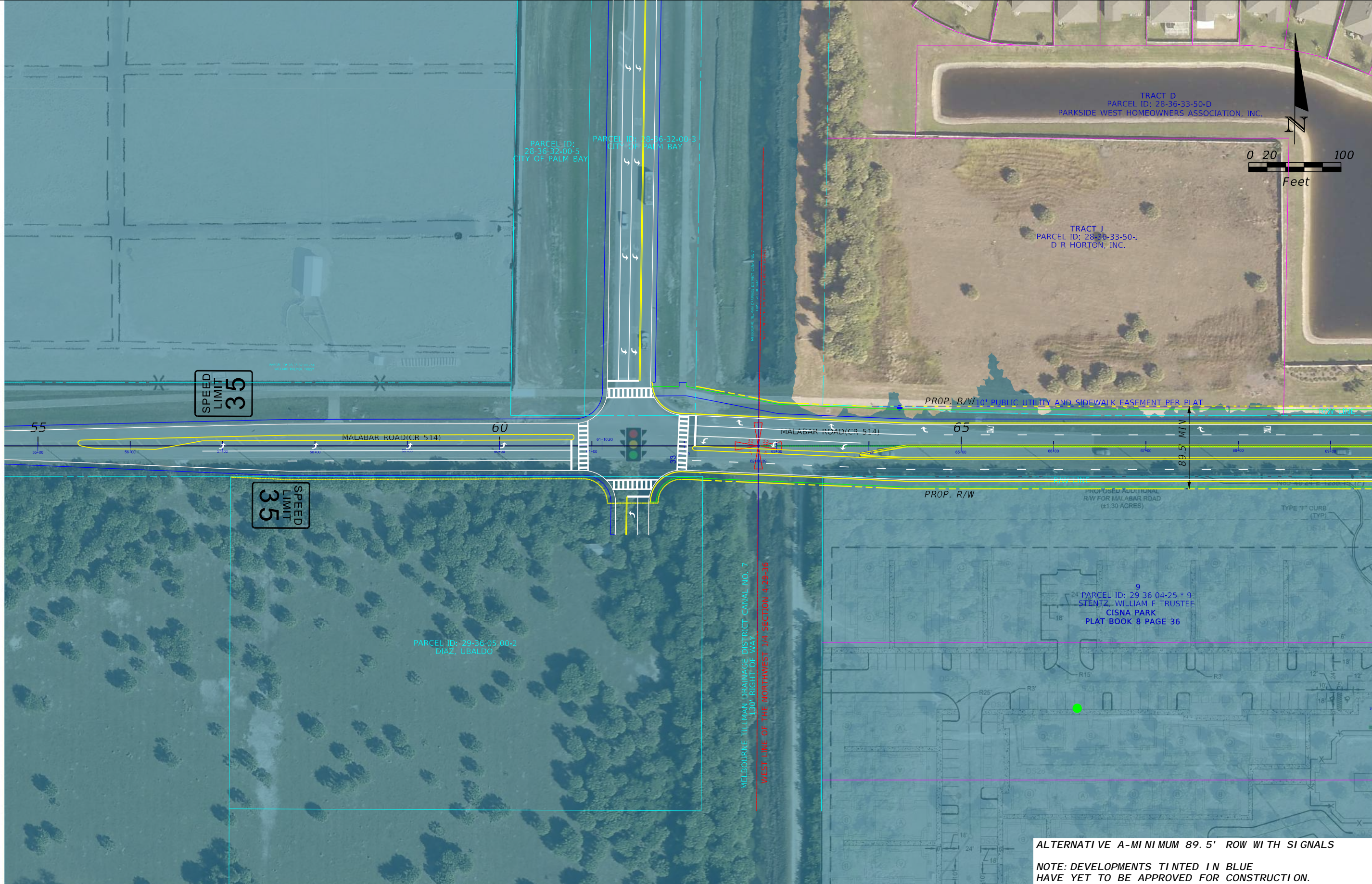
**CRASH ANALYSIS - Malabar Road from St. Johns Heritage Pkwy. to Minton Rd. (Pedestrian and Bicycle Crashes)**

		Analysis Year					Severity					Total	Average	Percent
		2016	2017	2018	2019	2020	Property Damage Only	Possible Injury	Non-Incapacitating Injury	Incapacitating Injury	Fatal			
Type of Crash	Rear End	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Angle	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Left Turn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Right Turn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Head On	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Off Road	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Pedestrian	2	3	2	2	0	1	5	0	3	0	9	1.80	52.9%
	Bicycle	0	2	3	2	1	3	2	3	0	0	8	1.60	47.1%
	Other	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	<b>Total Crashes</b>	<b>2</b>	<b>5</b>	<b>5</b>	<b>4</b>	<b>1</b>	<b>4</b>	<b>7</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>17</b>	<b>4.00</b>	<b>100.0%</b>
Crash Severity	Property Damage Only	0	1	1	2	0						4	0.80	23.5%
	Possible Injury	2	2	2	1	0						7	1.40	41.2%
	Non-Incapacitating Injury	0	0	2	0	1						3	0.60	17.6%
	Incapacitating Injury	0	2	0	1	0						3	0.60	17.6%
	Fatal	0	0	0	0	0						0	0.00	0.0%
Light Conditions	Daylight	1	3	4	2	1	3	6	2	0	0	11	2.20	64.7%
	Dusk	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Dawn	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Dark - Lighted	0	0	1	1	0	0	0	1	1	0	2	0.40	11.8%
	Dark - Not Lighted	1	2	0	0	0	0	1	0	2	0	3	0.60	17.6%
	Dark - Lighting Unknown	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Unknown	0	0	0	1	0	1	0	0	0	0	1	0.20	5.9%
Surface Condition	Dry	1	4	5	1	1	2	5	3	2	0	12	2.40	70.6%
	Wet	1	1	0	3	0	2	2	0	1	0	5	1.00	29.4%
	Other	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Month	January	0	1	0	1	0	1	1	0	0	0	2	0.40	11.8%
	February	0	0	1	0	0	1	0	0	0	0	1	0.20	5.9%
	March	0	0	0	1	0	0	1	0	0	0	1	0.20	5.9%
	April	0	0	1	0	0	0	0	1	0	0	1	0.20	5.9%
	May	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	June	0	0	0	0	1	0	0	1	0	0	1	0.20	5.9%
	July	0	0	1	0	0	0	0	1	0	0	1	0.20	5.9%
	August	0	0	0	1	0	0	0	0	1	0	1	0.20	5.9%
	September	1	0	1	0	0	0	2	0	0	0	2	0.40	11.8%
	October	1	1	0	0	0	0	2	0	0	0	2	0.40	11.8%
	November	0	2	1	0	0	1	1	0	1	0	3	0.60	17.6%
	December	0	1	0	1	0	1	0	0	1	0	2	0.40	11.8%
Day of Week	Monday	2	1	1	1	0	1	4	0	0	0	5	1.00	29.4%
	Tuesday	0	2	0	1	0	2	1	0	0	0	3	0.60	17.6%
	Wednesday	0	0	1	0	0	0	0	1	0	0	1	0.20	5.9%
	Thursday	0	0	1	1	0	1	0	0	1	0	2	0.40	11.8%
	Friday	0	0	1	0	0	0	0	1	0	0	1	0.20	5.9%
	Saturday	0	1	0	0	1	0	0	1	1	0	2	0.40	11.8%
	Sunday	0	1	1	1	0	0	2	0	1	0	3	0.60	17.6%
		0:00	0	0	0	0	0	0	0	0	0	0	0	0.00
Hour of Day	1:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	2:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	3:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	4:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	5:00	0	0	0	1	0	1	0	0	0	0	1	0.20	5.9%
	6:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	7:00	0	1	0	0	0	0	1	0	0	0	1	0.20	5.9%
	8:00	0	0	1	0	0	0	1	0	0	0	1	0.20	5.9%
	9:00	0	0	1	1	0	1	0	1	0	0	2	0.40	11.8%
	10:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	11:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	12:00	0	1	0	0	0	0	1	0	0	0	1	0.20	5.9%
	13:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	14:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	15:00	1	1	0	0	0	1	1	0	0	0	2	0.40	11.8%
	16:00	0	0	0	0	1	0	0	1	0	0	1	0.20	5.9%
	17:00	0	0	1	1	0	1	1	0	0	0	2	0.40	11.8%
	18:00	0	0	1	0	0	0	1	0	0	0	1	0.20	5.9%
	19:00	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	20:00	0	1	0	1	0	0	0	0	2	0	2	0.40	11.8%
	21:00	1	0	0	0	0	0	1	0	0	0	1	0.20	5.9%
	22:00	0	1	0	0	0	0	0	0	1	0	1	0.20	5.9%
	23:00	0	0	1	0	0	0	0	1	0	0	1	0.20	5.9%
Time Period	12AM-6AM	0	0	0	1	0	1	0	0	0	0	1	0.20	5.9%
	6AM-12PM	0	1	2	1	0	1	2	1	0	0	4	0.80	23.5%
	12PM-6PM	1	2	1	1	1	2	3	1	0	0	6	1.20	35.3%
	6PM-12AM	1	2	2	1	0	0	2	1	3	0	6	1.20	35.3%
Alcohol & Drugs	None	2	5	4	3	1	4	7	2	2	0	15	3.00	88.2%
	Alcohol Involved	0	0	1	1	0	0	0	1	1	0	2	0.40	11.8%
	Drugs Involved	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
	Alcohol and Drugs	0	0	0	0	0	0	0	0	0	0	0	0.00	0.0%
Distraction Related	Y	0	0	1	0	0	0	1	0	0	0	1	0.20	5.9%
	N	2	5	4	4	1	4	6	3	3	0	16	3.20	94.1%

## Appendix C – Alternatives A and B Concept Plans

# **Alternative A Concept Plan**





SPEED LIMIT 35

SPEED LIMIT 35

MATCH LINE 69+50

ALTERNATIVE A-MINIMUM 89.5' ROW WITH SIGNALS

NOTE: DEVELOPMENTS TINTED IN BLUE HAVE YET TO BE APPROVED FOR CONSTRUCTION.

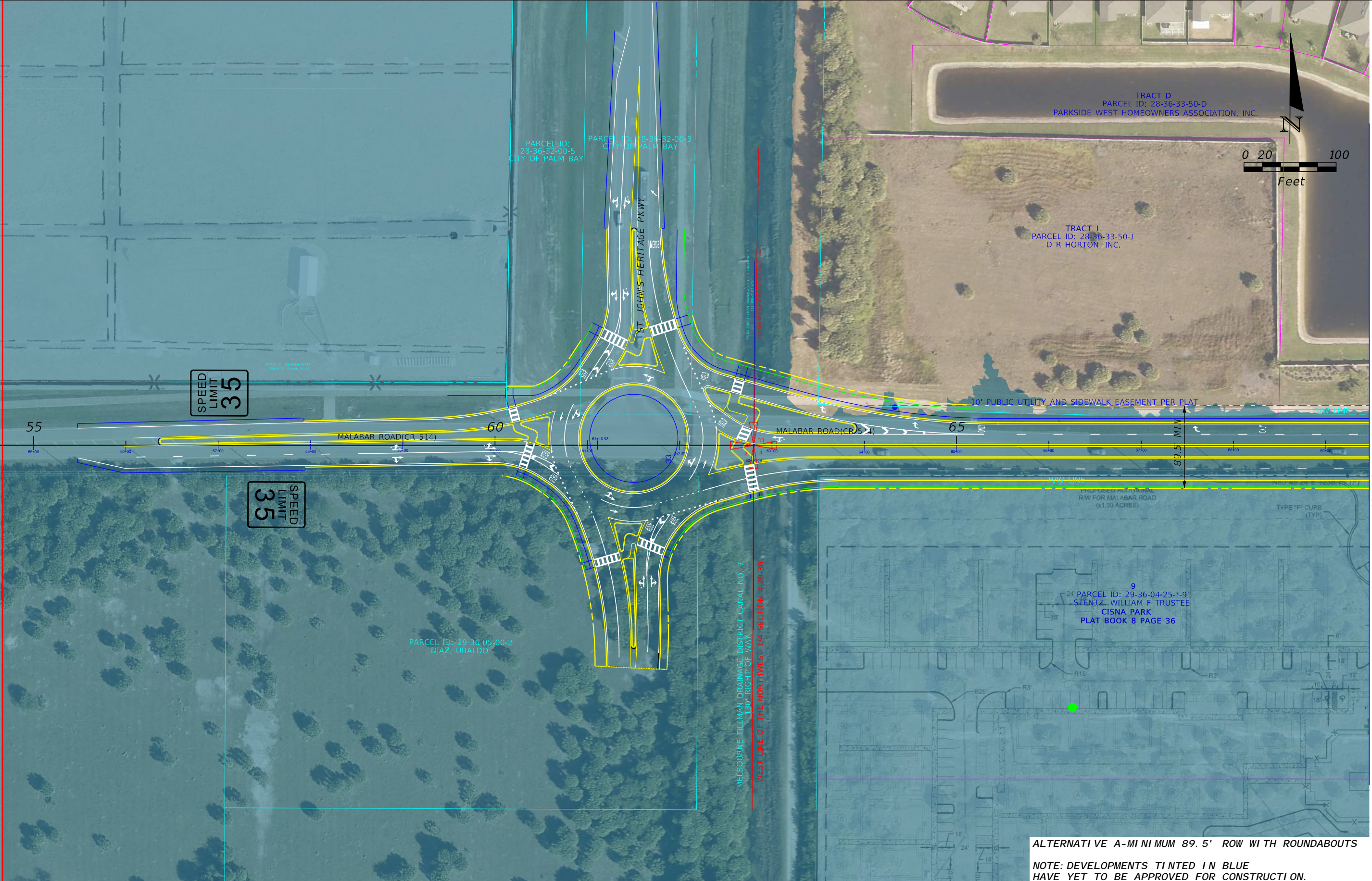
LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

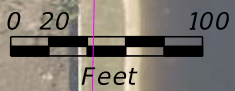
SHEET NO.  
C-2  
1





SPEED LIMIT 35

SPEED LIMIT 35



MATCH LINE 69+50

ALTERNATIVE A-MINI MUM 89.5' ROW WITH ROUNDABOUTS

NOTE: DEVELOPMENTS TINTED IN BLUE HAVE YET TO BE APPROVED FOR CONSTRUCTION.

LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	437210-1-28-01

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

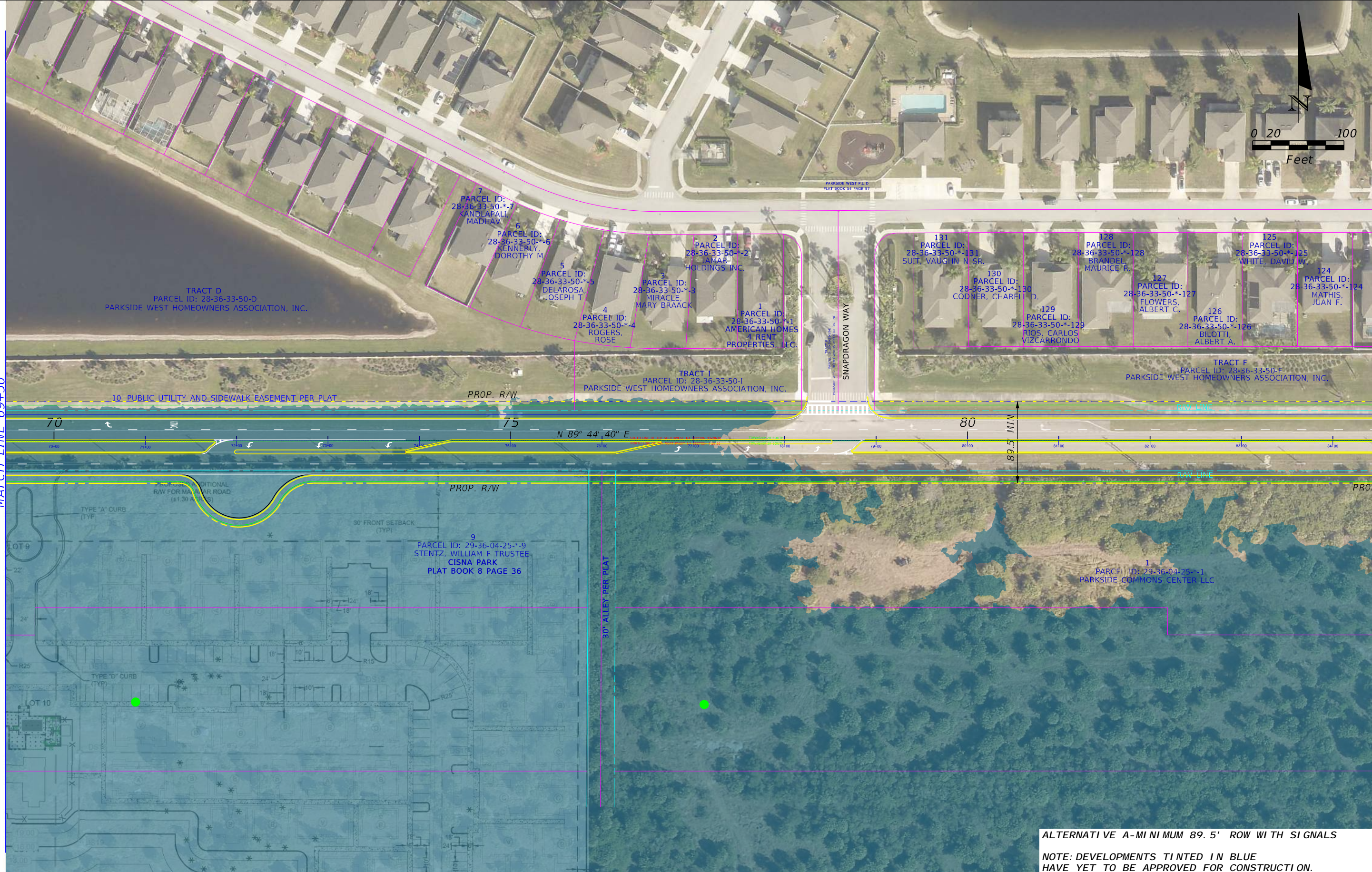
SHEET NO.  
C-3  
1A





MATCH LINE 69+50

MATCH LINE 84+50



ALTERNATIVE A-MINIMUM 89.5' ROW WITH SIGNALS  
 NOTE: DEVELOPMENTS TINTED IN BLUE  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

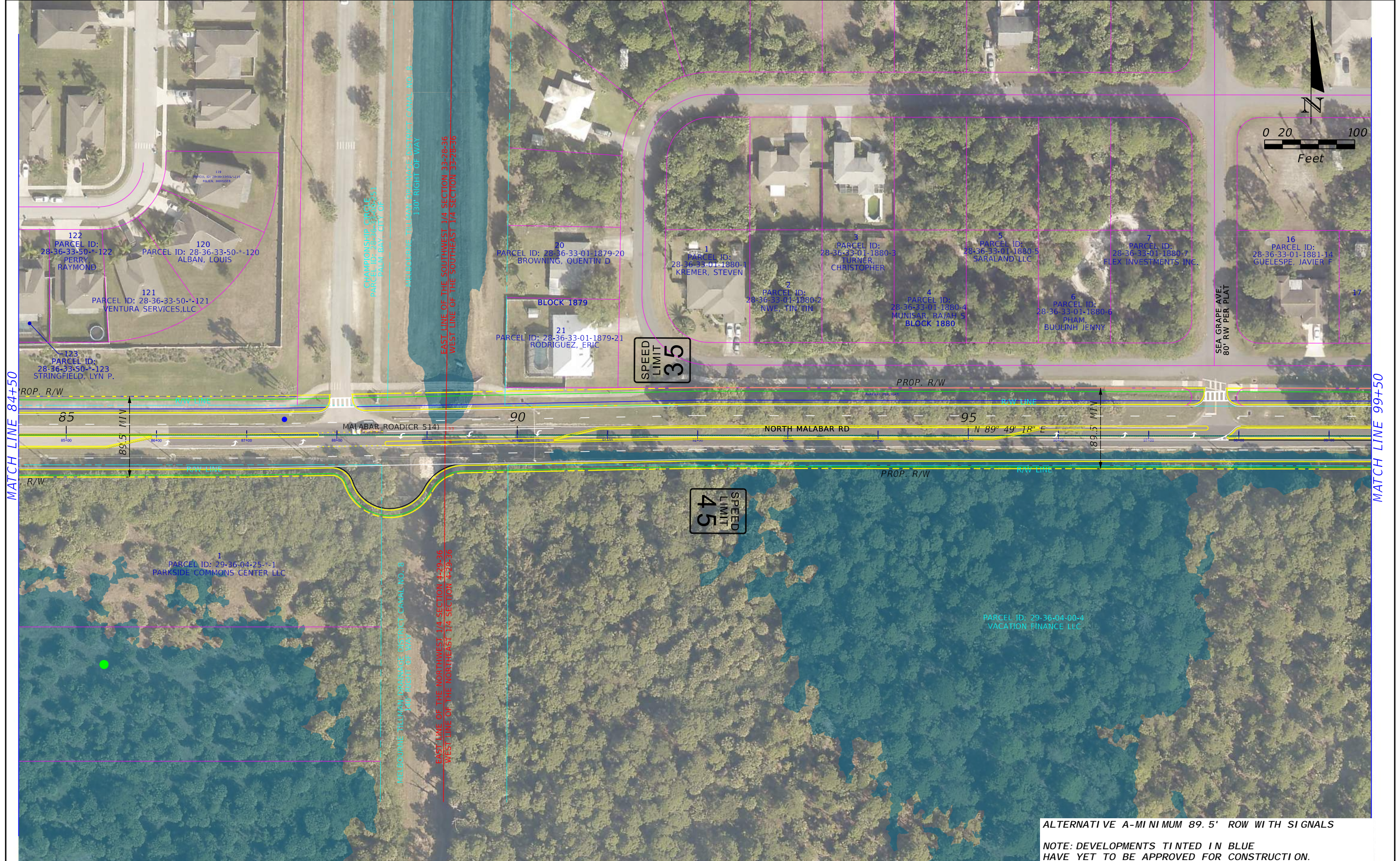
LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	437210-1-28-01

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.
C-4 2





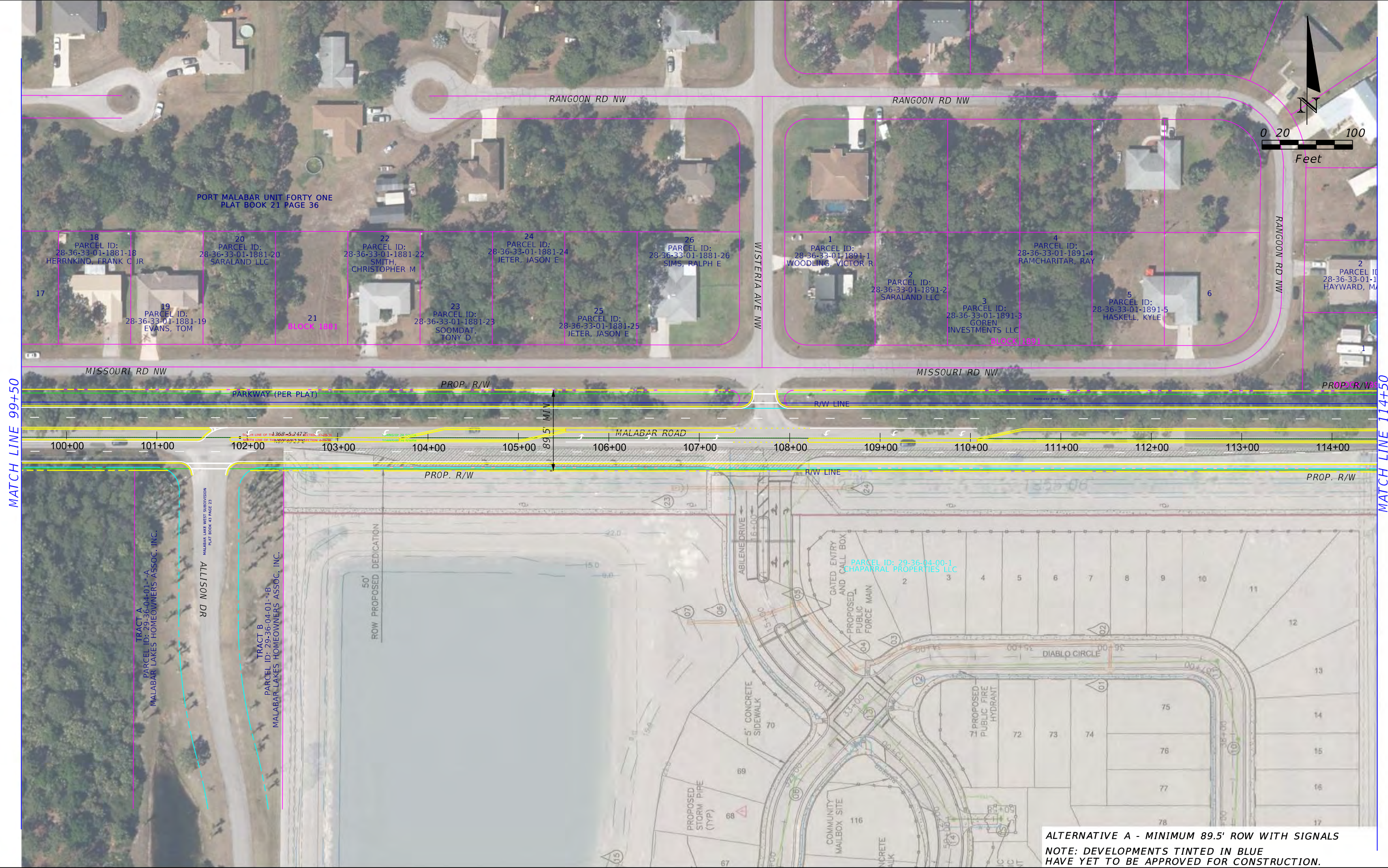
ALTERNATIVE A-MI NIMUM 89.5' ROW WITH SIGNALS  
 NOTE: DEVELOPMENTS TINTED IN BLUE  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	437210-1-28-01

MALABAR ROAD PD&E STUDY	
PLANSHEET	
SHEET NO.	C-5
	3





ALTERNATIVE A - MINIMUM 89.5' ROW WITH SIGNALS  
 NOTE: DEVELOPMENTS TINTED IN BLUE  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

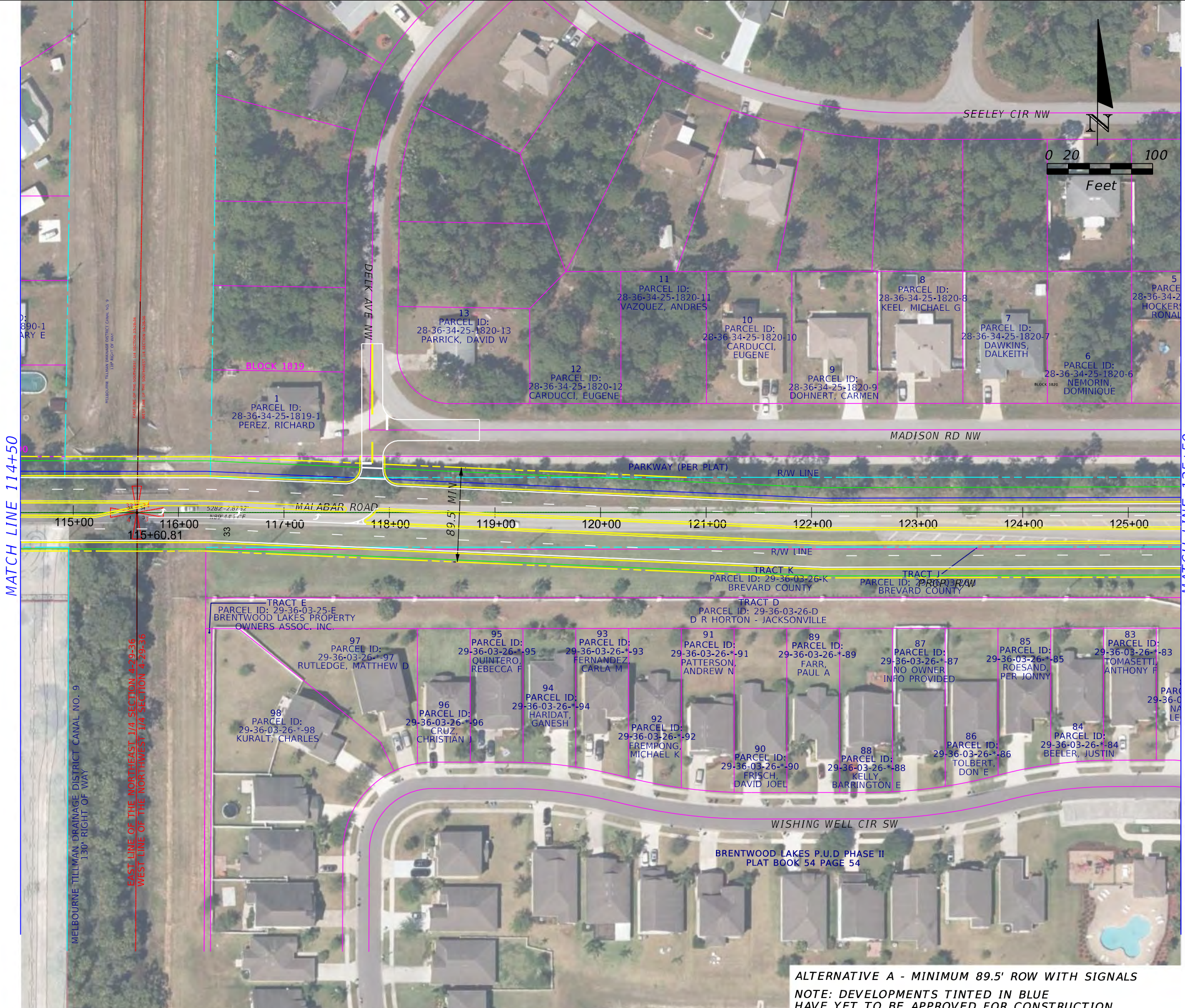
LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.	
C-6	4





MATCH LINE 114+50

MATCH LINE 125+50

MELBOURNE TILLMAN DRAINAGE DISTRICT CANAL NO. 9  
130' RIGHT OF WAY

EAST LINE OF THE NORTHEAST 1/4 SECTION 4-29-36  
WEST LINE OF THE NORTHWEST 1/4 SECTION 4-29-36

**ALTERNATIVE A - MINIMUM 89.5' ROW WITH SIGNALS**  
NOTE: DEVELOPMENTS TINTED IN BLUE  
HAVE YET TO BE APPROVED FOR CONSTRUCTION.

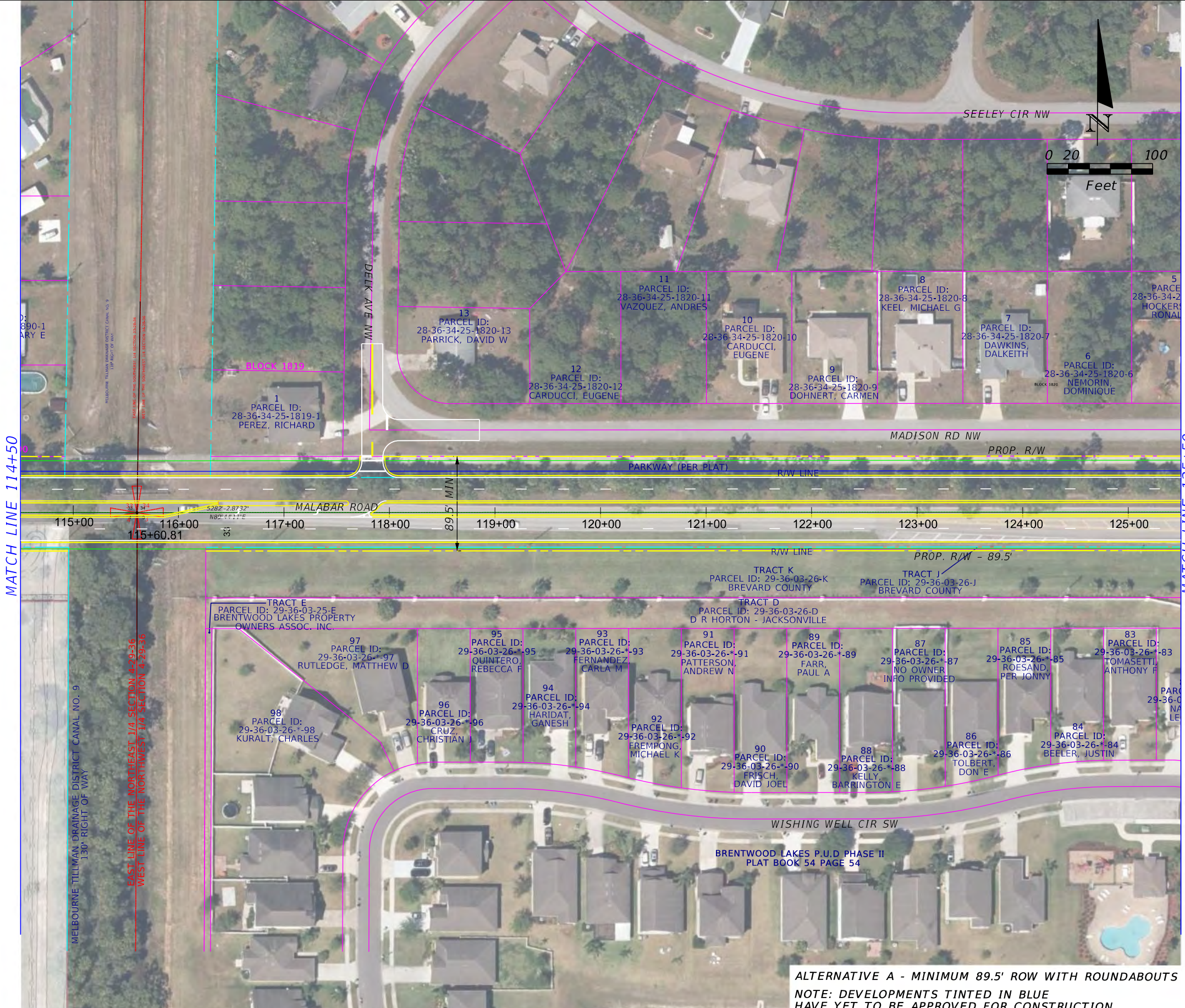
LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.  
C-7  
5





MATCH LINE 114+50

MATCH LINE 125+50

**ALTERNATIVE A - MINIMUM 89.5' ROW WITH ROUNDABOUTS**  
 NOTE: DEVELOPMENTS TINTED IN BLUE  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

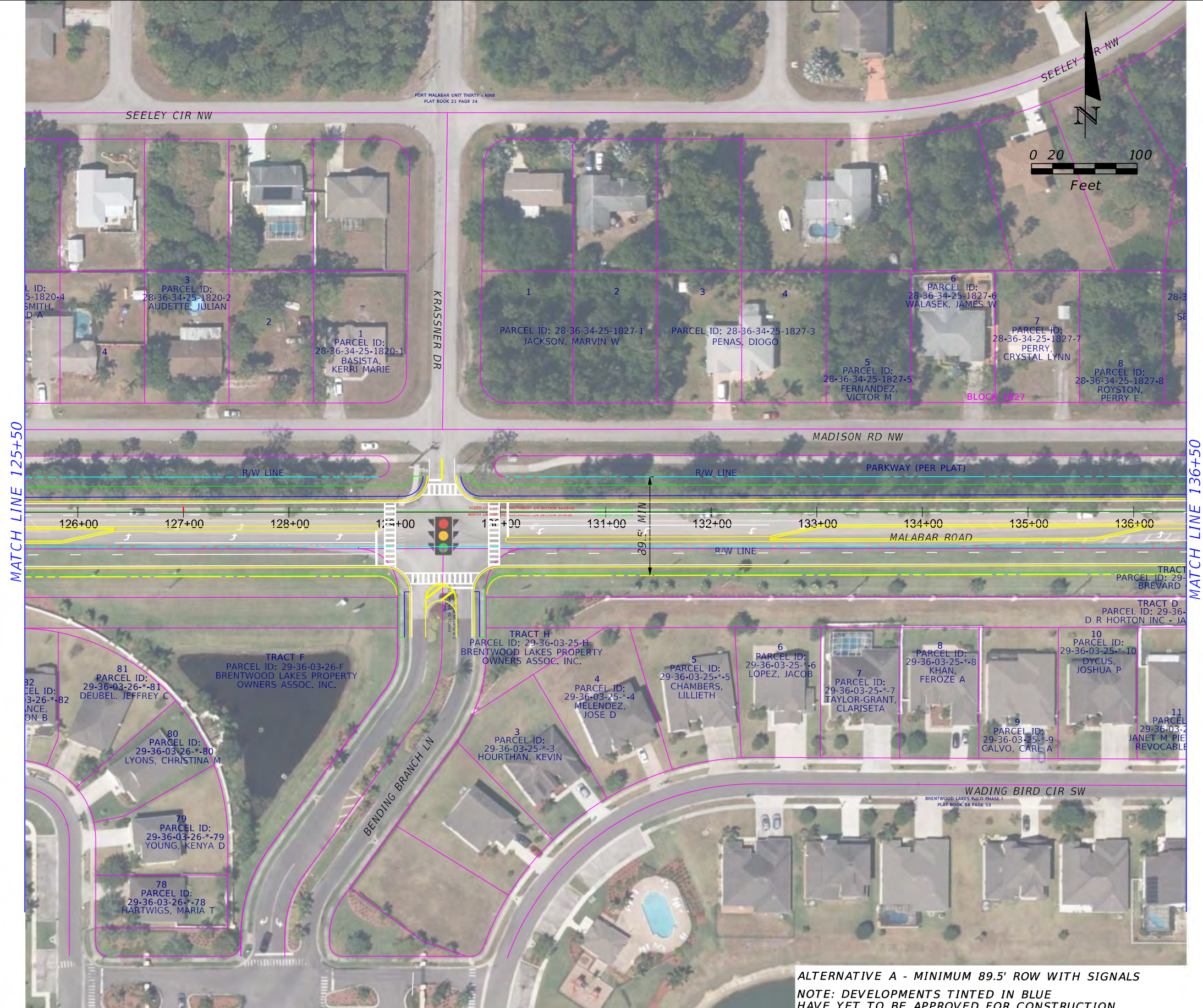
LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.  
 C-8  
 5A





ALTERNATIVE A - MINIMUM 89.5' ROW WITH SIGNALS  
 NOTE: DEVELOPMENTS TINTED IN BLUE  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

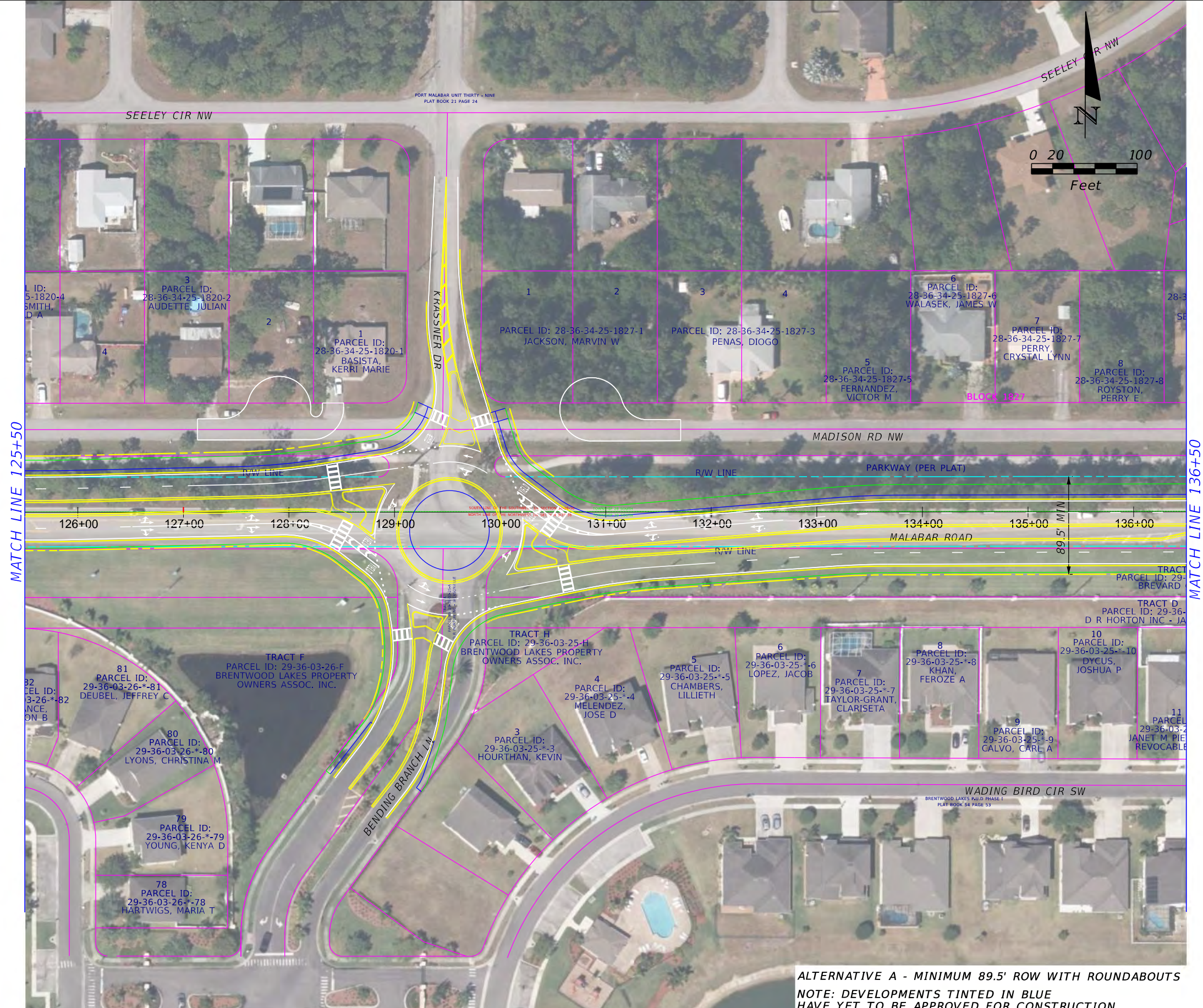
LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

MALABAR ROAD PD&E STUDY	
PLANSHEET	
C-9	6

SHEET NO.
6





MATCH LINE 125+50

MATCH LINE 136+50

ALTERNATIVE A - MINIMUM 89.5' ROW WITH ROUNDABOUTS  
 NOTE: DEVELOPMENTS TINTED IN BLUE  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

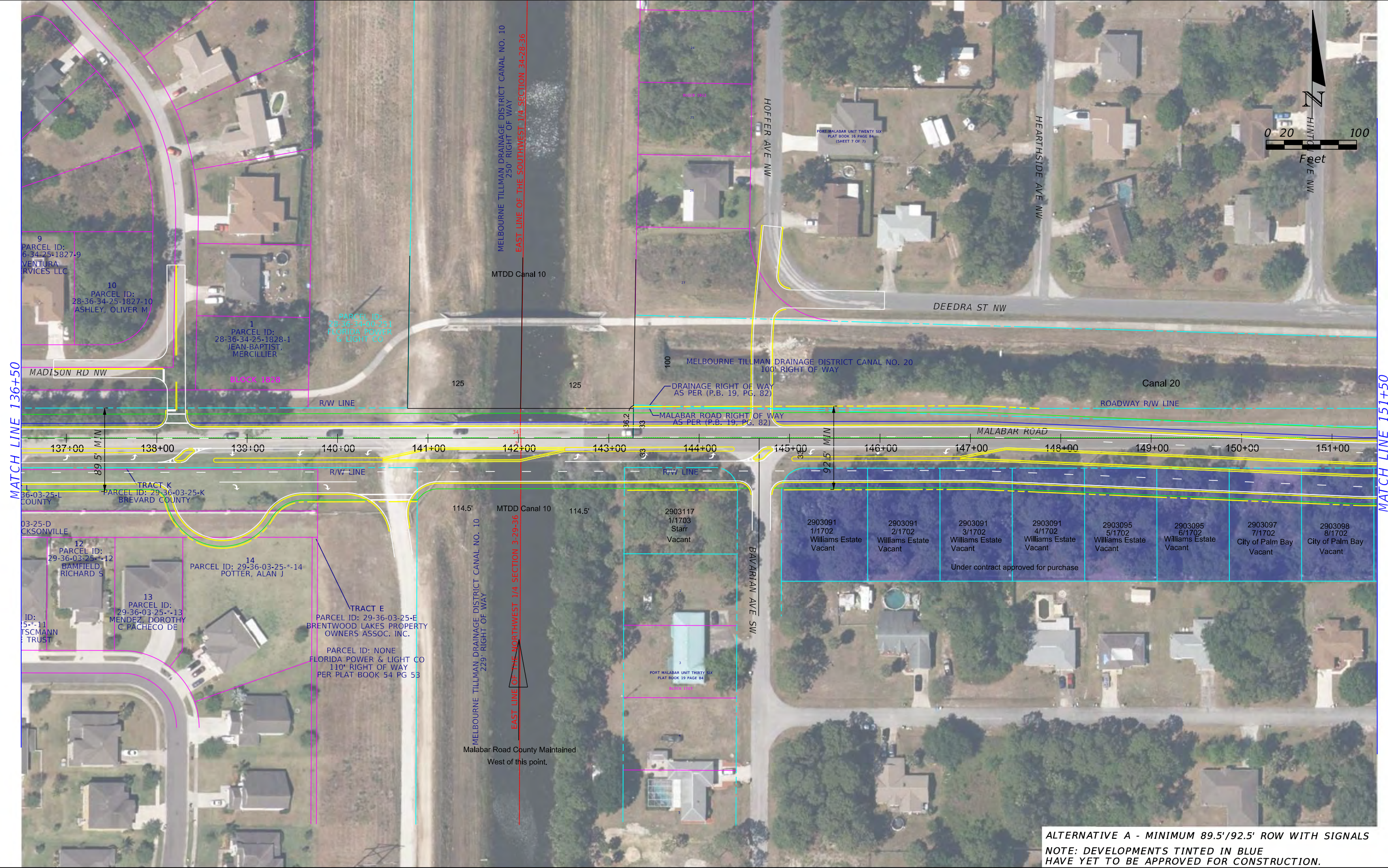
LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.  
 C - 10  
 6A





MATCH LINE 136+50

MATCH LINE 151+50

**ALTERNATIVE A - MINIMUM 89.5'/92.5' ROW WITH SIGNALS**  
 NOTE: DEVELOPMENTS TINTED IN BLUE  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

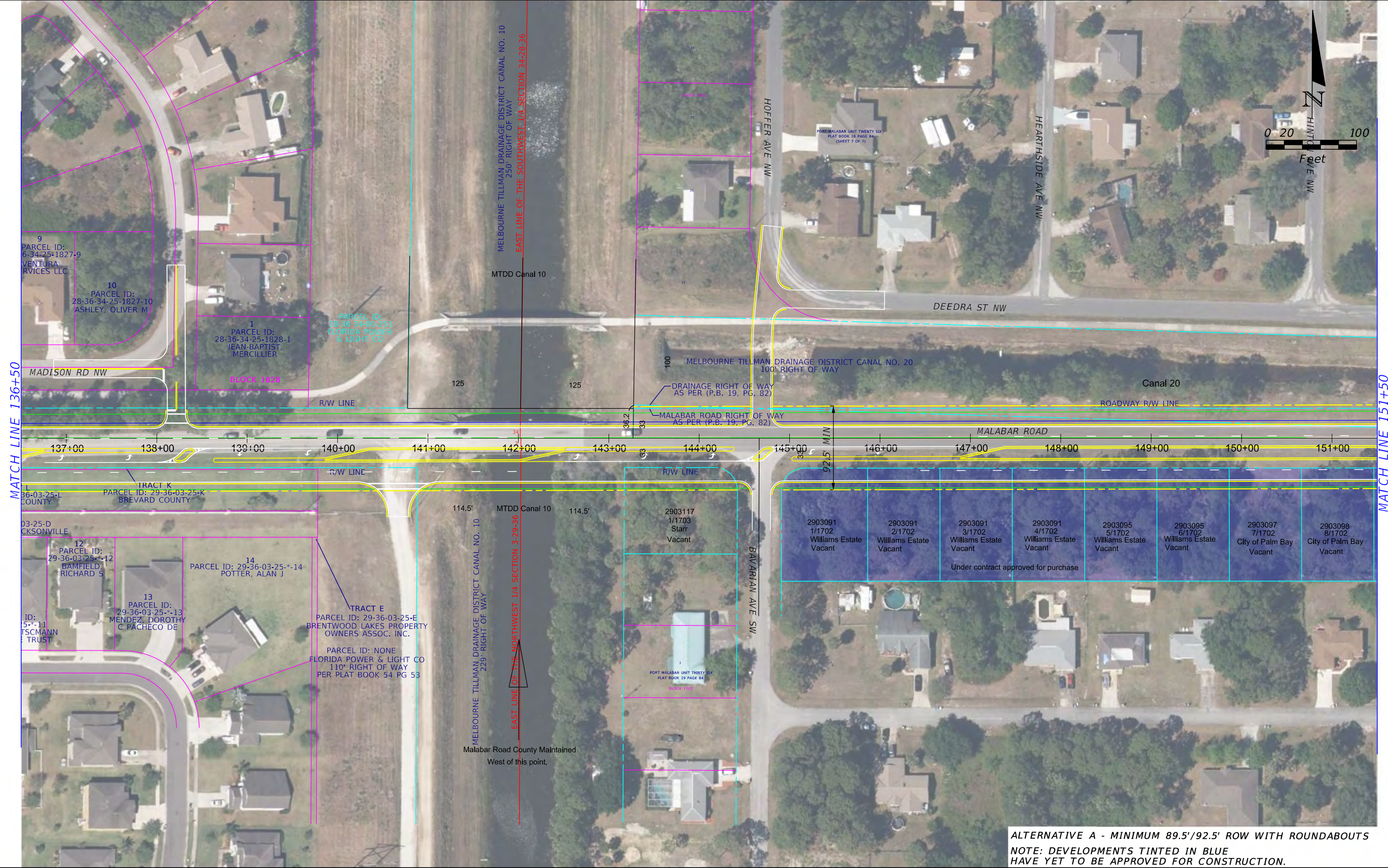
LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.  
 C-11  
 7





MATCH LINE 136+50

MATCH LINE 151+50

ALTERNATIVE A - MINIMUM 89.5'/92.5' ROW WITH ROUNDABOUTS  
 NOTE: DEVELOPMENTS TINTED IN BLUE  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

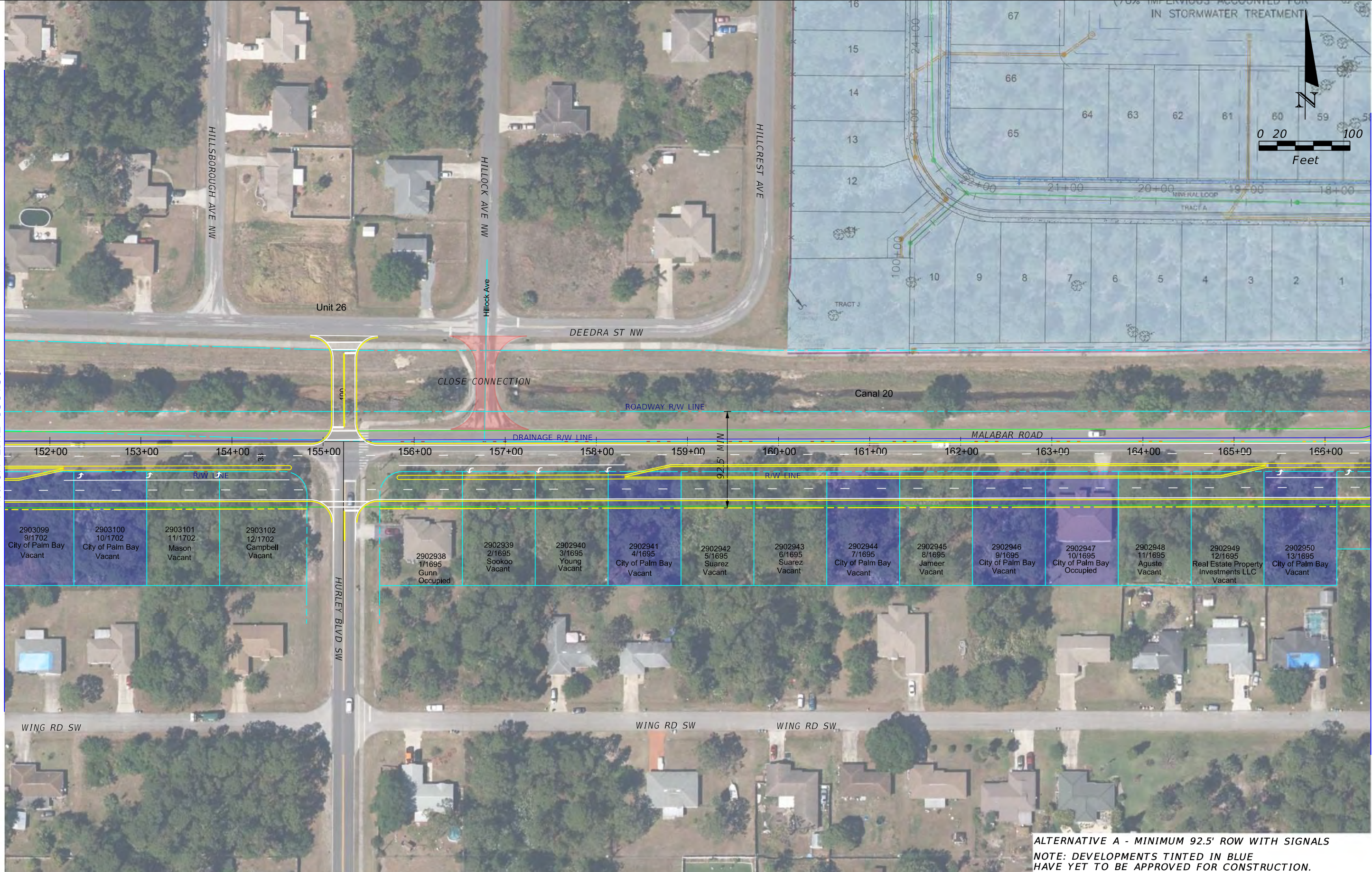
LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.  
 C-12  
 7A





MATCH LINE 151+50

MATCH LINE 166+50

**LEGEND**

- EXISTING PARCEL LINE
- SUBDIVISION PARCEL LINES
- EXISTING RIGHT OF WAY
- BUS STOP LOCATIONS
- PROPOSED RIGHT OF WAY
- CITY ACQUIRED PARCELS

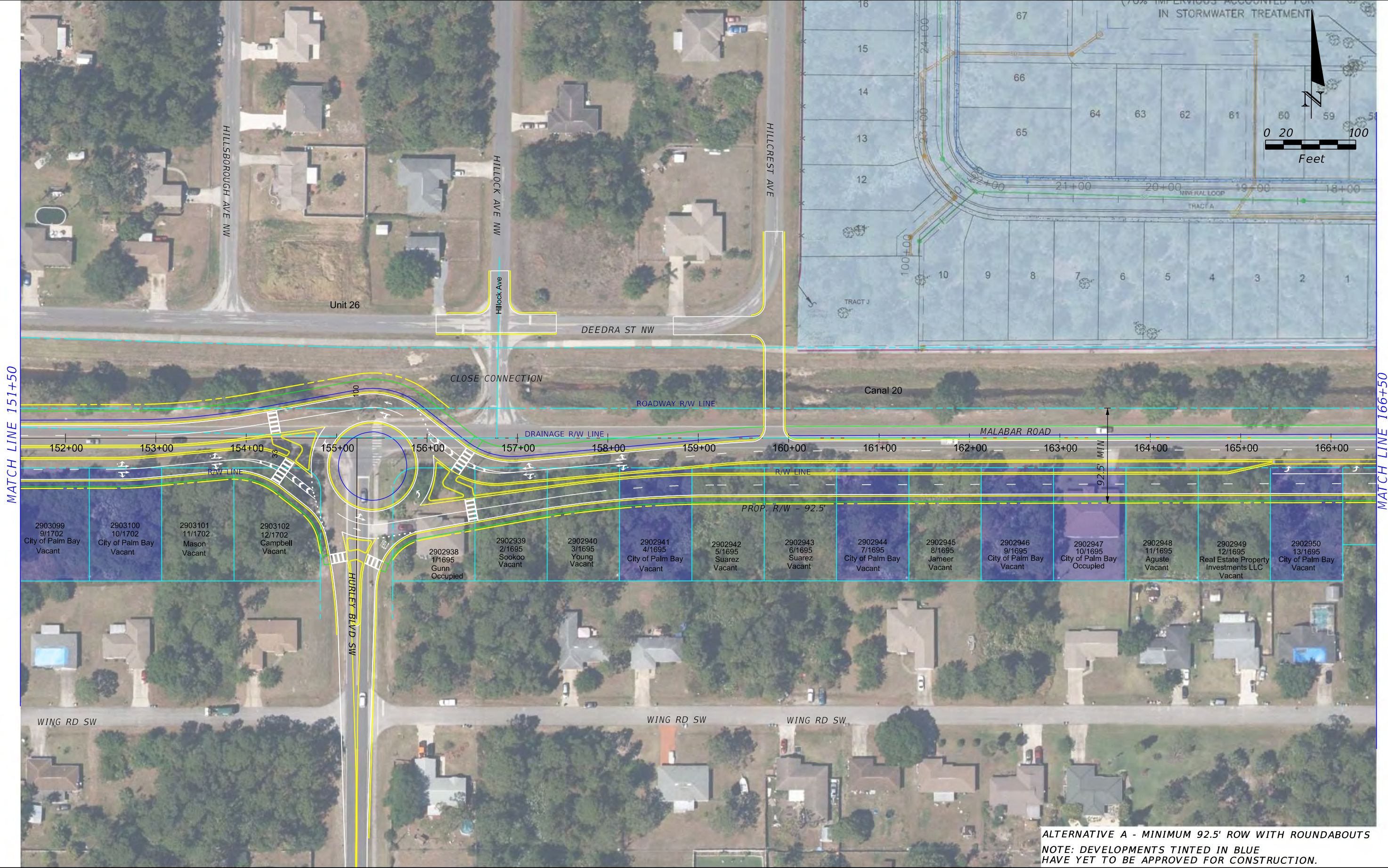
CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.
C-13 8

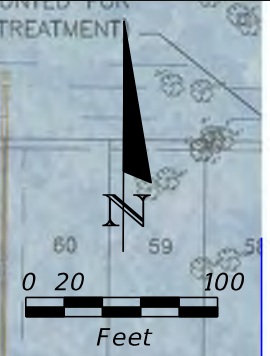
**ALTERNATIVE A - MINIMUM 92.5' ROW WITH SIGNALS**  
**NOTE: DEVELOPMENTS TINTED IN BLUE**  
**HAVE YET TO BE APPROVED FOR CONSTRUCTION.**





MATCH LINE 151+50

MATCH LINE 166+50



LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

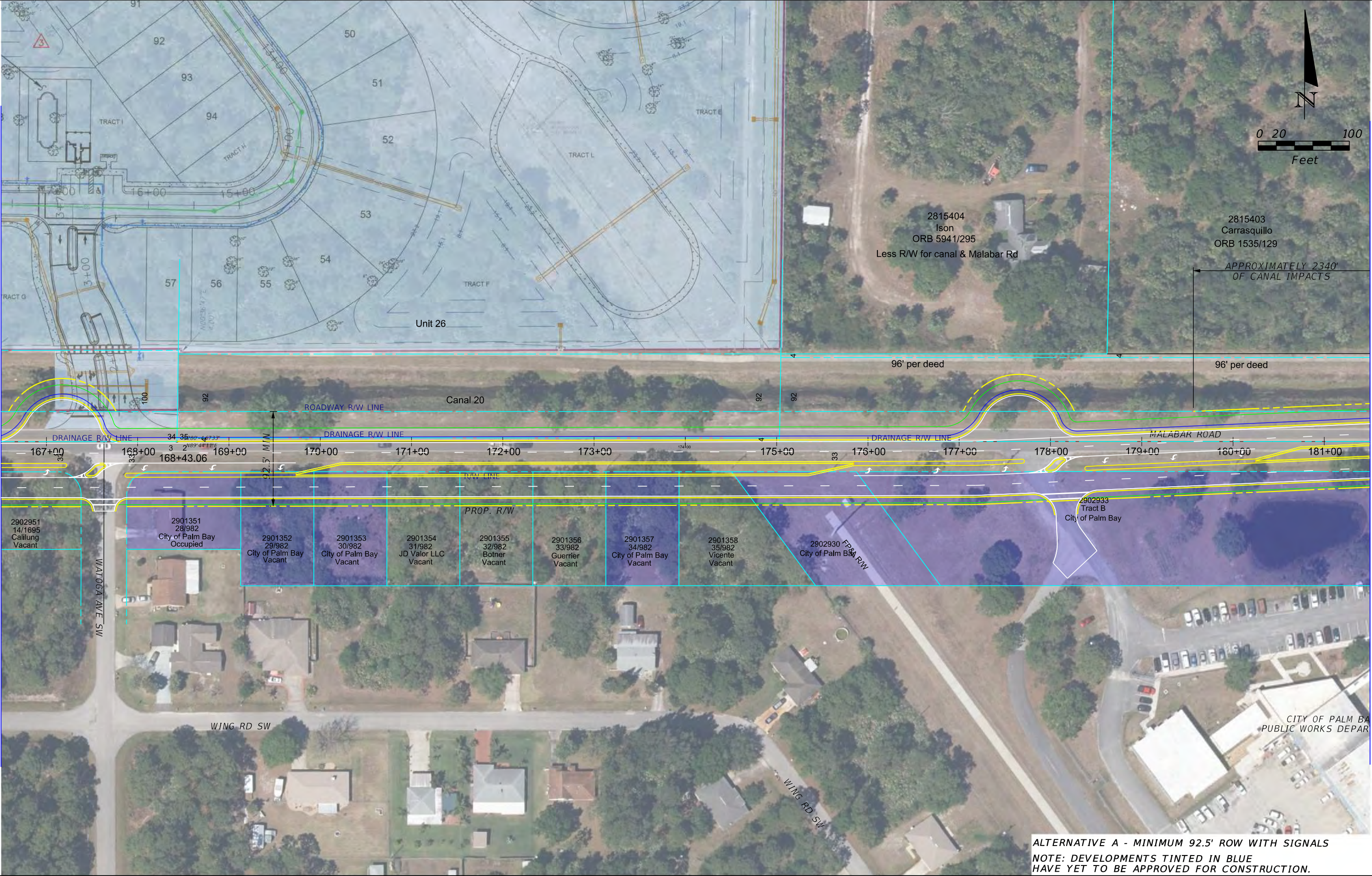
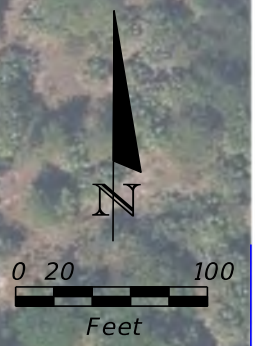
**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.  
C-14  
8A



MATCH LINE 166+50

MATCH LINE 181+50



ALTERNATIVE A - MINIMUM 92.5' ROW WITH SIGNALS  
 NOTE: DEVELOPMENTS TINTED IN BLUE  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.
C - 15 9





2815402  
Methodist Church  
ORB 3095/3685

Methodist Church  
ORB 3534/1478

APPROXIMATELY 2340' OF CANAL IMPACTS

SHALIMAR AVE NW

CARMELITE AVE NW

Less R/W for public roads & canals

4' DROW

MATCH LINE 181+50

MATCH LINE 196+50

Canal 20

Canal 20

PROP. R/W

ROADWAY R/W LINE

DRAINAGE R/W LINE

DRAINAGE R/W LINE

R/W LINE

182+00 183+00 184+00 185+00 186+00 187+00 188+00 189+00 190+00 191+00 192+00 193+00 194+00 195+00 196+00

PROP. R/W

2902932  
Tract B  
City of Palm Bay

2901311  
Tract C  
Post Office

2901313  
Tract D  
Circle K Stores

2901312  
Circle K Stores

UNITED STATES  
POSTAL SERVICE

JUPITER BLVD SW

ALTERNATIVE A - MINIMUM 92.5' ROW WITH SIGNALS  
NOTE: DEVELOPMENTS TINTED IN BLUE  
HAVE YET TO BE APPROVED FOR CONSTRUCTION.

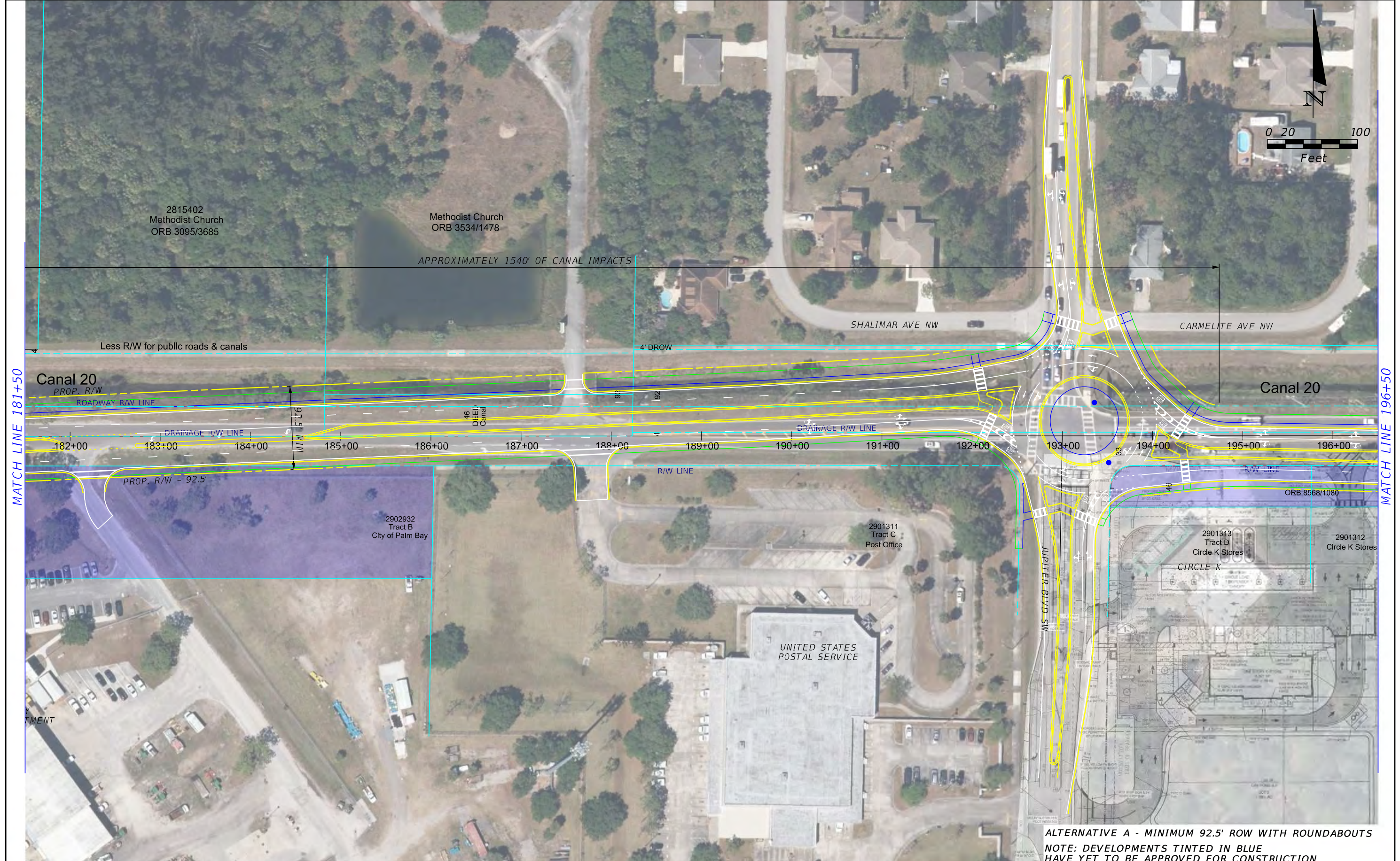
LEGEND	
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	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

MALABAR ROAD PD&E STUDY  
PLANSHEET

SHEET NO.
C - 16 10





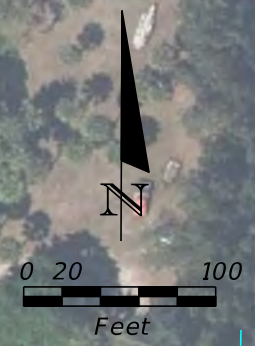
LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.  
 C-17  
 10A

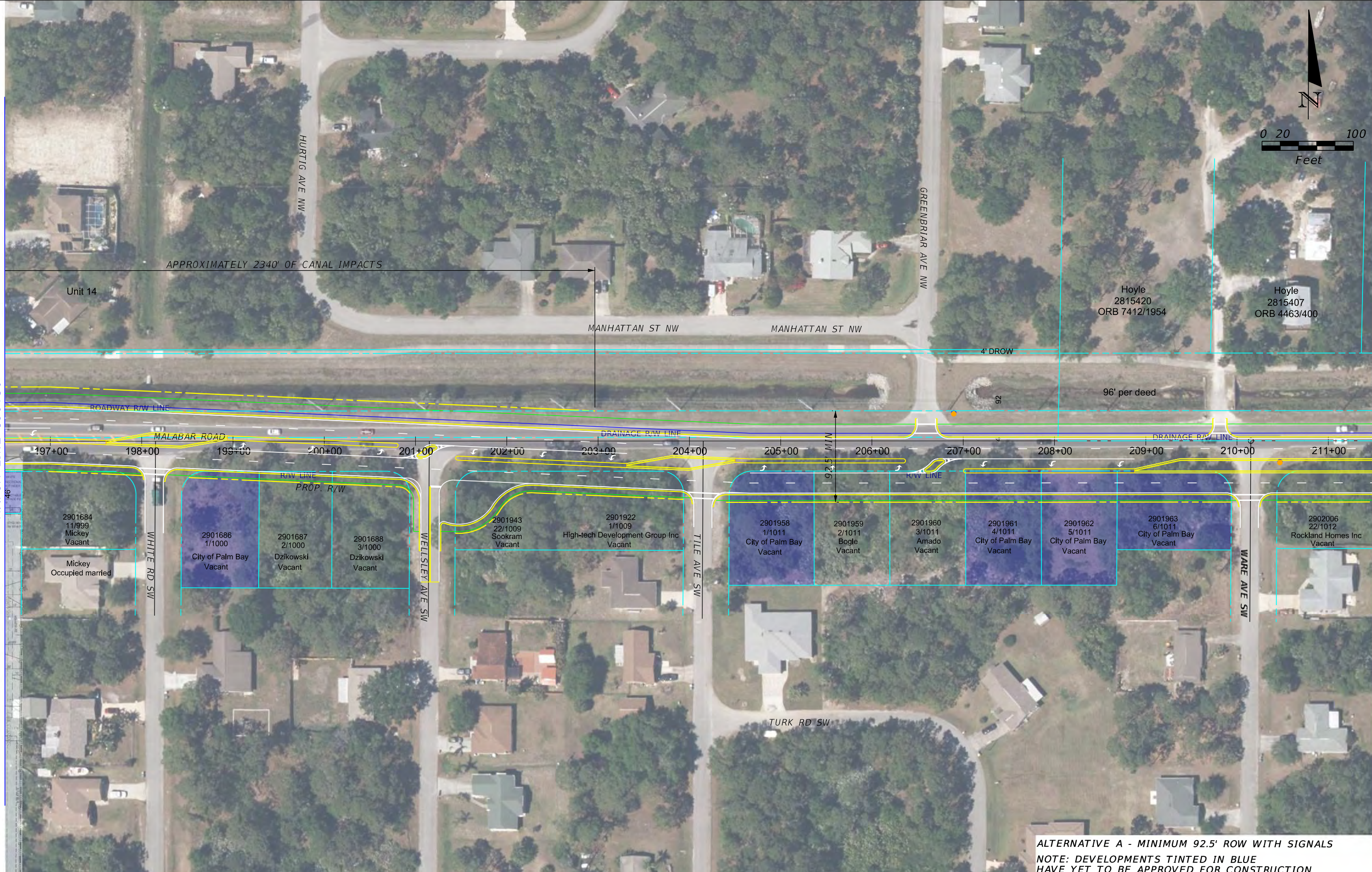




APPROXIMATELY 2340' OF CANAL IMPACTS

MATCH LINE 196+50

MATCH LINE 211+50



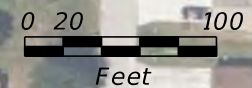
ALTERNATIVE A - MINIMUM 92.5' ROW WITH SIGNALS  
 NOTE: DEVELOPMENTS TINTED IN BLUE  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

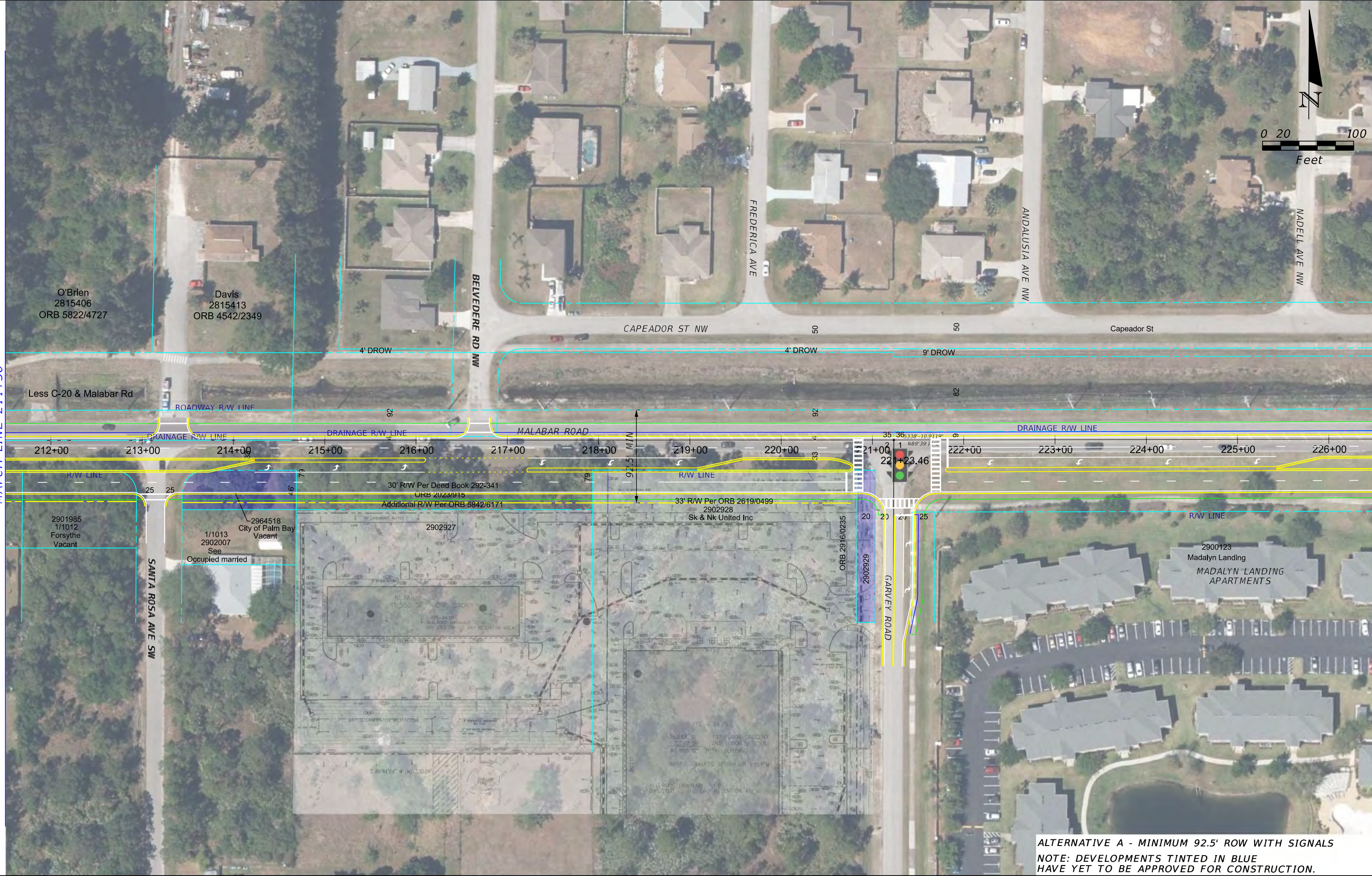
MALABAR ROAD PD&E STUDY	
PLANSHEET	
C - 18	11





MATCH LINE 211+50

MATCH LINE 226+50



**ALTERNATIVE A - MINIMUM 92.5' ROW WITH SIGNALS**  
 NOTE: DEVELOPMENTS TINTED IN BLUE  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

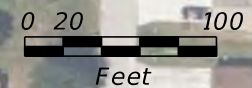
LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

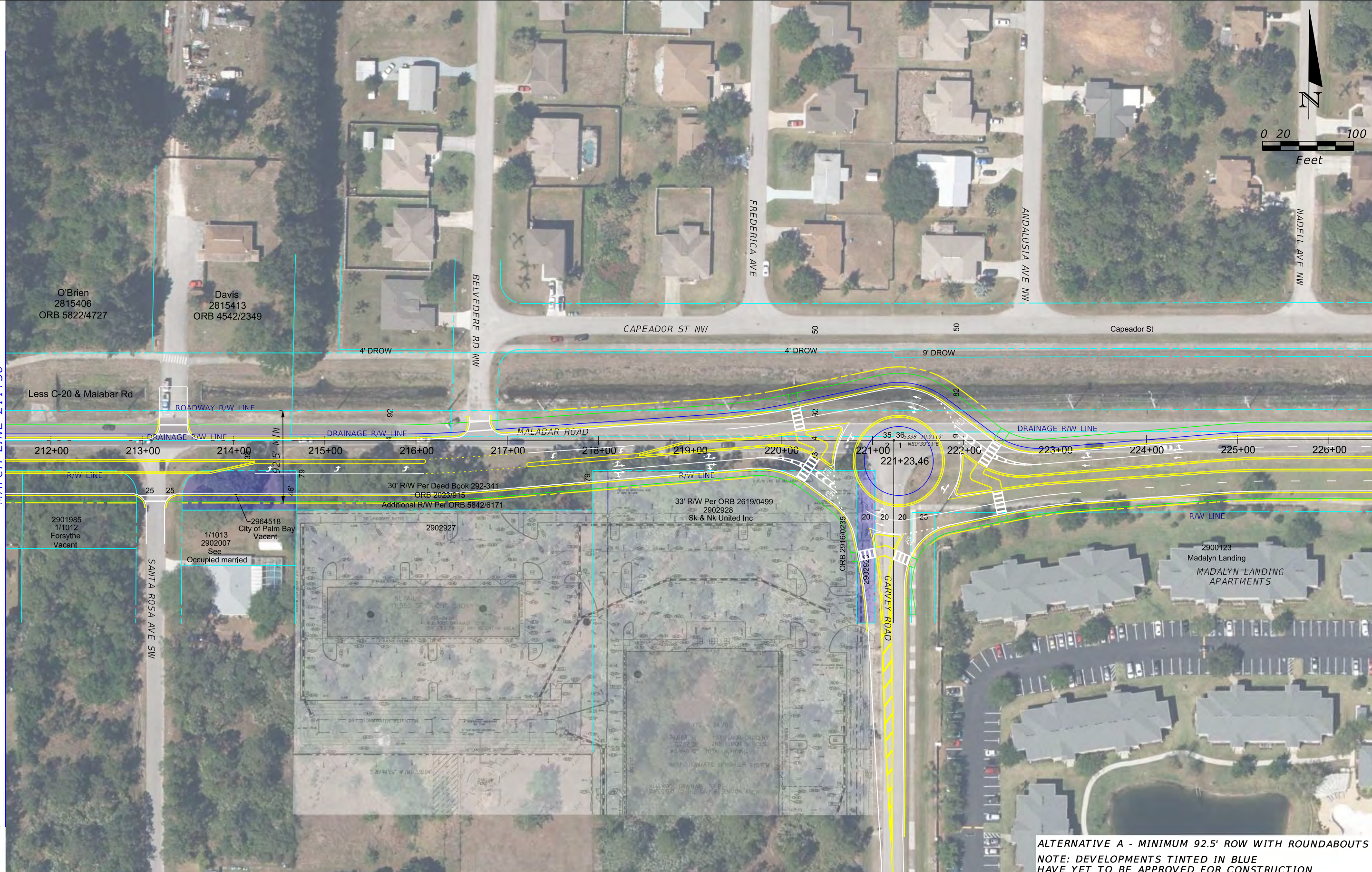
SHEET NO.  
 C-19  
 12





MATCH LINE 211+50

MATCH LINE 226+50



**ALTERNATIVE A - MINIMUM 92.5' ROW WITH ROUNDABOUTS**  
 NOTE: DEVELOPMENTS TINTED IN BLUE  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

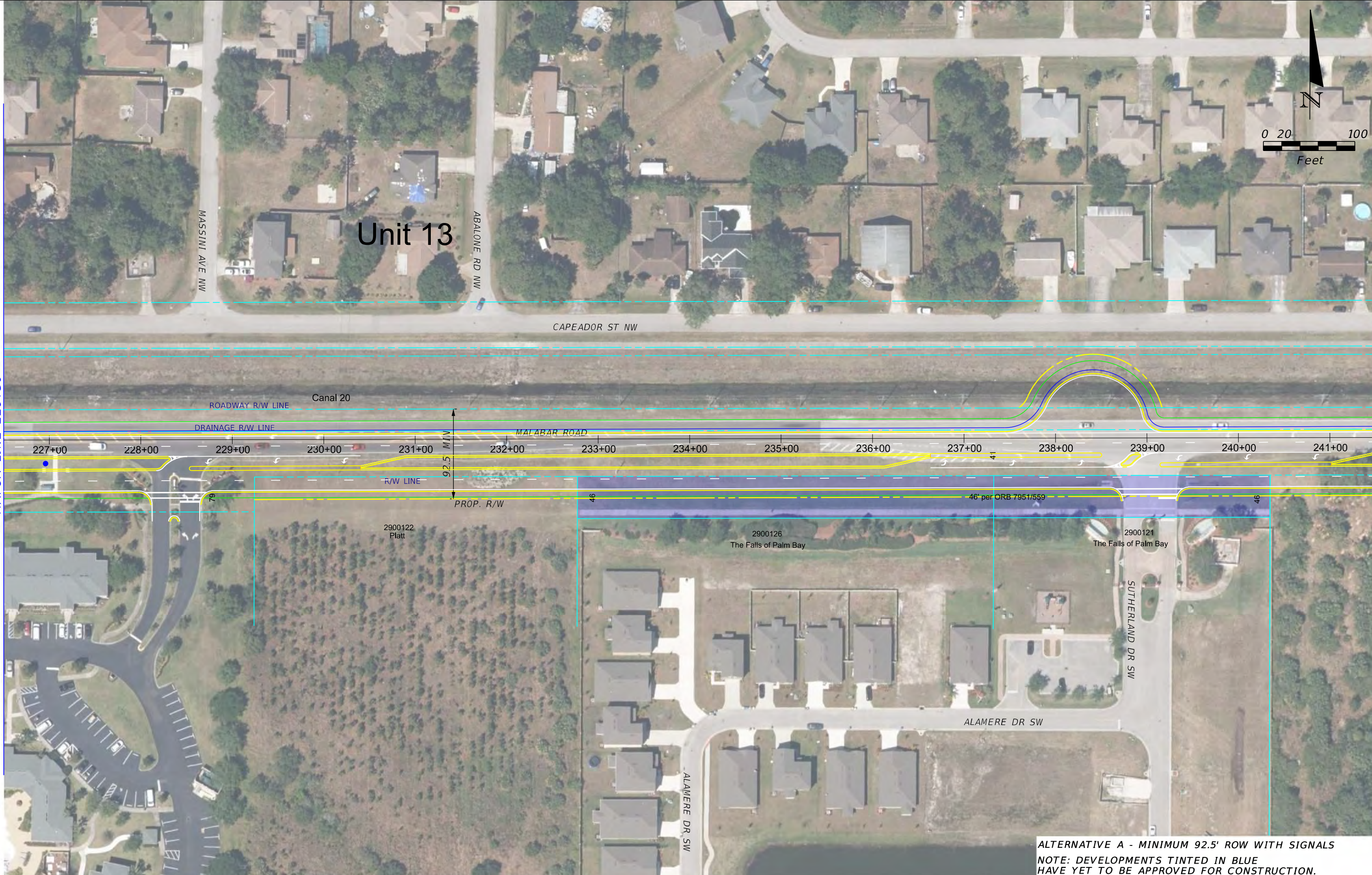
LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.  
 C - 20  
 12A





ALTERNATIVE A - MINIMUM 92.5' ROW WITH SIGNALS  
 NOTE: DEVELOPMENTS TINTED IN BLUE  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

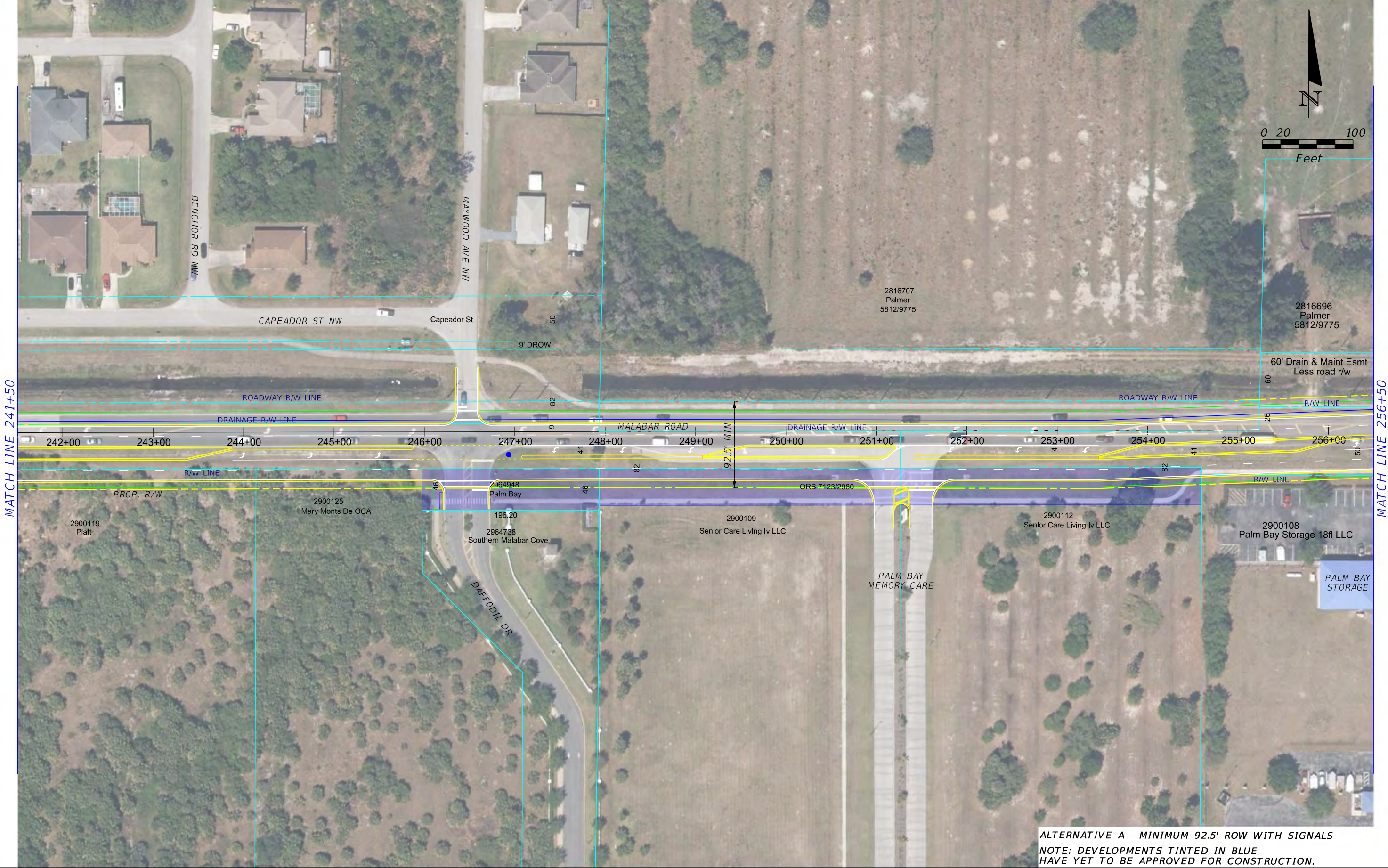
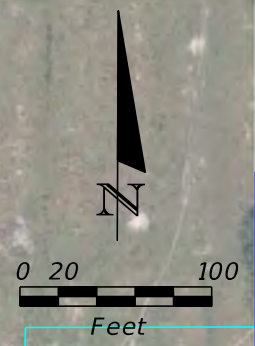
LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.
C-21 13





MATCH LINE 241+50

MATCH LINE 256+50

ALTERNATIVE A - MINIMUM 92.5' ROW WITH SIGNALS  
 NOTE: DEVELOPMENTS TINTED IN BLUE  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.  
 C - 22  
 14





MATCH LINE 256+50



ALTERNATIVE A - MINIMUM 92.5' ROW WITH SIGNALS  
 NOTE: DEVELOPMENTS TINTED IN BLUE  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY ACQUIRED PARCELS

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

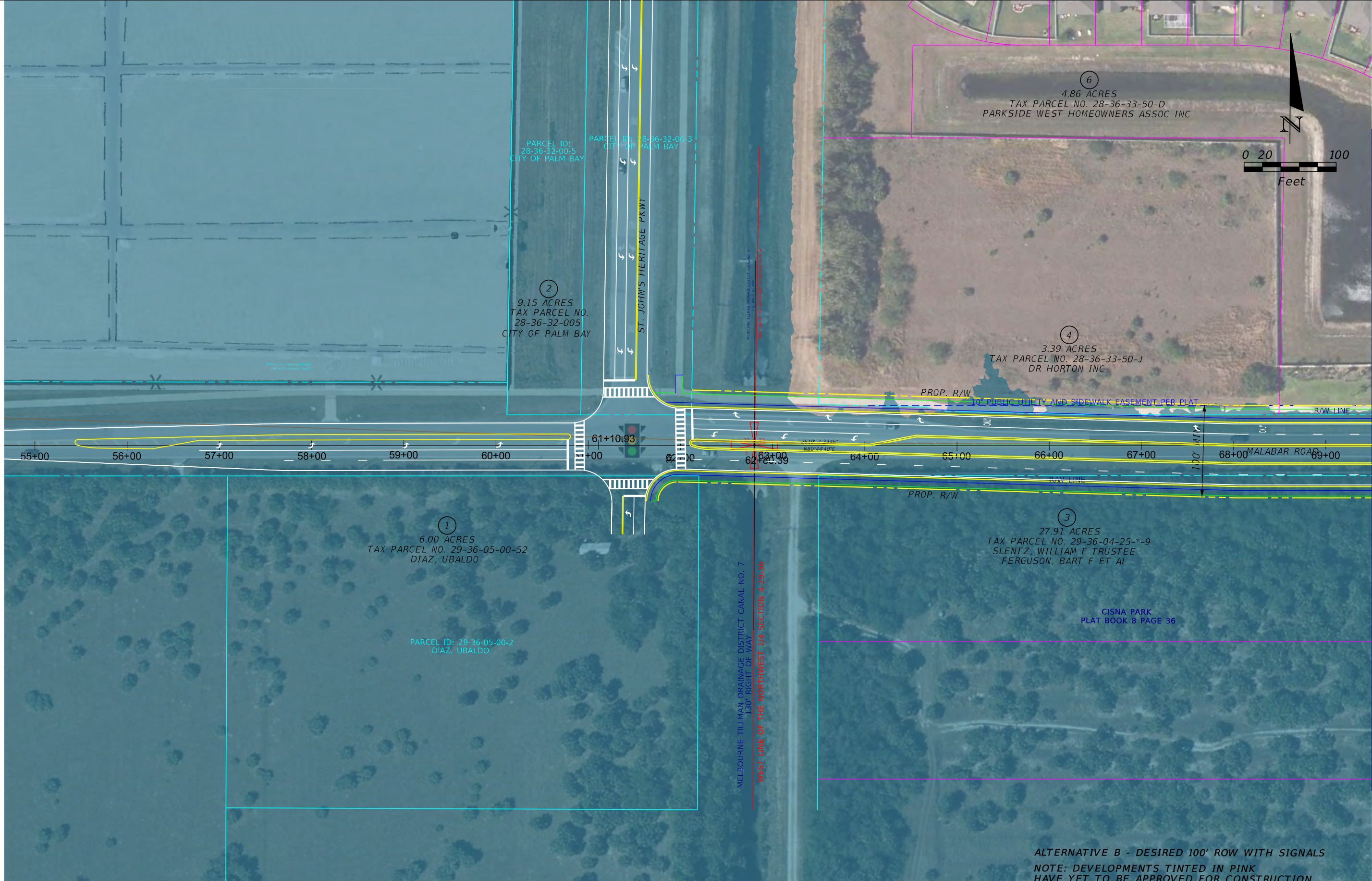
**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.  
 C-23  
 15



## **Alternative B Concept Plan**





ALTERNATIVE B - DESIRED 100' ROW WITH SIGNALS  
 NOTE: DEVELOPMENTS TINTED IN PINK  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE		CITY ACQUIRED PARCELS
	SUBDIVISION PARCEL LINES		POTENTIAL HISTORIC BUILDING
	EXISTING RIGHT OF WAY		FLOODPLAIN
	BUS STOP LOCATIONS		UNAPPROVED DEVELOPMENT
	PROPOSED RIGHT OF WAY		
	CITY BOUNDARY		

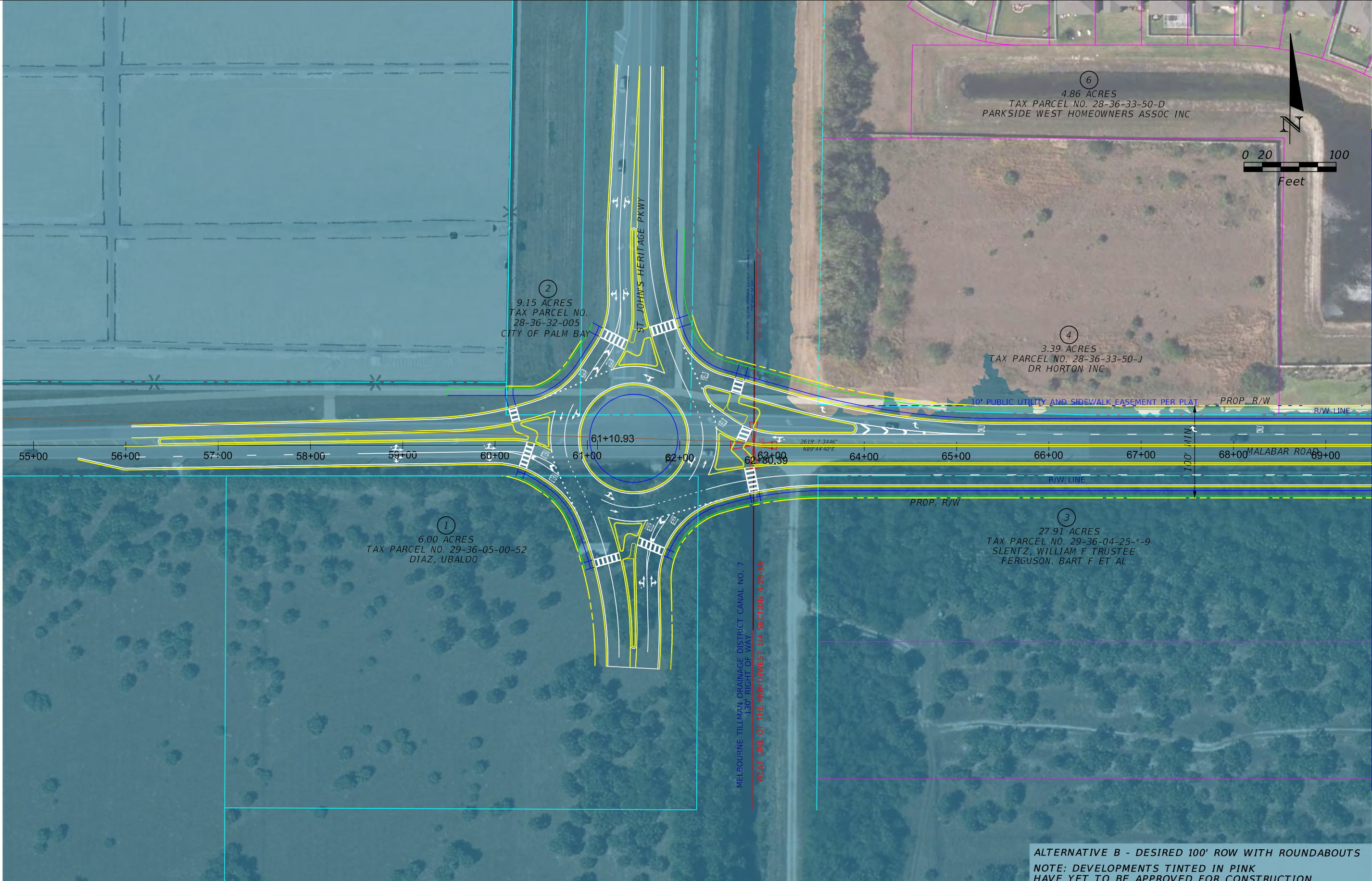
ROAD NO.	COUNTY
62	BREVARD

<b>CITY OF PALM BAY</b>		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
62	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.  
 C - 25  
 1





ALTERNATIVE B - DESIRED 100' ROW WITH ROUNDABOUTS  
 NOTE: DEVELOPMENTS TINTED IN PINK  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE		CITY ACQUIRED PARCELS
	SUBDIVISION PARCEL LINES		POTENTIAL HISTORIC BUILDING
	EXISTING RIGHT OF WAY		FLOODPLAIN
	BUS STOP LOCATIONS		UNAPPROVED DEVELOPMENT
	PROPOSED RIGHT OF WAY		
	CITY BOUNDARY		

	<b>CITY OF PALM BAY</b>
ROAD NO.	COUNTY
	BREVARD
FINANCIAL PROJECT ID	

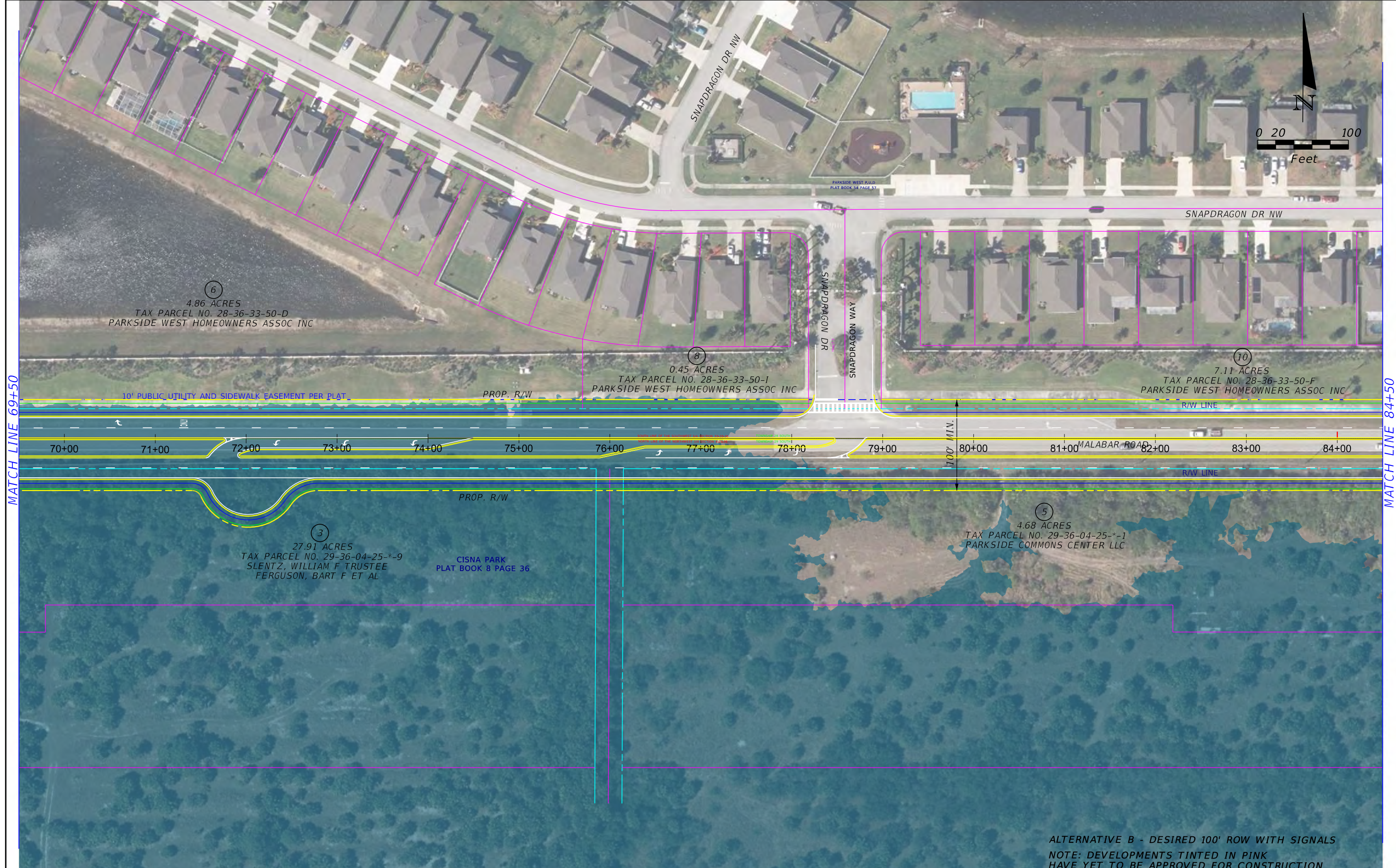


<b>CITY OF PALM BAY</b>	
ROAD NO.	COUNTY
	BREVARD
FINANCIAL PROJECT ID	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.  
 C-26  
 1A





⑥  
4.86 ACRES  
TAX PARCEL NO. 28-36-33-50-D  
PARKSIDE WEST HOMEOWNERS ASSOC INC

⑧  
0.45 ACRES  
TAX PARCEL NO. 28-36-33-50-I  
PARKSIDE WEST HOMEOWNERS ASSOC INC

⑩  
7.11 ACRES  
TAX PARCEL NO. 28-36-33-50-F  
PARKSIDE WEST HOMEOWNERS ASSOC INC

③  
27.91 ACRES  
TAX PARCEL NO. 29-36-04-25-\*  
SLENTZ, WILLIAM F TRUSTEE  
FERGUSON, BART F ET AL

CISNA PARK  
PLAT BOOK 8 PAGE 36

⑤  
4.68 ACRES  
TAX PARCEL NO. 29-36-04-25-\*  
PARKSIDE COMMONS CENTER LLC

ALTERNATIVE B - DESIRED 100' ROW WITH SIGNALS  
NOTE: DEVELOPMENTS TINTED IN PINK  
HAVE YET TO BE APPROVED FOR CONSTRUCTION.

LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY BOUNDARY
	CITY ACQUIRED PARCELS
	POTENTIAL HISTORIC BUILDING
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT

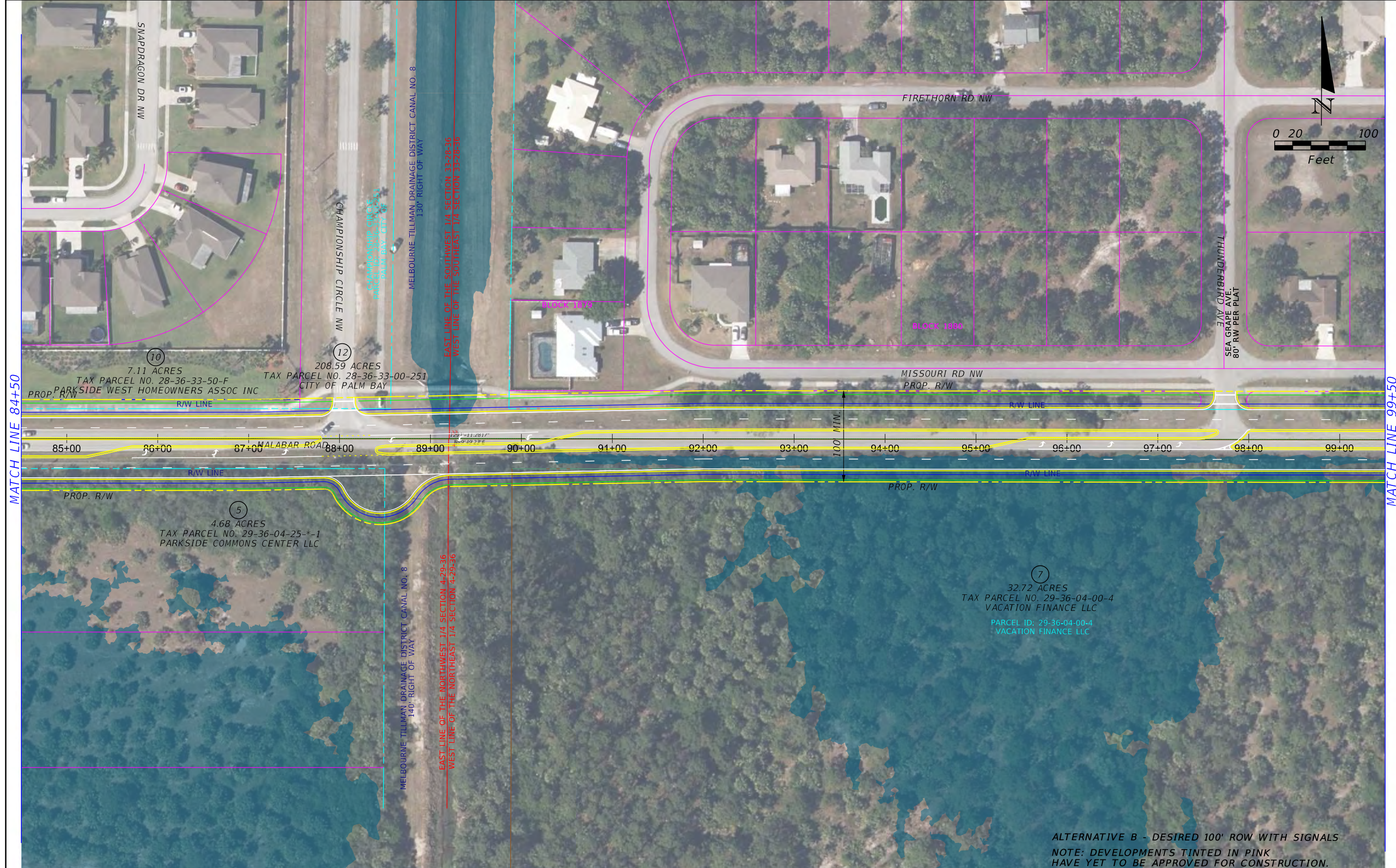


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.
C-27 2





MATCH LINE 84+50

MATCH LINE 99+50

**LEGEND**

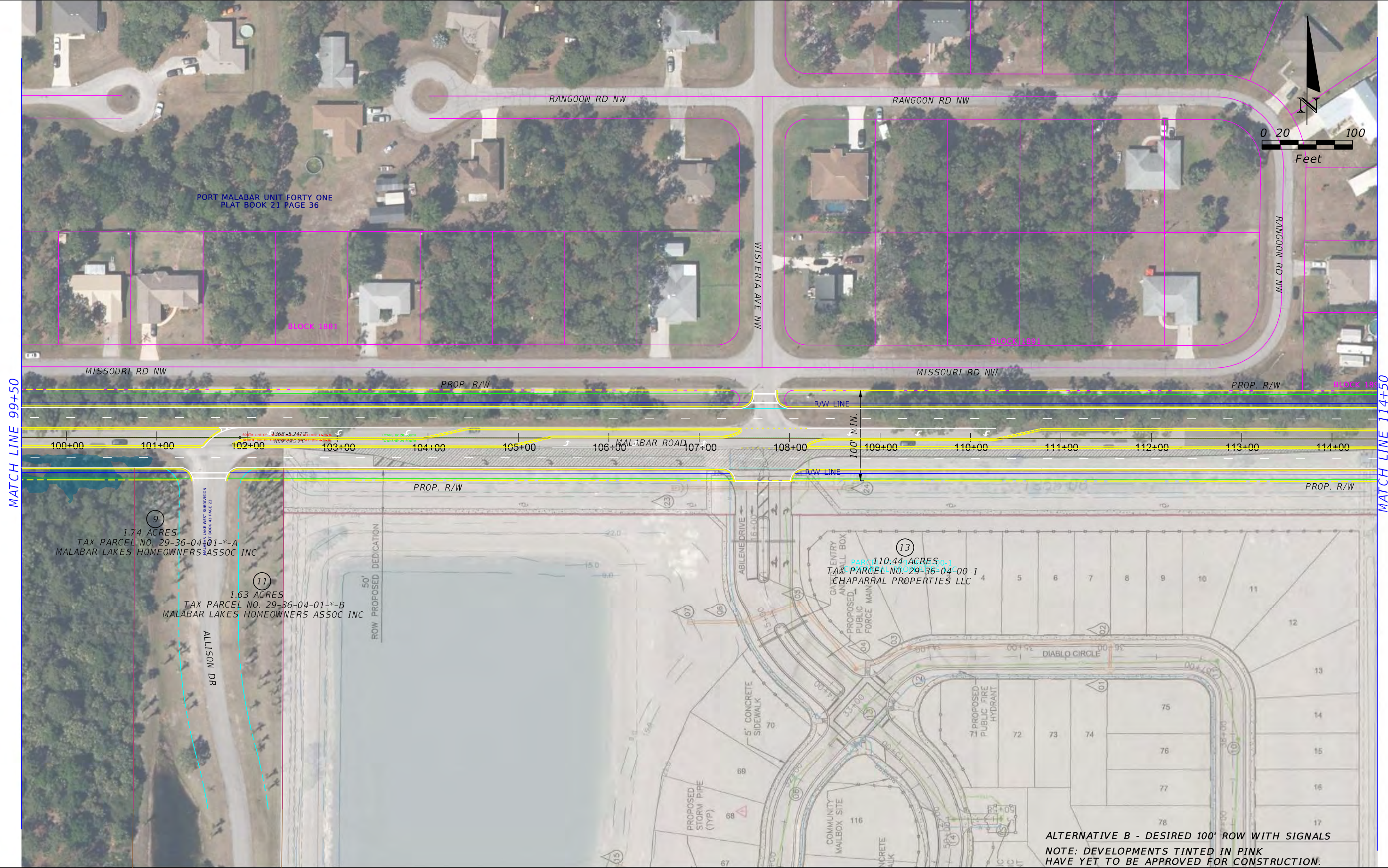
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	SUBDIVISION PARCEL LINES		POTENTIAL HISTORIC BUILDING
	EXISTING RIGHT OF WAY		FLOODPLAIN
	BUS STOP LOCATIONS		UNAPPROVED DEVELOPMENT
	PROPOSED RIGHT OF WAY		
	CITY BOUNDARY		

CITY OF PALM BAY	
ROAD NO.	COUNTY
	BREVARD
FINANCIAL PROJECT ID	

<b>MALABAR ROAD PD&amp;E STUDY</b>	
<b>PLANSHEET</b>	

SHEET NO.
C - 28
3





ALTERNATIVE B - DESIRED 100' ROW WITH SIGNALS  
 NOTE: DEVELOPMENTS TINTED IN PINK  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

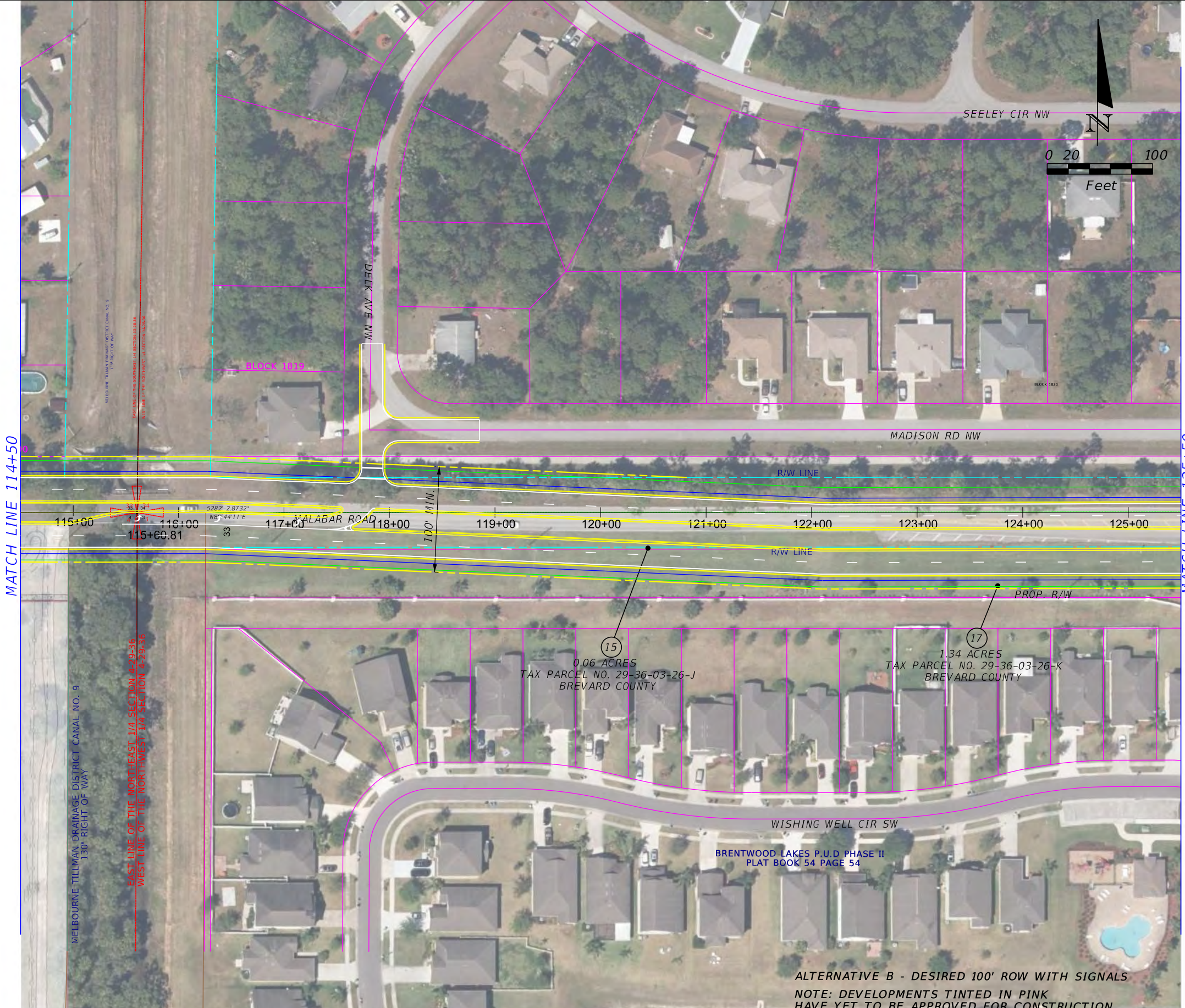
	EXISTING PARCEL LINE		CITY ACQUIRED PARCELS
	SUBDIVISION PARCEL LINES		POTENTIAL HISTORIC BUILDING
	EXISTING RIGHT OF WAY		FLOODPLAIN
	BUS STOP LOCATIONS		UNAPPROVED DEVELOPMENT
	PROPOSED RIGHT OF WAY		
	CITY BOUNDARY		

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

<b>CITY OF PALM BAY</b>		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

<b>MALABAR ROAD PD&amp;E STUDY</b>		SHEET NO.
<b>PLANSHEET</b>		C - 29
		4





MELBOURNE TILLMAN DRAINAGE DISTRICT CANAL NO. 9  
130' RIGHT OF WAY

EAST LINE OF THE NORTHEAST 1/4 SECTION 4-29-36  
WEST LINE OF THE NORTHWEST 1/4 SECTION 4-29-36



MATCH LINE 114+50

MATCH LINE 125+50

15  
0.06 ACRES  
TAX PARCEL NO. 29-36-03-26-J  
BREVARD COUNTY

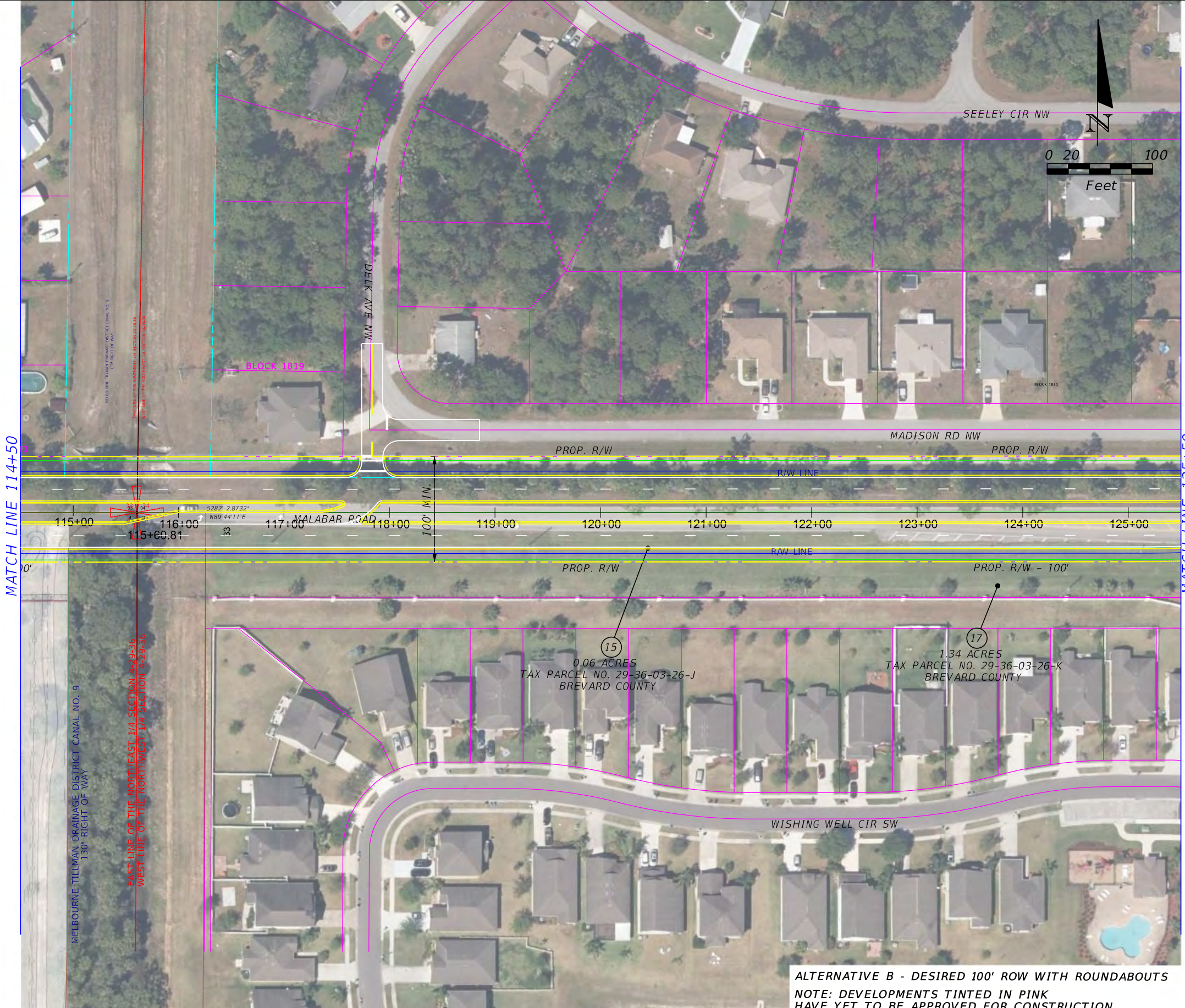
17  
1.34 ACRES  
TAX PARCEL NO. 29-36-03-26-K  
BREVARD COUNTY

BRENTWOOD LAKES P.U.D PHASE II  
PLAT BOOK 54 PAGE 54

ALTERNATIVE B - DESIRED 100' ROW WITH SIGNALS  
NOTE: DEVELOPMENTS TINTED IN PINK  
HAVE YET TO BE APPROVED FOR CONSTRUCTION.

<b>LEGEND</b> 	EXISTING PARCEL LINE SUBDIVISION PARCEL LINES EXISTING RIGHT OF WAY BUS STOP LOCATIONS PROPOSED RIGHT OF WAY CITY BOUNDARY	CITY ACQUIRED PARCELS POTENTIAL HISTORIC BUILDING FLOODPLAIN UNAPPROVED DEVELOPMENT		CITY OF PALM BAY		<b>MALABAR ROAD PD&amp;E STUDY</b>  <b>PLANSHEET</b>	SHEET NO. C-30 5	
	<table border="1"> <thead> <tr> <th>ROAD NO.</th> <th>COUNTY</th> <th>FINANCIAL PROJECT ID</th> </tr> </thead> <tbody> <tr> <td></td> <td>BREVARD</td> <td></td> </tr> </tbody> </table>	ROAD NO.		COUNTY	FINANCIAL PROJECT ID			
ROAD NO.	COUNTY	FINANCIAL PROJECT ID						
	BREVARD							





ALTERNATIVE B - DESIRED 100' ROW WITH ROUNDABOUTS  
 NOTE: DEVELOPMENTS TINTED IN PINK  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE		CITY ACQUIRED PARCELS
	SUBDIVISION PARCEL LINES		POTENTIAL HISTORIC BUILDING
	EXISTING RIGHT OF WAY		FLOODPLAIN
	BUS STOP LOCATIONS		UNAPPROVED DEVELOPMENT
	PROPOSED RIGHT OF WAY		
	CITY BOUNDARY		

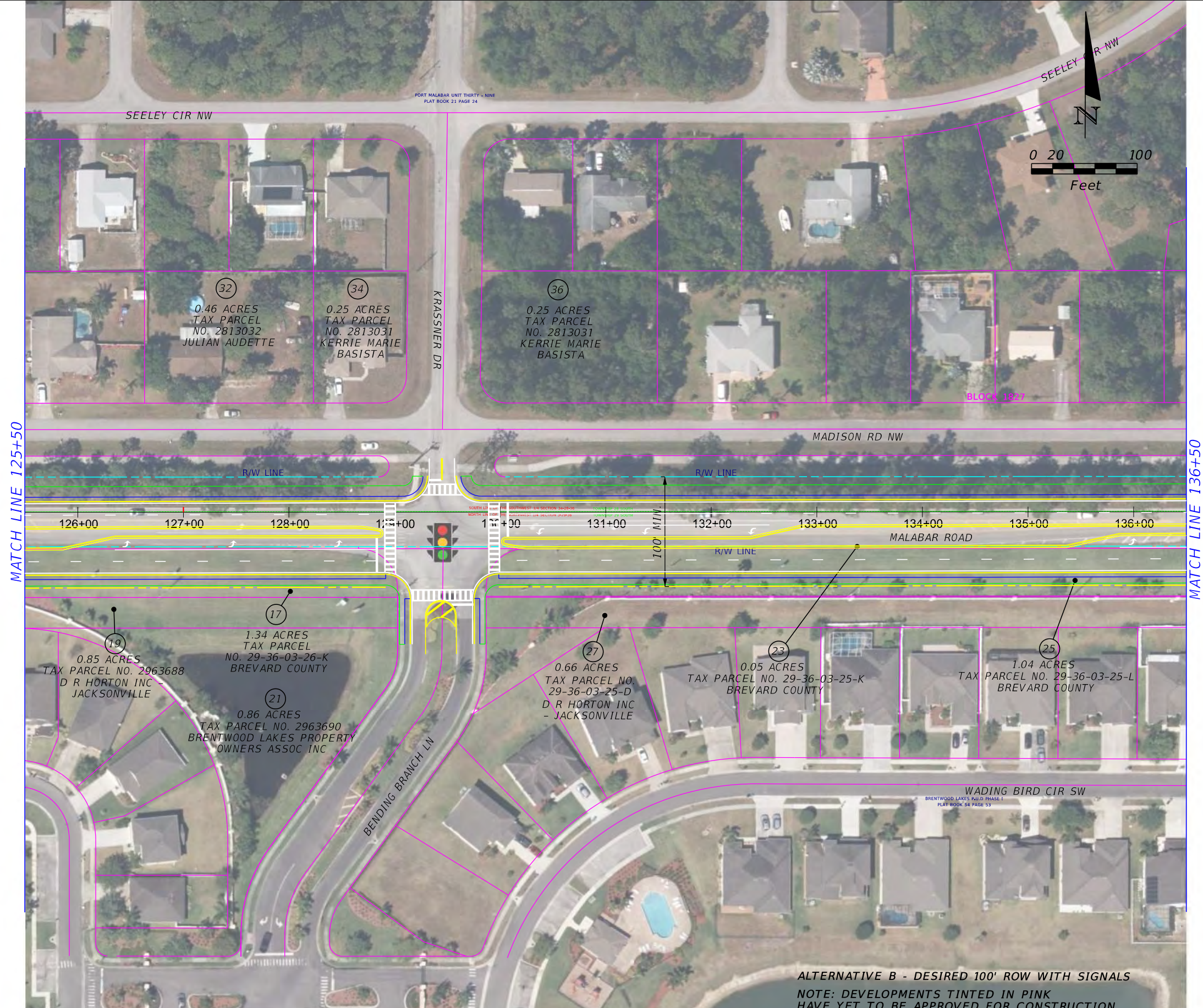
ROAD NO.	COUNTY
11	BREVARD

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
11	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

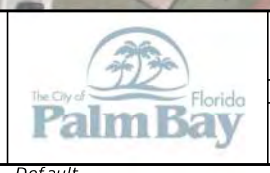
SHEET NO.  
 C-31  
 5A





ALTERNATIVE B - DESIRED 100' ROW WITH SIGNALS  
 NOTE: DEVELOPMENTS TINTED IN PINK  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY BOUNDARY
	CITY ACQUIRED PARCELS
	POTENTIAL HISTORIC BUILDING
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT

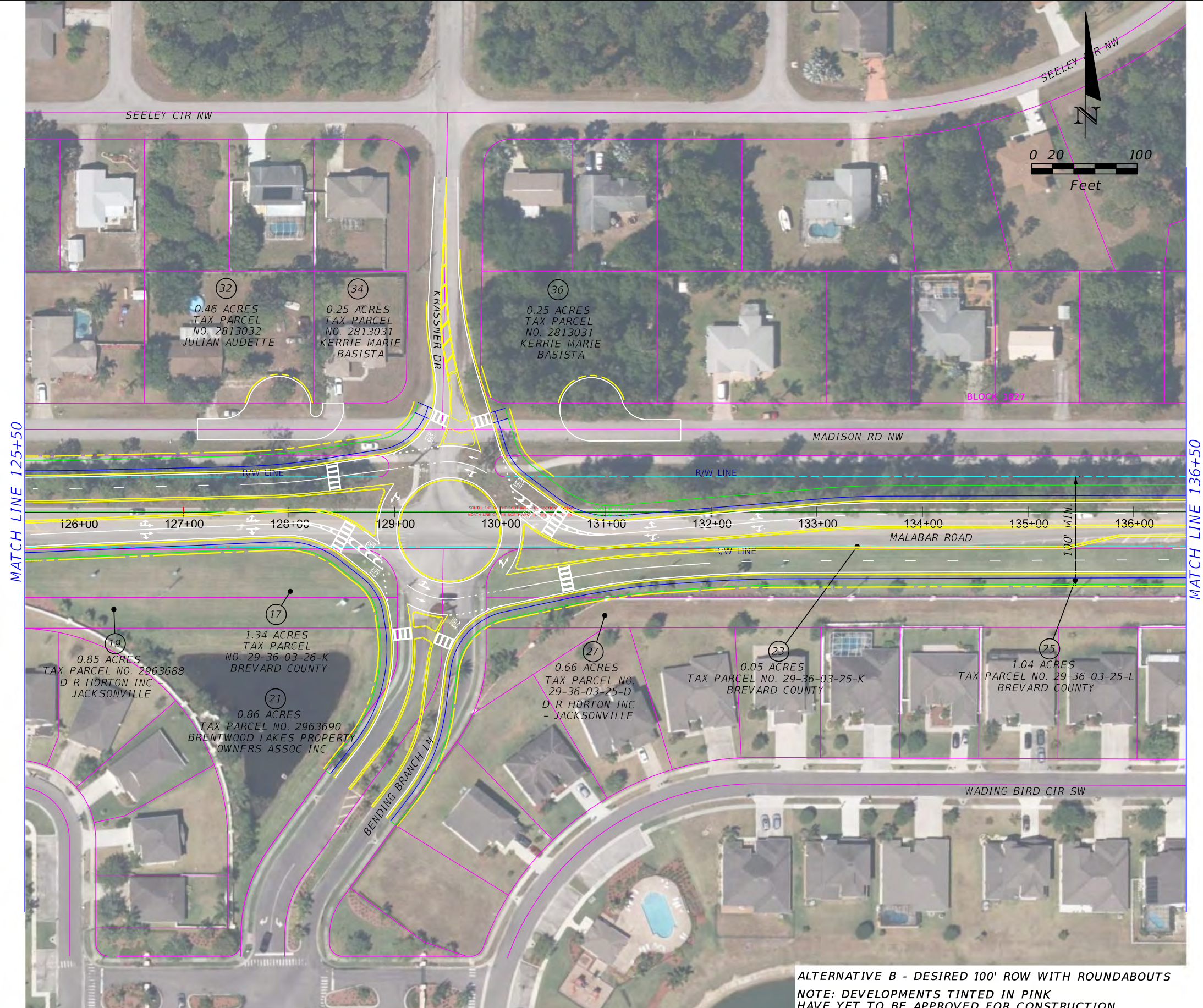


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.
C - 32 6

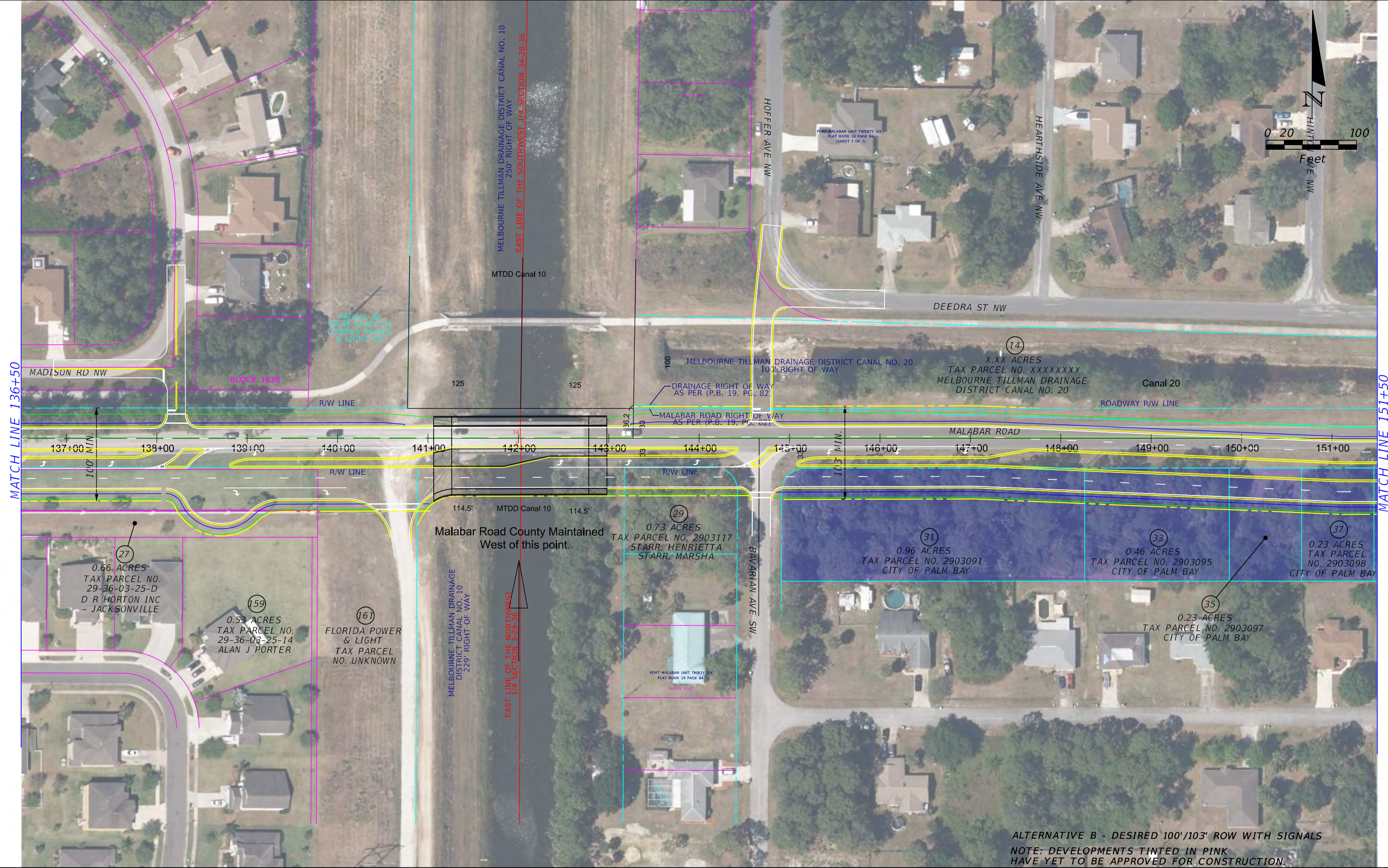




ALTERNATIVE B - DESIRED 100' ROW WITH ROUNDABOUTS  
 NOTE: DEVELOPMENTS TINTED IN PINK  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

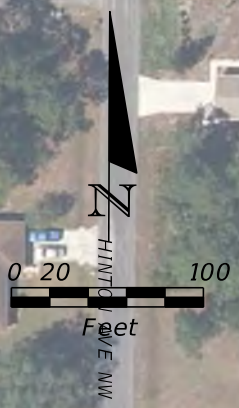
<b>LEGEND</b> 	EXISTING PARCEL LINE SUBDIVISION PARCEL LINES EXISTING RIGHT OF WAY BUS STOP LOCATIONS PROPOSED RIGHT OF WAY CITY BOUNDARY	CITY ACQUIRED PARCELS POTENTIAL HISTORIC BUILDING FLOODPLAIN UNAPPROVED DEVELOPMENT		CITY OF PALM BAY		<b>MALABAR ROAD PD&amp;E STUDY</b> <b>PLANSHEET</b>	SHEET NO. C - 33 6A
	ROAD NO. COUNTY FINANCIAL PROJECT ID	BREVARD					





MATCH LINE 136+50

MATCH LINE 151+50



ALTERNATIVE B - DESIRED 100'/103' ROW WITH SIGNALS  
 NOTE: DEVELOPMENTS TINTED IN PINK  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY BOUNDARY
	CITY ACQUIRED PARCELS
	POTENTIAL HISTORIC BUILDING
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT



CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

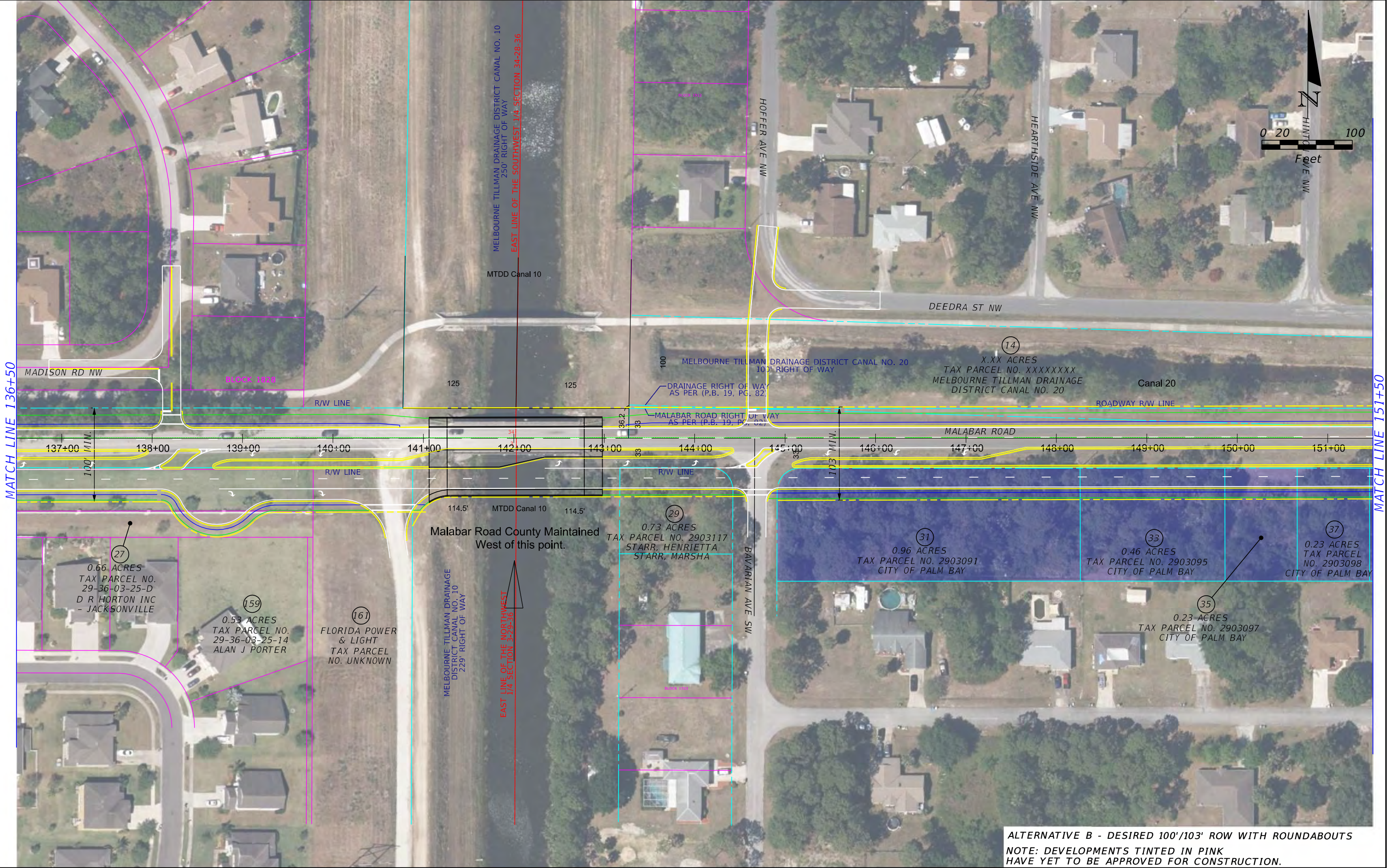
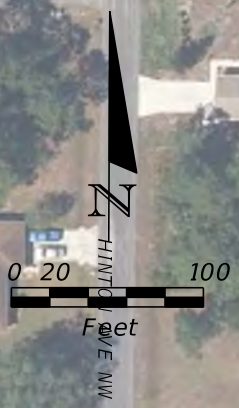
**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.
C-34 7



MATCH LINE 136+50

MATCH LINE 151+50



ALTERNATIVE B - DESIRED 100'/103' ROW WITH ROUNDABOUTS  
 NOTE: DEVELOPMENTS TINTED IN PINK  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE		CITY ACQUIRED PARCELS
	SUBDIVISION PARCEL LINES		POTENTIAL HISTORIC BUILDING
	EXISTING RIGHT OF WAY		FLOODPLAIN
	BUS STOP LOCATIONS		UNAPPROVED DEVELOPMENT
	PROPOSED RIGHT OF WAY		
	CITY BOUNDARY		

	CITY ACQUIRED PARCELS
	POTENTIAL HISTORIC BUILDING
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT

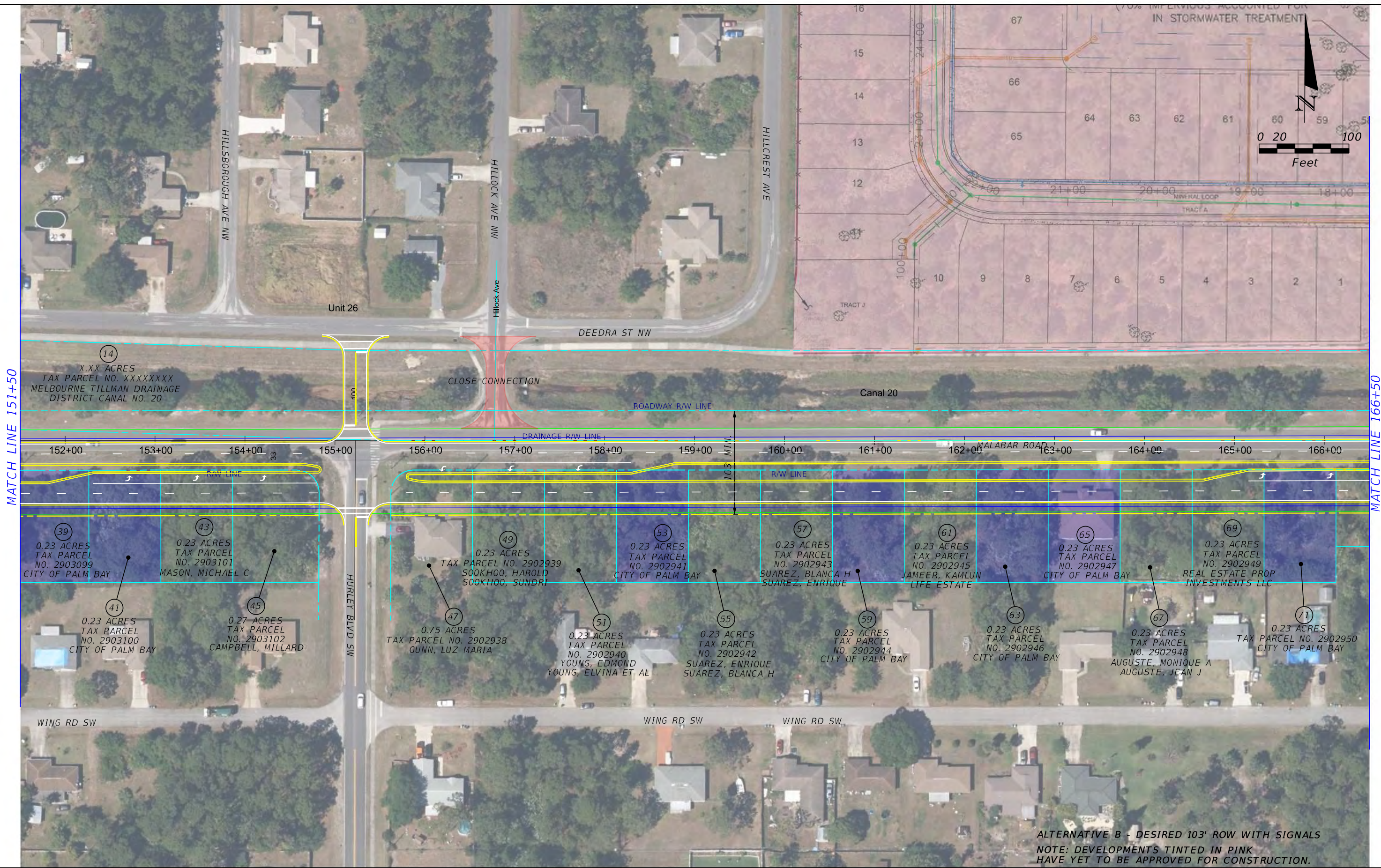


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.  
 C - 35  
 7A





**LEGEND**

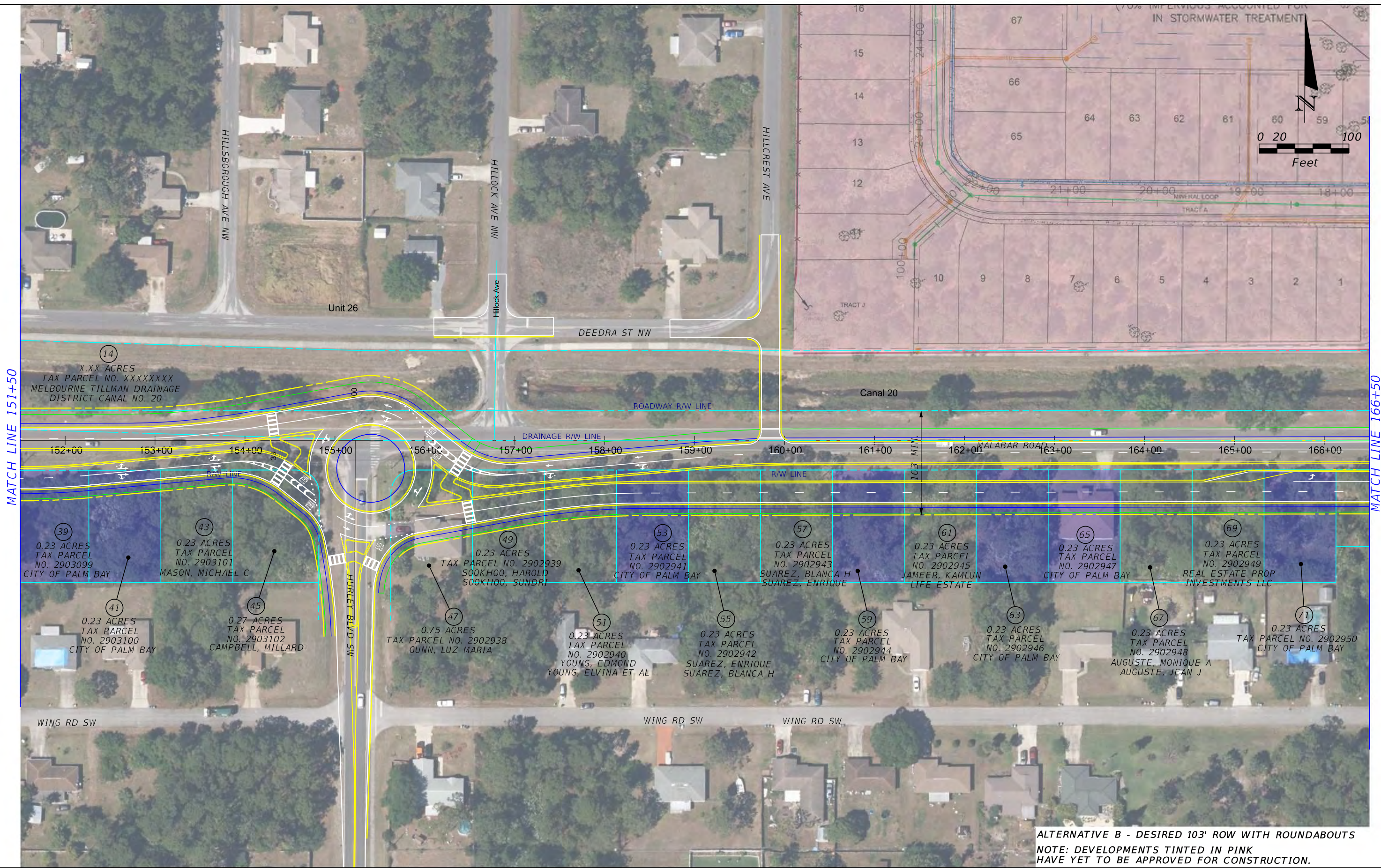
	EXISTING PARCEL LINE		CITY ACQUIRED PARCELS
	SUBDIVISION PARCEL LINES		POTENTIAL HISTORIC BUILDING
	EXISTING RIGHT OF WAY		FLOODPLAIN
	BUS STOP LOCATIONS		UNAPPROVED DEVELOPMENT
	PROPOSED RIGHT OF WAY		
	CITY BOUNDARY		

<b>CITY OF PALM BAY</b>		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

<b>MALABAR ROAD PD&amp;E STUDY</b>		
<b>PLANSHEET</b>		

SHEET NO.
C-36
8





MATCH LINE 151+50

MATCH LINE 166+50

ALTERNATIVE B - DESIRED 103' ROW WITH ROUNDABOUTS  
 NOTE: DEVELOPMENTS TINTED IN PINK  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE		CITY ACQUIRED PARCELS
	SUBDIVISION PARCEL LINES		POTENTIAL HISTORIC BUILDING
	EXISTING RIGHT OF WAY		FLOODPLAIN
	BUS STOP LOCATIONS		UNAPPROVED DEVELOPMENT
	PROPOSED RIGHT OF WAY		
	CITY BOUNDARY		

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

<b>CITY OF PALM BAY</b>		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

<b>MALABAR ROAD PD&amp;E STUDY</b>	SHEET NO.
<b>PLANSHEET</b>	C-37 8A



MATCH LINE 166+50

MATCH LINE 181+50



APPROXIMATELY 2320' OF CANAL IMPACTS

2815404  
Ison  
ORB 5941/295  
Less R/W for canal & Malabar Rd

2815403  
Carrasquillo  
ORB 1535/129

96' per deed

96' per deed

14  
X.XX ACRES  
TAX PARCEL NO. XXXXXXXX  
MELBOURNE TILLMAN DRAINAGE  
DISTRICT CANAL NO. 20

Canal 20

ROADWAY R/W LINE

DRAINAGE R/W LINE

DRAINAGE R/W LINE

DRAINAGE R/W LINE

167+00 168+00 168+43.06 169+00 170+00 171+00 172+00 173+00 174+00 175+00 176+00 177+00 178+00 179+00 180+00 181+00

MALABAR ROAD

WATOGA AVE SW

WING RD SW

WING RD SW

CITY OF PALM BAY PUBLIC WORKS DEPAR

73  
0.24 ACRES  
TAX PARCEL NO. 2902951  
CALILUNG, ROMMELL M

75  
0.24 ACRES  
TAX PARCEL NO. 2901351  
CITY OF PALM BAY

77  
0.23 ACRES  
TAX PARCEL NO. 2901353  
CITY OF PALM BAY

79  
0.23 ACRES  
TAX PARCEL NO. 2901353  
CITY OF PALM BAY

81  
0.23 ACRES  
TAX PARCEL NO. 2901354  
JD VALOR LLC

83  
0.23 ACRES  
TAX PARCEL NO. 2901355  
BOTNER, SARKA  
BOTNER, CLYDE

85  
0.23 ACRES  
TAX PARCEL NO. 2901356  
GUERRIER, THOMAS

87  
0.23 ACRES  
TAX PARCEL NO. 2901357  
CITY OF PALM BAY

89  
0.30 ACRES  
TAX PARCEL NO. 2901358  
VICENTE, RUBEN V

91  
15.75 ACRES  
TAX PARCEL NO. 2902930  
CITY OF PALM BAY

93  
15.54 ACRES  
TAX PARCEL NO. 2902933  
CITY OF PALM BAY

ALTERNATIVE B - DESIRED 103' ROW WITH SIGNALS  
NOTE: DEVELOPMENTS TINTED IN PINK  
HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE		CITY ACQUIRED PARCELS
	SUBDIVISION PARCEL LINES		POTENTIAL HISTORIC BUILDING
	EXISTING RIGHT OF WAY		FLOODPLAIN
	BUS STOP LOCATIONS		UNAPPROVED DEVELOPMENT
	PROPOSED RIGHT OF WAY		
	CITY BOUNDARY		

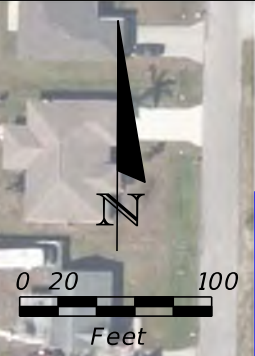


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLANSHEET**

SHEET NO.  
C-38  
9





APPROXIMATELY 2320' OF CANAL IMPACTS

2815402  
Methodist Church  
ORB 3095/3685

Methodist Church  
ORB 3534/1478

X.XX ACRES  
TAX PARCEL NO. XXXXXXXX  
MELBOURNE TILLMAN DRAINAGE  
DISTRICT CANAL NO. 20

(38)  
0.24 ACRES  
TAX PARCEL  
NO. 2815047  
MARCIO DELIMA

(30)  
0.25 ACRES  
TAX PARCEL  
NO. 2815088  
1687 JUPITER  
HOLDING LLC

(40)  
0.23 ACRES  
TAX PARCEL  
NO. 2815087  
SARALAND LLC

X.XX ACRES  
TAX PARCEL NO.  
XXXXXXXX  
MELBOURNE  
TILLMAN DRAINAGE  
DISTRICT CANAL  
NO. 20

SHALIMAR AVE NW

CARMELITE AVE NW

Less R/W for public roads & canals

4' DROW

Canal 20

Canal 20

MATCH LINE 181+50

MATCH LINE 196+50

PROP. R/W

ROADWAY R/W LINE

DRAINAGE R/W LINE

DRAINAGE R/W LINE

R/W LINE

182+00 183+00 184+00 185+00 186+00 187+00 188+00 189+00 190+00 191+00 192+00 193+00 194+00 195+00 196+00

PROP. R/W - 91.5'

(95)  
3.13 ACRES  
TAX PARCEL NO. 2902932  
CITY OF PALM BAY

(167)  
8.97 ACRES  
TAX PARCEL NO. 2901311  
UNITED STATES  
POSTAL SERVICE

(97)  
0.33 ACRES  
TAX PARCEL NO. 3020729  
CITY OF PALM BAY

(93)  
0.24 ACRES  
TAX PARCEL NO. 2902933  
CITY OF PALM BAY

(99)  
0.92 ACRES  
TAX PARCEL NO. 2901313  
CIRCLE K STORES INC

(163)  
0.92 ACRES  
TAX PARCEL NO. 2901312  
CIRCLE K STORES INC

JUPITER BLVD SW

ALTERNATIVE B - DESIRED 103' ROW WITH SIGNALS  
NOTE: DEVELOPMENTS TINTED IN PINK  
HAVE YET TO BE APPROVED FOR CONSTRUCTION.

LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	BUS STOP LOCATIONS
	PROPOSED RIGHT OF WAY
	CITY BOUNDARY
	CITY ACQUIRED PARCELS
	POTENTIAL HISTORIC BUILDING
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT



CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

MALABAR ROAD PD&E STUDY  
PLANSHEET

SHEET NO.  
C - 39  
10





APPROXIMATELY 1540' OF CANAL IMPACTS

2815402  
Methodist Church  
ORB 3095/3685

Methodist Church  
ORB 3534/1478

X.XX ACRES  
TAX PARCEL NO. XXXXXXXX  
MELBOURNE TILLMAN DRAINAGE  
DISTRICT CANAL NO. 20

(38)  
0.24 ACRES  
TAX PARCEL  
NO. 2815047  
MARCIO DELIMA

(30)  
0.25 ACRES  
TAX PARCEL  
NO. 2815088  
1687 JUPITER  
HOLDING LLC

(40)  
0.23 ACRES  
TAX PARCEL  
NO. 2815087  
SARALAND LLC

X.XX ACRES  
TAX PARCEL NO.  
XXXXXXXX  
MELBOURNE  
TILLMAN DRAINAGE  
DISTRICT CANAL  
NO. 20

Less R/W for public roads & canals

4' DROW

SHALIMAR AVE NW

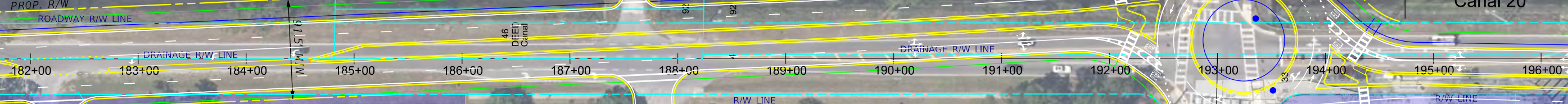
CARMELITE AVE NW

Canal 20

Canal 20

MATCH LINE 181+50

MATCH LINE 196+50



PROP. R/W - 92.5'

(95)  
3.13 ACRES  
TAX PARCEL NO. 2902932  
CITY OF PALM BAY

(167)  
8.97 ACRES  
TAX PARCEL NO. 2901311  
UNITED STATES  
POSTAL SERVICE

(97)  
0.33 ACRES  
TAX PARCEL NO. 3020729  
CITY OF PALM BAY

(93)  
0.24 ACRES  
TAX PARCEL NO. 2902933  
CITY OF PALM BAY

(99)  
0.92 ACRES  
TAX PARCEL NO. 2901313  
CIRCLE K STORES INC

(163)  
0.92 ACRES  
TAX PARCEL NO. 2901312  
CIRCLE K STORES INC

JUPITER BLVD SW

ALTERNATIVE B - DESIRED 103' ROW WITH ROUNDABOUTS  
NOTE: DEVELOPMENTS TINTED IN PINK  
HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE		CITY ACQUIRED PARCELS
	SUBDIVISION PARCEL LINES		POTENTIAL HISTORIC BUILDING
	EXISTING RIGHT OF WAY		FLOODPLAIN
	BUS STOP LOCATIONS		UNAPPROVED DEVELOPMENT
	PROPOSED RIGHT OF WAY		
	CITY BOUNDARY		

CITY ACQUIRED PARCELS  
POTENTIAL HISTORIC BUILDING  
FLOODPLAIN  
UNAPPROVED DEVELOPMENT

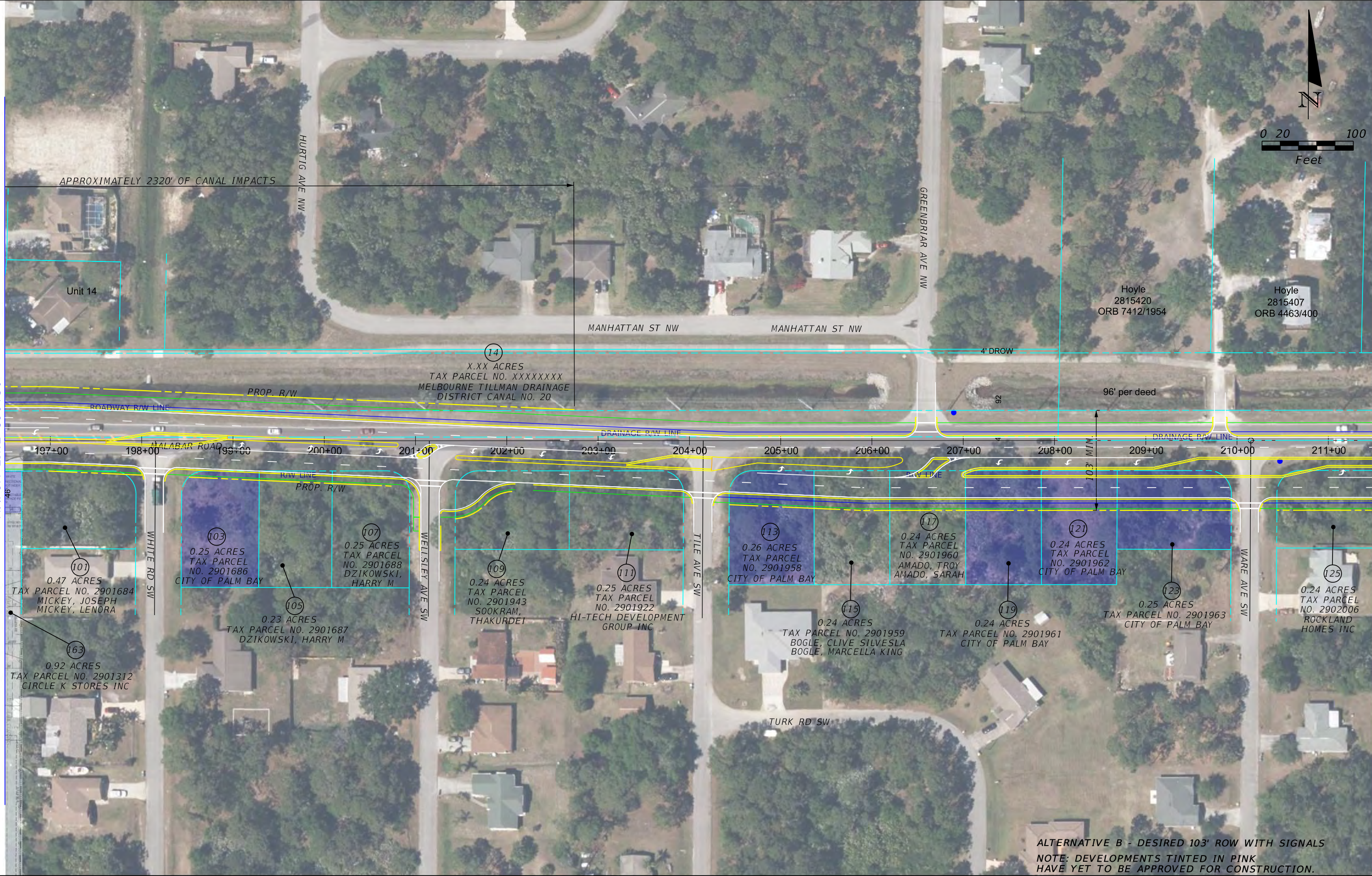
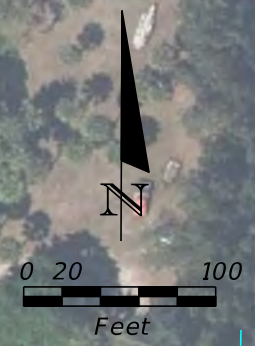


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
PLANSHEET**

SHEET NO.  
C-40  
10A





MATCH LINE 196+50

MATCH LINE 211+50

**LEGEND**

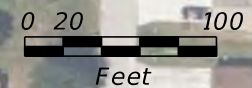
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	SUBDIVISION PARCEL LINES		POTENTIAL HISTORIC BUILDING
	EXISTING RIGHT OF WAY		FLOODPLAIN
	BUS STOP LOCATIONS		UNAPPROVED DEVELOPMENT
	PROPOSED RIGHT OF WAY		
	CITY BOUNDARY		

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

<b>MALABAR ROAD PD&amp;E STUDY</b>		
<b>PLANSHEET</b>		

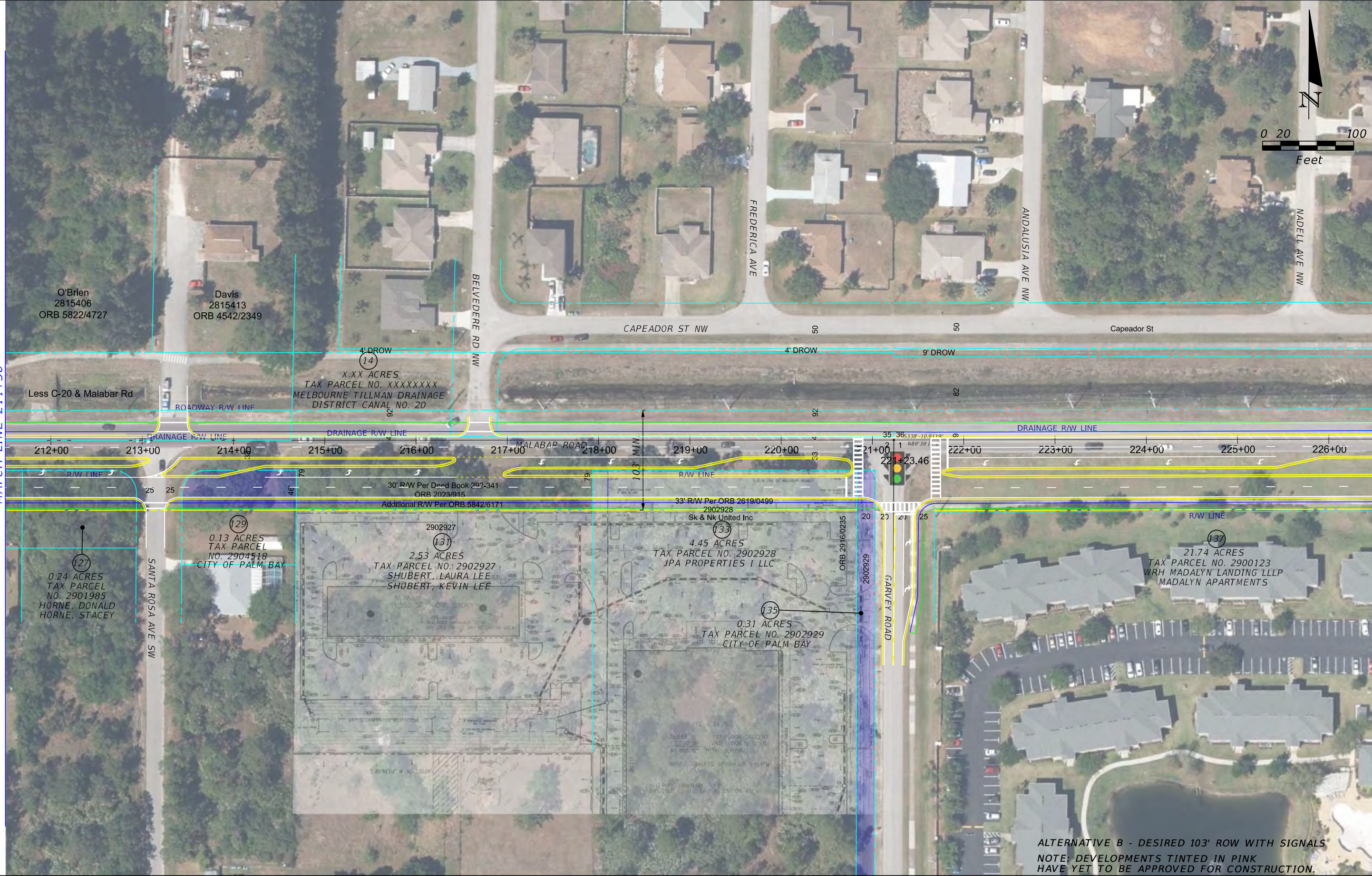
SHEET NO.
C-41
11





MATCH LINE 211+50

MATCH LINE 226+50



ALTERNATIVE B - DESIRED 103' ROW WITH SIGNALS  
 NOTE: DEVELOPMENTS TINTED IN PINK  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

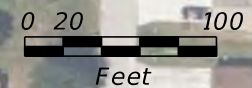
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	SUBDIVISION PARCEL LINES		POTENTIAL HISTORIC BUILDING
	EXISTING RIGHT OF WAY		FLOODPLAIN
	BUS STOP LOCATIONS		UNAPPROVED DEVELOPMENT
	PROPOSED RIGHT OF WAY		
	CITY BOUNDARY		

<b>CITY OF PALM BAY</b>		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

<b>MALABAR ROAD PD&amp;E STUDY</b>		
<b>PLANSHEET</b>		
SHEET NO.		
C - 42		
12		

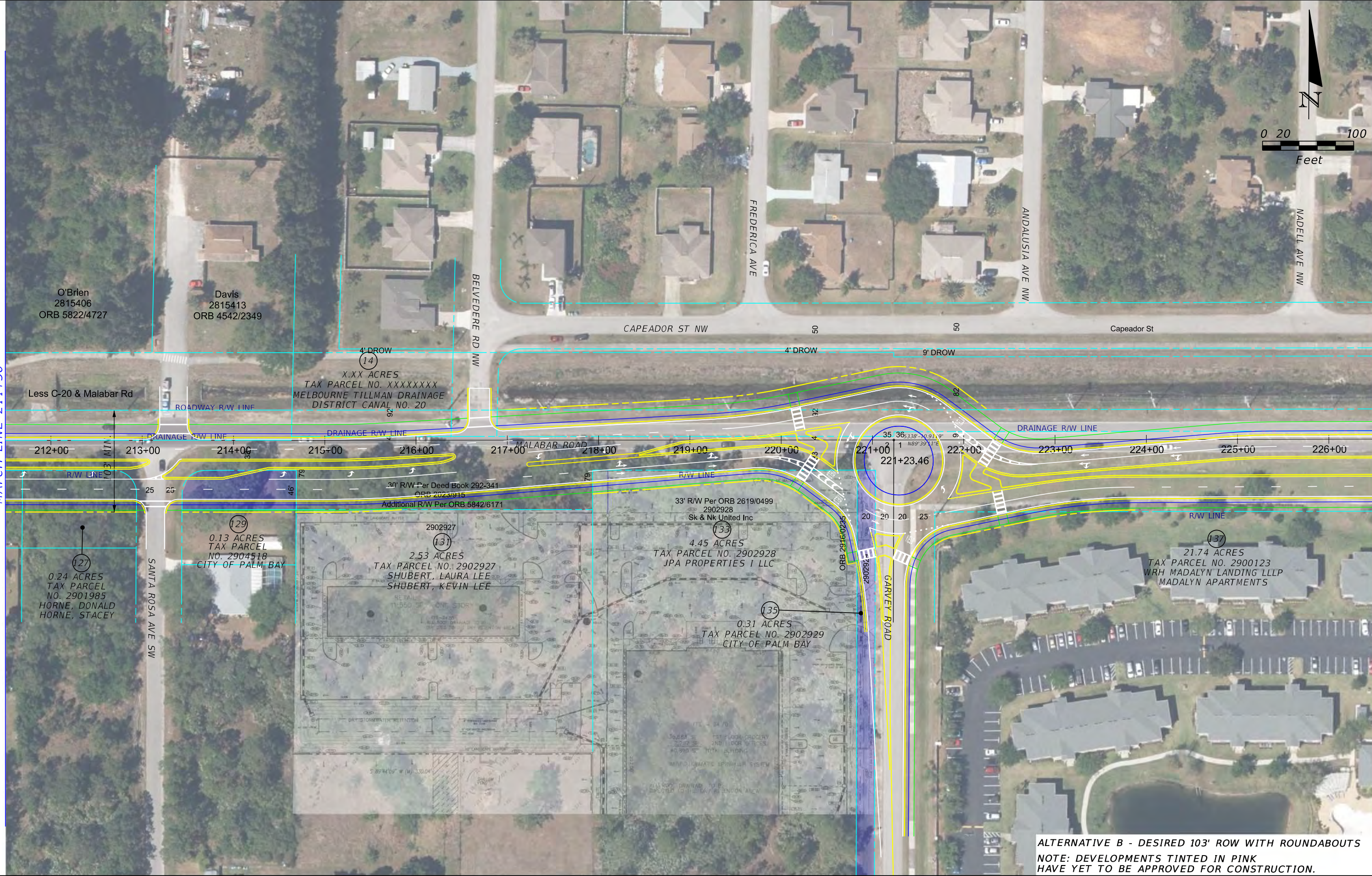
<b>MALABAR ROAD PD&amp;E STUDY</b>		
<b>PLANSHEET</b>		
SHEET NO.		
C - 42		
12		





MATCH LINE 211+50

MATCH LINE 226+50



**ALTERNATIVE B - DESIRED 103' ROW WITH ROUNDABOUTS**  
 NOTE: DEVELOPMENTS TINTED IN PINK  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

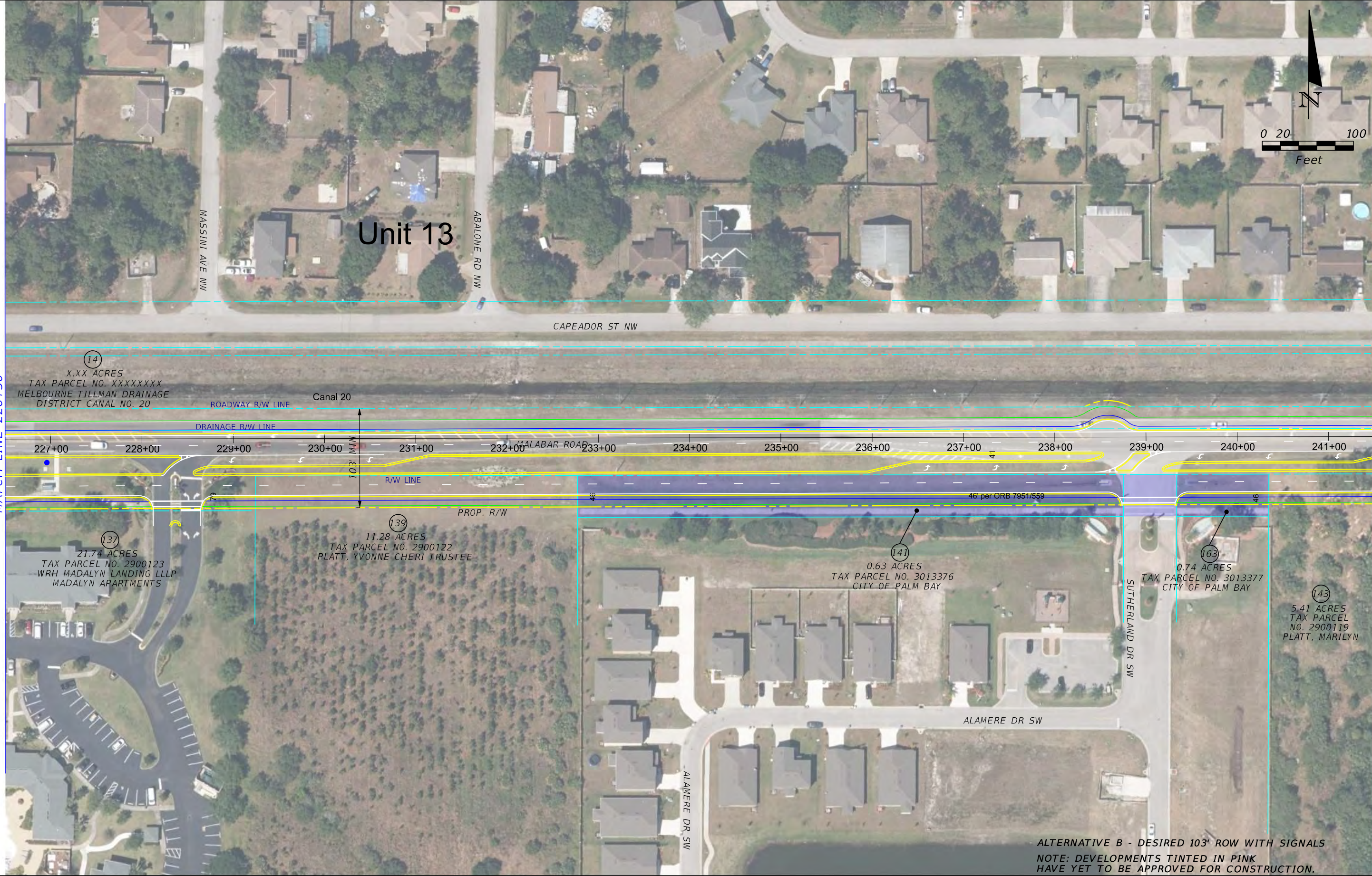
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	SUBDIVISION PARCEL LINES		POTENTIAL HISTORIC BUILDING
	EXISTING RIGHT OF WAY		FLOODPLAIN
	BUS STOP LOCATIONS		UNAPPROVED DEVELOPMENT
	PROPOSED RIGHT OF WAY		
	CITY BOUNDARY		

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

<b>MALABAR ROAD PD&amp;E STUDY</b>		
<b>PLANSHEET</b>		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

<b>MALABAR ROAD PD&amp;E STUDY</b>		SHEET NO. C - 43 12A
<b>PLANSHEET</b>		





MATCH LINE 226+50

MATCH LINE 241+50

ALTERNATIVE B - DESIRED 103' ROW WITH SIGNALS  
 NOTE: DEVELOPMENTS TINTED IN PINK  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

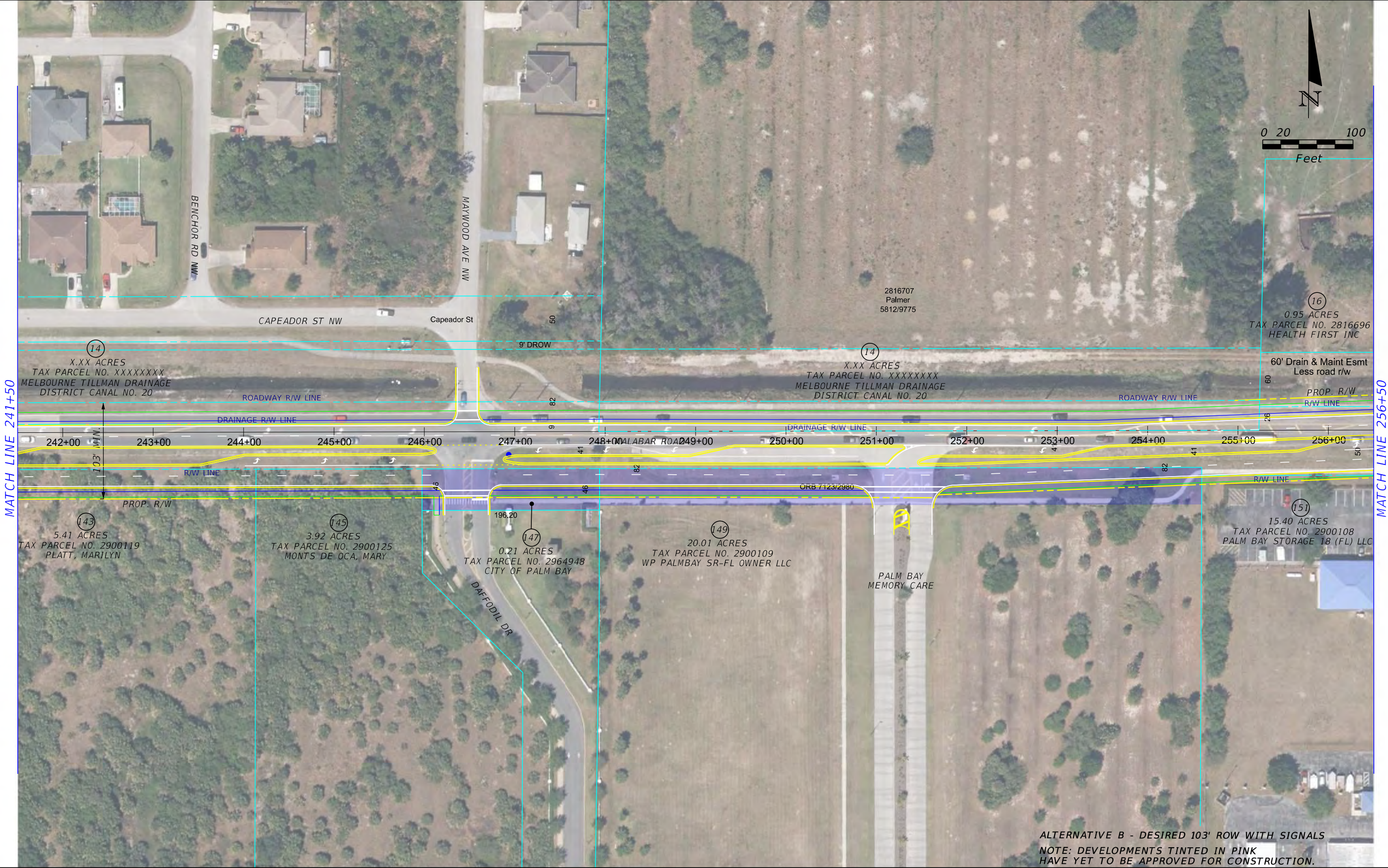
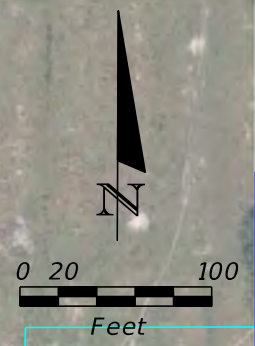
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	SUBDIVISION PARCEL LINES		POTENTIAL HISTORIC BUILDING
	EXISTING RIGHT OF WAY		FLOODPLAIN
	BUS STOP LOCATIONS		UNAPPROVED DEVELOPMENT
	PROPOSED RIGHT OF WAY		
	CITY BOUNDARY		

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

<b>MALABAR ROAD PD&amp;E STUDY</b>		
<b>PLANSHEET</b>		

SHEET NO.
C - 44
13





ALTERNATIVE B - DESIRED 103' ROW WITH SIGNALS  
 NOTE: DEVELOPMENTS TINTED IN PINK  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE		CITY ACQUIRED PARCELS
	SUBDIVISION PARCEL LINES		POTENTIAL HISTORIC BUILDING
	EXISTING RIGHT OF WAY		FLOODPLAIN
	BUS STOP LOCATIONS		UNAPPROVED DEVELOPMENT
	PROPOSED RIGHT OF WAY		
	CITY BOUNDARY		

CITY OF PALM BAY	
ROAD NO.	COUNTY
	BREVARD
FINANCIAL PROJECT ID	

<b>MALABAR ROAD PD&amp;E STUDY</b>	
<b>PLANSHEET</b>	

SHEET NO.
C - 45
14







## Appendix D – Existing Bridge Information



D - 1

**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
Inspection/CIDR Report with PDF attachment(s)  
Inspection**

**Structure ID: 704004****DISTRICT: D5 - Deland****INSPECTION DATE: 2/18/2020 GOZZ**

BY: Ayres Associates	STRUCTURE NAME: Malabar Rd-Canal
OWNER: 2 County Hwy Agency	YEAR BUILT: 1972
MAINTAINED BY: 2 County Hwy Agency	SECTION NO.: 70 000 396
STRUCTURE TYPE: 5 Prestressed Concrete - 01 Slab	MP: 1.512
LOCATION: 2.5 Miles West of CR-509	ROUTE: 00514
SERV. TYPE ON: 5 Highway-pedestrian	FACILITY CARRIED: Malabar Rd
SERV. TYPE UNDER: 5 Waterway	FEATURE INTERSECTED: Canal

 FUNCTIONALLY OBSOLETE STRUCTURALLY DEFICIENT

TYPE OF INSPECTION: Regular NBI

DATE FIELD INSPECTION WAS PERFORMED: ABOVE WATER: 2/18/2020 UNDERWATER: 2/18/2020

SUFFICIENCY RATING: 65.1  
HEALTH INDEX: 93.94

D - 2

FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
Inspection/CIDR Report with PDF attachment(s)  
Inspection

Structure ID: 704004

DISTRICT: D5 - Deland

INSPECTION DATE: 2/18/2020 GOZZ

BY: Ayres Associates  
OWNER: 2 County Hwy Agency  
MAINTAINED BY: 2 County Hwy Agency  
STRUCTURE TYPE: 5 Prestressed Concrete - 01 Slab  
LOCATION: 2.5 Miles West of CR-509  
SERV. TYPE ON: 5 Highway-pedestrian  
SERV. TYPE UNDER: 5 Waterway

STRUCTURE NAME: Malabar Rd-Canal  
YEAR BUILT: 1972  
SECTION NO.: 70 000 396  
MP: 1.512  
ROUTE: 00514  
FACILITY CARRIED: Malabar Rd  
FEATURE INTERSECTED: Canal

- THIS BRIDGE CONTAINS FRACTURE CRITICAL COMPONENTS
- THIS BRIDGE IS SCOUR CRITICAL
- THIS REPORT IDENTIFIES DEFICIENCIES WHICH REQUIRE PROMPT CORRECTIVE ACTION
- FUNCTIONALLY OBSOLETE
- STRUCTURALLY DEFICIENT

TYPE OF INSPECTION: Regular NBI

DATE FIELD INSPECTION WAS PERFORMED: ABOVE WATER: 2/18/2020 UNDERWATER: 2/18/2020

OVERALL NBI RATINGS:

DECK: 5 Fair	CHANNEL: 7 Minor Damage
SUPERSTRUCTURE: 5 Fair	CULVERT: N N/A (NBI)
SUBSTRUCTURE: 7 Good	SUFF. RATING: 65.1
PERF. RATING: Fair	HEALTH INDEX: 93.94

FIELD PERSONNEL / TITLE / NUMBER:

INITIALS

Steege, Casey - Bridge Inspector (CBI#00525) (lead)  
Jensen, Denise - Bridge Inspector (CBI #00592) Diver  
Fescina, Michael - Assistant Bridge Inspector - Diver

Casey Steege Digitally signed by Casey Steege  
Date: 2020.04.08 12:48:59 -04'00'  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

REVIEWING BRIDGE INSPECTION SUPERVISOR:

Maslyn, Rick - Bridge Inspector (CBI #00271)

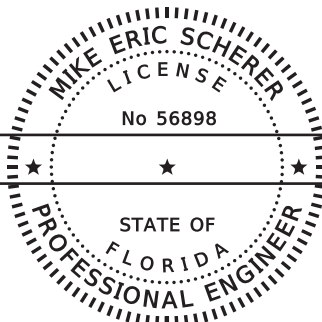
Frederick C Maslyn Digitally signed by Frederick C Maslyn  
Date: 2020.04.08 12:55:48 -04'00'

CONFIRMING REGISTERED PROFESSIONAL ENGINEER:

Scherer, Michael - Professional Engineer (P.E.#56898) Ayres Associates (C. A. #4356)  
8875 Hidden River Pkwy  
Suite 200  
Tampa FL 33637

SIGNATURE: \_\_\_\_\_

DATE: \_\_\_\_\_



THIS ITEM HAS BEEN DIGITALLY  
SIGNED AND SEALED BY  
Michael E Scherer  
Digitally signed by Michael  
E Scherer  
Date: 2020.04.08 13:05:23  
-04'00'

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.

This report contains information relating to the physical security of a structure and depictions of the structure. This information is confidential and exempt from public inspection pursuant to sections 119.071(3)(a) and 119.071(3)(b), Florida Statutes. Only the cover page of this report may be inspected and copied.

D - 3

**FLORIDA DEPARTMENT OF TRANSPORTATION**  
**BRIDGE MANAGEMENT SYSTEM**  
**Inspection/CIDR Report with PDF attachment(s)**  
**Inspection**

Structure ID: 704004

DISTRICT: D5 - Deland

INSPECTION DATE: 2/18/2020 GOZZ

## All Elements

## DECKS : Decks/Slabs

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	8099 / 3	PS Conc Slab (Sonovoid)	5122	99.96	0	.	2	0.04	0	.	5124 (SF)
0	1080 / 3	Delamination/Spall/Patched Area	0	.	0	.	2	100	0	.	2 (SF)
0	510 / 3	Wearing Surfaces	3358	85.06	420	10.64	170	4.31	0	.	3948 sq.ft
0	3210 / 3	Del/Spall/Patch/Pot(Wear Surf)	0	.	0	.	170	100	0	.	170 sq.ft
0	3220 / 3	Crack (Wearing Surface)	0	.	420	100	0	.	0	.	420 sq.ft

## Element Inspection Notes:

8099/3 Note: The tops of the slab units are not visible due to an asphalt overlay. There are two utilities and a lin. cable attached to the left fascia of the structure.

## Previously Noted:

CS3 (1080) = There is a spall with no exposed steel up to 10in. x 5in. x 1/2in. deep in the underside of Slab Unit 1-9 around the scupper. (1SF)

CS3 (1080) = Slab Unit 5-1 has a spall 10in. x 8in. x 1-1/4in. where a utility bolt has broken loose, approximately 4-1/2ft. from Bent 5 on the outer edge. (1SF)

## INCIDENTAL:

The steel utilities along the left side of the bridge have moderate to heavy corrosion.

Light dirt and debris are collected in the shoulders of the roadway.

Bats are present in the slab unit joints under the structure.

## Noted This Inspection:

CS2 (1120) = There is moderate staining, efflorescence and corrosion staining in the slab unit joints throughout. Refer to Photo 1.

1080/3 Refer to Parent Element

510/3 Previously Noted:

CS3 (3210) = The asphalt overlay has transverse cracks up to full deck width x 1/2in. wide with potholes and impending potholes up to 2ft. x 4in. x 2in. deep over the expansion joints. Refer to Photo 2. REPAIR (170SF)

CS2 (3220) = The asphalt overlay has full span length up to 1/4in. wide longitudinal cracks over the joints between the slab units. REPAIR (420SF)

3210/3 Refer to Parent Element

3220/3 Refer to Parent Element

## DECKS : Joints

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	301 / 3	Pourable Joint Seal	0	.	188	85.45	32	14.55	0	.	220 ft
0	2310 / 3	Leakage	0	.	188	100	0	.	0	.	188 ft
0	2330 / 3	Seal Damage	0	.	0	.	32	100	0	.	32 ft

## Element Inspection Notes:

301/3 Note: The expansion joints are covered with an overlay of asphalt.

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D - 4

**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
Inspection/CIDR Report with PDF attachment(s)  
Inspection**

Structure ID: 704004

DISTRICT: D5 - Deland

INSPECTION DATE: 2/18/2020 GOZZ

Previously Noted:

CS3 (2330) = The joints in the sidewalks are heavily deteriorated and packed with dirt and debris with minor vegetation. Refer to Photo 3. REPAIR (32FT)

CS2 (2310) = Water staining on abutments and intermediate bent caps indicate that the expansion joints are leaking. (188FT)

2310/3 Refer to Parent Element

2330/3 Refer to Parent Element

**MISCELLANEOUS : Channel**

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	8290 / 3	Channel	0	.	1	100	0	.	0	.	1 (EA)
0	9150 / 3	Bank Erosion	0	.	1	100	0	.	0	.	1 (EA)

**Element Inspection Notes:**

8290/3

Previously Noted:

CS2 (9150) = The vertical face of the toe of the west slope is exposed up to 12in. high x full length with no undermining. (1EA)

There is scattered drift throughout the channel.

There are several timber pile stubs between Bents 4 and 5 up to 2ft. above the mudline.

INCIDENTAL:

On the west face of Pile 4-2, bottom 3 ft. of the tide gauge is loose.

9150/3

Refer to Parent Element

**MISCELLANEOUS : Other Elements**

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	321 / 3	Re Conc Approach Slab	732	100	0	.	0	.	0	.	732 sq.ft
0	510 / 3	Wearing Surfaces	562	100	0	.	0	.	0	.	562 sq.ft

**Element Inspection Notes:**

321/3

Note: The approach slabs are covered with an asphalt overlay.

510/3

Refer to Parent Element

**MISCELLANEOUS : Other Elements**

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	8475 / 3	R/Conc Walls	39	97.5	0	.	1	2.5	0	.	40 ft
0	1080 / 3	Delamination/Spall/Patched Area	0	.	0	.	1	100	0	.	1 ft

**Element Inspection Notes:**

8475/3

Previously Noted:

CS3 (1080) = The northeast wingwall has a spall 12in. high x 8in. wide x 3/4in. diameter at the end. (1FT)

INCIDENTAL:

The northwest slope at the wingwall has a washout 6ft. x 4ft. x 30in. at the end. Refer to Photo 4. REPAIR

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D - 5

**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
Inspection/CIDR Report with PDF attachment(s)  
Inspection**

Structure ID: 704004

DISTRICT: D5 - Deland

INSPECTION DATE: 2/18/2020 GOZZ

The southeast slope at the wingwall has a washout 12in. wide x 2ft. high x 2ft. back under due to a drainage pipe at the end of wingwall. Refer to Photo 5. REPAIR

1080/3 Refer to Parent Element

**SUBSTRUCTURE : Substructure**

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	215 / 3	Re Conc Abutment	78	100	0	.	0	.	0	.	78 ft

**Element Inspection Notes:**

215/3 No Notes

**SUBSTRUCTURE : Substructure**

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	226 / 3	Pre Conc Pile	0	.	28	100	0	.	0	.	28 (EA)
0	1080 / 3	Delamination/Spall/Patched Area	0	.	10	100	0	.	0	.	10 (EA)
0	1190 / 3	Abrasion(PSC/RC)	0	.	18	100	0	.	0	.	18 (EA)

**Element Inspection Notes:**

226/3 Previously Noted:

CS2 (1080) = The Piles have construction related edge spalls up to 4in. x 2in. x 1/2in. in several locations throughout the structure. (10EA)

CS2 (1190) = The piles have scaling up to 1/16in. deep from the high water mark down to the mudline. (18EA)

The majority of the Piles have cut, exposed and corroded pickup points, typically 10ft. below the caps.

1080/3 Refer to Parent Element

1190/3 Refer to Parent Element

**SUBSTRUCTURE : Substructure**

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	234 / 3	Re Conc Pier Cap	159	97.55	4	2.45	0	.	0	.	163 ft
0	1080 / 3	Delamination/Spall/Patched Area	0	.	1	100	0	.	0	.	1 ft
0	1090 / 3	Exposed Rebar	0	.	3	100	0	.	0	.	3 ft

**Element Inspection Notes:**

234/3 Previously Noted:

CS2 (1090) (1080) = There are two spalls with exposed steel up to 3in. in diameter x 1/2in. deep and a 4in. x 2in. delamination in the south face of Bent Cap 5. REPAIR (2FT) (1FT)

CS2 (1090) = South of Pile 5-1 on Bent 5 cap underside, there is a 3 in. diameter x 1/2 in. spall with exposed steel. Refer to Photo 6. REPAIR (1FT)

1080/3 Refer to Parent Element

1090/3 Refer to Parent Element

**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
Inspection/CIDR Report with PDF attachment(s)  
Inspection**

Structure ID: 704004

DISTRICT: D5 - Deland

INSPECTION DATE: 2/18/2020 GOZZ

**SUBSTRUCTURE** : Substructure

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	8394 / 3	R/Conc Abut Slope Protection	2382	95.74	6	0.24	100	4.02	0	.	2488 (SF)
0	1130 / 3	Cracking (RC and Other)	0	.	6	5.66	100	94.34	0	.	106 (SF)

**Element Inspection Notes:**

8394/3 Note: This element represents the concrete panel slope protection.

## Previously Noted:

CS3 (1130) = Three panels along the northeast slope are fractured and upheaved up to 3in. due to prior undermining. Repairs made and panels appear to be stable. Refer to Photo 7. Cracks up to 1/2 in. wide are unsealed. (100SF)

CS2 (1130) = The west slope second panel from the south has a transverse crack up to 1/16in. wide x 6ft. long, approximately 7ft. from Abutment 1. (6SF)

CS1 = The bottom corners of all four slopes have minor vegetation growth.

## INCIDENTAL:

Slope pavement joints at Abutments 1 and 6 caps are not sealed.

1130/3 Refer to Parent Element

**SUPERSTRUCTURE** : Bearings

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	310 / 3	Elastomeric Bearing	10	100	0	.	0	.	0	.	10 each

**Element Inspection Notes:**

310/3 No Notes

**SUPERSTRUCTURE** : Superstructure

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	331 / 3	Re Conc Bridge Railing	0	.	267	95.36	13	4.64	0	.	280 ft
0	1080 / 3	Delamination/Spall/Patched Area	0	.	0	.	3	100	0	.	3 ft
0	1090 / 3	Exposed Rebar	0	.	0	.	10	100	0	.	10 ft
0	1130 / 3	Cracking (RC and Other)	0	.	267	100	0	.	0	.	267 ft

**Element Inspection Notes:**

331/3 Note: This element represents the post and beam concrete bridge rail.

## Previously Noted:

CS3 (1090) = The following posts have spalls with exposed rebar up to 3ft. x 8in. x 2in. with 70% section remaining on the exposed rebar;

Post 1-3 Left, northwest and northeast corners.

Post 1-4 Left, southwest corner.

Post 2-3 Right, northeast corner.

Post 3-2 Right, southeast corner.

Post 3-4 Right, southwest and northeast corner.

Post 4-4 Left, northwest corner.

Post 4-2 Right, northeast corner.

Post 4-3 Right, northeast corner.

Post 5-2 Left, northwest corner. Refer to Photo 8. REPAIR ALL (10FT)



D - 7

**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
Inspection/CIDR Report with PDF attachment(s)  
Inspection**

**Structure ID: 704004****DISTRICT: D5 - Deland****INSPECTION DATE: 2/18/2020 GOZZ**

CS3 (1080) = Span 3 left bridge rail bottom beam at Post 3-3 has a spall 1ft. x 2in. x 1in. with exposed rebar in the bottom north face. REPAIR (1FT)

CS3 (1080) = Span 5 right bridge rail top beam east of Post 5-3 has a spall 20in. x 4in. x 1in. with exposed rebar in the bottom north face. Refer to Photo 9. REPAIR (2FT)

CS2 (1130) = All the concrete posts exhibit vertical cracks up to full height 3.5ft. long x 1/16in. wide primarily at the corners. The majority of the corners are delaminated. Post concrete is soft. (40FT)

CS2 (1130) = The beams also exhibit cracks both horizontal and vertical up to full length 7.5ft. x full height 8in. x up to 1/16in. wide. (227FT)

1080/3 Refer to Parent Element

1090/3 Refer to Parent Element

1130/3 Refer to Parent Element

**Total Number of Elements\*: 11**

\*excluding defects/protective systems

**Structure Notes**

BRIDGE OWNER: BREVARD COUNTY

This structure was inventoried from west to east.

**TRAFFIC RESTRICTIONS:**

Based on the results of the most recent load rating analysis dated 06/03/10, posting is not required. The structure is not posted.

Average asphalt thickness = 3 in.

As stated in section 3.4 of the Bridge and Other Structures Inspection and Reporting as of 11/24/2009 superstructure unit numbering (Section 3.4.2.2) and substructure unit numbering (Section 3.4.3) are designated NOT BY ORDER IN WHICH THE ELEMENTS WERE CONSTRUCTED AND PUT INTO SERVICE. Plans sheet or drawing in Topic G, Bridge Description and Drawings section of the bridge folder can confirm all references to these elements prior to this date.

D - 8

**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM**

**Inspection/CIDR Report with PDF attachment(s)  
Inspection**

Structure ID: 704004

DISTRICT: D5 - Deland

INSPECTION DATE: 2/18/2020 GOZZ

**INSPECTION NOTES:                      GOZZ                      2/18/2020**

**LOAD CAPACITY EVALUATION:**

A cursory review of the current load rating analysis dated 6/3/10 was conducted during this inspection by Michael Scherer, P.E. on 3/30/2020. The findings of this review and inspection reveal no substantial deterioration, geometric changes or additional dead load to the bridge that warrant the need for a new load rating analysis; therefore, the current load rating is considered applicable.

Note: The NBI Rating for Items 58 Deck and 59 Superstructure have been lowered to a 5 due to the staining between the slab unit joints.

The lead underwater inspector for the current routine inspection is Denise Jensen (CBI# 00592).

The following underwater elements were inspected:

226 Pre Conc Pile - Bents 3 and 4 each with seven 14in. concrete piling  
8290 Channel

Non-Structural Items:

Approach Roadway:

Previously Noted:

West approach roadway is settling and deteriorated.

Noted This Inspection:

Approach slab/ roadway transition is cracked up to 1/2 in. wide with light dirt and vegetation. Refer to Photo 10. REPAIR

Both approach roadways have multi-directional cracks up to 1/2 in. throughout with the west approach being the worst case.

Approach Shoulders:

Previously Noted:

The approach shoulders are 6in. to 1ft. higher than the approach roadway. This does not appear to effect the drainage so no repair will be issued at this time.

Graffiti:

Previously Noted:

There is graffiti on the underside of the structure, not visible to the traveling public.

Guardrail:

Previously Noted:

The northeast guardrail end terminal has minor impact damage.

Noted This Inspection:

The approach guardrails are not attached to the structure. The guardrails do not meet any current FDOT Standard Index guidelines. Refer to Photo 11. REPAIR

Post 1 of the northeast guardrail has a split cushion block. REPAIR

Cushion blocks are weathered throughout. REPAIR

Striping:

Previously Noted:

The striping on the structure is faded and chipped. Refer to Photo 12. REPAIR

Sufficiency Rating Calculation Accepted on 3/31/2020

This report contains information relating to the physical security of a structure and depictions of the structure. This information is confidential and exempt from public inspection pursuant to sections 119.071(3)(a) and 119.071(3)(b), Florida Statutes. Only the cover page of this report may be inspected and copied.

**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
BRIDGE INSPECTION REPORT  
ADDENDUM**

**CONTENTS OF ADDENDUM**

	Bridge Location Map		Sketches and Photos
*	Additional Element Inspection Notes		Recommended Corrective Action
	Load Rating Analysis Summary		Scour Evaluation
*	Posting Photos	*	Fracture Critical Inspections

\* This section is not included in this report.

**PREPARED FOR: FDOT  
BRIDGE OWNER: BREVARD COUNTY  
PREPARED BY: AYRES ASSOCIATES**

**REPORT IDENTIFICATION**

Bridge Number: 704004 – Regular NBI	Inspection Date: 02/18/2020
-------------------------------------	-----------------------------

Bridge Name: Malabar Road over Canal

Facility Carried: Malabar Road

Featured Intersected: Canal



West Approach



# FLORIDA DEPARTMENT OF TRANSPORTATION BRIDGE MANAGEMENT SYSTEM BRIDGE INSPECTION REPORT

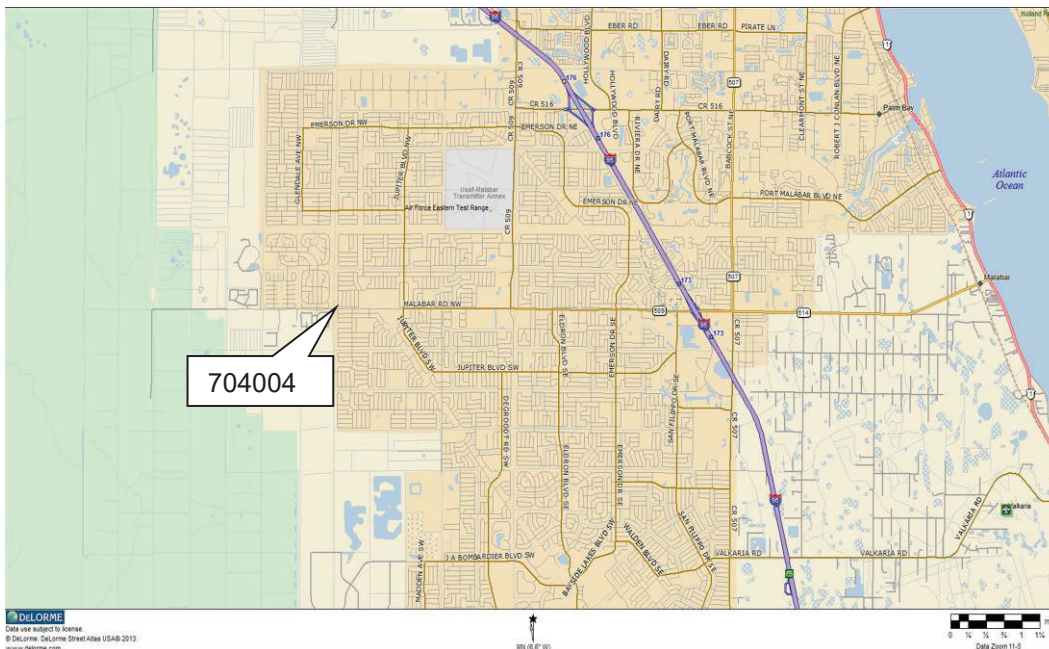
Bridge No: 704004

Inspection Date: 02/18/2020

## BRIDGE LOCATION MAP



South Elevation



Malabar Rd Canal

2.5 miles west of CR-509



**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
BRIDGE INSPECTION REPORT**

Bridge No: 704004

Inspection Date: 02/18/2020

**LOAD RATING ANALYSIS SUMMARY**

Form Revision: 27-Jun-07

**BRIDGE LOAD RATING SUMMARY FORM**

<b>BRIDGE DATA</b>		<b>LONGITUDINAL GOVERNING COMPONENT</b>		<b>OTHER SPAN OF INTEREST</b> (If Applicable)	
Bridge Number:	704004	Main/Approach Span:	Main		
Struct. Type Main [Item 43] @:	501	Description:	Slab		
Struct. Type Appr. [Item 44] @:	501	Material:	Prestressed Conc		
<b>POSTING DATA</b>		Simple/Continuous Span:	Simple		
Current Restrictions		Span Length:	28.00		
Item 41 @:	Open, No Restrictions	Flexure, Shear or Principal Tension:	Principal Tension		
Is Posting Needed:	No	<b>TRANSVERSE GOVERNING COMPONENT</b>			
Proposed Restrictions		Main/Approach Span:		<b>OTHER SPAN OF INTEREST</b> (If Applicable)	
Item 70 @:	A/Above Legal Loads	Description:			
<b>PROGRAM USED</b>		Material:			
	PSBeam	Deck, Box or Substructure:			
		Flexure, Shear or Principal Tension:			

PONTIS APPRAISAL TAB			PONTIS DATABASE INPUT			PONTIS LOAD RATING 1 TAB			PONTIS LOAD RATING 2 TAB		
Description (NBIS Code)	Value		Description (NBIS Code)	Value		Description (NBIS Code)	Value		Description (NBIS Code)	Value	
Design Load (31) @	MS18 (HS20)		HS 20/HL 93 Governing Span Length	28.00	FT	FL 120 Longitudinal Governing Span Rating	-1.0	Tons			
HL93, M9 (H10), M13.5 (HS15), M18 (HS20), MS18 (HS20), MS18 (HS20) Mod. Pedestrian, Railroad, MS22.5 (HS25), Unknown (NB), Unknown (P), Not Applicable (P)			Load Rating Origination		Design Plans						
Operating Type (63) @	Load Factor		Load Rating Date	01-Jun-10		<b>SEGMENTAL</b>					
Unknown, Load Factor, Allowable Stress, Load & Resistance Factor, Load Test, No Rating, Unknown (NB), Not Applicable (P)			Method Calculation	AASHTO Formula		FL 120 Transverse Rating (Segmental)**	-1.0	Tons			
Operating Rating (64)* @ (Int P.S.U. - M)	54.0	Tons	Unknown, AASHTO Formula, SALOD, BRUFEM, Other			Single Axle Transverse Rating**	-1.0	Tons			
Inventory Type (65) @	Load Factor		Load Distribution Factor	1.0000		Tandem Axle Transverse Rating**	-1.0	Tons			
Unknown, Load Factor, Allowable Stress, Load & Resistance Factor, Load Test, No Rating, Unknown (NB), Not Applicable (P)			Impact Factor	30.0%		Wing Span**	-1.00	FT			
Inventory Rating (66)* @ (Int P.S.U. - M)	42.1	Tons	Design Method	Working Stress		Web-to-Web Span**	-1.00	FT			
			Design Measure	English		<b>MAXIMUM SPAN</b>					
			Unknown, Working Stress, Load Factor, LRFD, Others			HS 20 Operating Rating Maximum Span**	54.0	Tons			
			Unknown, English, System International			FL 120 Longitudinal Maximum Span #	-1.0	Tons			
<b>TRUCK OPERATING RATINGS</b>											
SU 2**	Interior P.S.U. (M)	49.1	Tons								
SU 3**	Interior P.S.U. (M)	53.5	Tons								
SU 4**	Interior P.S.U. (M)	52.2	Tons								
C 3**	Interior P.S.U. (M)	73.6	Tons								
C 4**	Interior P.S.U. (M)	66.0	Tons								
C 5**	Interior P.S.U. (M)	74.0	Tons								
ST 5**	Interior P.S.U. (M)	81.2	Tons								
Recommended SU Posting ##		99	Tons								
Recommended C Posting ##		99	Tons								
Recommended ST Posting ##		99	Tons								



Responsible Engineer:  
FL P.E. #: 65632  
Date: 03-Jun-10  
Address: Ananda B. Kelley, Suite 400, 201 N. Franklin St, Tampa, FL 33602

COMMENTS BY ENGINEER	
An Interior slab unit controls by moment for HS20 Inventory (moment) & Operating (stress). Due to evidence of longitudinal cracking on bridge deck surface, the prestressed slab units have been assumed to work independently (LLDF = 0.5 lanes per slab unit).	

COMPUTATIONS	
Performed By:	Carlos Layrisse
Checked By:	Kipling Laskaris
Reviewed By:	Ananda B. Kelley
Date:	01-Jun-10
Date:	01-Jun-10
Date:	03-Jun-10



**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
BRIDGE INSPECTION REPORT**

Bridge No: 704004

Inspection Date: 02/18/2020

**SKETCHES AND PHOTOS**



Photo 1: Element 8099: Showing leaking and staining in the slab unit joints.



Photo 2: Element 8099: Showing transverse cracks with potholes in AC overlay at Bent 4.



**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
BRIDGE INSPECTION REPORT**

Bridge No: 704004

Inspection Date: 02/18/2020

**SKETCHES AND PHOTOS**



Photo 3: Element 301: Sidewalk expansion joint deteriorated sealant, dirt and debris



Photo 4: Element 8475: Showing northwest wingwall corner washout.



**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
BRIDGE INSPECTION REPORT**

Bridge No: 704004

Inspection Date: 02/18/2020

**SKETCHES AND PHOTOS**



Photo 5: Element 8475: Showing southeast wingwall corner washout.



Photo 6: Element 234: Spall with exposed steel on underside of Bent 5.



**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
BRIDGE INSPECTION REPORT**

Bridge No: 704004

Inspection Date: 02/18/2020

**SKETCHES AND PHOTOS**



Photo 7: Element 8394: Showing northeast panel repairs and original fractures.



Photo 8: Element 331: Showing post spall/delamination with exposed steel.



**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
BRIDGE INSPECTION REPORT**

Bridge No: 704004

Inspection Date: 02/18/2020

**SKETCHES AND PHOTOS**



Photo 9: Element 331: Showing spall with exposed steel in bridge rail top.



Photo 10: Inspection Notes: Showing cracks with light dirt and vegetation in the approach slab/roadway transition.



**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
BRIDGE INSPECTION REPORT**

Bridge No: 704004

Inspection Date: 02/18/2020

**SKETCHES AND PHOTOS**



Photo 11: Inspection Notes: Showing approach guardrail not attached to structure.



Photo 12: Inspection Notes: Faded and chipped striping on bridge.

**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
BRIDGE INSPECTION REPORT**

Bridge No: 704004

Inspection Date: 02/18/2020

**RECOMMENDED CORRECTIVE ACTION**

8099 PS Conc Slab (Sonovoid)

Repair and seal the potholes and cracks in the AC overlay.

301 Pourable Joint Seal

Clean and seal expansion joints.

331 Re Conc Bridge Railing

Remove unsound concrete, clear and paint exposed steel and patch the spalls.

234 Re Conc Pier Cap

Clean and paint exposed steel and patch spalls on Bent Cap 5.

8475 R/Conc Walls

Repair washouts on the northwest and southeast wingwalls.

## Non-Structural Elements:

Approach Roadway:

Repair the approach slab to approach roadway cracking.

Guardrail:

Install an upgraded guardrail system in accordance with current FDOT Standard Index Guidelines.

Striping:

Install new roadway striping.



**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
BRIDGE INSPECTION REPORT**

Bridge No: 704004

Inspection Date: 02/18/2020

**SCOUR EVALUATION**

**LEFT SIDE**

Location	Original	Previous	Current	Change
	12/16/87	02/14/18	02/18/20	
Abutment 1	5.5	4.4	4.4	0.0
Bent 2	16.5	14.5	14.5	0.0
Bent 3	18.0	18.0	17.6	0.4
C/L of Channel	18.5	18.2	18.3	-0.1
Bent 4	18.1	17.9	17.6	0.3
Bent 5	15.0	14.8	15.0	-0.2
Abutment 6	4.5	4.3	4.3	0.0

Waterline at C/L of Channel	15.7	14.7	14.0
-----------------------------	------	------	------

**RIGHT SIDE**

Location	Original	Previous	Current	Change
	12/16/87	02/14/18	02/18/20	
Abutment 1	5.5	4.4	4.4	0.0
Bent 2	14.0	14.0	14.0	0.0
Bent 3	17.0	18.2	19.1	-0.9
C/L of Channel	20.7	18.7	18.6	0.1
Bent 4	18.7	19.1	18.5	0.6
Bent 5	15.6	15.0	14.7	0.3
Abutment 6	5.5	4.3	4.5	-0.2

Waterline at C/L of Channel	15.7	14.7	14.0
-----------------------------	------	------	------

NOTE: - = An increase in degradation.

Blank box = No previous measurement available.

Relative Channel Plots Are Not To Scale.

Any Vertical Curvature Of Datum Point Is Not Reflective In Plot.

The waterline and mudline measurements, in reference to the top of sidewalk, are provided for future comparison. All measurements are in feet.

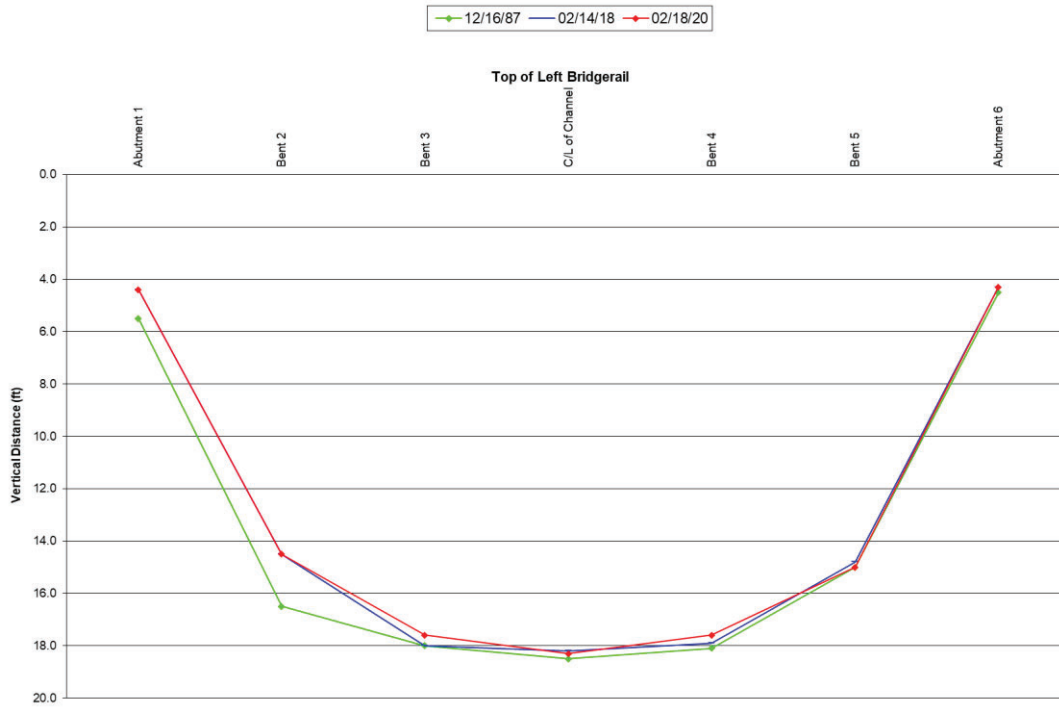
# FLORIDA DEPARTMENT OF TRANSPORTATION BRIDGE MANAGEMENT SYSTEM BRIDGE INSPECTION REPORT

Bridge No: 704004

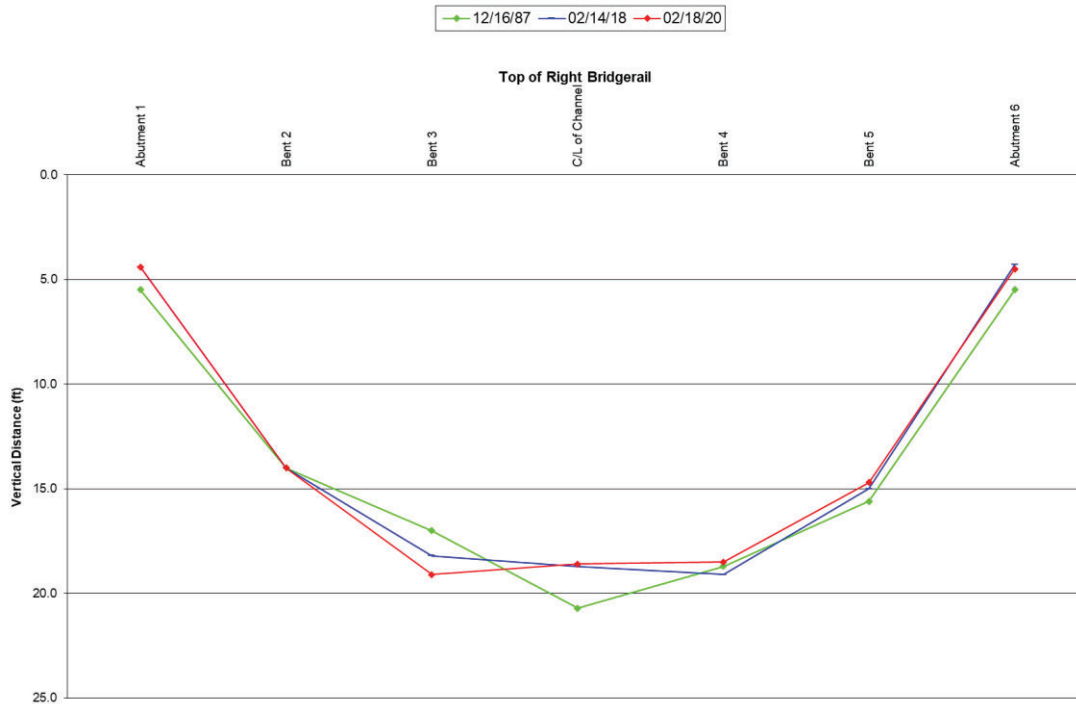
Inspection Date: 02/18/2020

## SCOUR EVALUATION

### LEFT SIDE SOUNDINGS



### RIGHT SIDE SOUNDINGS



Relative Channel Plots Are Not To Scale.  
Any Vertical Curvature Of Datum Point Is Not Reflective In Plot.

# FLORIDA DEPARTMENT OF TRANSPORTATION BRIDGE MANAGEMENT SYSTEM BRIDGE INSPECTION REPORT

Bridge No: 704004

Inspection Date: 02/18/2020

## SCOUR EVALUATION



Channel Looking North



Channel Looking South



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**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
BRIDGE INSPECTION REPORT**

Bridge No: 704004

Inspection Date: 02/18/2020

**FIELD PREPARATION**

## A. Tools and Equipment

Full Size Cargo Van:	Yes: <u>X</u>	No: <u>  </u>	Pick-up Truck:	Yes: <u>  </u>	No: <u>X</u>
Automobile:	Yes: <u>  </u>	No: <u>X</u>	Video:	Yes: <u>  </u>	No: <u>X</u>
Camera:	Yes: <u>X</u>	No: <u>  </u>			
NDT Equipment:	Yes: <u>  </u>	No: <u>X</u>			
NDT Type: N/A					
Binoculars:	Yes: <u>  </u>	No: <u>X</u>			
Diving Performed:	Yes: <u>X</u>	No: <u>  </u>	Max Depth:	<u>5.1 ft.</u>	Current: <u>&lt; 1 fps</u>

Dive Mode: Level II Commercial Scuba

Hand Tools: (i.e. Chipping Hammer, 6' Ruler, etc.)

- |                              |                     |
|------------------------------|---------------------|
| 1. Standard Inspection Tools | 2. Chipping Hammers |
| 3. Flashlights               | 4. Carpenter Ruler  |
| 5. Inspection Hand Tools     |                     |

Other:   

## B. Services

Flag Crew: N/A  
Electrician: N/A

Snooper: N/A  
Other: N/A

## C. Scheduling (Brief Explanation)

Man Hours: 4 hrs. Dive Time: 2 hrs. Travel Time: 3.0 hrs. Office Time: 6.0 hrs.

## D. Site Conditions

Boat Needed: Yes Type of Boat: Jon BoatLocation of Boat Ramp: N/ALengthy Travel Required: NODifficult Access: NOWater Obviously Polluted: NOWater quality is fair (partially meets use): YESStrong Water Current: NOOther: NONE

## E. UNDERWATER ELEMENTS INSPECTED:

226 Pre Conc Pile  
8290 Channel

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**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM**

**Inspection/CIDR Report with PDF attachment(s)  
CIDR**

REPORT ID: INSP005

Structure ID: 704004

DATE PRINTED: 4/8/2020

<b>Description</b>
--------------------

**Structure Unit Identification**

Bridge/Unit Key: 704004 0  
 Structure Name: Malabar Rd-Canal  
 Description: SPANS 1 THROUGH 5  
 Type: M - Main

**Roadway Identification**

NBI Structure No (8): 704004  
 Position/Prefix (5): 1 - Route On Structure  
 Kind Hwy (Rte Prefix): 4 County Hwy  
 Design Level of Service: 1 Mainline  
 Route Number/Suffix: 00514 / 0 N/A (NBI)  
 Feature Intersect (6): Canal  
 Critical Facility: Not Defense-crit  
 Facility Carried (7): Malabar Rd  
 Mile Point (11): 1.512  
 Latitude (16): 027d59'56.4"      Long (17): 080d42'46.1"

**Roadway Classification**

Nat. Hwy Sys (104): 0 Not on NHS  
 National base Net (12): 0 - Not on Base Network  
 LRS Inventory Rte (13a): 70 000 396      Sub Rte (13b): 00  
 Functional Class (26): 16 Urban Minor Arterial  
 Federal Aid System: ON  
 Defense Hwy (100): 0 Not a STRAHNET hwy  
 Direction of Traffic (102): 2 2-way traffic  
 Emergency:

**NBI Project Data**

Proposed Work (075A): Not Applicable (P)  
 Work To Be Done By (075B): Not Applicable (P)  
 Improvement Length (076): 0 ft

**NBI Rating**

Channel (61): 7 Minor Damage  
 Deck (58): 5 Fair  
 Superstructure (59): 5 Fair  
 Substructure (60): 7 Good

**Roadway Traffic and Accidents**

Lanes (28): 2      Medians: 0      Speed: 30 mph  
 ADT Class: 3 ADT Class 3  
 Recent ADT (29): 12800      Year (30): 2020  
 Future ADT (114): 22305      Year (115): 2042  
 Truck % ADT (109): 4  
 Detour Length (19): 8.7 mi  
 Detour Speed: 30 mph  
 Accident Count: -1      Rate:

**Roadway Clearances**

Vertical (10): 99.99 ft      Appr. Road (32): 28.2 ft  
 Horiz. (47): 28.2 ft      Roadway (51): 28.2 ft  
 Truck Network (110): 0 Not part of natl netwo  
 Toll Facility (20): 3 On free road  
 Fed. Lands Hwy (105): 0 N/A (NBI)  
 School Bus Route:   
 Transit Route:

Improvement Cost (094): \$ 0.00  
 Roadway Improvement Cost (095): \$ 0.00  
 Total Cost (096): \$ 0.00  
 Year of Estimate (097):

Culvert (62): N N/A (NBI)  
 Waterway (71): 8 Equal Desirable  
 Unrepaired Spalls: -1 sq.ft.  
 Review Required:

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# FLORIDA DEPARTMENT OF TRANSPORTATION BRIDGE MANAGEMENT SYSTEM

REPORT ID: INSP005

Inspection/CIDR Report with PDF attachment(s)

Structure ID: 704004

CIDR

DATE PRINTED: 4/8/2020

**Structure Identification**

Admin Area: Space Coast  
 District (2): D5 - Deland  
 County (3): (70)Brevard  
 Place Code (4): No city involved  
 Location (9): 2.5 Miles West of CR-509  
 Border Br St/Reg (98): Not Applicable (P) Share: 0 %  
 Border Struct No (99):  
 FIPS State/Region (1): 12 Florida Region 4-Atlanta  
 NBIS Bridge Len (112): Y - Meets NBI Length  
 Parallel Structure (101): No || bridge exists  
 Temp. Structure (103): Not Applicable (P)  
 Maint. Resp. (21): 2 County Hwy Agency  
 Owner (22): 2 County Hwy Agency  
 Historic Signif. (37): 5 Not eligible for NRHP

**Structure Type and Material**

Curb/Sidewalk (50): Left: 3 ft Right: 3 ft  
 Bridge Median (33): 0 No median  
 Main Span Material (43A): 5 Prestressed Concrete  
 Appr Span Material (44A): Not Applicable  
 Main Span Design (43B): 01 Slab  
 Appr Span Design (44B): Not Applicable

**Appraisal****Structure Appraisal**

Open/Posted/Closed (41): A Open, no restriction  
 Deck Geometry (68): 4 Tolerable  
 Underclearances (69): N Not applicable (NBI)  
 Approach Alignment (72): 8-No Speed Red thru Curv  
 Bridge Railings (36a): 0 Substandard  
 Transitions (36b): 0 Substandard  
 Approach Guardrail (36c): 0 Substandard  
 Approach Guardrail Ends (36d): 0 Substandard  
 Scour Critical (113): 5 Stable w/in footing

**Minimum Vertical Clearance**

Over Structure (53): 99.99 ft  
 Under (reference) (54a): N Feature not hwy or RR  
 Under (54b): 0 ft

**Schedule****Current Inspection**

Inspection Date: 02/18/2020  
 Inspector: KNAAACS - Casey Steege  
 Bridge Group: CA429  
 Alt. Bridge Group:  
 Primary Type: Regular NBI  
 Review Required:

**Geometrics**

Spans in Main Unit (45): 5  
 Approach Spans (46): 0  
 Length of Max Span (48): 28 ft  
 Structure Length (49): 140 ft  
 Total Length: 160 ft  
 Deck Area: 5124 sqft  
 Structure Flared (35): 0 No flare

**Age and Service**

Year Built (27): 1972  
 Year Reconstructed (106): 0  
 Type of Service On (42a): 5 Highway-pedestrian  
 Under (42b): 5 Waterway  
 Fracture Critical Details: Not Applicable

**Deck Type and Material**

Deck Width (52): 36.6 ft  
 Skew (34): 0 deg  
 Deck Type (107): 2 Concrete Precast Panel  
 Surface (108): 6 Bituminous  
 Membrane: 0 None  
 Deck Protection: None

**Navigation Data**

Navigation Control (38): Permit Not Required  
 Nav Vertical Clr (39): 0 ft  
 Nav Horizontal Clr (40): 0 ft  
 Min Vert Lift Clr (116): 0 ft  
 Pier Protection (111): Not Applicable (P)

**NBI Condition Rating**

Sufficiency Rating: 65.1  
 Health Index: 93.94  
 Structural Eval (67): 5 Above Min Tolerable  
 Deficiency: Not Deficient

**Minimum Lateral Underclearance**

Reference (55a): N Feature not hwy or RR  
 Right Side (55b): 0 ft  
 Left Side (56): 0 ft

**Next Inspection Date Scheduled**

NBI: 02/18/2022  
 Element: 02/18/2022  
 Fracture Critical:  
 Underwater: 02/18/2022  
 Other/Special:  
 Inventory Photo Update Due: 02/28/2030



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# FLORIDA DEPARTMENT OF TRANSPORTATION BRIDGE MANAGEMENT SYSTEM

## Inspection/CIDR Report with PDF attachment(s) CIDR

REPORT ID: INSP005

Structure ID: 704004

DATE PRINTED: 4/8/2020

### Schedule Cont.

#### Inspection Types Performed

NBI  Element  Fracture Critical  Underwater  Other Special

#### Inspection Intervals Required (92) Frequency (92) Last Date (93) Inspection Resources

Fracture Critical	<input type="checkbox"/>	mos			Crew Hours: 4
Underwater	<input checked="" type="checkbox"/>	24 mos	02/18/2020		Flagger Hours: 0
Other Special	<input type="checkbox"/>	mos			Helper Hours: 0
NBI		24 mos	(91) 02/18/2020	(90)	Snooper Hours: 0
					Special Crew Hours: 3
					Special Equip Hours: 0

### Bridge Related

#### General Bridge Information

Parallel Bridge Seq:		Bridge Rail 1: Concrete post & beam
Channel Depth: 5.1 ft		Bridge Rail 2: Not applicable-No rail
Radio Frequency: -1		Electrical Devices: No electric service
Phone Number:		Culvert Type: Not applicable
Exception Date:		Maintenance Yard: Not FDOT Maintained
Exception Type: Unknown		FIHS ON / OFF: No Routes on FIHS
Accepted By Maint: 01/01/1972		Previous Structure:
Warranty Expiration: 00/00/0000		2nd Previous Structure:
Performance Rating: Fair		Replacement Structure:
Permitted Utilities: Power <input type="checkbox"/> Water <input type="checkbox"/> Gas <input type="checkbox"/> Fiber Optic <input type="checkbox"/> Sewage <input type="checkbox"/> Other <input checked="" type="checkbox"/> (2) 5 in. steel pipes		

#### Bridge Load Rating Information

Inventory Type (065): 1 LF Load Factor	Inventory Rating (066): 42.1 tons
Operating Type (063): 1 LF Load Factor	Operating Rating (064): 54.0 tons
Original Design Load (031): 5 MS 18 (HS 20)	FL120 Permit Rating: -1.0 tons
Date: 06/03/2010	HS20/FL120 Max Span Rating: 54.0 tons
Initials: ABK	Dynamic Impact in Percent: 30 %
Load Rating Rev. Recom.:	Governing Span Length: 27.9 ft
Load Rating Plans Status: Design or Construction	Minimum Span Length:
	Distribution Method: AASHTO formula

Load Rating Notes:

#### LEGAL LOADS

SU2: 49.1 tons  
 SU3: 53.5 tons  
 SU4: 52.2 tons  
 C3: 73.6 tons  
 C4: 66.0 tons  
 C5: 74.0 tons  
 ST5: 81.2 tons

Posting (070): 5 At/Above Legal Loads

Open/Posted/Closed (041): A Open, no restriction

#### FLOOR BEAM (FB)

FB Present: No

FB Span Length, Gov: 0.0 ft  
 FB Spacing, Gov: 0.0 ft  
 FB OPR Rating: 0.0 tons  
 FB SU4 OPR Rating: 0.0 tons  
 FB FL120 Rating: 0.0 tons

#### POSTING

Recom. SU Posting: 99 tons  
 Recom. C Posting: 99 tons  
 Recom. ST5 Posting: 99 tons  
 Actual SU Posting: 99 tons  
 Actual C Posting: 99 tons  
 Actual ST5 Posting: 99 tons  
 Actual Blanket Posting: 99 tons  
 Emergency Vehicle: 1 EV inapplicable

#### SEGMENTAL (SEG)

SEG Wing-Span: -1.0 ft  
 SEG Web-to-Web Span: -1.0 ft  
 SEG Transverse HL93 Operating: -1.00 RF

#### Bridge Scour and Storm Information

Pile Driving Record: No pile driving records	Scour Recommended I: Not Applicable
Foundation Type: No foundation details	Scour Recommended II: Not Applicable
Mode of Flow: Riverine	Scour Recommended III: Not Applicable
Rating Scour Eval: Unknown	Scour Elevation: 999 ft
Highest Scour Eval: No phase completed	Action Elevation: 999 ft
Scour Evaluation Method:	Storm Frequency: 999

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**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM**

**Inspection/CIDR Report with PDF attachment(s)  
CIDR**

REPORT ID: INSP005

Structure ID: 704004

DATE PRINTED: 4/8/2020

**Elements**

Inspection Date: 02/18/2020 GOZZ

**DECKS : Decks/Slabs**

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	8099 / 3	PS Conc Slab (Sonovoid)	5122	99.96	0	.	2	0.04	0	.	5124 (SF)
0	1080 / 3	Delamination/Spall/Patched Area	0	.	0	.	2	100	0	.	2 (SF)
0	510 / 3	Wearing Surfaces	3358	85.06	420	10.64	170	4.31	0	.	3948 sq.ft
0	3210 / 3	Del/Spall/Patch/Pot(Wear Surf)	0	.	0	.	170	100	0	.	170 sq.ft
0	3220 / 3	Crack (Wearing Surface)	0	.	420	100	0	.	0	.	420 sq.ft

**DECKS : Joints**

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	301 / 3	Pourable Joint Seal	0	.	188	85.45	32	14.55	0	.	220 ft
0	2310 / 3	Leakage	0	.	188	100	0	.	0	.	188 ft
0	2330 / 3	Seal Damage	0	.	0	.	32	100	0	.	32 ft

**MISCELLANEOUS : Channel**

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	8290 / 3	Channel	0	.	1	100	0	.	0	.	1 (EA)
0	9150 / 3	Bank Erosion	0	.	1	100	0	.	0	.	1 (EA)

**MISCELLANEOUS : Other Elements**

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	321 / 3	Re Conc Approach Slab	732	100	0	.	0	.	0	.	732 sq.ft
0	510 / 3	Wearing Surfaces	562	100	0	.	0	.	0	.	562 sq.ft

**MISCELLANEOUS : Other Elements**

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	8475 / 3	R/Conc Walls	39	97.5	0	.	1	2.5	0	.	40 ft
0	1080 / 3	Delamination/Spall/Patched Area	0	.	0	.	1	100	0	.	1 ft

**SUBSTRUCTURE : Substructure**

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	215 / 3	Re Conc Abutment	78	100	0	.	0	.	0	.	78 ft

**SUBSTRUCTURE : Substructure**

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	226 / 3	Pre Conc Pile	0	.	28	100	0	.	0	.	28 (EA)
0	1080 / 3	Delamination/Spall/Patched Area	0	.	10	100	0	.	0	.	10 (EA)
0	1190 / 3	Abrasion(PSC/RC)	0	.	18	100	0	.	0	.	18 (EA)

**SUBSTRUCTURE : Substructure**

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	234 / 3	Re Conc Pier Cap	159	97.55	4	2.45	0	.	0	.	163 ft
0	1080 / 3	Delamination/Spall/Patched Area	0	.	1	100	0	.	0	.	1 ft
0	1090 / 3	Exposed Rebar	0	.	3	100	0	.	0	.	3 ft

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**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM**

REPORT ID: INSP005

Inspection/CIDR Report with PDF attachment(s)

Structure ID: 704004

CIDR

DATE PRINTED: 4/8/2020

**SUBSTRUCTURE** : Substructure

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	8394 / 3	R/Conc Abut Slope Protection	2382	95.74	6	0.24	100	4.02	0	.	2488 (SF)
0	1130 / 3	Cracking (RC and Other)	0	.	6	5.66	100	94.34	0	.	106 (SF)

**SUPERSTRUCTURE** : Bearings

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	310 / 3	Elastomeric Bearing	10	100	0	.	0	.	0	.	10 each

**SUPERSTRUCTURE** : Superstructure

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	331 / 3	Re Conc Bridge Railing	0	.	267	95.36	13	4.64	0	.	280 ft
0	1080 / 3	Delamination/Spall/Patched Area	0	.	0	.	3	100	0	.	3 ft
0	1090 / 3	Exposed Rebar	0	.	0	.	10	100	0	.	10 ft
0	1130 / 3	Cracking (RC and Other)	0	.	267	100	0	.	0	.	267 ft

**Total Number of Elements\*:** 11

\*excluding defects/protective systems

**Inspection Information**

Inspection Date: 02/18/2020

Type: Regular NBI

Inspector: KNAAACS - Casey Steege



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**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM**

**Inspection/CIDR Report with PDF attachment(s)  
CIDR**

REPORT ID: INSP005

Structure ID: 704004

DATE PRINTED: 4/8/2020

**Inspection Information****Inspection Notes:****LOAD CAPACITY EVALUATION:**

A cursory review of the current load rating analysis dated 6/3/10 was conducted during this inspection by Michael Scherer, P.E. on 3/30/2020. The findings of this review and inspection reveal no substantial deterioration, geometric changes or additional dead load to the bridge that warrant the need for a new load rating analysis; therefore, the current load rating is considered applicable.

Note: The NBI Rating for Items 58 Deck and 59 Superstructure have been lowered to a 5 due to the staining between the slab unit joints.

The lead underwater inspector for the current routine inspection is Denise Jensen (CBI# 00592).

The following underwater elements were inspected:  
226 Pre Conc Pile - Bents 3 and 4 each with seven 14in. concrete piling  
8290 Channel

**Non-Structural Items:****Approach Roadway:****Previously Noted:**

West approach roadway is settling and deteriorated.

**Noted This Inspection:**

Approach slab/ roadway transition is cracked up to 1/2 in. wide with light dirt and vegetation. Refer to Photo 10. REPAIR

Both approach roadways have multi-directional cracks up to 1/2 in. throughout with the west approach being the worst case.

**Approach Shoulders:****Previously Noted:**

The approach shoulders are 6in. to 1ft. higher than the approach roadway. This does not appear to effect the drainage so no repair will be issued at this time.

**Graffiti:****Previously Noted:**

There is graffiti on the underside of the structure, not visible to the traveling public.

**Guardrail:****Previously Noted:**

The northeast guardrail end terminal has minor impact damage.

**Noted This Inspection:**

The approach guardrails are not attached to the structure. The guardrails do not meet any current FDOT Standard Index guidelines. Refer to Photo 11. REPAIR

Post 1 of the northeast guardrail has a split cushion block. REPAIR

Cushion blocks are weathered throughout. REPAIR

**Striping:****Previously Noted:**

The striping on the structure is faded and chipped. Refer to Photo 12. REPAIR

Sufficiency Rating Calculation Accepted on 3/31/2020

**Inspection Date:**

02/14/2018

**Type:** Regular NBI**Inspector:** KNAACD - Dave Crissey

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**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM**

REPORT ID: INSP005

Structure ID: 704004

**Inspection/CIDR Report with PDF attachment(s)  
CIDR**

DATE PRINTED: 4/8/2020

**Inspection Information****Inspection Notes:****LOAD RATING EVALUATION:**

This inspection noted no changes in the structure condition that would warrant a new load rating. The load rating dated 06/03/10 appears to still apply.

The lead underwater inspector for the current routine inspection is David Crissey (CBI# 00321).

The following underwater elements were inspected:  
226 Pre Conc Pile - Bents 3 and 4 each with seven 14in. concrete piling  
8290 Channel

**Non-Structural Items:****Approach Roadway:****Previously Noted:**

West approach roadway is settling and deteriorated.

**Noted This Inspection:**

Approach slab/ roadway transition is cracked up to 1/2 in. wide with light dirt and vegetation. Refer to Photo 11. REPAIR

Both approach roadways have multi-directional cracks up to 1/2 in. throughout with the west approach being the worst case.

**Approach Shoulders:****Previously Noted:**

The approach shoulders are 6in. to 1ft. higher than the approach roadway. This does not appear to effect the drainage so no repair will be issued at this time.

**Graffiti:****Previously Noted:**

There is graffiti on the underside of the structure, not visible to the traveling public.

**Guardrail:****Previously Noted:**

The northeast guardrail end terminal has minor impact damage.

**Noted This Inspection:**

The approach guardrails are not attached to the structure. The guardrails do not meet any current FDOT Standard Index guidelines. Refer to Photo 12. REPAIR

Post 1 of the northeast guardrail has a split cushion block. REPAIR

Cushion blocks are weathered throughout. REPAIR

**Striping:****Previously Noted:**

The striping on the structure is faded and chipped. Refer to Photo 13. REPAIR

Sufficiency Rating Calculation Accepted by KNAACD at 3/21/2018 2:54:28 PM

**Inspection Date:**

02/05/2016

**Type:** Regular NBI**Inspector:** KNAAARN - Ricardo Narvaez

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**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM**

**Inspection/CIDR Report with PDF attachment(s)  
CIDR**

REPORT ID: INSP005

Structure ID: 704004

DATE PRINTED: 4/8/2020

**Inspection Information**

**Inspection Notes:** Sufficiency Rating Calculation Accepted by knaaapc-P at 2016-03-03 12:26:39

**LOAD RATING EVALUATION:**

This inspection noted no changes in the structure condition that would warrant a new load rating. The load rating dated 06/03/10 appears to still apply.

The lead underwater inspector for the current routine inspection is Ricardo Narvaez (CBI# 00447).

The following underwater elements were inspected:  
204 P/S Concrete Piling - Bents 3 and 4 each with seven 14in. concrete piling  
290 Channel

**Non-Structural Items:****Approach Roadway:****Noted This Inspection:**

Northwest corner transition between bridge and approach roadway is crumbling with 3 inch wide openings. Refer to Photo 10. REPAIR

West approach roadway is settling and deteriorated.

**Approach Shoulders:****Previously Noted:**

The approach shoulders are 6in. to 1ft. higher than the approach roadway. This does not appear to effect the drainage so no repair will be issued at this time.

**Graffiti:****Previously Noted:**

There is graffiti on the underside of the structure, not visible to the traveling public.

**Guardrail:****Previously Noted:**

The northeast guardrail end terminal has minor impact damage.

**Striping:****Previously Noted:**

The shoulder striping on both sides of the structure is faded and chipped.

**Inspection Date:** 02/26/2014 **Type:** Regular NBI

**Inspector:** KNVOLSH - Scott Hughes

**Inspection Notes:** Sufficiency Rating Calculation Accepted by KNVOLCW-P at 2014-03-04 10:36:24

**LOAD RATING EVALUATION:**

This inspection noted no changes in the structure condition that would warrant a new load rating. The load rating dated 06/03/10 appears to still apply.

The lead underwater inspector for the current routine inspection is Keith Hoogland (CBI# 00341).

The following underwater elements were inspected:  
204 P/S Concrete Piling - Bents 3 and 4 each with seven 14in. concrete piling  
290 Channel

**Non-Structural Items:****Approach Shoulders:**

The approach shoulders are 6in. to 1ft. higher than the approach roadway. This does not appear to effect the drainage so no repair will be issued at this time.

**Graffiti:**

There is graffiti on the underside of the structure. Refer to Photo 11. REPAIR

**Guardrail:**

The northeast guardrail end terminal has minor impact damage. Refer to Photo 12. REPAIR

**Striping:**

The shoulder striping on both sides of the structure is faded and chipped. No repair will be issued during this inspection due the similar condition of the approach roadway striping.

**Inspection Date:** 02/14/2012 **Type:** Regular NBI



**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM****Inspection/CIDR Report with PDF attachment(s)  
CIDR**

REPORT ID: INSP005

Structure ID: 704004

DATE PRINTED: 4/8/2020

**Inspection Information****Inspector:** KNVOLDW - Dave Walker**Inspection Notes:** Sufficiency Rating Calculation Accepted by KNVOLCW-P at 2012-02-21 09:45:51**LOAD RATING EVALUATION:**

This inspection noted nothing that warrants a new load rating. The current load rating dated 06/03/10 appears to still apply.

The lead underwater inspector for the current routine inspection is Stephen Hays (CBI #00438).

The following underwater elements were inspected:

204 P/S Concrete Piling - Bents 3 and 4 each with seven 14in. concrete piling  
290 Channel**Non-Structural Items:****Approach Shoulders:**

The approach shoulders are 6in. to 1ft. higher than the approach roadway. This does not appear to effect the drainage so no repair will be issued at this time.

**Graffiti:**

There is graffiti on the deck underside, abutment caps and slope protection in Spans 1 and 5 and the piles at Bents 2 and 5. Refer to Photo 8. REPAIR

**Guardrail:**

The northeast guardrail end terminal has minor impact damage. Refer to Photo 9. REPAIR

**Striping:**

The shoulder striping on both sides of the structure is faded and chipped. No repair will be issued during this inspection due the similar condition of the approach roadway striping.

**CORRECTIVE ACTION:**

The erosion on the northwest and southeast corners of the structure have been repaired.

The southwest and southeast guardrail end terminals have been repaired.

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**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM**

REPORT ID: INSP005

Structure ID: 704004

**Inspection/CIDR Report with PDF attachment(s)  
CIDR**

DATE PRINTED: 4/8/2020

**Inspection Information****Inspection Date:** 02/11/2010**Type:** Regular NBI**Inspector:** INACTIVE1337 - Paul Elborne**Inspection Notes:** Sufficiency Rating Calculation Accepted by KNKCARL-P at 2010-10-14 09:30:51

Non-Pontis Items:

Approach Roadways:

Noted This Inspection:

CORRECTIVE ACTION TAKEN:

The west approach roadway has a new asphalt overlay.

Approach Slopes/Shoulders:

Previously Noted:

The approach shoulders are 6in. to 1ft. higher than the approach roadways, which restricts proper roadway drainage. Refer to photo 9.

A 6ft. x 3ft. x 2-1/2ft. (previously 3ft. x 2ft. x 2-1/2ft.) deep area of erosion is exhibited in the northwest approach slope at the end of the northwest wingwall, which appears stable.

A 9ft. x 3ft. x 1ft. 6in. (previously 5ft. x 1ft. 8in. x 1ft. 6in.) area of erosion is exhibited in the southeast approach slope along the south side crown of the southeast slope protection. Refer to photo 10.

No undermining was noted and the area appears stable now. There is a 4ft. x 3-1/2ft. x 1ft. high area of erosion at the southeast wingwall due to a drain pipe that has been installed exposing the end of the wingwall.

Graffiti:

Previously Noted:

Graffiti is present on the piles at Bents 2 and 5, the slopes, the abutments and the slab units in Spans 1 and 5.(graffiti is mostly faded)

Noted This Inspection:

CORRECTIVE ACTION TAKEN:

The majority of the graffiti is faded or has been removed.

Due to Pontis character limitations, refer to the Additional "Element Inspection Notes" section in the addendum for a complete list of deficiencies.

**Inspection Date:** 02/25/2008**Type:** Regular NBI**Inspector:** KNAAAOJ - John O'Grady

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**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM**

REPORT ID: INSP005

Structure ID: 704004

**Inspection/CIDR Report with PDF attachment(s)  
CIDR**

DATE PRINTED: 4/8/2020

**Inspection Information**

**Inspection Notes:** Sufficiency Rating Calculation Accepted by kn538oj-P at 2008-03-25 16:52:37

Non-Pontis Items:

Approach Roadways - Previously Noted:

The west approach roadway asphalt exhibits 1/4in. to 1/2in. wide transverse and longitudinal cracks in random locations.

Noted This Inspection:

Corrective Action Taken:

The east approach roadway has been resurfaced since the previous routine inspection.

Approach Slopes/Shoulders - Previously Noted:

The approach shoulders are 6in. to 1ft. higher than the approach roadways, which restricts proper roadway drainage. Refer to photo 7. A 3ft. x 2ft. x 2-1/2ft. deep area of erosion is exhibited in the NW approach slope at the end of the NW wingwall, which appears stable. Refer to photo 8. A 5ft. x 1ft. 8in. x 1ft. 6in. area of erosion is exhibited in the SE approach slope along the south side crown of the SE slope protection. No undermining was noted and the area appears stable now. There is a 4ft. x 1ft. x 3-1/2ft. area of erosion at the SE wingwall due to a drain pipe that has been installed exposing the end of the wingwall.

Graffiti - Noted This Inspection:

Graffiti is present on the piles at Bents 2 and 5, the slopes, the abutments and the slab units in Spans 1 and 5. Refer to photo 9.

Guardrails - Previously Noted:

All four guardrail end terminals exhibit minor collision damage. The guardrail panels are not bolted to the bridge rails, but the posts are bolted to the sidewalks. Refer to photo 10.

Noted This Inspection:

The northwest guardrail has sustained heavy impact damage. The panels are no longer attached to the posts and two posts are broken. Refer to photo 11.

Reflectors - Previously Noted:

The object marker reflectors have not been provided at the approach ends of the guardrail system. The bridge end reflectors exhibit an outdated color scheme and are obscured by the guardrails. All 12 raised pavement marker reflectors along the centerline striping are missing.

**Inspection Date:** 03/09/2006

**Type:** Regular NBI

**Inspector:**

**Inspection Notes:** Sufficiency Rating Calculation Accepted by kn538pl-P at 2006-03-31 16:19:00

Non-Pontis Items:

Approach Roadways - Previously Noted:

The approach roadway asphalt overlays exhibit 1/4in. to 1/2in. wide transverse and longitudinal cracks in random locations.

Approach Slopes/Shoulders - Previously Noted:

The approach shoulders are 6in. to 1ft. higher than the approach roadways, which restricts proper roadway drainage. A 3ft. x 2ft. x 2-1/2ft. deep area of erosion is exhibited in the northwest approach slope at the end of the northwest wingwall, which appears stable. A 5ft. x 1ft. 8in. x 1ft. 6in. area of erosion is exhibited in the southeast approach slope along the south side crown of the southeast slope protection. No undermining was noted and the area appears stable now.

Guardrails - Previously Noted:

All four (previously noted as the northwest and southwest) guardrail end terminals exhibit minor collision damage. The guardrail panels are not bolted to the bridge rails, but the post are bolted to the sidewalks. Refer to photo 6.

Reflectors - Previously Noted:

Type 2 object marker reflectors have not been provided at the approach ends of the guardrail systems. The Type 3 bridge end reflectors exhibit an outdated color scheme and are obscured by the guardrails. All 12 (previously 9) raised pavement marker reflectors along the centerline striping are missing.

**Inspection Date:** 03/24/2004

**Type:** Regular NBI

**Inspector:** KNAAAOJ - John O'Grady



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**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM**

REPORT ID: INSP005

Structure ID: 704004

**Inspection/CIDR Report with PDF attachment(s)  
CIDR**

DATE PRINTED: 4/8/2020

**Inspection Information**

**Inspection Notes:** Sufficiency Rating Calculation Accepted by kn538oj-P at 2004-05-04 08:41:41

Non-PONTIS Items:

Approach Slopes/Shoulder - Previously Noted:

The approach shoulders are 6in. to 1ft. higher than the approach roadways, which restricts proper roadway drainage. A 3ft. x 2ft. x 2-1/2ft. deep area of erosion is exhibited in the northwest approach slope at the end of the northwest wingwall, which appears stable. A 5ft. x 1ft.-8in. x 1ft.-6in. area of erosion is exhibited in the southeast approach slope along the south side crown of the southeast slope protection. No undermining was noted and the area appears stable now.

Guardrails - Previously Noted:

All four (previously noted as the NW and SW) rail end terminals exhibit minor collision damage. The guardrail panels are not bolted to the bridge rails, but the post are bolted to the sidewalks. Refer to Photo 5.

Reflectors - Previously Noted:

Type 2 object marker reflectors have not been provided at the approach ends of the guardrail systems. The Type 3 bridge end reflectors exhibit an outdated color scheme and are obscured by the guardrails. Nine of the 12 raised pavement marker reflectors along the centerline striping are missing.

Roadway Condition - Previously Noted:

The approach roadway asphalt overlays exhibit 1/4in. to 1/2in. wide transverse and longitudinal cracks in random locations.

**Inspection Date:** 03/18/2002 **Type:** Regular NBI

**Inspector:**

**Inspection Notes:** Sufficiency Rating Calculation Accepted by kn538sf at 7/8/02 15:14:08  
KN538SF inspection comments -  
Structure 704004 -  
Date 3/18/02 - This structure was inventoried from west to east.

Non-PONTIS Items:

Approach Slopes/Shoulder -

The approach shoulders are 6" to 1' higher than the approach roadways, which restricts proper roadway drainage.

> A 3' L x 2' W x 2.5' D area of erosion is exhibited in the northwest approach slope at the end of the northwest wingwall.

> A 5' L x 1.6' W x 1.5' D area of erosion is exhibited in the southeast approach slope along the south side crown of the southeast slope protection.

Noted This Inspection:

> The previously noted eroded area at the northeast approach slope at the end of the northwest wingwall has been repaired.

Guardrails -

> The northwest and southwest rail end terminals exhibit minor collision damage.

Roadway Condition -

> The approach roadway asphalt overlays exhibit 1/4" to 1/2" wide transverse and longitudinal cracks in random locations.

Reflectors -

> Type 2 object marker reflectors have not been provided at the approach ends of the guardrail systems.

> The Type 3 bridge end reflectors exhibit an out-dated color scheme and are obscured by the guardrails.

> Nine of the 12 raised pavement marker reflectors along the centerline striping are missing.

**Inspection Date:** 02/29/2000 **Type:** Regular NBI

**Inspector:**

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# FLORIDA DEPARTMENT OF TRANSPORTATION BRIDGE MANAGEMENT SYSTEM

REPORT ID: INSP005

Structure ID: 704004

## Inspection/CIDR Report with PDF attachment(s) CIDR

DATE PRINTED: 4/8/2020

### Inspection Information

**Inspection Notes:** Sufficiency Rating Calculation Accepted by kn538rr at 4/21/00 15:10:42  
KN538RR inspection comments -  
Structure 704004 -  
Date 2/29/00 - This structure was inventoried from west to east.

#### Approach Slopes/Shoulder

The approach shoulders are 6" to 1' higher than the approach roadways, which restricts proper roadway drainage. A 3' L x 2' W x 2.5' D area of erosion is exhibited in the northwest approach slope at the end of the northwest wingwall. A 7.5' L x 5' W x 3' D area of erosion is exhibited in the northeast approach slope at the end of the northeast wingwall. A 5' L x 1.6' W x 1.5' D area of erosion is exhibited in the southeast approach slope along the south side crown of the southeast slope protection.

#### Guardrails

The northwest and southwest rail end terminals exhibit minor collision damage.

#### Roadway Condition

The approach roadway asphalt overlays exhibit 1/4" to 1/2" wide transverse and longitudinal cracks in random locations.

#### Reflectors

Type 2 object marker reflectors have not been provided at the approach ends of the guardrail systems. The Type 3 bridge end reflectors exhibit an out-dated color scheme and are obscured by the guardrails. Nine of the 12 raised pavement marker reflectors along the centerline striping are missing.

Previous comments > (none)

### Structure Notes

BRIDGE OWNER: BREVARD COUNTY

This structure was inventoried from west to east.

#### TRAFFIC RESTRICTIONS:

Based on the results of the most recent load rating analysis dated 06/03/10, posting is not required. The structure is not posted.

Average asphalt thickness = 3 in.

As stated in section 3.4 of the Bridge and Other Structures Inspection and Reporting as of 11/24/2009 superstructure unit numbering (Section 3.4.2.2) and substructure unit numbering (Section 3.4.3) are designated NOT BY ORDER IN WHICH THE ELEMENTS WERE CONSTRUCTED AND PUT INTO SERVICE. Plans sheet or drawing in Topic G, Bridge Description and Drawings section of the bridge folder can confirm all references to these elements prior to this date.

### Schedule Notes

FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
STRUCTURE LEVEL INVENTORY REPORT

BRIDGE ID : 704004

Structure Inventory Photo Due Date : 02/28/2030



Bridge Number



FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
STRUCTURE LEVEL INVENTORY REPORT

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BRIDGE ID : 704004

Structure Inventory Photo Due Date : 02/28/2030



Southwest Oncoming Transition

**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
STRUCTURE LEVEL INVENTORY REPORT**

**BRIDGE ID : 704004**

**Structure Inventory Photo Due Date : 02/28/2030**



**Northeast Oncoming Transition**



**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
STRUCTURE LEVEL INVENTORY REPORT**

**BRIDGE ID : 704004**

**Structure Inventory Photo Due Date : 02/28/2030**



**Northwest Off-Going Transition**



**FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
STRUCTURE LEVEL INVENTORY REPORT**

**BRIDGE ID : 704004**

**Structure Inventory Photo Due Date : 02/28/2030**



**Southeast Off-Going Transition**

FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
STRUCTURE LEVEL INVENTORY REPORT

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BRIDGE ID : 704004

Structure Inventory Photo Due Date : 02/28/2030



West Approach Looking East



FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
STRUCTURE LEVEL INVENTORY REPORT

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BRIDGE ID : 704004

Structure Inventory Photo Due Date : 02/28/2030



West Approach Looking West



FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
STRUCTURE LEVEL INVENTORY REPORT

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BRIDGE ID : 704004

Structure Inventory Photo Due Date : 02/28/2030



East Approach Looking West

FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
STRUCTURE LEVEL INVENTORY REPORT

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BRIDGE ID : 704004

Structure Inventory Photo Due Date : 02/28/2030



East Approach Looking East



FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
STRUCTURE LEVEL INVENTORY REPORT

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BRIDGE ID : 704004

Structure Inventory Photo Due Date : 02/28/2030



North Elevation



FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
STRUCTURE LEVEL INVENTORY REPORT

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BRIDGE ID : 704004

Structure Inventory Photo Due Date : 02/28/2030



South Elevation

FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
STRUCTURE LEVEL INVENTORY REPORT

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BRIDGE ID : 704004

Structure Inventory Photo Due Date : 02/28/2030



Typical Underside



FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
STRUCTURE LEVEL INVENTORY REPORT

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BRIDGE ID : 704004

Structure Inventory Photo Due Date : 02/28/2030



Channel Looking North



FLORIDA DEPARTMENT OF TRANSPORTATION  
BRIDGE MANAGEMENT SYSTEM  
STRUCTURE LEVEL INVENTORY REPORT

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BRIDGE ID : 704004

Structure Inventory Photo Due Date : 02/28/2030



Channel Looking South

## Appendix E – SPICE Outputs

**Federal Highway Administration (FHWA)  
Safety Performance for Intersection Control Evaluation Tool**

**Results**

*Summary of crash prediction results for each alternative*

**Project Information**

<b>Project Name:</b>	Malabar Road PD&E Study	<b>Intersection Type</b>	At-Grade Intersection
<b>Intersection:</b>	Malabar Road & St. Johns Heritage Parkway	<b>Opening Year</b>	2030
<b>Agency:</b>	City of Palm Bay	<b>Design Year</b>	2050
<b>Project Reference:</b>	23773	<b>Facility Type</b>	On Urban and Suburban Arterial
<b>City:</b>	Palm Bay	<b>Number of Legs</b>	4-leg
<b>State:</b>	Florida	<b>1-Way/2-Way</b>	2-way Intersecting 2-way
<b>Date:</b>	2/20/2023	<b># of Major Street Lanes (both directions)</b>	5 or fewer
<b>Analyst:</b>	APG	<b>Major Street Approach Speed</b>	Less than 55 mph

**Crash Prediction Summary**

Control Strategy	Crash Type	Opening Year	Design Year	Total Project Life Cycle	Crash Prediction Rank	AADT Within SPF Prediction Range?	Source of Prediction	SSI Score		
								Opening Year	Design Year	Rank
Traffic Signal	Total	3.15	5.03	85.65	2	Yes	Calibrated SPF	<u>98</u>	<u>96</u>	2
	Fatal & Injury	1.10	1.75	29.81						
2-lane Roundabout	Total	5.84	9.57	161.37	1	Yes	Uncalibrated SPF	<u>99</u>	<u>98</u>	1
	Fatal & Injury	0.91	1.57	25.98						



**Federal Highway Administration (FHWA)  
Safety Performance for Intersection Control Evaluation Tool**

**Results**

*Summary of crash prediction results for each alternative*

**Project Information**

<b>Project Name:</b>	Malabar Road PD&E Study	<b>Intersection Type</b>	At-Grade Intersection
<b>Intersection:</b>	Malabar Road & Wisteria Avenue/Abilene Drive	<b>Opening Year</b>	2030
<b>Agency:</b>	City of Palm Bay	<b>Design Year</b>	2050
<b>Project Reference:</b>	437210-1-28-01	<b>Facility Type</b>	On Urban and Suburban Arterial
<b>City:</b>	Palm Bay	<b>Number of Legs</b>	4-leg
<b>State:</b>	Florida	<b>1-Way/2-Way</b>	2-way Intersecting 2-way
<b>Date:</b>	2/20/2023	<b># of Major Street Lanes (both directions)</b>	5 or fewer
<b>Analyst:</b>	APG	<b>Major Street Approach Speed</b>	Less than 55 mph

**Crash Prediction Summary**

Control Strategy	Crash Type	Opening Year	Design Year	Total Project Life Cycle	Crash Prediction Rank	AADT Within SPF Prediction Range?	Source of Prediction	SSI Score		
								Opening Year	Design Year	Rank
Traffic Signal	Total	4.58	6.70	118.31	2	Yes	Calibrated SPF	<u>96</u>	<u>93</u>	2
	Fatal & Injury	1.56	2.30	40.41						
2-lane Roundabout	Total	4.79	6.37	117.07	1	Yes	Uncalibrated SPF	<u>99</u>	<u>99</u>	1
	Fatal & Injury	0.84	1.14	20.77						

**Federal Highway Administration (FHWA)  
Safety Performance for Intersection Control Evaluation Tool**

**Results**

*Summary of crash prediction results for each alternative*

**Project Information**

<b>Project Name:</b>	Malabar Road PD&E Study	<b>Intersection Type</b>	At-Grade Intersection
<b>Intersection:</b>	Malabar Road & Krassner Drive/Bending Branch Lane	<b>Opening Year</b>	2030
<b>Agency:</b>	City of Palm Bay	<b>Design Year</b>	2050
<b>Project Reference:</b>	437210-1-28-01	<b>Facility Type</b>	On Urban and Suburban Arterial
<b>City:</b>	Palm Bay	<b>Number of Legs</b>	4-leg
<b>State:</b>	Florida	<b>1-Way/2-Way</b>	2-way Intersecting 2-way
<b>Date:</b>	2/20/2023	<b># of Major Street Lanes (both directions)</b>	5 or fewer
<b>Analyst:</b>	APG	<b>Major Street Approach Speed</b>	Less than 55 mph

**Crash Prediction Summary**

Control Strategy	Crash Type	Opening Year	Design Year	Total Project Life Cycle	Crash Prediction Rank	AADT Within SPF Prediction Range?	Source of Prediction	SSI Score		
								Opening Year	Design Year	Rank
Traffic Signal	Total	4.89	6.82	122.90	2	Yes	Calibrated SPF	<u>97</u>	<u>96</u>	2
	Fatal & Injury	1.67	2.37	42.29						
2-lane Roundabout	Total	4.00	5.51	99.68	1	Yes	Uncalibrated SPF	<u>99</u>	<u>99</u>	1
	Fatal & Injury	0.69	0.99	17.64						

**Federal Highway Administration (FHWA)  
Safety Performance for Intersection Control Evaluation Tool**

**Results**

*Summary of crash prediction results for each alternative*

**Project Information**

<b>Project Name:</b>	Malabar Road PD&E Study	<b>Intersection Type</b>	At-Grade Intersection
<b>Intersection:</b>	Malabar Road & Hurley Boulevard	<b>Opening Year</b>	2030
<b>Agency:</b>	City of Palm Bay	<b>Design Year</b>	2050
<b>Project Reference:</b>	437210-1-28-01	<b>Facility Type</b>	On Urban and Suburban Arterial
<b>City:</b>	Palm Bay	<b>Number of Legs</b>	4-leg
<b>State:</b>	Florida	<b>1-Way/2-Way</b>	2-way Intersecting 2-way
<b>Date:</b>	2/20/2023	<b># of Major Street Lanes (both directions)</b>	5 or fewer
<b>Analyst:</b>	APG	<b>Major Street Approach Speed</b>	Less than 55 mph

**Crash Prediction Summary**

Control Strategy	Crash Type	Opening Year	Design Year	Total Project Life Cycle	Crash Prediction Rank	AADT Within SPF Prediction Range?	Source of Prediction	SSI Score		
								Opening Year	Design Year	Rank
Traffic Signal	Total	6.57	8.89	162.16	1	Yes	Calibrated SPF	95	92	1
	Fatal & Injury	2.25	3.09	56.00						



**Federal Highway Administration (FHWA)  
Safety Performance for Intersection Control Evaluation Tool**

**Results**

*Summary of crash prediction results for each alternative*

**Project Information**

<b>Project Name:</b>	Malabar Road PD&E Study	<b>Intersection Type</b>	At-Grade Intersection
<b>Intersection:</b>	Malabar Road & Hurley Boulevard	<b>Opening Year</b>	2030
<b>Agency:</b>	City of Palm Bay	<b>Design Year</b>	2050
<b>Project Reference:</b>	437210-1-28-01	<b>Facility Type</b>	On Urban and Suburban Arterial
<b>City:</b>	Palm Bay	<b>Number of Legs</b>	3-leg
<b>State:</b>	Florida	<b>1-Way/2-Way</b>	2-way Intersecting 2-way
<b>Date:</b>	2/20/2023	<b># of Major Street Lanes (both directions)</b>	5 or fewer
<b>Analyst:</b>	APG	<b>Major Street Approach Speed</b>	Less than 55 mph

**Crash Prediction Summary**

Control Strategy	Crash Type	Opening Year	Design Year	Total Project Life Cycle	Crash Prediction Rank	AADT Within SPF Prediction Range?	Source of Prediction	SSI Score		
								Opening Year	Design Year	Rank
2-lane Roundabout	Total	4.01	5.21	96.73	1	Yes	Uncalibrated SPF	<u>99</u>	<u>99</u>	1
	Fatal & Injury	0.72	0.97	17.71						

**Federal Highway Administration (FHWA)  
Safety Performance for Intersection Control Evaluation Tool**

**Results**

*Summary of crash prediction results for each alternative*

**Project Information**

<b>Project Name:</b>	Malabar Road PD&E Study	<b>Intersection Type</b>	At-Grade Intersection
<b>Intersection:</b>	Malabar Road & Jupiter Boulevard	<b>Opening Year</b>	2030
<b>Agency:</b>	City of Palm Bay	<b>Design Year</b>	2050
<b>Project Reference:</b>	437210-1-28-01	<b>Facility Type</b>	On Urban and Suburban Arterial
<b>City:</b>	Palm Bay	<b>Number of Legs</b>	4-leg
<b>State:</b>	Florida	<b>1-Way/2-Way</b>	2-way Intersecting 2-way
<b>Date:</b>	2/20/2023	<b># of Major Street Lanes (both directions)</b>	5 or fewer
<b>Analyst:</b>	APG	<b>Major Street Approach Speed</b>	Less than 55 mph

**Crash Prediction Summary**

Control Strategy	Crash Type	Opening Year	Design Year	Total Project Life Cycle	Crash Prediction Rank	AADT Within SPF Prediction Range?	Source of Prediction	SSI Score		
								Opening Year	Design Year	Rank
Traffic Signal	Total	16.14	23.57	416.76	2	Yes	Calibrated SPF	<u>91</u>	<u>85</u>	2
	Fatal & Injury	3.62	5.39	94.47						
2-lane Roundabout	Total	11.26	14.73	272.59	1	Yes	Uncalibrated SPF	<u>98</u>	<u>97</u>	1
	Fatal & Injury	2.02	2.72	49.77						

Federal Highway Administration (FHWA)  
 Safety Performance for Intersection Control Evaluation Tool

Results

Summary of crash prediction results for each alternative

Project Information

Project Name:	Malabar Road PD&E Study	Intersection Type	At-Grade Intersection
Intersection:	Malabar Road & Garvey Road	Opening Year	2030
Agency:	City of Palm Bay	Design Year	2050
Project Reference:	437210-1-28-01	Facility Type	On Urban and Suburban Arterial
City:	Palm Bay	Number of Legs	3-leg
State:	Florida	1-Way/2-Way	2-way Intersecting 2-way
Date:	2/20/2023	# of Major Street Lanes (both directions)	5 or fewer
Analyst:	APG	Major Street Approach Speed	Less than 55 mph

Crash Prediction Summary

Control Strategy	Crash Type	Opening Year	Design Year	Total Project Life Cycle	Crash Prediction Rank	AADT Within SPF Prediction Range?	Source of Prediction	SSI Score		
								Opening Year	Design Year	Rank
Traffic Signal	Total	5.45	10.24	163.56	2	Yes	Calibrated SPF	96	91	2
	Fatal & Injury	1.99	3.44	56.76						
2-lane Roundabout	Total	4.37	7.37	123.01	1	No	Uncalibrated SPF	99	98	1
	Fatal & Injury	0.79	1.47	23.63						



**Federal Highway Administration (FHWA)  
Safety Performance for Intersection Control Evaluation Tool**

**Results**

*Summary of crash prediction results for each alternative*

**Project Information**

<b>Project Name:</b>	Malabar Road PD&E Study	<b>Intersection Type</b>	At-Grade Intersection
<b>Intersection:</b>	Malabar Road & Maywood Avenue/Daffodil Drive	<b>Opening Year</b>	2030
<b>Agency:</b>	City of Palm Bay	<b>Design Year</b>	2050
<b>Project Reference:</b>	437210-1-28-01	<b>Facility Type</b>	On Urban and Suburban Arterial
<b>City:</b>	Palm Bay	<b>Number of Legs</b>	4-leg
<b>State:</b>	Florida	<b>1-Way/2-Way</b>	2-way Intersecting 2-way
<b>Date:</b>	2/20/2023	<b># of Major Street Lanes (both directions)</b>	5 or fewer
<b>Analyst:</b>	APG	<b>Major Street Approach Speed</b>	Less than 55 mph

**Crash Prediction Summary**

Control Strategy	Crash Type	Opening Year	Design Year	Total Project Life Cycle	Crash Prediction Rank	AADT Within SPF Prediction Range?	Source of Prediction	SSI Score		
								Opening Year	Design Year	Rank
Traffic Signal	Total	5.83	9.22	157.97	2	Yes	Calibrated SPF	<u>97</u>	<u>95</u>	2
	Fatal & Injury	2.03	3.30	55.86						
2-lane Roundabout	Total	5.01	8.09	137.16	1	Yes	Uncalibrated SPF	<u>99</u>	<u>99</u>	1
	Fatal & Injury	0.89	1.52	25.18						

# Appendix F – ICE Tool Outputs

This sheet compiles the data from summary tables in individual alternatives sheets. To populate the output sheet press the "Setup Worksheets" button in the Alternatives MasterList tab.

## Outputs

<b>Agency:</b>	City of Palm Bay
<b>Project Name:</b>	Malabar Road PD&E Study
<b>Project Reference:</b>	437210-1-28-01
<b>Intersection:</b>	Malabar Road at St. Johns Heritage Parkway
<b>City:</b>	Palm Bay
<b>State:</b>	Florida
<b>Performing Department or Organization:</b>	KAI
<b>Date:</b>	9/30/2021
<b>Analyst:</b>	APG
<b>Analysis Type</b>	At-Grade Intersection

## Analysis Summary

Cost Categories	Net Present Value of Costs		
	Traffic Signal	Roundabout	
Planning, Construction & Right of Way Costs	\$ 3,420,800	\$ 2,903,300	
Post-Opening Costs	\$ 98,229	\$ 72,952	
Auto Passenger Delay	\$ 41,957,366	\$ 17,152,832	
Truck Delay	\$ 7,722,982	\$ 3,032,216	
Safety	\$ 5,862,696	\$ 5,478,892	
<b>Total cost</b>	<b>\$59,062,073</b>	<b>\$28,640,192</b>	

Select Base Case for Benefit-Cost Comparison: (Choose from list)	Traffic Signal		
Benefit Categories	Net Present Value of Benefits Relative to Base Case		
	Traffic Signal	Roundabout	
Auto Passenger Delay		\$ 24,804,534	
Truck Delay		\$ 4,690,766	
Safety		\$ 383,805	
<b>Net Present Value of Benefits</b>		<b>\$ 29,879,104</b>	
<b>Net Present Value of Costs</b>		<b>\$ (542,777)</b>	
<b>Net Present Value of Improvement</b>		<b>\$ 30,421,881</b>	
<b>Benefit-Cost (B/C) Ratio</b>		Control strategy preferred. Benefits are greater than base case and cost is less than base case.	
<b>Delay B/C</b>		Control strategy preferred. Benefits are greater than base case and cost is less than base case.	
<b>Safety B/C</b>		Control strategy preferred. Benefits are greater than base case and cost is less than base case.	



This sheet compiles the data from summary tables in individual alternatives sheets. To populate the output sheet press the "Setup Worksheets" button in the Alternatives MasterList tab.

## Outputs

<b>Agency:</b>	City of Palm Bay
<b>Project Name:</b>	Malabar Road PD&E Study
<b>Project Reference:</b>	437210-1-28-01
<b>Intersection:</b>	Malabar Road at Krassner Drive/Bending Branch Lane
<b>City:</b>	Palm Bay
<b>State:</b>	Florida
<b>Performing Department or Organization:</b>	KAI
<b>Date:</b>	9/30/2021
<b>Analyst:</b>	APG
<b>Analysis Type</b>	At-Grade Intersection

## Analysis Summary

Cost Categories	Net Present Value of Costs		
	Traffic Signal	Roundabout	
Planning, Construction & Right of Way Costs	\$ 3,753,800	\$ 3,859,800	
Post-Opening Costs	\$ 98,229	\$ 72,952	
Auto Passenger Delay	\$ 19,853,260	\$ 4,555,697	
Truck Delay	\$ 3,750,814	\$ 860,605	
Safety	\$ 8,447,511	\$ 3,758,196	
<b>Total cost</b>	<b>\$35,903,614</b>	<b>\$13,107,250</b>	

Select Base Case for Benefit-Cost Comparison: (Choose from list)	Traffic Signal		
Benefit Categories	Net Present Value of Benefits Relative to Base Case		
	Traffic Signal	Roundabout	
Auto Passenger Delay		\$ 15,297,563	
Truck Delay		\$ 2,890,208	
Safety		\$ 4,689,316	
<b>Net Present Value of Benefits</b>		<b>\$ 22,877,087</b>	
<b>Net Present Value of Costs</b>		<b>\$ 80,723</b>	
<b>Net Present Value of Improvement</b>		<b>\$ 22,796,364</b>	
<b>Benefit-Cost (B/C) Ratio</b>		<b>283.40</b>	
<b>Delay B/C</b>		<b>225.31</b>	
<b>Safety B/C</b>		<b>58.09</b>	

This sheet compiles the data from summary tables in individual alternatives sheets. To populate the output sheet press the "Setup Worksheets" button in the [Alternatives MasterList](#) tab.

## Outputs

<b>Agency:</b>	City of Palm Bay
<b>Project Name:</b>	Malabar Road PD&E Study
<b>Project Reference:</b>	437210-1-28-01
<b>Intersection:</b>	Malabar Road at Hurley Boulevard
<b>City:</b>	Palm Bay
<b>State:</b>	Florida
<b>Performing Department or Organization:</b>	KAI
<b>Date:</b>	9/30/2021
<b>Analyst:</b>	APG
<b>Analysis Type</b>	At-Grade Intersection

## Analysis Summary

Cost Categories	Net Present Value of Costs		
	Traffic Signal	Roundabout	
Planning, Construction & Right of Way Costs	\$ 2,246,600	\$ 2,943,200	
Post-Opening Costs	\$ 98,229	\$ 72,952	
Auto Passenger Delay	\$ 9,909,056	\$ 4,208,922	
Truck Delay	\$ 1,305,724	\$ 554,746	
Safety	\$ 11,209,936	\$ 3,790,764	
<b>Total cost</b>	<b>\$24,769,545</b>	<b>\$11,570,584</b>	

Select Base Case for Benefit-Cost Comparison: (Choose from list)	Traffic Signal		
Benefit Categories	Net Present Value of Benefits Relative to Base Case		
	Traffic Signal	Roundabout	
Auto Passenger Delay		\$ 5,700,134	
Truck Delay		\$ 750,979	
Safety		\$ 7,419,171	
<b>Net Present Value of Benefits</b>		<b>\$ 13,870,284</b>	
<b>Net Present Value of Costs</b>		<b>\$ 671,323</b>	
<b>Net Present Value of Improvement</b>		<b>\$ 13,198,961</b>	
<b>Benefit-Cost (B/C) Ratio</b>		<b>20.66</b>	
<b>Delay B/C</b>		<b>9.61</b>	
<b>Safety B/C</b>		<b>11.05</b>	

This sheet compiles the data from summary tables in individual alternatives sheets. To populate the output sheet press the "Setup Worksheets" button in the Alternatives MasterList tab.

## Outputs

<b>Agency:</b>	City of Palm Bay
<b>Project Name:</b>	Malabar Road PD&E Study
<b>Project Reference:</b>	437210-1-28-01
<b>Intersection:</b>	Malabar Road at Maywood Avenue/Daffodil Drive
<b>City:</b>	Palm Bay
<b>State:</b>	Florida
<b>Performing Department or Organization:</b>	KAI
<b>Date:</b>	9/30/2021
<b>Analyst:</b>	APG
<b>Analysis Type</b>	At-Grade Intersection

## Analysis Summary

Cost Categories	Net Present Value of Costs		
	Traffic Signal	Roundabout	
Planning, Construction & Right of Way Costs	\$ 1,716,000	\$ 3,169,100	
Post-Opening Costs	\$ 98,229	\$ 72,952	
Auto Passenger Delay	\$ 8,184,437	\$ 5,827,520	
Truck Delay	\$ 554,626	\$ 394,924	
Safety	\$ 10,920,625	\$ 5,234,385	
<b>Total cost</b>	<b>\$21,473,916</b>	<b>\$14,698,881</b>	

Select Base Case for Benefit-Cost Comparison: (Choose from list)	Traffic Signal		
Benefit Categories	Net Present Value of Benefits Relative to Base Case		
	Traffic Signal	Roundabout	
Auto Passenger Delay		\$ 2,356,917	
Truck Delay		\$ 159,702	
Safety		\$ 5,686,240	
<b>Net Present Value of Benefits</b>		<b>\$ 8,202,858</b>	
<b>Net Present Value of Costs</b>		<b>\$ 1,427,823</b>	
<b>Net Present Value of Improvement</b>		<b>\$ 6,775,035</b>	
<b>Benefit-Cost (B/C) Ratio</b>		<b>5.75</b>	
<b>Delay B/C</b>		<b>1.76</b>	
<b>Safety B/C</b>		<b>3.98</b>	



This sheet compiles the data from summary tables in individual alternatives sheets. To populate the output sheet press the "Setup Worksheets" button in the Alternatives MasterList tab.

## Outputs

<b>Agency:</b>	City of Palm Bay
<b>Project Name:</b>	Malabar Road PD&E Study
<b>Project Reference:</b>	437210-1-28-01
<b>Intersection:</b>	Malabar Road at Wisteria Avenue-Abilene Drive
<b>City:</b>	Palm Bay
<b>State:</b>	Florida
<b>Performing Department or Organization:</b>	KAI
<b>Date:</b>	9/30/2021
<b>Analyst:</b>	APG
<b>Analysis Type</b>	At-Grade Intersection

## Analysis Summary

Cost Categories	Net Present Value of Costs		
	Traffic Signal	Roundabout	
Planning, Construction & Right of Way Costs	\$ 1,655,900	\$ 3,218,900	
Post-Opening Costs	\$ 98,229	\$ 72,952	
Auto Passenger Delay	\$ 11,894,181	\$ 5,618,480	
Truck Delay	\$ 68,667	\$ 35,388	
Safety	\$ 8,035,644	\$ 4,455,612	
<b>Total cost</b>	<b>\$21,752,622</b>	<b>\$13,401,331</b>	

Select Base Case for Benefit-Cost Comparison: (Choose from list)	Traffic Signal		
Benefit Categories	Net Present Value of Benefits Relative to Base Case		
	Traffic Signal	Roundabout	
Auto Passenger Delay		\$ 6,275,702	
Truck Delay		\$ 33,280	
Safety		\$ 3,580,032	
<b>Net Present Value of Benefits</b>		<b>\$ 9,889,013</b>	
<b>Net Present Value of Costs</b>		<b>\$ 1,537,723</b>	
<b>Net Present Value of Improvement</b>		<b>\$ 8,351,290</b>	
<b>Benefit-Cost (B/C) Ratio</b>		<b>6.43</b>	
<b>Delay B/C</b>		<b>4.10</b>	
<b>Safety B/C</b>		<b>2.33</b>	

# Appendix G – ETDM Summary Report



## Florida Department of Transportation

**RON DESANTIS**  
**GOVERNOR**

605 Suwannee Street  
Tallahassee, FL 32399-0450

**KEVIN J. THIBAUT**  
**SECRETARY**

# ETDM Summary Report

**Project #14396 - Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.**

**Preliminary Programming Screen - Published on 10/25/2019**

**Generated by Kathaleen Linger (on behalf of FDOT District 5)**

**Printed on: 10/25/2019**

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## Introduction to Programming Screen Summary Report

The Programming Screen Summary Report shown below is a read-only version of information contained in the Programming Screen Summary Report generated by the ETDM Coordinator for the selected project after completion of the ETAT Programming Screen review. The purpose of the Programming Screen Summary Report is to summarize the results of the ETAT Programming Screen review of the project; provide details concerning agency comments about potential effects to natural, cultural, and community resources; and provide additional documentation of activities related to the Programming Phase for the project. Available information for a Programming Screen Summary Report includes:

- Screening Summary Report chart
- Project Description information (including a summary description of the project, a summary of public comments on the project, and community-desired features identified during public involvement activities)
- Purpose and Need information (including the Purpose and Need Statement and the results of agency reviews of the project Purpose and Need)
- Specific information regarding the potential transportation improvement such as alternatives or road segments that were reviewed; an overview of ETAT Programming Screen reviews; and agency comments concerning potential effects and degree of effect, by issue, to natural, cultural, and community resources
- Project Scope information, consisting of general project recommendations resulting from the ETAT Programming Screen review, permits, and technical studies required (if any)
- Class of Action determined for the project
- Dispute Resolution Activity Log (if any)

The legend for the Degree of Effect chart is provided in an appendix to the report.

For complete documentation of the project record, also see the GIS Analysis Results Report published on the same date as the Programming Screen Summary Report.

The Florida Department of Transportation may adopt this planning product into the environmental review process, pursuant to Title 23 Sec. USC 168(4)(d) or the state project development process.

**#14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.**

**District:** District 5

**County:** Brevard

**Planning Organization:** FDOT District 5

**Plan ID:** Not Available

**Federal Involvement:** FHWA Funding Other Federal Permit

**LAP Agency** City of Palm Bay

**Agency Preparing NEPA Document:** Local Agency (with FDOT oversight)

**Phase:** Programming Screen

**From:** St. John's Heritage Pkwy.

**To:** Minton Rd.

**Financial Management No.:** 437210-1-28-01

**Contact Information:** Lorena Cucek (386) 943-5392 Lorena.Cucek@dot.state.fl.us

**Snapshot Data From:** Programming Screen Summary Report Published on 10/25/2019 by Kathaleen Linger  
*Issues and Categories are reflective of what was in place at the time of the screening event.*

	Social and Economic						Cultural			Natural				Physical							
	Land Use Changes	Social	Relocation Potential	Farmlands	Aesthetic Effects	Economic	Mobility	Section 4(f) Potential	Historic and Archaeological Sites	Recreation Areas	Wetlands and Surface Waters	Water Quality and Quantity	Floodplains	Wildlife and Habitat	Coastal and Marine	Noise	Air Quality	Contamination	Infrastructure	Navigation	Special Designations
Alternative #1 From: St. John's Heritage Pkwy. To: Minton Rd. Published: 10/25/2019 Reviewed from 07/30/2019 to 09/13/2019	1	3	2	2	2	1	1	2	2	2	3	3	3	3	0	2	2	3	2	N/A	3

---

## Purpose and Need

### Purpose and Need

#### PURPOSE

The purpose of the project is to accommodate future travel demand and improve safety.

#### NEED

The need for the project is based on transportation demand and safety.

*Transportation Demand* - In the future year (2040) no-build condition, the Annual Average Daily Traffic (AADT) on this segment of Malabar Road is projected at 18,232, resulting in at Level of Service (LOS) F, which exceeds the City of Palm Bay's adopted LOS Standard of C. In the existing condition, using 2017 AADT, this section of Malabar Road operates at a LOS C with an AADT of approximately 14,570 vehicles.

*Safety* - During the five-year period between 2013 and 2017, there were 404 crashes, including 68 crashes with an injury and 0 fatalities. Primary crash types include 8 head on, 236 rear ends, 54 left turns, 5 right turn, 17 angle, 31 sideswipes, 2 rollover, 5 off-road and 46 others. In this same timeframe, the annual number of crashes along the corridor increased from 80 incidents to 90 incidents, or a 2-percent annual increase.

#### PROJECT STATUS

Malabar Road is within the jurisdiction of the Space Coast Transportation Planning Organization (TPO). This project is identified in the Florida Department of Transportation's (FDOT) Statewide Transportation Improvement Program (STIP), the Space Coast TPO's 2018/19 to 2022/23 Transportation Improvement Plan (TIP), and 2040 Long Range Transportation Plan (LRTP). The project is currently funded for the Project Development and Environment (PD&E) in the FDOT's 5-year Work Program; however, there is currently no funding for the design, right-of-way or construction phases.

### Project Description

The project involves the two-lane to four-lane widening of Malabar Road from the St. John's Heritage Parkway to Minton Road, a distance of approximately 4 miles. Within the study limits, Malabar Road is currently a two-lane roadway under the jurisdiction of the City of Palm Bay.

### Summary of Public Comments

Summary of Public Comments is not available at this time.

### Planning Consistency Status

#### Federal Consistency Determination

**Date of Determination:** 09/18/2019 by Chris Stahl

**FDEP Clearinghouse Determination:** CONSISTENT with Coastal Zone Management Program.

### Potential Lead Agencies

- FDOT Office of Environmental Management

### Exempted Agencies

Agency Name	Justification	Date
Federal Transit Administration	FTA has requested to be exempt from reviewing any non-transit projects.	02/01/2019

### Community Desired Features

No desired features have been entered into the database. This does not necessarily imply that none have been identified.

### User Defined Communities Within 500 Feet

No user defined communities were found within a 500 ft. buffer distance for this project.

### Census Places Within 500 Feet



- Palm Bay

## Purpose and Need Reviews

### FDOT Office of Environmental Management

Acknowledgment	Date Reviewed	Reviewer	Comments
Accepted	08/26/2019	Katie Britt Williams (Katie.BrittWilliams@dot.state.fl.us)	No Purpose and Need comments found.

### FL Department of Economic Opportunity

Acknowledgment	Date Reviewed	Reviewer	Comments
Understood	09/13/2019	Matt Preston (matt.preston@deo.myflorida.com)	No Purpose and Need comments found.

### FL Department of State

Acknowledgment	Date Reviewed	Reviewer	Comments
Understood	07/31/2019	Adrienne Daggett (Adrienne.Daggett@dos.myflorida.com)	Understood

### FL Fish and Wildlife Conservation Commission

Acknowledgment	Date Reviewed	Reviewer	Comments
Understood	09/11/2019	Jennifer Goff (jennifer.goff@MyFWC.com)	No Purpose and Need comments found.

### National Marine Fisheries Service

Acknowledgment	Date Reviewed	Reviewer	Comments
Understood	08/28/2019	Jennifer Schull (Jennifer.Schull@noaa.gov)	No Purpose and Need comments found.

### National Park Service

Acknowledgment	Date Reviewed	Reviewer	Comments
Understood	09/13/2019	Anita Barnett (anita_barnett@nps.gov)	No Purpose and Need comments found.

### Saint Johns River Water Management District

Acknowledgment	Date Reviewed	Reviewer	Comments
Understood	08/16/2019	Sandy Smith (ssmith@sjrwmd.com)	Understood

### Seminole Tribe of Florida

Acknowledgment	Date Reviewed	Reviewer	Comments
Understood	08/01/2019	Victoria Menchaca (victoriamentchaca@seminoletribe.com)	No Purpose and Need comments found.

### US Army Corps of Engineers

Acknowledgment	Date Reviewed	Reviewer	Comments
Understood	08/22/2019	Randy Turner (Randy.L.Turner@usace.army.mil)	No Purpose and Need comments found.

### US Coast Guard

Acknowledgment	Date Reviewed	Reviewer	Comments
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Understood	08/02/2019	Randall Overton (randall.d.overton@uscg.mil)	No Coast Guard involvement
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**US Environmental Protection Agency**

Acknowledgment	Date Reviewed	Reviewer	Comments
Understood	09/09/2019	Roshanna White (White.Roshanna@epa.gov)	No Purpose and Need comments found.

**US Fish and Wildlife Service**

Acknowledgment	Date Reviewed	Reviewer	Comments
Understood	09/12/2019	Zakia Williams (zakia_williams@fws.gov)	No Purpose and Need comments found.

The following organizations were notified but did not submit a review of the Purpose and Need:

- FL Department of Agriculture and Consumer Services
- FL Department of Environmental Protection
- National Aeronautics and Space Administration
- Natural Resources Conservation Service

## Alternative #1

### Description

Name	From	To	Type	Status	Total Length	Cost	Modes	SIS
Unnamed	St. John's Heritage Pkwy.	Minton Rd.	Widening	ETAT Review Complete	4.0 mi.		Roadway	N

### Segment Description(s)

#### Location and Length

Segment Record	Segment Name	Facility Name	Beginning Location	Ending Location	Length (mi.)	Roadway Id	BMP	EMP
S-001	Segment 1	Segment 1			5.956	Digitized		

#### Jurisdiction and Class

Segment Record	Segment Name	Jurisdiction	Urban Service Area	Functional Class
S-001	Segment 1			

#### Base Conditions

Segment Record	Segment Name	Year	AADT	Lanes	Config
S-001	Segment 1				

#### Interim Plan

Segment Record	Segment Name	Year	AADT	Lanes	Config
S-001	Segment 1				

#### Needs Plan

Segment Record	Segment Name	Year	AADT	Lanes	Config
S-001	Segment 1				

#### Cost Feasible Plan

Segment Record	Segment Name	Year	AADT	Lanes	Config
S-001	Segment 1				

#### Funding Sources

No funding sources found.

### Project Effects Overview for Alternative #1

Issue	Degree of Effect	Organization	Date Reviewed
<b>Social and Economic</b>			
Economic	1 Enhanced	FL Department of Economic Opportunity	09/13/2019
Social	3 Moderate	US Environmental Protection Agency	09/09/2019
Land Use Changes	1 Enhanced	FL Department of Economic Opportunity	09/13/2019
<b>Cultural</b>			
Recreation Areas	2 Minimal	National Park Service	09/13/2019
Recreation Areas	2 Minimal	Saint Johns River Water Management District	08/16/2019
Historic and Archaeological Sites	2 Minimal	Seminole Tribe of Florida	08/01/2019
Historic and Archaeological Sites	2 Minimal	FL Department of State	07/31/2019
<b>Natural</b>			
Coastal and Marine	2 Minimal	National Marine Fisheries Service	08/28/2019
Coastal and Marine	0 None	Saint Johns River Water Management District	08/16/2019
Floodplains	3 Moderate	Saint Johns River Water Management District	09/13/2019



Water Quality and Quantity	3	Moderate	Saint Johns River Water Management District	09/13/2019
Water Quality and Quantity	2	Minimal	FL Department of Environmental Protection	09/12/2019
Water Quality and Quantity	3	Moderate	US Environmental Protection Agency	09/09/2019
Wetlands and Surface Waters	0	None	FL Department of Environmental Protection	09/12/2019
Wetlands and Surface Waters	3	Moderate	US Fish and Wildlife Service	09/12/2019
Wetlands and Surface Waters	3	Moderate	US Environmental Protection Agency	09/09/2019
Wetlands and Surface Waters	2	Minimal	National Marine Fisheries Service	08/28/2019
Wetlands and Surface Waters	2	Minimal	US Army Corps of Engineers	08/22/2019
Wetlands and Surface Waters	2	Minimal	Saint Johns River Water Management District	08/16/2019
Wildlife and Habitat	3	Moderate	US Fish and Wildlife Service	09/12/2019
Wildlife and Habitat	2	Minimal	FL Fish and Wildlife Conservation Commission	09/11/2019
<b>Physical</b>				
Air Quality	2	Minimal	US Environmental Protection Agency	09/09/2019
Navigation	N/A	N/A / No Involvement	US Army Corps of Engineers	08/22/2019
Navigation	N/A	N/A / No Involvement	US Coast Guard	08/02/2019
Contamination	2	Minimal	FL Department of Environmental Protection	09/12/2019
Contamination	3	Moderate	US Environmental Protection Agency	09/09/2019
<b>Special Designations</b>				
Special Designations	3	Moderate	Saint Johns River Water Management District	09/13/2019
Special Designations	N/A	N/A / No Involvement	US Environmental Protection Agency	09/09/2019

## ETAT Reviews and Coordinator Summary: Social and Economic

### Economic

#### Project Effects

**Coordinator Summary Degree of Effect:** 1 *Enhanced* assigned 10/04/2019 by FDOT District 5

#### Comments:

The Department of Economic Opportunity assigned a Degree of Effect (DOE) of "Enhanced". This DOE is based on the potential of the project to attract new development. The FDOT has assigned an overall DOE of "Enhanced" because the project would have the potential to attract new development consistent with existing and planned zoning and land use; moreover, additional business zones are proposed to be developed in this area in the future.

**Degree of Effect:** 1 *Enhanced* assigned 09/13/2019 by Matt Preston, FL Department of Economic Opportunity

#### Coordination Document:

No Involvement

#### Direct Effects

#### Identified Resources and Level of Importance:

Comprehensive Plan(s) Reviewed:

*City of Palm Bay Comprehensive Plan 2001-2011, as amended, June of 2019; and, Brevard County Comprehensive Plan, Capital Improvements Element, Transportation Improvements Project Map Locator, updated in 2018.*

**Comments on Effects to Resources:**

The project *is not* located within a Rural Area of Opportunity.

Improvements to Malabar Road West would have the potential to attract new development. Additional business zones are proposed to be developed in this area in the future.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to FL Department of Economic Opportunity's Review (10/04/2019):** Thank you for your review and comments.

**Social**

**Project Effects**

**Coordinator Summary Degree of Effect:** 3 Moderate assigned 10/04/2019 by FDOT District 5

**Comments:**

USEPA reviewed this issue and assigned a Degree of Effect of "Moderate" because several census blocks that abut the project have minority populations greater than 40%. While there is limited potential for disproportionately high and adverse effects on minority and low-income populations, proactive measures will be taken to involve the affected community in the decisions related to alternative selection, impact analysis, and mitigation. The FDOT has assigned a DOE of "Moderate" for this category.

**Degree of Effect:** 3 Moderate assigned 09/09/2019 by Roshanna White, US Environmental Protection Agency

**Coordination Document:**

To Be Determined: Further Coordination Required

**Direct Effects**

**Identified Resources and Level of Importance:**

FDOT acknowledges in the preliminary environmental discussion (PED) that within a 500-ft. buffer the minority population comprises approximately 46.6% of the total population. In EST Beta, there are several Census blocks with a minority population greater than 40% that abut the widening of Malabar Road project. The proposed widening of Malabar Road from St. Johns Heritage Parkway to Minton Road, from two-lanes to four lanes, may require additional right-of-way. The EPA assigns a Moderate degree of effect on social impacts until further project development and analysis is available. The impact on the minority and/or low-income populations along project corridor will further determine the degree of effect.

**Comments on Effects to Resources:**

Additional right-of way may be needed for the proposed widening of Malabar Road. Partial and full right-of-way acquisition of homes, business, and other community features may affect quality of life. Environmental features and community elements help individuals maintain health and well-being.

FDOT acknowledges in the PED that the project will be developed in accordance with the Civil Rights Act of 1964, the Civil Rights Act of 1968, along with Title VI of the Civil Rights Act, Executive Order 12898 (Environmental Justice), which requires Federal agencies to take the appropriate steps to identify and address any disproportionately high and adverse human health or environmental effects of Federal programs, policies, and activities on minority and low-income populations.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

FDOT acknowledges in the PED and EPA supports where there is potential for disproportionately high and adverse effects on minority

and low-income populations, proactive measures be taken to involve the affected community in the decisions related to alternative selection, impact analysis, and mitigation.

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to US Environmental Protection Agency's Review (10/04/2019):** Thank you for your review and comments. Executive Orders 13045 and 12898 will be considered during the public outreach and alternative analysis phases of the Project Development and Environment (PD&E) Study.

The project will be developed in accordance with the Civil Rights Act of 1964, the Civil Rights Act of 1968, along with Title VI of the Civil Rights Act, Executive Order 12898 (Environmental Justice), which requires Federal agencies to take the appropriate steps to identify and address any disproportionately high and adverse human health or environmental effects of Federal programs, policies, and activities on minority and low-income populations.

A proactive public involvement approach, consistent with the PD&E Manual, will be implemented to ensure that opportunity is given to all residents and businesses along the corridor to provide input into this project. If necessary, the FDOT will further analyze sociocultural effects during the PD&E study consistent with the Sociocultural Effects Evaluation Handbook.

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## Relocation Potential

### Project Effects

**Coordinator Summary Degree of Effect:** 2 *Minimal* assigned 10/04/2019 by FDOT District 5

**Comments:**

No ETAT reviews were submitted for this issue. The proposed project is expected to result in minimal, if any, residential relocations or business displacements. Right-of-way may be required for stormwater ponds; however, the project will be designed to avoid and/or minimize relocation impacts. A Conceptual Stage Relocation Plan will be prepared if it is determined that residential relocations or business displacements occur.

None found

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## Aesthetic Effects

### Project Effects

**Coordinator Summary Degree of Effect:** 2 *Minimal* assigned 10/04/2019 by FDOT District 5

**Comments:**

No ETAT reviews were submitted for this issue. The project is anticipated to have minimal impacts to aesthetics, viewsheds, etc.; therefore, a Degree of Effect of "Minimal" is being assigned to this issue. The context classification may be considered and potential landscaping and other options will be identified in either the PD&E Study or in future phases.

None found

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## Farmlands

### Project Effects

**Coordinator Summary Degree of Effect:** 2 *Minimal* assigned 10/04/2019 by FDOT District 5

**Comments:**

No ETAT reviews were submitted for this issue. Because of the developed nature of the majority of the corridor, the proposed



project is expected to result in minimal involvement with farmlands. During the PD&E Study, the FDOT will coordinate with the Natural Resources Conservation Service (NRCS) to determine whether a Farmland Protection Policy Act (AD-1006) assessment is required.

None found

The following organization(s) were expected to but did not submit a review of the Farmlands issue for **Alternative #1**: Natural Resources Conservation Service

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## Mobility

### Project Effects

**Coordinator Summary Degree of Effect:** **i** *Enhanced* assigned 10/04/2019 by FDOT District 5

**Comments:**

No ETAT reviews were submitted for this issue. A Degree of Effect of "Enhanced" is being assigned to this issue due to the potential for increased roadway capacity as well as the addition of bicyclist and pedestrian features.

None found

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## Land Use Changes

### Project Effects

**Coordinator Summary Degree of Effect:** **i** *Enhanced* assigned 10/04/2019 by FDOT District 5

**Comments:**

The Florida Department of Economic Opportunity (DEO) assigned a Degree of Effect of "Enhanced" for Land Use Changes. The Degree of Effect was assigned because, as noted by DEO, the project is compatible with community development goals and city and county comprehensive plans; additionally, several projects in the City of Palm Bay's comprehensive plan require the widening of Malabar Road. The FDOT will coordinate with the City of Palm Bay and Brevard County to update the transportation-related maps in the comprehensive plans. The FDOT has assigned a DOE of "Enhanced" for land use changes.

**Degree of Effect:** **i** *Enhanced* assigned 09/13/2019 by Matt Preston, FL Department of Economic Opportunity

**Coordination Document:**

No Involvement

### Direct Effects

**Identified Resources and Level of Importance:**

Comprehensive Plan(s) Reviewed:

*City of Palm Bay Comprehensive Plan 2001-2011, as amended, June of 2019; and, Brevard County Comprehensive Plan, Capital Improvements Element, Transportation Improvements Project Map Locator, updated in 2018.*

**Comments on Effects to Resources:**

Compatibility with Community Development Goals and Comprehensive Plan:

The proposed project is compatible with community development goals and is also consistent with both comprehensive plans. The City of Palm Bay is planning to have Malabar Road widened, as several projects in the comprehensive plan require it.

Future Transportation Map:

The proposed project is not included on any transportation-related maps in the comprehensive plans. DEO staff recommends that the City and County update their maps accordingly to include the proposed project in its entirety.

Land Uses:

Future Land Use Map categories that surround the project include: Single Family Residential, Multi-Family Residential, Commercial, and Public/Semi-Public.

Parks:

The proposed project is located within a quarter mile of the following park: Palm Bay Regional Park (City of Palm Bay). FDOT should analyze potential impacts to this 4(f) resource.

Area of Critical State Concern (ACSC), Coastal High Hazard Area (CHHA), and Military Bases:

The project is not located within an Area of Critical State Concern, or the CHHA; nor does it encroach on any military installation.

Other Planning-Related Items:

The City has approved projects on Malabar Road Northwest that would require improvements.

Contact Information:

Laurence Bradley (City of Palm Bay) - Phone Number: (321) 733-3042.

Frank Watanabe (City of Palm Bay) - Phone Number: (321) 952-3403.

Cheryl Campbell (Brevard County) - Phone Number: (321) 633-2070 ext. 58271.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to FL Department of Economic Opportunity's Review (10/04/2019):** Thank you for your review and comments. The FDOT will work with the City of Palm Bay and Brevard County to update the transportation-related maps in the comprehensive plans

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**ETAT Reviews and Coordinator Summary: Cultural Recreation Areas**

**Project Effects**

**Coordinator Summary Degree of Effect:** 2 *Minimal* assigned 10/04/2019 by FDOT District 5

**Comments:**

Both the National Park Service and the St. Johns River Florida Water Management District assigned a Degree of Effect (DOE) of "Minimal". The proposed project is anticipated to avoid impacts to the Palm Bay Urban Regional Park, now known as the Fred Poppe Regional Park. The FDOT recognizes this resource is protected under Section 6f and is a Land and Water Conservation site. During the PD&E Study, the FDOT will attempt to avoid impacts to wetlands as noted by the SJRWMD. If avoidance isn't feasible, the FDOT will seek to first minimize then mitigate for unavoidable impacts to wetlands.

**Degree of Effect:** 2 *Minimal* assigned 09/13/2019 by Anita Barnett, National Park Service

**Coordination Document:**

To Be Determined: Further Coordination Required

**Direct Effects**

**Identified Resources and Level of Importance:**

Access may be concern. Further coordination may be needed if access is to Palm Bay Urban Regional Park is affected. Palm Bay Urban Regional Park is a Land and Water Conservation Fund Site.

**Comments on Effects to Resources:**

Access may be a concern. Further coordination may be needed if access is to Palm Bay Urban Regional Park is affected.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**Additional Comments (optional):**

**CLC Recommendations:**

### Indirect Effects

#### Identified Resources and Level of Importance:

#### Comments on Effects to Resources:

#### Recommended Avoidance, Minimization, and Mitigation Opportunities:

**FDOT District 5 Feedback to National Park Service's Review (10/04/2019):** Thank you for your review and comment.

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**Degree of Effect:** 2 Minimal assigned 08/16/2019 by Sandy Smith, Saint Johns River Water Management District

#### Coordination Document:

Permit or Technical Study Required

### Direct Effects

#### Identified Resources and Level of Importance:

It appears that there are canals and open water wetland systems along Malabar Road. If possible locating the expansion within the existing ROW should help avoid most wetlands. There are several Mitigation Banks in the service Area of Basin 20 with State Credits.

#### Comments on Effects to Resources:

The project includes both forested, open water and herbaceous wetlands. Any impacts proposed if considered adverse will need to be offset with mitigation. The project is located in Basin 20 Southern St. Johns River Basin.

#### Recommended Avoidance, Minimization, and Mitigation Opportunities:

We suggest that the wetlands within the project limits or adjacent to the roadway improvements be delineated and reviewed by District review staff to assure that the wetland impacts are being reduced and minimized to the maximum extent practicable prior to right of way acquisition if required. There are two formal wetland determination along the corridor called the Palmer Property district permit No's # 125999-2 and 12600-2.

#### Additional Comments (optional):

#### CLC Recommendations:

### Indirect Effects

#### Identified Resources and Level of Importance:

Every effort to not impact wetlands should be taken.

#### Comments on Effects to Resources:

Every effort to not impact wetlands should be taken.

#### Recommended Avoidance, Minimization, and Mitigation Opportunities:

Every effort to not impact wetlands should be taken.

**FDOT District 5 Feedback to Saint Johns River Water Management District's Review (10/04/2019):** Thank you for your review and comment.

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The following organization(s) were expected to but did not submit a review of the Recreation Areas issue for **Alternative #1**: FL Department of Environmental Protection

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## Section 4(f) Potential

### Project Effects

**Coordinator Summary Degree of Effect:** 2 Minimal assigned 10/25/2019 by FDOT District 5

#### Comments:

No ETAT reviews were submitted for this issue. No Section 4(f) properties are currently identified in the project impact area. A



determination of applicability will be prepared for identified Section 4(f) resources within the study area, should any be identified later during the PD&E Study, although the proposed project is expected to result in minimal to no involvement with Section 4(f) resources.

None found

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## Historic and Archaeological Sites

### Project Effects

**Coordinator Summary Degree of Effect:** 2 *Minimal* assigned 10/04/2019 by FDOT District 5

**Comments:**

The Seminole Tribe of Florida and the Florida Department of State, Division of Historic Resources both assigned a Degree of Effect (DOE) of "Minimal". The FDOT recognizes, the project area has not been comprehensively surveyed, and has also assigned a DOE of "Minimal".

A Cultural Resource Assessment Survey (CRAS) report that follows the specifications set forth in Chapter 1A-46 Florida Administrative Code, FDOT PD&E Manual Part 2, Chapter 8 will be developed.

**Degree of Effect:** 2 *Minimal* assigned 08/01/2019 by Victoria Menchaca, Seminole Tribe of Florida

**Coordination Document:**

PD&E Support Document As Per PD&E Manual

**Coordination Document Comments:**

The Seminole Tribe of Florida would respectfully like to request a copy of the CRAS report when it is finished in order to complete our assessment pursuant to Section 106 of the National Historic Preservation Act and its implementing authority, 36 CFR 800

### Direct Effects

**Identified Resources and Level of Importance:**

unknown archaeological resources

**Comments on Effects to Resources:**

Project could disturb unknown archaeological resources

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**Additional Comments (optional):**

The Seminole Tribe of Florida would respectfully like to request a copy of the CRAS report when it is finished in order to complete our assessment pursuant to Section 106 of the National Historic Preservation Act and its implementing authority, 36 CFR 800

**CLC Recommendations:**

### Indirect Effects

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to Seminole Tribe of Florida's Review (10/04/2019):** Thank you for your review and comments. A Cultural Resource Assessment Survey will be prepared during the PD&E Study. This will be transmitted to the Seminole Tribe of Florida as requested.

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**Degree of Effect:** 2 *Minimal* assigned 07/31/2019 by Adrienne Daggett, FL Department of State

**Coordination Document:**

PD&E Support Document As Per PD&E Manual

**Coordination Document Comments:**

Since the project area has not been comprehensively surveyed, a survey should be conducted for this project. All cultural resources, including potential historic districts, within the area of potential effect should be documented and assessed for NRHP eligibility. The resultant survey report shall conform to the specifications set forth in Chapter 1A-46 Florida Administrative Code, FDOT PD&E Manual Part 2, Chapter 8 and will need to be forwarded to this agency (or the appropriate Federal Agency) for review and comment. SHPO also welcomes consultation in advance of the cultural resources survey to discuss scope of work, APE, methodology, or any other concerns the district may have.

**Direct Effects**

**Identified Resources and Level of Importance:**

As reported.

**Comments on Effects to Resources:**

The project has the potential to impact cultural resources within and adjacent to the proposed project.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

This office will consult with the project sponsors to avoid, minimize, or mitigate any adverse effects to significant cultural resources.

**Additional Comments (optional):**

Since the project area has not been comprehensively surveyed, a survey should be conducted for this project. All cultural resources, including potential historic districts, within the area of potential effect should be documented and assessed for NRHP eligibility. The resultant survey report shall conform to the specifications set forth in Chapter 1A-46 Florida Administrative Code, FDOT PD&E Manual Part 2, Chapter 8 and will need to be forwarded to this agency (or the appropriate Federal Agency) for review and comment. SHPO also welcomes consultation in advance of the cultural resources survey to discuss scope of work, APE, methodology, or any other concerns the district may have.

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to FL Department of State's Review (10/04/2019):** Thank you for your review and comments. Further coordination with your agency will take place during the PD&E Study, which will include a Cultural Resource Assessment Survey.

**ETAT Reviews and Coordinator Summary: Natural**

**Coastal and Marine**

**Project Effects**

**Coordinator Summary Degree of Effect:** 0 *None* assigned 10/04/2019 by FDOT District 5

**Comments:**

The St. Johns River Water Management District assigned a Degree of Effect (DOE) of "None". National Marine Fisheries Service assigned a DOE of "Minimal" because only freshwater wetland systems (freshwater marshes, mixed scrub/shrub wetlands, and wet prairie) are located within the project corridor. The proposed project is anticipated to have no involvement with coastal or marine resources and as such was assigned a DOE of "None" for Coastal and Marine.

**Degree of Effect:** 2 *Minimal* assigned 08/28/2019 by Jennifer Schull, National Marine Fisheries Service

**Coordination Document:**

No Involvement

## Direct Effects

### Identified Resources and Level of Importance:

#### *Identify resources and level of importance:*

Based on our review of the information provided on the EST website, GIS-based effects analysis on wetlands and interpretation of aerial photographs, NOAA's National Marine Fisheries Service (NMFS) has determined that freshwater marshes, mixed scrub/shrub wetlands, and wet prairie are located within the project corridor. These wetlands appear to be low in quality though the riverine wetlands eventually connect to Turkey Creek, Palm Bay and the Atlantic Ocean.

### Comments on Effects to Resources:

The wetlands along the proposed roadway expansion provide water quality functions, such as removal of sediments, excess nutrients, and contaminants, which benefit and support these aquatic ecosystems. Through hydrological connections, these wetlands also contribute plant material and other useable nutrients (both dissolved and particulate organic matter) into aquatic food webs that include recreationally, commercially, and ecologically important species within downstream estuaries. If wetland impacts are unavoidable, sequential minimization and mitigation should take place.

In addition to the direct impacts from filling wetlands, construction activities may impact adjacent wetlands through sedimentation and runoff.

### Recommended Avoidance, Minimization, and Mitigation Opportunities:

**Magnuson-Stevens Act:** Based on the project location, information provided in the ETDM website, and GIS-based analysis of impacts, NOAA's National Marine Fisheries Service (NMFS) concludes that essential fish habitat (EFH) would not be impacted by the proposed road modifications; accordingly, we offer no comments pursuant to the EFH provisions of the Magnuson-Stevens Act (P.L. 104-297); and this project will not require an EFH Assessment. Further consultation on this matter is not necessary unless future modifications are proposed and you believe that the proposed action may result in adverse impacts to EFH.

**Endangered Species Act:** We are not aware of any threatened or endangered species or critical habitat under the purview of NMFS that occur within the project area. However, it should be noted that a "no effect" determination must be made by the action agency and the reasoning underlying the determination should be documented in a project file. Please coordinate closely with the U.S. Fish and Wildlife Service for other species listed under the Endangered Species Act that may require consultation.

**Fish and Wildlife Coordination Act:** The comments NMFS provided regarding sequential mitigation are in accordance with the Fish and Wildlife Coordination Act.

### Additional Comments (optional):

### CLC Recommendations:

## Indirect Effects

### Identified Resources and Level of Importance:

### Comments on Effects to Resources:

### Recommended Avoidance, Minimization, and Mitigation Opportunities:

**FDOT District 5 Feedback to National Marine Fisheries Service's Review (10/04/2019):** Thank you for your review and confirmation that the project will not affect National Marine Service trust resources.

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**Degree of Effect:** 0 None assigned 08/16/2019 by Sandy Smith, Saint Johns River Water Management District

### Coordination Document:

No Involvement

## Direct Effects

### Identified Resources and Level of Importance:

### Comments on Effects to Resources:

### Recommended Avoidance, Minimization, and Mitigation Opportunities:



**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to Saint Johns River Water Management District's Review (10/04/2019):** Thank you for your review.

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**Floodplains**

**Project Effects**

**Coordinator Summary Degree of Effect:** 3 *Moderate* assigned 10/04/2019 by FDOT District 5

**Comments:**

The SJRWMD assigned a Degree of Effect (DOE) of "Moderate". Due to the segments of the project abutting or partially located within areas identified as FEMA Flood Hazard Areas, an overall DOE of "Moderate" is being assigned for floodplains.

An evaluation of floodplain impacts and alternatives to avoid impacts will be undertaken as part of the Project Development and Environment (PD&E) Study. Efforts will be made to avoid or minimize impacts to floodplain resources and functions. Engineering design features and hydrological drainage structures will be designed such that stormwater transport, flow, and discharge meet or exceed flood control requirements.

**Degree of Effect:** 3 *Moderate* assigned 09/13/2019 by Melissa Bryan Parsons, Saint Johns River Water Management District

**Coordination Document:**

Permit or Technical Study Required

**Direct Effects**

**Identified Resources and Level of Importance:**

Segments of the project abut or are partially located within areas identified as FEMA Flood Hazard Areas. The project has the potential to adversely affect floodplain storage or conveyance by direct encroachment into the floodplain or by generating stormwater runoff that could increase the rate or volume of discharge to the floodplain. However, the Degree of Effect is assumed to be "Moderate" because the project will require an Individual Environmental Resource Permit (ERP), and designing the project to meet the applicable Water Management District design criteria, and the conditions for issuance of an Individual ERP in 62-330.301 and 302, F.A.C., would provide reasonable assurance that the project would not result in adverse impacts to the affected floodplains. With respect to floodplain storage and conveyance, the project must be designed to meet the applicable criteria in section 3.3, SJRWMD ERP Applicant's Handbook, Volume II.

**Comments on Effects to Resources:**

Designing the project to meet the applicable Water Management District design criteria, and the conditions for issuance of an Individual ERP in 62-330.301 and 302, F.A.C., would provide reasonable assurance that the project would not result in adverse flooding to on-site or off-site property and would not result in adverse impacts to existing floodplain or surface water storage and conveyance capabilities.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

Where encroachment into the floodplain cannot be avoided or is not practicable, compensatory storage or other design considerations should be made to prevent a net reduction in flood storage within the 10-year and 100-year floodplains, as applicable. Existing drainage patterns should be considered in the project design to ensure that conveyance of runoff or surface water from off-site areas to the floodplain is not adversely affected.

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to Saint Johns River Water Management District's Review (10/04/2019):** Thank you for your review. An evaluation of floodplain impacts and alternatives to avoid potential impacts will take place during the Project Development and Environment (PD&E) Study.

**Water Quality and Quantity**

**Project Effects**

**Coordinator Summary Degree of Effect:** 3 *Moderate* assigned 10/04/2019 by FDOT District 5

**Comments:**

The Water Quality issue was given a "Moderate" Degree of Effect (DOE) by the US Environmental Protection Agency and the St. Johns River Water Management District, while the Florida Department of Environmental Protection assigned a DOE of "Minimal". A Summary DOE of "Moderate" is being assigned due to the verified impaired waters and special basin criteria that the project occurs within.

**Degree of Effect:** 3 *Moderate* assigned 09/13/2019 by Melissa Bryan Parsons, Saint Johns River Water Management District

**Coordination Document:**

Permit or Technical Study Required

**Direct Effects**

**Identified Resources and Level of Importance:**

Although the project is wholly located within the Upper St. Johns River Hydrologic Basin, the project appears to be within an area that drains to Melbourne-Tillman Water Control District (MTWCD) Canal 7 (C-7), which eventually drains east to the Indian River Lagoon. The proposed project is expected to generate stormwater runoff that could potentially cause adverse water quality and quantity impacts to receiving waters and adjacent lands. Additionally, the proposed project may potentially affect existing permitted systems within and/or adjacent to the project boundary. However, the Degree of Effect is assumed to be "Moderate" because the project will require an Individual Environmental Resource Permit (ERP), and designing the project to meet the applicable Water Management District design criteria, and the conditions for issuance of an Individual ERP in 62-330.301 and 302, F.A.C., would provide reasonable assurance that the project would not result in adverse water quality or quantity impacts to water resources and adjacent lands.

**Water Quality:**

The proposed project should be designed to provide water quality treatment as required per Parts IV and V, SJRWMD ERP Applicant's Handbook (A.H.), Volume II, and subsection 62-330.301(1)e, F.A.C. The required treatment volumes and recovery times are based on the methodology of treatment, which can be found in Parts V and IX, SJRWMD ERP A.H., Volume II. Note that systems that propose a direct discharge to water bodies that are impaired for nutrients at the time of permitting must also be designed to provide a net improvement in the nutrient load discharged to the impaired water body.

**Water Quantity:**

The proposed project should be designed to provide water quantity treatment, including both rate of discharge and volumetric attenuation, as required per Part III, SJRWMD ERP A.H., Volume II, and 62-330.301(1)(a), (b), and (c), F.A.C.

**Special Regulatory Basin:**

The project is located within a special regulatory basin, which includes additional design criteria related to water quantity treatment

(including rate and volume discharge requirements for specific storm frequencies) and for interbasin diversion. As such, the project should also be designed to comply with the applicable standards and design criteria for the St. Johns River Hydrologic Basin in section 13.1, SJRWMD ERP Applicant's Handbook, Volume II, in subsection 62-330.301 and 302, F.A.C., and in subsection 40C-41.063(1), F.A.C. If the project cannot practicably be designed to meet the interbasin diversion criterion in subsection 13.1.3, SJRWMD ERP Applicant's Handbook, Volume II, consideration may be made for participation in the District-sponsored Canal 1 (C-1) Rediversion Project, which diverts portions of the runoff currently flowing to Turkey Creek and the Indian River Lagoon through the C-1 back to the Upper St. Johns River Basin. Participation in this cost-share project would offset the increase in volume proposed to be discharged from the project site. However, please note that participation through a cost-share agreement would require payment to the District of \$265.00 per acre, which is proportional to the total cost of the Canal 1 Rediversion Project based upon a calculation of the increase in runoff from the project and the total volume water returned to St. Johns River by the Canal 1 Rediversion project.

**Comments on Effects to Resources:**

Designing the project to meet the applicable Water Management District design criteria, and the conditions for issuance of an Individual ERP in 62-330.301 and 302, F.A.C., would provide reasonable assurance that the project would not result in adverse water quality or quantity impacts to water resources and adjacent lands.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

The project should be designed to include systems (e.g., ponds, swales, etc.) to infiltrate, retain and/or detain stormwater runoff to provide direct water quality treatment (and/or compensatory water quality treatment, if applicable), and to provide rate of discharge and volumetric attenuation as applicable. Also consider designing a stormwater harvesting system, if feasible, to reduce the volume of treated stormwater discharged to surface waters. There is an existing school and recreational park nearby that may currently irrigate with private wells or could potentially benefit from additional treated stormwater for irrigation. Explore possible opportunities with the potential users to generate interest in a partnership or joint-use system.

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to Saint Johns River Water Management District's Review (10/04/2019):** Thank you for your review and comments regarding permit information and the special regulatory basin. The potential impact the proposed project will have on water quality will be evaluated according to Part 2, Chapter 11 of the FDOT Project Development and Environment (PD&E) Manual. The FDOT will include an evaluation of existing stormwater treatment and details on the future stormwater treatment facilities. The project will be designed to meet state water quality and quantity requirements, and the FDOT will implement proper best management practices during construction.

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**Degree of Effect:** 2 *Minimal* assigned 09/12/2019 by Chris Stahl, FL Department of Environmental Protection

**Coordination Document:**

PD&E Support Document As Per PD&E Manual

**Direct Effects**

**Identified Resources and Level of Importance:**

The Indian River Lagoon and tributaries.

**Comments on Effects to Resources:**

Every effort should be made to maximize the treatment of stormwater runoff from the proposed road project to prevent ground and surface water contamination. Stormwater treatment should be designed to maintain the natural predevelopment hydroperiod and water quality, as well as to protect the natural functions of adjacent wetlands.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

Basin Management Action Plan has been created for the Indian River Lagoon. Please see <https://floridadep.gov/dear/water-quality-restoration/content/basin-management-action-plans-bmaps> for additional information.



**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to FL Department of Environmental Protection's Review (10/04/2019):** Thank you for your review and comments. The potential impact the proposed project will have on water quality will be evaluated according to Part 2, Chapter 11 of the FDOT Project Development and Environment (PD&E) Manual. The FDOT will include an evaluation of existing stormwater treatment and details on the future stormwater treatment facilities. The project will be designed to meet state water quality and quantity requirements, and the FDOT will implement proper best management practices during construction.

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**Degree of Effect:** 3 *Moderate* assigned 09/09/2019 by Roshanna White, US Environmental Protection Agency

**Coordination Document:**

To Be Determined: Further Coordination Required

**Direct Effects**

**Identified Resources and Level of Importance:**

FDOT acknowledges in the preliminary environmental discussion (PED) that within a 500-ft. buffer the Indian River Lagoon Adopted Basin Management Action Plan (BMAP), two FDEP verified impaired waters (Melbourne-Tillman Canal and Drained Farmland) and the FDEP water body Three Forks Marsh Run/C-40 Canal, Principal Aquifers of the State of Florida described the Surficial Aquifer System as 502.96 acres (100%) and the Recharge Areas of the Floridan Aquifer shows a "Discharge less than 1" as 100%, 87 onsite sewage septic tanks, and 19 Super Act Wells. Within 500 ft. GIS analysis identified 35 US EPA National Pollutant Discharge Elimination System (NPDES) and the Surficial Aquifer System is more vulnerable to contamination. FDOT expects the proposed project to result in moderate involvement with water quality and quantity resources. The EPA assigns a Moderate Degree of effect to Wetlands and Surface waters.

**Comments on Effects to Resources:**

Healthy waters provide clean drinking water and productive fisheries which support a healthy environment and quality of life. Human activities have the potential to degrade ground water, and it is important to maintain and protect the quality of water because it provides drinking water for the State of Florida. Storm water runoff from the built environment is a principal contributor to water quality impairment of waterbodies (including wetlands) nationwide. An increase in impervious or semi-impervious surfaces can contribute to surface drainage and non-point sources that will impact surface and groundwater quality. Common roadway pollutants such as heavy metals, volatile organic chemicals, petroleum hydrocarbons, and suspended solids degrade near-by water bodies through storm water runoff.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

The EPA recommends for Water Quality and Quantity impacts:

- Consult The Indian River Lagoon BMAP Plans
- A Storm Water Pollution Prevention Program (SWPPP) will also be implemented [as required by the NPDES permits] to control the effects of storm water runoff during construction
- Make every effort to maximize the treatment of storm water runoff from the proposed roadway improvements
- Explain how adequate sediment and erosion control measures will be used to prevent the discharge of pollutants into the water body
- Stabilize soils to reduce the effects of erosion, sedimentation, and runoff to maintain or improve water quality
- Reduce the impact of pollution runoff from construction activities

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to US Environmental Protection Agency's Review (10/04/2019):** Thank you for your review and comments regarding the two impaired waters. The potential impact the proposed project will have on water quality will be evaluated according to Part 2, Chapter 11 of the FDOT Project Development and Environment (PD&E) Manual. The FDOT will include an evaluation of existing stormwater treatment and details on the future stormwater treatment facilities. The project will be designed to meet state water quality and quantity requirements, and the FDOT will implement proper best management practices during construction. A Water Quality Impact Evaluation will also be prepared as part of this study.

**Wetlands and Surface Waters**

**Project Effects**

**Coordinator Summary Degree of Effect:** **3** *Moderate* assigned 10/04/2019 by FDOT District 5

**Comments:**

The Wetlands and Surface Water issue was given a "Moderate" Degree of Effect (DOE) by the US Environmental Protection Agency and the US Fish and Wildlife Service. The National Marine Fisheries Service, the US Army Corps of Engineers, and the St. Johns River Water Management District assigned a DOE of "Minimal". Florida Department of Environmental Protection assigned a DOE of "None". Given the uncertainty of the impacts, and the responses from the ETAT, the FDOT is assigning a DOE of "Moderate" to this issue.

Measures to avoid and/or minimize impacts to wetlands, mitigation options, as well cumulative impacts will be documented in the Natural Resource Evaluation report that will be prepared as part of this study. The project will be designed to meet state water quality and quantity requirements, and the FDOT will implement proper best management practices during construction.

**Degree of Effect:** **0** *None* assigned 09/12/2019 by Chris Stahl, FL Department of Environmental Protection

**Coordination Document:**

PD&E Support Document As Per PD&E Manual

**Direct Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to FL Department of Environmental Protection's Review (10/04/2019):** Thank you for your review. Measures to avoid and/or minimize impacts to wetlands as well as state cumulative impact criteria will be documented in the Natural Resource Evaluation report that will be developed as part of this study. The project will be designed to meet state water quality and quantity requirements, and the FDOT will implement proper best management practices during construction.

**Degree of Effect:** **3** *Moderate* assigned 09/12/2019 by Zakia Williams, US Fish and Wildlife Service

## Coordination Document:

PD&E Support Document As Per PD&E Manual

### Direct Effects

#### Identified Resources and Level of Importance:

The Service has reviewed our Geographic Information System (GIS) database for recorded locations of federally threatened and endangered species on or adjacent to the project study area. The GIS database is a compilation of data received from several sources. Based on review of our GIS database, the Service notes that the following federal listed species may occur in or near the project area.

#### Florida scrub-jay (*Aphelocoma coerulescens*)

The EST tool identified that the project area is within the Florida scrub-jay service area. The Service has documented occurrences of scrub-jay in the area, east of Minton Road. The Service recommends that surveys be conducted in areas where suitable habitat occurs.

#### Wood Stork (*Mycteria americana*)

The project corridor is located within the Core Foraging Area (CFA) of wood stork colonies. The Service believes that the loss of wetlands within a CFA due to an action could result in the loss of foraging habitat for the wood stork. To minimize adverse effects to the wood stork, we recommend that any lost foraging habitat resulting from the project be replaced within the CFA of the affected nesting colony. Moreover, wetlands provided as mitigation should adequately replace the wetland functions lost as a result of the action. In some cases, the Service accepts wetlands compensation located outside the CFA of the affected wood stork nesting colony. Specifically, wetland credits purchased from a "Service Approved" mitigation bank located outside of the CFA would be acceptable to the Service provided that the impacted wetland occur within the permitted service area of the bank.

To minimize adverse effects to the wood stork and other wetland dependent species, we recommend that impacts to suitable foraging habitat be avoided. If avoidance is not possible, minimization measure should be employed and best management practices to avoid further degradation of the site. Mitigation for wetland impacts should be discussed with USFWS and will require further coordination. Please refer to the North Florida Field Office website for WOST colony locations. <http://www.fws.gov/northflorida>

The Service also believes that the following federally listed species have the potential to occur in or near the project area: Audubon's crested caracara, Eastern indigo snake, red-cockaded woodpecker and Federally listed plants. Accordingly, the Service recommends that the Florida Department of Transportation (FDOT) prepare a Biological Assessment for the project (as required by 50 CFR 402.12) during the FDOT's Project's Development and Environment process.

Coordination with the Office of Migratory birds will be needed for **all projects involving** migratory birds and eagles, please contact Ulgonda Kilpatrick in our Migratory Birds Permit Office at:

Migratory Birds Permit Office  
1875 Century Boulevard, NE  
Atlanta, Georgia 30345  
352-406-6780 cell (MAIN)

A trained botanist should conduct surveys for all federally listed plants found in Brevard County (the list can be found on our website [northflorida.fws.gov](http://northflorida.fws.gov)).

Florida has 229 species of plants found nowhere else in the world, and most of them are rare and declining. Diverse plant communities are essential for maintaining a healthy environment for fish, wildlife, and people, and improved land conservation and land management can help restore these rare plants. To this end, the Service worked with the Florida Department of Agriculture and Consumer Services, and many universities and non-profits, to establish the Florida Rare Plant Conservation Endowment. The Endowment funds projects that are critical to preventing the extinction of Florida's rare plants. To ensure the survival of Florida's unique and rare plants the Service encourages the applicant to make a voluntary contribution of \$5,000 to the Endowment. All contributions are voluntary and tax deductible.

### Wetlands

Wetlands provide important habitat for fish and wildlife. Best Management Practices (BMPs) should be used to prevent degradation of wetland and other aquatic resources from erosion, siltation, and nutrient discharges associated with the project site. We recommend that the project be designed to avoid these valuable resources to the greatest extent practicable. If impacts to wetlands are unavoidable, we recommend that the FDOT provides mitigation that fully compensates for the loss of wetland resources.



**Comments on Effects to Resources:**

Dependent upon the alternative(s) selected, the proposed project is expected to result in minimal to moderate involvement with wildlife and habitat resources. If it is determined the project will affect and federally listed species and/or their habitat, the Department will initiate consultation with FWS during the Project Development process.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to US Fish and Wildlife Service's Review (10/04/2019):** Thank you for your review and comments. Measures to avoid and/or minimize impacts to wetlands as well as mitigation opportunities will be documented in the Natural Resource Evaluation report that will be prepared as part of this study. The project will be designed to meet state water quality and quantity requirements, and the FDOT will implement proper best management practices during construction.

**Degree of Effect:** 3 Moderate assigned 09/09/2019 by Roshanna White, US Environmental Protection Agency

**Coordination Document:**

To Be Determined: Further Coordination Required

**Direct Effects**

**Identified Resources and Level of Importance:**

FDOT acknowledges in the preliminary environmental discussion (PED) that within a 500-ft. buffer National Wetlands Inventory (NWI) dataset identified 11.81 acres (2.35% of the area) as Palustrine wetlands and 4.76 (0.95%) as Riverine, and within the 100-foot project buffer area the D-FIRM 100-year Floodplain dataset identifies 2.12 acres within the 100-year floodplain. The proposed widening of Malabar Road project may require wetlands to be filled for additional right-of-way. The number of acres of wetlands to be filled, the classification of those filled wetlands, and any mitigation will further determine the impact of wetlands assessment. Therefore, EPA assigns a Moderate Degree of effect to Wetlands and Surface waters.

**Comments on Effects to Resources:**

Wetlands are important because they are a critical natural resource and serve several functions including filtration and treatment of surface water runoff, store flood waters and provide erosion control. Storm water runoff from urban sources, including roadways, carry pollutants such as volatile organics, petroleum hydrocarbons, heavy metals, and pesticides/herbicides. With an increase in the impervious surface area, the project area may experience an increase in storm water runoff and the increase of pollutants into surface waters and wetlands. Contamination by pollutants or sediments can reduce wetland function characteristics and value. Once contaminants reach wetlands, water chemistry changes can damage the ecosystem.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

The EPA recommends the following practices for direct wetland and surface water impacts

- Consistent with Section 404 of the Clean Water Act, the selected site should avoid and minimize to the maximum extent practicable, placement of fill into jurisdictional waters of the U.S., which include wetlands and streams.
- Divert storm water runoff from the proposed project from water bodies and/or treated to prevent water quality impacts to nearby wetlands
- Demonstrate what increases, if any, in flood plain elevation will result from this project and flow of water and debris in the floodplain which would alter discharge capacity

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to US Environmental Protection Agency's Review (10/04/2019):** Thank you for your review and comments. The limits of wetlands will be preliminarily established during the PD&E Study and then surveyed during the design phase. Measures to avoid and/or minimize impacts to wetlands will be documented in the Natural Resource Evaluation report that will be developed as part of this study. The project will be designed to meet state water quality and quantity requirements, and the FDOT will implement proper best management practices during construction.

**Degree of Effect:** 2 Minimal assigned 08/28/2019 by Jennifer Schull, National Marine Fisheries Service

**Coordination Document:**  
No Involvement

**Direct Effects**

**Identified Resources and Level of Importance:**

*Identify resources and level of importance:*

Based on our review of the information provided on the EST website, GIS-based effects analysis on wetlands and interpretation of aerial photographs, NOAA's National Marine Fisheries Service (NMFS) has determined that freshwater marshes, mixed scrub/shrub wetlands, and wet prairie are located within the project corridor. These wetlands appear to be low in quality though the riverine wetlands eventually connect to Turkey Creek, Palm Bay and the Atlantic Ocean.

**Comments on Effects to Resources:**

The wetlands along the proposed roadway expansion provide water quality functions, such as removal of sediments, excess nutrients, and contaminants, which benefit and support these aquatic ecosystems. Through hydrological connections, these wetlands also contribute plant material and other useable nutrients (both dissolved and particulate organic matter) into aquatic food webs that include recreationally, commercially, and ecologically important species within downstream estuaries. If wetland impacts are unavoidable, sequential minimization and mitigation should take place.

In addition to the direct impacts from filling wetlands, construction activities may impact adjacent wetlands through sedimentation and runoff.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**Magnuson-Stevens Act:** Based on the project location, information provided in the ETDM website, and GIS-based analysis of impacts, NOAA's National Marine Fisheries Service (NMFS) concludes that essential fish habitat (EFH) would not be impacted by the proposed road modifications; accordingly, we offer no comments pursuant to the EFH provisions of the Magnuson-Stevens Act (P.L. 104-297); and this project will not require an EFH Assessment. Further consultation on this matter is not necessary unless future modifications are proposed and you believe that the proposed action may result in adverse impacts to EFH.

**Endangered Species Act:** We are not aware of any threatened or endangered species or critical habitat under the purview of NMFS that occur within the project area. However, it should be noted that a "no effect" determination must be made by the action agency and the reasoning underlying the determination should be documented in a project file. Please coordinate closely with the U.S. Fish and Wildlife Service for other species listed under the Endangered Species Act that may require consultation.

**Fish and Wildlife Coordination Act:** The comments NMFS provided regarding sequential mitigation are in accordance with the Fish and Wildlife Coordination Act.

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

## Recommended Avoidance, Minimization, and Mitigation Opportunities:

**FDOT District 5 Feedback to National Marine Fisheries Service's Review (10/04/2019):** Thank you for your review and confirmation that the project will not affect National Marine Fisheries Service trust resources.

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**Degree of Effect:** 2 *Minimal* assigned 08/22/2019 by Randy Turner, US Army Corps of Engineers

**Coordination Document:**  
Permit or Technical Study Required

### Direct Effects

#### Identified Resources and Level of Importance:

A review of the EST revealed the presence of approximately 11.8 acres of palustrine and 4.8 acres of riverine wetlands within a 500 foot buffer; 3.5 acres of palustrine and 1.2 acres of riverine wetlands within a 200 foot buffer; and, 2.3 acre of palustrine 0.5 acre of riverine wetlands within a 100 foot buffer. The riverine wetlands appear to be associated with the C-20 and C-10 drainage canals. That intersect the project study area. The majority of palustrine wetlands within the 5,280 buffer are identified as freshwater marsh, scrub-shrub, and wet prairies. The level of importance would be minimal.

#### Comments on Effects to Resources:

Any palustrine wetlands in the project area deemed to be jurisdictional along the roadway corridor already have been secondarily impacted so a functional assessment should reveal a lower quality of wetlands. There does not appear to be a quantifiable amount of wetlands within a 500 foot and smaller buffer with the exception of the drainage canal surface waters and any adjacent wetlands associated with the canals that intersect the project study area.

## Recommended Avoidance, Minimization, and Mitigation Opportunities:

The Corps recommends a continued emphasis on wetland avoidance and minimization opportunities throughout the planning process. A wetland survey should be conducted within the study area to identify the wetlands and a jurisdictional determination should be completed. A review of the Corps RIBITS indicates that the proposed project corridor would traverse the geographical service areas of two (2) federally approved mitigation banks:

Lake Washington Mitigation Bank (UMAM Credits)  
Palustrine Emergent: 99.4

Mary A Mitigation Bank (UMAM Credits)  
Palustrine Emergent: 295.32  
Palustrine Forested: 4.41  
Palustrine Scrub-Shrub: 38.45

All banks are assessed with the Uniform Mitigation Assessment Method (UMAM). Any unavoidable wetland impacts should be assessed using UMAM which would align with the functional assessment of the bank that is proposed. The project as proposed, may qualify for the Department of the Army's Regional General Permit (RGP) - 92 for impacts to any proposed impacts to waters of the U.S. (wetlands or surface waters). If the wetland impacts are 0.5 acre or below, the Corps recommends using the Nationwide Permit 14 for any proposed impacts to waters of the U.S. (wetlands and surface waters). If the project does not qualify for a general permit then it would need to be permitted using a Standard Individual Permit which includes the need to publish a Public Notice to other federally and State resource agencies as well as all adjacent property owners.

## Additional Comments (optional):

### CLC Recommendations:

### Indirect Effects

#### Identified Resources and Level of Importance:

See direct effects.

#### Comments on Effects to Resources:

New, previously non-disturbed, adjacent wetlands would incur secondary effects along the new expanded roadway corridor footprint.



**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

See direct impacts.

**FDOT District 5 Feedback to US Army Corps of Engineers's Review (10/04/2019):** Thank you for your comments and identifying the permits and mitigation bank opportunities available.

**Degree of Effect:** 2 *Minimal* assigned 08/16/2019 by Sandy Smith, Saint Johns River Water Management District

**Coordination Document:**

Permit or Technical Study Required

**Permits**

Environmental Resource Permit

**Comments:**

It appears the project will exceed our permitting engineering and wetland impact thresholds.

**Technical Studies**

Wetlands Evaluation Report

**Comments:**

We suggest that the wetlands within the project limits or adjacent to the roadway improvements be delineated and reviewed by District review staff to assure that the wetland impacts are being reduced and minimized to the maximum extent practicable prior to right of way acquisition if required. There are two formal wetland determination along the corridor called the Palmer Property district permit No's # 125999-2 and 12600-2.

**Direct Effects**

**Identified Resources and Level of Importance:**

It appears that there are canals and open water wetland systems along Malabar Road. If possible locating the expansion within the existing ROW should help avoid most wetlands. There are several Mitigation Banks in the service Area of Basin 20 with State Credits.

**Comments on Effects to Resources:**

The project includes both forested, open water and herbaceous wetlands. Any impacts proposed if considered adverse will need to be offset with mitigation . The project is located in Basin 20 Southern St. Johns River Basin.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

We suggest that the wetlands within the project limits or adjacent to the roadway improvements be delineated and reviewed by District review staff to assure that the wetland impacts are being reduced and minimized to the maximum extent practicable prior to right of way acquisition if required. There are two formal wetland determination along the corridor called the Palmer Property district permit No's # 125999-2 and 12600-2.

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

Every effort to not impact wetlands should be taken.

**Comments on Effects to Resources:**

Every effort to not impact wetlands should be taken.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

Every effort to not impact wetlands should be taken.

**FDOT District 5 Feedback to Saint Johns River Water Management District's Review (10/04/2019):** Thank you for your review and comments regarding wetlands and formal wetland determinations that occur within or adjacent to the project corridor. The limits of wetlands will be preliminarily established during the PD&E Study and then surveyed during the design phase. Measures to avoid and/or minimize impacts to wetlands will be documented in the Natural Resource Evaluation report that will be developed as part of this study. The project will be designed to meet state water quality and quantity requirements, and the FDOT will implement

proper best management practices during construction

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## Wildlife and Habitat

### Project Effects

**Coordinator Summary Degree of Effect:** 3 Moderate assigned 10/04/2019 by FDOT District 5

**Comments:**

The Florida Fish and Wildlife Conservation Service (FWC) assigned a Degree of Effect (DOE) of "Moderate" for this issue, while US Fish and Wildlife Service (FWS) and South Florida Water Management District assigned a "Minimal" DOE. These agencies provided comments on Wildlife and Habitat issues citing that the project is within the geographic range and consultation area for a number of species, including the Florida scrub-jay, Everglade snail kite, red cockaded woodpecker, Audubon's crested caracara, and Florida grasshopper sparrow. However, the potential presence of these species along this corridor is unlikely with the exception of the caracara and the Florida scrub-jay.

The FDOT will conduct wildlife surveys during the Project Development and Environment (PD&E) Study and coordinate with the FWS and FWC. A Natural Resource Evaluation (NRE) will be prepared during the PD&E Study to assess potential impacts to listed species, develop avoidance and minimization efforts, and to document any involvement with wildlife and habitat resources. The NRE will assess potential floral and faunal species within the corridor, as well as potential habitat for these species. The results of the NRE will be coordinated with federal and/or state resource/regulatory agencies as applicable.

**Degree of Effect:** 3 Moderate assigned 09/12/2019 by Zakia Williams, US Fish and Wildlife Service

**Coordination Document:**

PD&E Support Document As Per PD&E Manual

### Direct Effects

**Identified Resources and Level of Importance:**

The Service has reviewed our Geographic Information System (GIS) database for recorded locations of federally threatened and endangered species on or adjacent to the project study area. The GIS database is a compilation of data received from several sources. Based on review of our GIS database, the Service notes that the following federal listed species may occur in or near the project area.

**Florida scrub-jay (*Aphelocoma coerulescens*)**

The EST tool identified that the project area is within the Florida scrub-jay service area. The Service has documented occurrences of scrub-jay in the area, east of Minton Road. The Service recommends that surveys be conducted in areas where suitable habitat occurs.

**Wood Stork (*Mycteria americana*)**

The project corridor is located within the Core Foraging Area (CFA) of wood stork colonies. The Service believes that the loss of wetlands within a CFA due to an action could result in the loss of foraging habitat for the wood stork. To minimize adverse effects to the wood stork, we recommend that any lost foraging habitat resulting from the project be replaced within the CFA of the affected nesting colony. Moreover, wetlands provided as mitigation should adequately replace the wetland functions lost as a result of the action. In some cases, the Service accepts wetlands compensation located outside the CFA of the affected wood stork nesting colony. Specifically, wetland credits purchased from a "Service Approved" mitigation bank located outside of the CFA would be acceptable to the Service provided that the impacted wetland occur within the permitted service area of the bank.

To minimize adverse effects to the wood stork and other wetland dependent species, we recommend that impacts to suitable foraging habitat be avoided. If avoidance is not possible, minimization measure should be employed and best management practices to avoid further degradation of the site. Mitigation for wetland impacts should be discussed with USFWS and will require further coordination. Please refer to the North Florida Field Office website for WOST colony locations. <http://www.fws.gov/northflorida>

The Service also believes that the following federally listed species have the potential to occur in or near the project area: Audubon's crested caracara, Eastern indigo snake, red-cockaded woodpecker and Federally listed plants. Accordingly, the Service recommends that the Florida Department of Transportation (FDOT) prepare a Biological Assessment for the project (as required by 50 CFR 402.12) during the FDOT's Project's Development and Environment process.

Coordination with the Office of Migratory birds will be needed for **all projects involving** migratory birds and eagles, please contact Ulgonda Kilpatrick in our Migratory Birds Permit Office at:

Migratory Birds Permit Office  
1875 Century Boulevard, NE  
Atlanta, Georgia 30345  
352-406-6780 cell (MAIN)

A trained botanist should conduct surveys for all federally listed plants found in Brevard County (the list can be found on our website northflorida.fws.gov).

Florida has 229 species of plants found nowhere else in the world, and most of them are rare and declining. Diverse plant communities are essential for maintaining a healthy environment for fish, wildlife, and people, and improved land conservation and land management can help restore these rare plants. To this end, the Service worked with the Florida Department of Agriculture and Consumer Services, and many universities and non-profits, to establish the Florida Rare Plant Conservation Endowment. The Endowment funds projects that are critical to preventing the extinction of Florida's rare plants. To ensure the survival of Florida's unique and rare plants the Service encourages the applicant to make a voluntary contribution of \$5,000 to the Endowment. All contributions are voluntary and tax deductible.

### **Wetlands**

Wetlands provide important habitat for fish and wildlife. Best Management Practices (BMPs) should be used to prevent degradation of wetland and other aquatic resources from erosion, siltation, and nutrient discharges associated with the project site. We recommend that the project be designed to avoid these valuable resources to the greatest extent practicable. If impacts to wetlands are unavoidable, we recommend that the FDOT provides mitigation that fully compensates for the loss of wetland resources.

### **Comments on Effects to Resources:**

Dependent upon the alternative(s) selected, the proposed project is expected to result in minimal to moderate involvement with wildlife and habitat resources. If it is determined the project will affect and federally listed species and/or their habitat, the Department will initiate consultation with FWS during the Project Development process.

### **Recommended Avoidance, Minimization, and Mitigation Opportunities:**

### **Additional Comments (optional):**

### **CLC Recommendations:**

### **Indirect Effects**

### **Identified Resources and Level of Importance:**

### **Comments on Effects to Resources:**

### **Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to US Fish and Wildlife Service's Review (10/04/2019):** Thank you for your review and comments. A Natural Resource Evaluation report will be prepared as part of the Project Development and Environment (PD&E) Study. This report will document the results of field surveys and the potential for effects to federally protected species. The FDOT will coordinate with USFWS during the PD&E Study regarding species effect determinations and any impacts that cannot be avoided.

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**Degree of Effect:** 2 *Minimal* assigned 09/11/2019 by Jennifer Goff, FL Fish and Wildlife Conservation Commission

For the official list of fish and wildlife designated by the state of Florida as Endangered, Threatened or Species of Special Concern, please refer to sections 68A-27.003, .0031 and 005 in *Rules Relating to Endangered or Threatened Species*, Chapter 68A-27, Florida Administrative Code, <https://www.flrules.org/gateway/ChapterHome.asp?Chapter=68A-27>.

For general information on Florida imperiled species and species conservation programs, go to <https://myfwc.com/wildlifehabitats/wildlife/>

### **Coordination Document:**



No Involvement

### Direct Effects

#### Identified Resources and Level of Importance:

No significant wildlife resources were identified in the project area.

#### Comments on Effects to Resources:

Minimal impacts to fish or wildlife resources are anticipated to result from this project.

#### Recommended Avoidance, Minimization, and Mitigation Opportunities:

Minimal impacts to fish or wildlife resources are anticipated to result from this project.

#### Additional Comments (optional):

#### CLC Recommendations:

### Indirect Effects

#### Identified Resources and Level of Importance:

#### Comments on Effects to Resources:

#### Recommended Avoidance, Minimization, and Mitigation Opportunities:

**FDOT District 5 Feedback to FL Fish and Wildlife Conservation Commission's Review (10/04/2019):** Thank you for your review and comments. A Natural Resource Evaluation report will be developed as part of the Project Development and Environment (PD&E) Study. This report will document the results of field surveys and the potential for effects to state protected species.

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The following organization(s) were expected to but did not submit a review of the Wildlife and Habitat issue for **Alternative #1**: FL Department of Agriculture and Consumer Services

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## ETAT Reviews and Coordinator Summary: Physical

### Air Quality

#### Project Effects

**Coordinator Summary Degree of Effect:** 2 *Minimal* assigned 10/04/2019 by FDOT District 5

#### Comments:

USEPA reviewed this issue and assigned a Degree of Effect of "Minimal" since this project is within an attainment area, and the impacts to air quality are expected to be minimal.

**Degree of Effect:** 2 *Minimal* assigned 09/09/2019 by Roshanna White, US Environmental Protection Agency

#### Coordination Document:

To Be Determined: Further Coordination Required

### Direct Effects

#### Identified Resources and Level of Importance:

A wide variety of air pollutants can emit from stationary and mobile sources. The EPA establishes the National Ambient Air Quality Standards (NAAQS) to protect public health and public welfare and regulates emissions of hazardous air pollutants. The proposed project is in an attainment area, so criteria pollutants under NAAQS are an acceptable level. Therefore, EPA expects the project to have Minimal impact on air quality.

#### Comments on Effects to Resources:

The project area air quality can possibly be affected by airborne dust, and other ambient air pollutants from project construction.

#### Recommended Avoidance, Minimization, and Mitigation Opportunities:

To maintain healthy air quality, consider the use of diesel controls, cleaner fuel and cleaner construction practices for on-road and off-road equipment used for transportation, soil movement, or other project activities.

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to US Environmental Protection Agency's Review (10/04/2019):** Thank you for your review and comments.

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**Infrastructure**

**Project Effects**

**Coordinator Summary Degree of Effect:** 2 Minimal assigned 10/04/2019 by FDOT District 5

**Comments:**

No ETAT reviews were submitted for this issue. A Degree of Effect of "Minimal" is being assigned to this resource due to the low potential to impact utilities, contamination sites or the C-20 and C-10 canal systems.

None found

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**Navigation**

**Project Effects**

**Coordinator Summary Degree of Effect:** N/A N/A / No Involvement assigned 10/04/2019 by FDOT District 5

**Comments:**

The US Coast Guard and the US Army Corps of Engineers both assigned a Degree of Effect of "N/A / No Involvement" for Navigation noting that there would be no involvement with navigable waters.

**Degree of Effect:** N/A N/A / No Involvement assigned 08/22/2019 by Randy Turner, US Army Corps of Engineers

**Coordination Document:**

Permit or Technical Study Required

**Permits**

Section 404 - Individual or General

**Comments:**

The project would require Department of the Army authorization for impacts to waters of the U.S. (wetlands and surface waters) under Section 404 of the Clean Water Act but not under Section 10 of the Rivers and Harbor Act.

**Technical Studies**

Wetlands Evaluation Report

**Comments:**

The project as proposed, may qualify for the Department of the Army's Regional General Permit (RGP) - 92 for impacts to any proposed impacts to waters of the U.S. (wetlands or surface waters). If the project does not qualify for a general permit then it would need to be permitted using a Standard Individual Permit which includes the need to publish a Public Notice to other federally and State resource agencies as well as all adjacent property owners. If the wetland impacts are 0.5 acre or below, the Corps recommends using the Nationwide Permit 14 (NWP-14) for any proposed impacts to waters of the U.S. (Wetlands or surface waters).

**Direct Effects**

**Identified Resources and Level of Importance:**

None - No Involvement

**Comments on Effects to Resources:**

None.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

None.

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

N/A

**Comments on Effects to Resources:**

N/A

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

N/A

**FDOT District 5 Feedback to US Army Corps of Engineers's Review (10/04/2019):** Thank you for your review and comments.

**Degree of Effect:** N/A N/A / *No Involvement* assigned 08/02/2019 by Randall D Overton, US Coast Guard

**Coordination Document:**

No Involvement

**Direct Effects**

**Identified Resources and Level of Importance:**

Navigable waters of the United States

**Comments on Effects to Resources:**

No navigable waters in scope of project - No Coast Guard involvement

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to US Coast Guard's Review (10/04/2019):** Thank you for your review.

**Contamination**

**Project Effects**

**Coordinator Summary Degree of Effect:** 3 *Moderate* assigned 10/04/2019 by FDOT District 5



**Comments:**

The US Environmental Protection Agency assigned a Degree of Effect (DOE) of "Moderate", while the Florida Department of Environmental Protection assigned a DOE of "Minimal". The FDOT is assigning a DOE of "Moderate" based on the potentially contaminated sites in the area, including four (4) Hazardous Waste Facilities, 87 Onsite Sewage Sites, five (5) Petroleum Contamination Monitoring Sites, six (6) Storage Tank Contamination Monitoring Sites, three (3) Super Act Risk Sources, 19 Super Act Wells, 16 US EPA National Pollutant Discharge Elimination System (NPDES) facilities, eight (8) USEPA Resource Conservation and Recovery Act (RCRA) Regulated Facilities, and three (3) Biomedical Waste Facilities. Also, the FDOT may evaluate the bridge along the corridor for lead paint and asbestos.

**Degree of Effect:** 2 Minimal assigned 09/12/2019 by Chris Stahl, FL Department of Environmental Protection

**Coordination Document:**

PD&E Support Document As Per PD&E Manual

**Direct Effects**

**Identified Resources and Level of Importance:**

GIS data indicates that there are four hazardous waste facilities within the 500-ft. project buffer zone.

**Comments on Effects to Resources:**

A Contamination Screening Evaluation (similar to Phase I and Phase II Audits) may need to be conducted along the project right-of-way in considering the proximity to potential petroleum and hazardous material handling facilities. The Contamination Screening Evaluation should outline specific procedures that would be followed by the applicant in the event drums, wastes, tanks or potentially contaminated soils are encountered during construction. Special attention should be made in the screening evaluation to historical land uses (such as solid waste disposal) that may have an affect on the proposed project, including stormwater retention and treatment areas.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to FL Department of Environmental Protection's Review (10/04/2019):** Thank you for your comments. A Contamination Screening Evaluation Report will be conducted during the Project Development and Environment (PD&E) Study. Additional evaluations on medium and high risk sites will take place in future phases of project development.

**Degree of Effect:** 3 Moderate assigned 09/09/2019 by Roshanna White, US Environmental Protection Agency

**Coordination Document:**

To Be Determined: Further Coordination Required

**Direct Effects**

**Identified Resources and Level of Importance:**

FDOT acknowledges in the preliminary environmental discussion (PED) within a 500-ft buffer: four (4) Hazardous Waste Facilities, 87 Onsite Sewage Sites, five (5) Petroleum Contamination Monitoring Sites, six (6) Storage Tank Contamination Monitoring Sites, three (3) Super Act Risk Sources, 19 Super Act Wells, 16 US EPA National Pollutant Discharge Elimination System (NPDES) facilities, eight (8) USEPA Resource Conservation and Recovery Act (RCRA) Regulated Facilities, and three (3) Biomedical Waste Facilities. Also, FDOT will evaluate several bridges along the corridor for lead paint and asbestos.

Within 500 ft. Water Quality and Quantity GIS analysis identified 35 US EPA National Pollutant Discharge Elimination System (NPDES).

FDOT expects the proposed project to result in moderate involvement with water quality and quantity resources. The EPA assigns a Moderate Degree of effect to Contamination.

**Comments on Effects to Resources:**

Soils, groundwater and surface waters have the potential to be negatively affected by contaminated sites. Contamination of ground water can result in poor drinking water quality and loss of water supply. The potential sources of contamination reported in the PED have not been investigated to determine their potential risk. If there is an encounter with any subsurface hazardous wastes in the ground it can contaminate groundwater and degrade land use. If these wastes are not cleaned-up the property may become a brownfield site.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

The EPA acknowledges and supports the following comments in the PED of the project and encourages the use of these activities during project design and development:

- A Contamination Screening Evaluation Report will be included in the PD&E study scoping recommendations
- The EPA recommends corrective action is completed before commencement of project activities, if applicable.

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to US Environmental Protection Agency's Review (10/04/2019):** Thank you for your comments. A Contamination Screening Evaluation Report will be conducted during the Project Development and Environment (PD&E) Study. Additional evaluations on medium and high risk sites will take place in future phases of project development.

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**Noise**

**Project Effects**

**Coordinator Summary Degree of Effect:** 2 *Minimal* assigned 10/04/2019 by FDOT District 5

**Comments:**

No ETAT reviews were submitted for this issue. A Degree of Effect of "Minimal" is being assigned to this resource based on the noise sensitive sites present. Noise impacts will be documented in the Noise Study Report as part of the Project Development and Environment (PD&E) study in accordance with Part 2, Chapter 18 of the FDOT PD&E Manual.

None found

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**ETAT Reviews and Coordinator Summary: Special Designations**

**Special Designations**

**Project Effects**

**Coordinator Summary Degree of Effect:** 3 *Moderate* assigned 10/04/2019 by FDOT District 5

**Comments:**

The St. Johns River Water Management District assigned a Degree of Effect (DOE) of "Moderate" for Special Designations issues because the project is within SJRWMD's special regulatory basins, specifically, the Upper St. Johns River Hydrologic Basin. The US Environmental Protection Agency assigned a DOE of N/A-No Involvement.

The GIS analysis showed that there are no aquatic preserves, Outstanding Florida Waters, Scenic Highways, or wild and scenic rivers within a 500-foot buffer of the project area. The FDOT will assign a "Moderate" Degree of Effect recognizing the special regulatory basins, which will be evaluated during the PD&E study and further during the design permitting of the project.

regulatory basins, which will be evaluated during the PD&E study and further during the design permitting of the project.

**Degree of Effect:** 3 *Moderate* assigned 09/13/2019 by Melissa Bryan Parsons, Saint Johns River Water Management District

**Coordination Document:**  
Permit or Technical Study Required

**Direct Effects**

**Identified Resources and Level of Importance:**

The project is within SJRWMD's special regulatory basins, specifically, the Upper St. Johns River Hydrologic Basin. To minimize the potential for adverse effects to the water resources, the project should be designed to comply with the standards and design criteria for the Upper St. Johns River Hydrologic Basin in section 13.1, SJRWMD ERP Applicant's Handbook, Volume II, in subsections 62-330.301 and 302, F.A.C., and in subsections 40C-41.063(1), F.A.C. Although the project is wholly located within the Upper St. Johns River Hydrologic Basin, the project appears to be within an area that drains to Melbourne-Tillman Water Control District (MTWCD) Canal 7 (C-7), which eventually drains east to the Indian River Lagoon. Special consideration should be given to the interbasin diversion criterion in subsection 13.1.3, SJRWMD ERP Applicant's Handbook, Volume II.

**Comments on Effects to Resources:**

Designing the project to meet the applicable Water Management District design criteria, and the conditions for issuance of an Individual ERP in 62-330.301 and 302, F.A.C., would provide reasonable assurance that the project would not result in adverse water quality or quantity impacts to water resources and adjacent lands.

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**FDOT District 5 Feedback to Saint Johns River Water Management District's Review (10/04/2019):** Thank you for your review and comments.

**Degree of Effect:** N/A *N/A / No Involvement* assigned 09/09/2019 by Roshanna White, US Environmental Protection Agency

**Coordination Document:**  
To Be Determined: Further Coordination Required

**Direct Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**

**Additional Comments (optional):**

**CLC Recommendations:**

**Indirect Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Recommended Avoidance, Minimization, and Mitigation Opportunities:**



**FDOT District 5 Feedback to US Environmental Protection Agency's Review (10/04/2019):** Thank you for your review.

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## Eliminated Alternatives

There are no eliminated alternatives for this project.

## Project Scope

### General Project Recommendations

There are no general project recommendations identified for this project in the EST.

### Anticipated Permits

Permit	Type	Comments	Assigned By	Date
Section 404 - Individual or General	USACE		FDOT District 5	10/03/19
National Pollutant Discharge Eliminated System	FDEP		FDOT District 5	06/18/19
Nationwide Permit	USACE		FDOT District 5	06/18/19
Environmental Resource Permit	Water		FDOT District 5	10/03/19

### Permitting Timetable

Federal Permitting Agencies identified are also Co-operating Agencies for the development of this project. Permit application occurs when design plans are developed with sufficient engineering detail to support a complete permit application. This is expected to occur within one year FEIS/ROD approval and Location Design Concept Approval for the selected alternative, unless otherwise agreed upon during project development.

### Anticipated Technical Studies

Technical Study Name	Type	Comments	Assigned By	Date
Public Involvement Plan	ENVIRONMENTAL		FDOT District 5	10/03/2019
Noise Study Report	ENVIRONMENTAL		FDOT District 5	06/18/2019
Contamination Screening Evaluation Report	ENVIRONMENTAL		FDOT District 5	06/18/2019
Air Quality Technical Memorandum	Other		FDOT District 5	06/18/2019
Cultural Resource Assessment Survey Report	Other		FDOT District 5	06/18/2019
Water Quality Impact Evaluation	Other		FDOT District 5	10/03/2019
FDEP NPDES General Permit	Other		FDOT District 5	06/18/2019
Pond Siting Report	Other		FDOT District 5	06/18/2019
Preliminary Engineering Report	ENGINEERING		FDOT District 5	06/18/2019
Farmlands Technical Memorandum	Other		FDOT District 5	06/18/2019
Cultural Resource Assessment Survey	ENVIRONMENTAL		FDOT District 5	06/18/2019
Type 2 CE	ENVIRONMENTAL		FDOT District 5	06/18/2019
QA/QC Plan	ENGINEERING		FDOT District 5	06/18/2019
Pond Siting Report	ENGINEERING		FDOT District 5	06/18/2019
Farmland Conversion Impact Rating Form	ENVIRONMENTAL		FDOT District 5	06/18/2019
Natural Resources Evaluation (NRE)	ENVIRONMENTAL		FDOT District 5	06/18/2019

### Dispute Resolution Activity Log

There are no dispute actions identified for this project in the EST.



# Appendices

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## Preliminary Environmental Discussion Comments

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### Social and Economic

#### Land Use Changes

##### Project Level

The GIS analysis of the 2014 SJRWMD Florida Land Use and Land Cover GIS layer identified Medium Density Residential with 204 acres (40.57%) and Low Density Residential with 59.46 acres (11.82%) as the primary land uses within the 500-foot buffer of the project study area. Other land uses within the 500-foot buffer include Commercial and Services with 32.2 acres (6.4%), Spoil Areas with 31.68 acres (6.3%) and Unimproved Pastures with 24.87 acres (4.95%).

The proposed project is not anticipated to impact existing or future land use patterns.

#### Social

##### Project Level

The Environmental Screening Tool's (EST) Sociocultural Data Report (SDR) was used for demographic data (the SDR can be found within the Community Coordination section of the EST). The SDR uses the Census 2017, American Community Survey (ACS) data and reflects the approximation of the population based on a 500-foot project buffer area intersecting the Census Block Groups along the project corridor. Within the 500-foot buffer, the SDR identified the following demographics:

##### Population and Income

The SDR identified 434 households with a population of 1,309 people. The median household income is estimated at \$50,029 annually. 17.28% of households are below poverty level and 5.76% households receive public assistance.

##### Race and Ethnicity

The minority population comprises approximately 46.6% of the total population. 318 people (24.29%) identified as "Black or African American Alone"; 292 people (22.31%) identified as "Hispanic or Latino of Any Race"; 41 people (3.13%) "Claimed 2 or More Races"; 37 people (2.83%) identified as "Some Other Race Alone"; and lastly 15 people (1.15%) identified as "Asian Alone".

##### Age and Disability

The median age is 38, while persons age 65 and over comprise approximately 12.83% of the population. There are 118 people, 15.11% of the population, between the ages of 20 and 64 that have a disability.

##### Housing

There are 491 housing units. 443, or 90%, are single family units; 48, or 10%, are multi-family units.

##### Language

25 people (2.08%) were shown to speak English "not well". Based on US DOT Policy Guidance, the FDOT has identified four factors to help determine if Limited English Proficiency (LEP) services would be required as listed in the FDOT PD&E Manual, Part 1, Chapter 11, Section 11.1.2.2. Based on a review of these factors, services may be required. Refinement of the LEP population totals and requirements will be further evaluated in Project Development as part of the public involvement efforts.

The GIS analysis identified the Palm Bay West Movie Theater as the primary cultural center within the 500-foot buffer.

This project will be developed in accordance with the Civil Rights Act of 1964, the Civil Rights Act of 1968, along with Title VI of the Civil Rights Act, Executive Order 12898 (Environmental Justice), which requires Federal agencies to take the appropriate steps to identify and address any disproportionately high and adverse human health or environmental effects of Federal programs, policies, and activities on minority and low-income populations. Where there is potential for disproportionately high and adverse effects on minority and low-income populations, proactive measures will be taken to involve the affected community in the decisions related to alternative selection, impact analysis, and mitigation.

The proposed project is expected to result in minimal involvement with social resources.

## Relocation Potential

### Project Level

Because the existing, apparent right of way varies between 110 and 125 feet, minimal residential locations and/or business displacements are anticipated; however, the typical section, alignment analysis and pond siting process, will identify impacts.

Should there be residential relocation or business displacements, a right-of-way (ROW) and relocation program will be implemented in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. A Conceptual Stage Relocation Plan may be prepared for this project provided that any potential ROW acquisition results in necessary relocations.

The proposed project is expected to result in minimal involvement with relocations.

## Farmlands

### Project Level

For Prime Farmlands within the 500-foot buffer, the GIS analysis identified 337 acres (67%) of land designated as Farmland of Unique Importance.

Within the 500-foot buffer, the SJRWMD Agricultural Lands 2014 layer identified 24.87 acres (4.95%) of unimproved pastures, 18.78 acres (3.73%) of improved pasture, and 13.32 acres (2.65%) of other open lands-rural.

The proposed project is expected to result in minimal involvement with farmland resources; the FDOT will coordinate with the Natural Resources Conservation Service (NRCS) during the PD&E Study.

## Aesthetic Effects

### Project Level

The GIS analysis of the 2014 SJRWMD Florida Land Use and Land Cover GIS layer identified 273.1 acres of residential land use within the 500-foot buffer. The proposed improvements are expected to result in minimal involvement with aesthetics. Landscaping opportunities and aesthetic enhancements will be analyzed during the PD&E Study and in future phases of project development.

## Economic

### Project Level

The proposed project has the potential to enhance economic conditions by providing infrastructure to accommodate planned and future growth and development within the City of Palm Bay and Brevard County.

## Mobility

### Project Level

Within the 500-foot buffer, the GIS analysis identified two (2) OGT Multi-Use Trail Opportunities: the St. Johns River Corridor and the St. Johns River Eco-Heritage Trail. Additionally, the Space Coast Area Transit (SCAT) routes 20, 22 and 23 are located within the 500-foot buffer.

The proposed project is expected to enhance mobility.

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## Cultural

### Section 4(f) Potential

#### Project Level

The GIS Analysis does not show any resources located within a 500-foot buffer of the project corridor that may be protected under Section 4(f) of the Department of Transportation Act of 1966.

Section 4(f) resources outside of the 500-foot buffer include the Palm Bay Regional Park / Fred Poppe Regional Park. Additionally, the St. Johns River Water Management District (SJRWMD) owns several properties on the west side of the corridor.

The proposed project is expected to result in minimal involvement with Section 4(f) properties.

## Historic and Archaeological Sites

### Project Level

One (1) linear Resource is listed within the 500-foot buffer of the project: Melbourne Tillman Canal No. 20 (BR03535). However, this resource has been determined ineligible for listing in the National Register of Historic Places (NRHP) by the State Historic Preservation Officer (SHPO).

The GIS analysis identified one (1) documented archaeological or historical sites located within the 500-foot buffer (prehistoric campsite-BR00025) which has been evaluated by the SHPO as ineligible for NRHP.

According to the data, there are approximately two (2) parcels with pre-1970 construction dates located within the 500-foot buffer.

A Cultural Resource Assessment Survey (CRAS) will be prepared during the PD&E Study and coordination with the SHPO will be conducted. The proposed project is expected to result in minimal involvement with historic and archaeological sites.

## Recreation Areas

### Project Level

There are no State-Owned Florida Managed Lands, Parks and Recreational Facilities, National Park Projects, or Existing Recreational Trails within the 500-foot study area buffer. However, there are two (2) OGT (Office of Greenways and Trails) Multi-Use Trail Opportunities

The proposed project is anticipated to result in minimal involvement with recreational areas.

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## Natural

### Wetlands and Surface Waters

#### Project Level

The National Wetlands Inventory (NWI) dataset identified 11.81 acres (2.35% of the area) as Palustrine wetlands and 4.76 (0.95%) as Riverine within the 500-foot buffer. The state regulatory jurisdiction of this project is St. Johns River Water Management District (SJRWMD). The SJRWMD 2014 wetlands dataset identifies the wetlands in their jurisdiction and within 5,280 feet of the project as primarily wet prairie, mixed scrub-shrub wetland, and freshwater marsh.

A Natural Resources Evaluation (NRE) will be prepared during the PD&E Study and will include coordination with the USACE, FDEP, SJRWMD.

Based on the small percentage of wetland resources within 500 feet of the project, minimal involvement with wetlands is anticipated.

## Water Quality and Quantity

### Project Level

Within the 500-foot buffer, the GIS data identified the Indian River Lagoon Adopted Basin Management Action Plan (BMAP). There are two FDEP verified impaired waters (Melbourne-Tillman Canal and Drained Farmland) within the 500-foot buffer. The following FDEP Water Body Identifications are also located within the 500-foot buffer: Three Forks Marsh Run/C-40 Canal and the Melbourne-Tillman (C-1) Canal. As stated in other sections, this project is within the jurisdiction of the SJRWMD.

Within the 500-foot buffer, Principal Aquifers of the State of Florida described the Surficial Aquifer System as 502.96 acres (100%). Within this buffer, the Recharge Areas of the Floridan Aquifer shows a "Discharge less than 1" as 100%.

There are 87 onsite sewage septic tanks documented within the 500-foot buffer. There are 19 Super Act Wells are located within the 500-foot buffer. Potential contamination facilities are listed under the Contamination issue.



The project will be designed to meet state water quality and quantity requirements, and best management practices will be utilized during construction. The proposed project is expected to result in moderate involvement with water quality and quantity resources.

## Floodplains

### Project Level

The Geographic Information System (GIS) analysis identified the following Special Flood Hazard Areas within the 500-foot buffer area: Zone AE with 38.36 acres (7.63%) and 464.6 acres (92.37%) outside the 100-year floodplain. The D-FIRM 100-year Floodplain dataset identifies 2.12 acres (2.17%) of area within the 100-foot project buffer area that is within the 100-year floodplain. During the PD&E Study, engineering design features and hydrological drainage structures will be designed such that stormwater transport, flow, and discharge meet or exceed flood control requirements.

The proposed project is expected to have minimal involvement with floodplain resources.

## Wildlife and Habitat

For the official list of fish and wildlife designated by the state of Florida as Endangered, Threatened or Species of Special Concern, please refer to sections 68A-27.003, .0031 and 005 in *Rules Relating to Endangered or Threatened Species*, Chapter 68A-27, Florida Administrative Code, <https://www.flrules.org/gateway/ChapterHome.asp?Chapter=68A-27>.

For general information on Florida imperiled species and species conservation programs, go to <https://myfwc.com/wildlifehabitats/wildlife/>

### Project Level

The GIS analysis identified the project as within the US Fish and Wildlife Service (USFWS) designated Consultation Area for Florida scrub-jay, Audubon's crested caracara, red-cockaded woodpecker, Florida grasshopper sparrow and the Everglade snail kite. From a federally protected wildlife prospective, the Florida Scrub-jay, as well as the crested caracara, have been documented in the region. USFWS Information for Planning and Consultation (IPaC) also lists Carter's mustard and Lewton's Polygala as potential federally listed plants that may occur in the region.

According to GIS data, the project does occur within the Core Foraging Radius of wood stork nesting colonies. The data also indicated that there are no documented eagle nests within 3 miles of the project.

A Natural Resources Evaluation (NRE) will be prepared during the PD&E Study and will include coordination with the USFWS and Florida Fish and Wildlife Conservation Commission (FFWCC). The proposed project is expected to result in moderate involvement with wildlife and habitat resources.

## Coastal and Marine

### Project Level

The GIS analysis did not identify any Environmentally Sensitive Shorelines or Coastal Barrier Resources within the 500-foot buffer. The project is located within the Indian River Estuarine Drainage Areas (EDA) Coastal Assessment Framework.

The proposed project is anticipated to have no involvement with coastal or marine resources.

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## Physical

### Noise

#### Project Level

The Residential Lands Dataset (SJRWMD-2014) identified Rural, Low, Medium, and High Density Residential Lands within the 500-foot buffer.

According to the GIS analysis, the following potential noise sensitive sites are found within a 500-foot buffer: one (1) religious center (Fellowship United Methodist); one (1) assisted living facility (Inspired Living at Palm Bay), one (1) development of regional impact (The Phenion Gallery); and one (1) cultural center (Palm Bay West Movie Theater).

The proposed project is expected to result in minimal involvement regarding noise impacts. A noise analysis will be conducted

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during the PD&E Study.

## **Air Quality**

### **Project Level**

The project area, located in Brevard County, has not been designated as nonattainment or maintenance for ozone, carbon monoxide (CO), particulate matter (PM), or any of the National Ambient Air Quality Standards (NAAQS) in accordance with the Clean Air Act.

An Air Quality Technical Memorandum will be prepared during the PD&E Study.

The proposed project is expected to have minimal impact on air quality.

## **Contamination**

### **Project Level**

Within the 500-foot buffer of the study area, the GIS analysis identified: four (4) Hazardous Waste Facilities, 87 Onsite Sewage Sites, five (5) Petroleum Contamination Monitoring Sites, six (6) Storage Tank Contamination Monitoring Sites, three (3) Super Act Risk Sources, 19 Super Act Wells, 16 US EPA National Pollutant Discharge Elimination System (NPDES) facilities, eight (8) USEPA Resource Conservation and Recovery Act (RCRA) Regulated Facilities, and three (3) Biomedical Waste Facilities.

Within the 500-foot buffer the GIS analysis did not identify any FDEP Dry Cleaning Program Sites, Solid Waste Facilities, Brownfield locations, US EPA Regulated Air Emissions Facilities, State funded Hazardous Waste Cleanup Sites, Large Quantity Generator of Hazardous Waste, or Superfund Hazardous Waste Sites.

Additionally, there are several bridges along the corridor that will be evaluated for lead paint and asbestos.

A Contamination Screening Evaluation Report (CSER) will be prepared during the PD&E Study. Any contaminated site identified will be assessed to determine the need for avoidance, minimization, or remediation prior to construction.

The proposed project is expected to result in moderate involvement with potential sources of contamination.

## **Infrastructure**

### **Project Level**

Within the 500-foot buffer, the GIS analysis identified four (4) hazardous waste facilities, two (2) limited use drinking water wells, two (2) transmission lines, five (5) petroleum contamination monitoring sites and six (6) storage tank contamination monitoring sites. The C-20 canal and the C-10 canal are also present in the study area.

The proposed project is expected to result in minimal involvement with infrastructure resources.

## **Navigation**

### **Project Level**

There are no navigable waterways or crossings in the project area.

The proposed project is anticipated to have no involvement with navigation resources.

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## **Special Designations**

### **Special Designations: Outstanding Florida Waters**

#### **Project Level**

The GIS analysis did not identify any Outstanding Florida Waters within the 500-foot buffer; this proposed project will have no involvement with this resource.

## Special Designations: Aquatic Preserves

### Project Level

The GIS analysis did not identify any Aquatic Preserves within the 500-foot buffer; this proposed project will have no involvement with this resource.

## Special Designations: Scenic Highways

### Project Level

The GIS analysis did not identify any Scenic Highways within the 500-foot buffer; this proposed project will have no involvement with this resource.

## Special Designations: Wild and Scenic Rivers

### Project Level

The GIS analysis did not identify any Wild and Scenic Rivers within the 500-foot buffer; the proposed project will have no involvement with this resource.

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## Advance Notification Comments

### FL Department of State Comment --

No comments

--Adrienne Daggett, 7/31/2019

No response

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### Saint Johns River Water Management District Comment --

No changes.

--Sandy Smith, 8/16/2019

No response

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### Seminole Tribe of Florida Comment --

The Seminole Tribe of Florida would respectfully like to request a copy of the CRAS report when it is finished in order to complete our assessment pursuant to Section 106 of the National Historic Preservation Act and its implementing authority, 36 CFR 800

--Victoria Menchaca, 8/1/2019

No response

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### US Army Corps of Engineers Comment --

The Corps has no issues with the Advance Notification Package and concurs with the initial assessment of Wetlands and Surface Water and Navigation issues.

--Randy Turner, 8/22/2019

No response



## GIS Analyses

Since there are so many GIS Analyses available for Project #14396 - Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd., they have not been included in this ETDM Summary Report. GIS Analyses, however, are always available for this project on the Public ETDM Website. Please click on the link below (or copy this link into your Web Browser) in order to view detailed GIS tabular information for this project:

<http://etdmpub.fl.a-etat.org/est/index.jsp?tpID=14396&startPageName=GIS%20Analysis%20Results>

**Special Note:** Please be sure that when the GIS Analysis Results page loads, the **Programming Screen Summary Report Published on 10/25/2019 by Kathaleen Linger Milestone** is selected. GIS Analyses snapshots have been taken for Project #14396 at various points throughout the project's life-cycle, so it is important that you view the correct snapshot.

## Project Attachments

There are no attachments for this project.

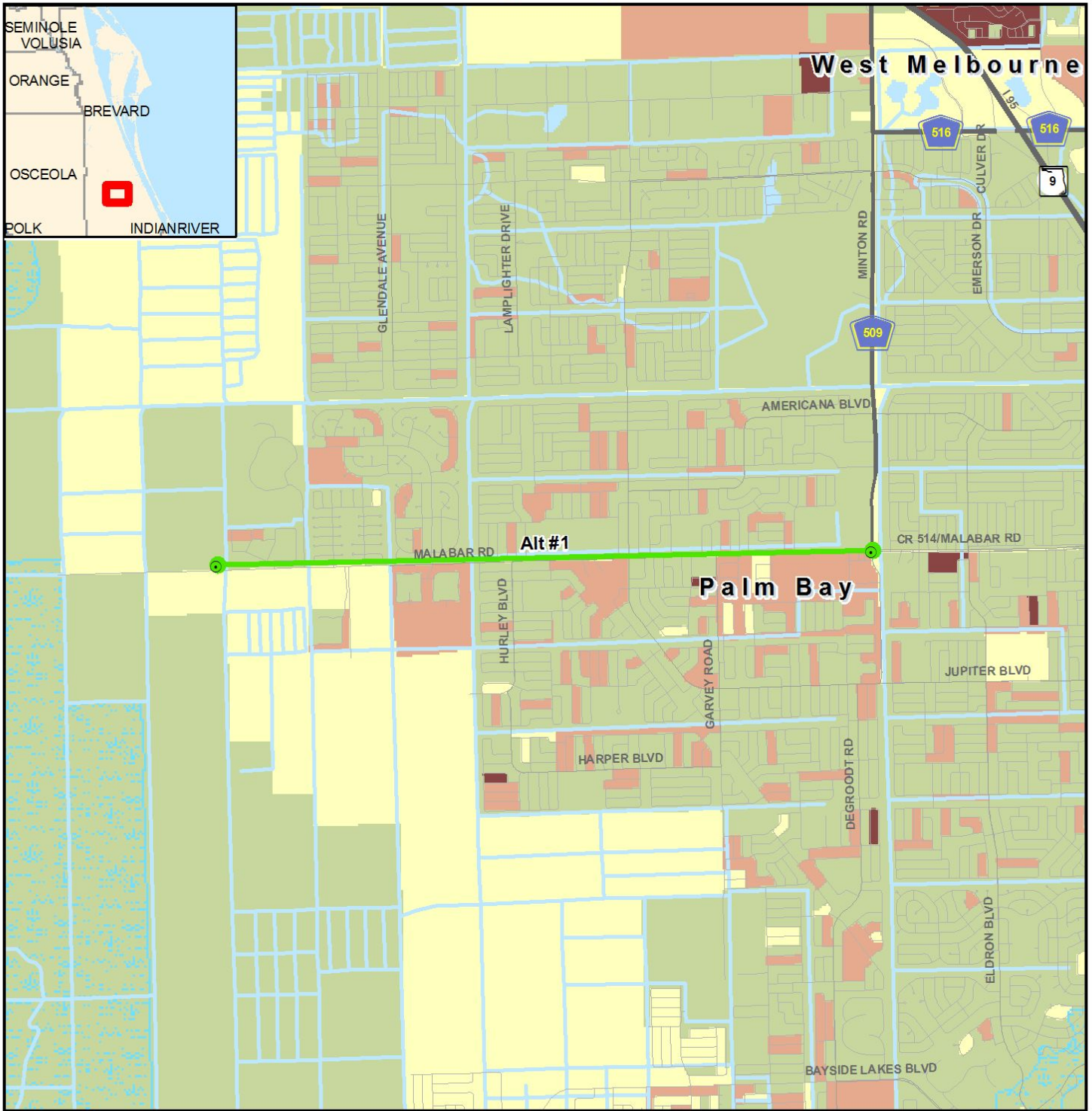
## Degree of Effect Legend

Color Code	Meaning	ETAT	Public Involvement
N/A	Not Applicable / No Involvement	There is no presence of the issue in relationship to the project, or the issue is irrelevant in relationship to the proposed transportation action.	
0	None (after 12/5/2005)	The issue is present, but the project will have no impact on the issue; project has no adverse effect on ETAT resources; permit issuance or consultation involves routine interaction with the agency. The <i>None</i> degree of effect is new as of 12/5/2005.	No community opposition to the planned project. No adverse effect on the community.
1	Enhanced	Project has positive effect on the ETAT resource or can reverse a previous adverse effect leading to environmental improvement.	Affected community supports the proposed project. Project has positive effect.
2	Minimal	Project has little adverse effect on ETAT resources. Permit issuance or consultation involves routine interaction with the agency. Low cost options are available to address concerns.	Minimum community opposition to the planned project. Minimum adverse effect on the community.
2	Minimal to None (assigned prior to 12/5/2005)	Project has little adverse effect on ETAT resources. Permit issuance or consultation involves routine interaction with the agency. Low cost options are available to address concerns.	Minimum community opposition to the planned project. Minimum adverse effect on the community.
3	Moderate	Agency resources are affected by the proposed project, but avoidance and minimization options are available and can be addressed during development with a moderated amount of agency involvement and moderate cost impact.	Project has adverse effect on elements of the affected community. Public Involvement is needed to seek alternatives more acceptable to the community. Moderate community interaction will be required during project development.
4	Substantial	The project has substantial adverse effects but ETAT understands the project need and will be able to seek avoidance and minimization or mitigation options during project development. Substantial interaction will be required during project development and permitting.	Project has substantial adverse effects on the community and faces substantial community opposition. Intensive community interaction with focused Public Involvement will be required during project development to address community concerns.
5	Potential Dispute (Planning Screen)	Project may not conform to agency statutory requirements and may not be permitted. Project modification or evaluation of alternatives is required before advancing to the LRTP Programming Screen.	Community strongly opposes the project. Project is not in conformity with local comprehensive plan and has severe negative impact on the affected community.
5	Dispute Resolution (Programming Screen)	Project does not conform to agency statutory requirements and will not be permitted. Dispute resolution is required before the project proceeds to programming.	Community strongly opposes the project. Project is not in conformity with local comprehensive plan and has severe negative impact on the affected community.
	No ETAT Consensus	ETAT members from different agencies assigned a different degree of effect to this project, and the ETDM coordinator has not assigned a summary degree of effect.	
	No ETAT Reviews	No ETAT members have reviewed the corresponding issue for this project, and the ETDM coordinator has not assigned a summary degree of effect.	

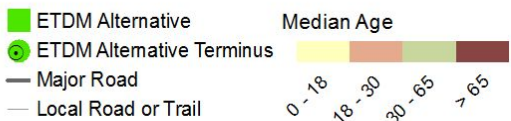
## Project-Level Hardcopy Maps

# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

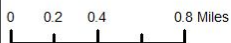
## St. John's Heritage Pkwy. to Minton Rd.



### Age Distribution Map



Data Sources:  
 US Geological Survey  
 FL Department of Transportation  
 NAVTEQ  
 US Census Bureau (2010)



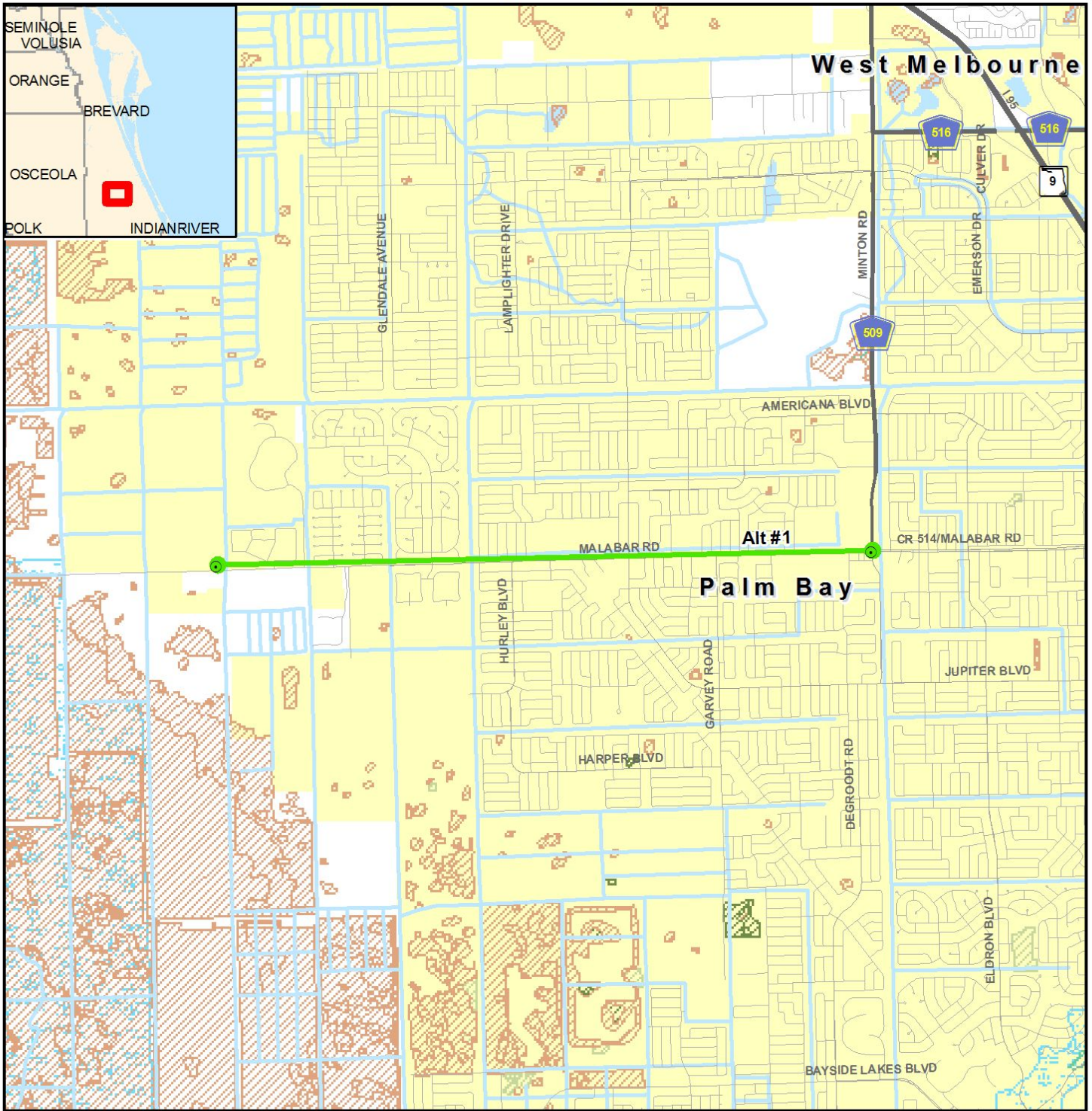
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# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

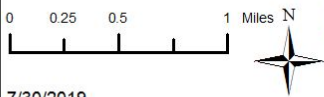
## St. John's Heritage Pkwy. to Minton Rd.



### Coastal and Marine Map

- |                                      |                                  |                               |                                |
|--------------------------------------|----------------------------------|-------------------------------|--------------------------------|
| ETDM Alternative                     | Swamp or Marsh                   | Coastal Barrier Resource Area | Non-vegetated Wetland          |
| ETDM Alternative Terminus            | Exposed Rocky Platform           | Continuous Seagrass           | Vegetated Non-forested Wetland |
| City Limits                          | Sand Beach                       | Discontinuous Seagrass        | Wetland Forested Mixed         |
| Navigable Water Way                  | Gravel Beach/Riprap              | Aquatic Preserve              | Wetland Coniferous Forest      |
| Exposed Tidal Flat                   | Sheltered Tidal Flat             | Wetland Hardwood Forest       |                                |
| Mixed Sand And Gravel Beach          | Sheltered Rock/Seawall/Vegetated |                               |                                |
| Exposed Vertical Rocky Shore/Seawall |                                  |                               |                                |

Data Sources: NAVTEQ; US Geological Survey; Florida Marine Research Institute; Florida Department of Transportation; Florida Department of Environmental Protection; National Oceanic and Atmospheric Association; Florida Water Management Districts



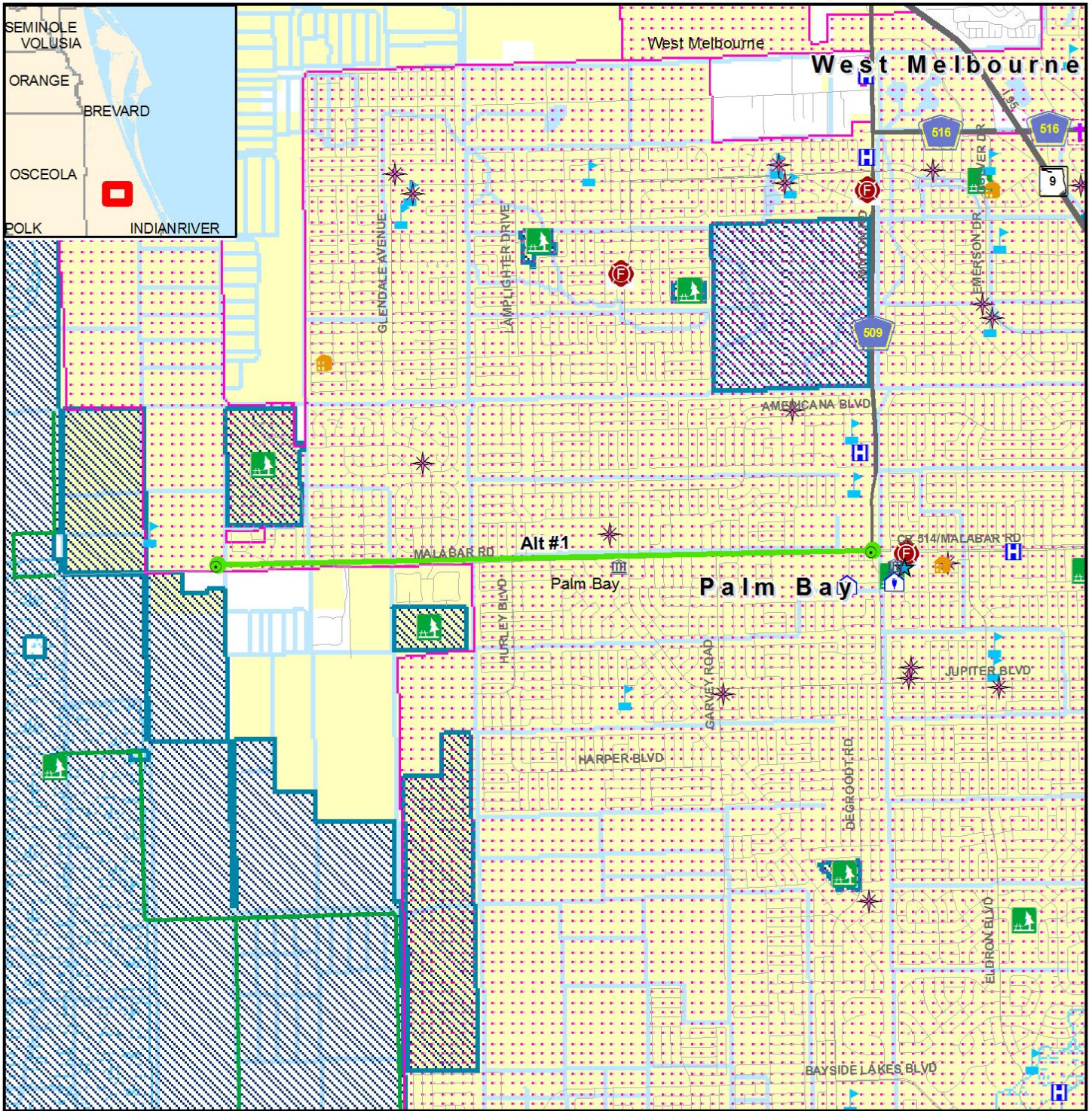
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# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

## St. John's Heritage Pkwy. to Minton Rd.



### Community Services Map

- ETDM Alternative
- ETDM Alternative Terminus
- Major Road
- Local Road or Trail
- City Limits
- Government
- Civic Center
- Cemetery
- Social Service
- Community Center
- Law Enforcement
- Place of Worship
- Cultural Center
- Fire Station
- Health Care
- School
- Park
- Recreational Trail
- Community Boundary
- Conservation or Recreation Area

Data Sources: US Geological Survey; FL Department of Transportation; NAVTEQ; FL Property Appraisers; FL Natural Areas Inventory



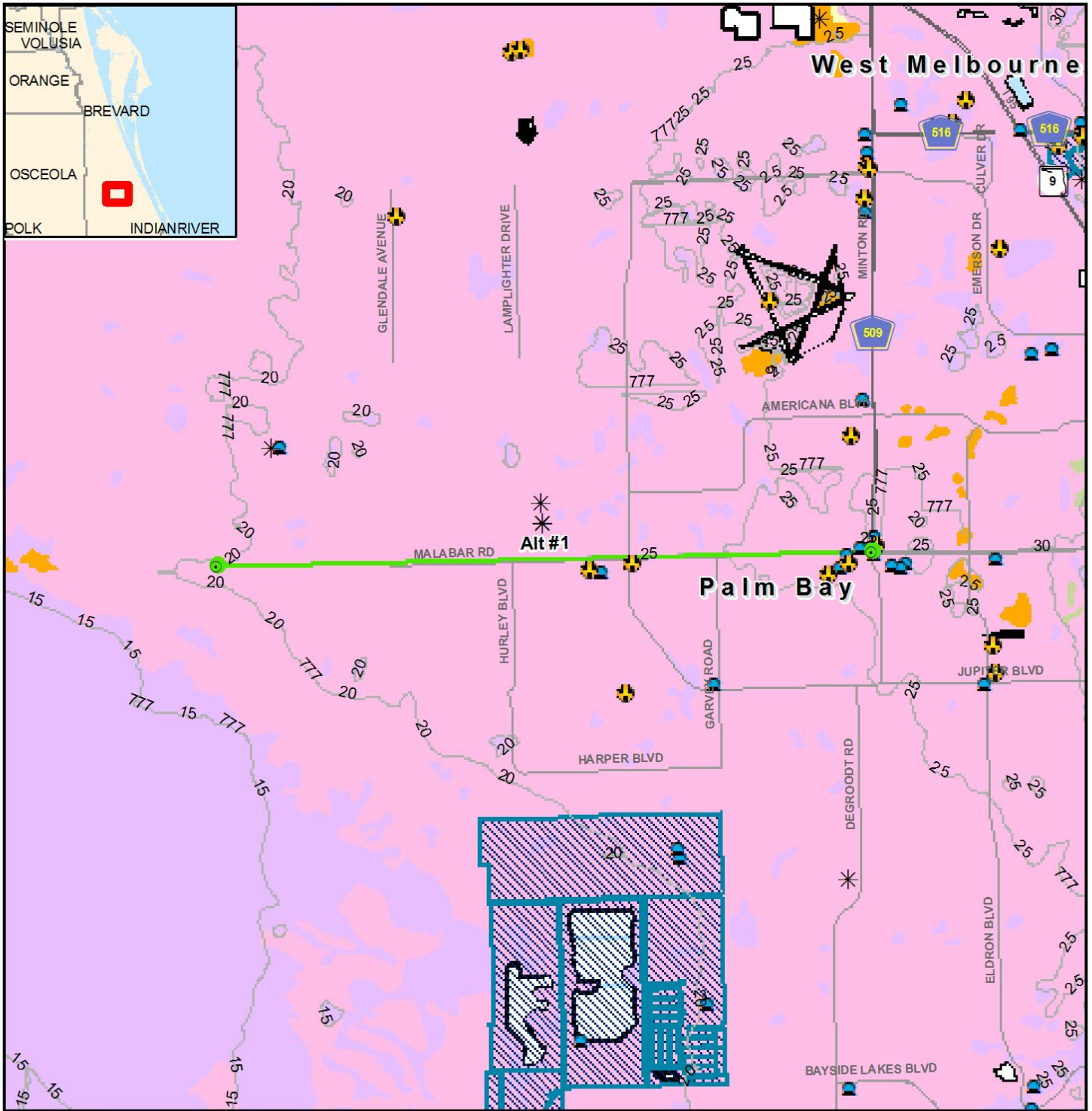
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# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

## St. John's Heritage Pkwy. to Minton Rd.



### Contamination Map

ETDM Alternative	Solid Waste Facility	FDEP Tanks	<b>Soil Drainage</b>	Somewhat Poorly Drained
ETDM Alternative Terminus	Hazardous Material Site	5 FT Contour	Excessively Drained	Poorly Drained
Major Road	Power Plant	Brownfield Area	Well Drained	Very Poorly Drained
Local Road or Trail	Superfund Site		Somewhat Excessively Drained	Unclassified
Toxic Release Inventory	Nuclear Site		Moderately Well Drained	
Dry Cleaning Facility				

Data Sources: NAVTEQ; US Geological Survey; FL Department of Transportation; FL Department of Environmental Protection; FL Water Management Districts; US Environmental Protection Agency; Natural Resource Conservation Service

0 0.25 0.5 1 Miles

7/30/2019

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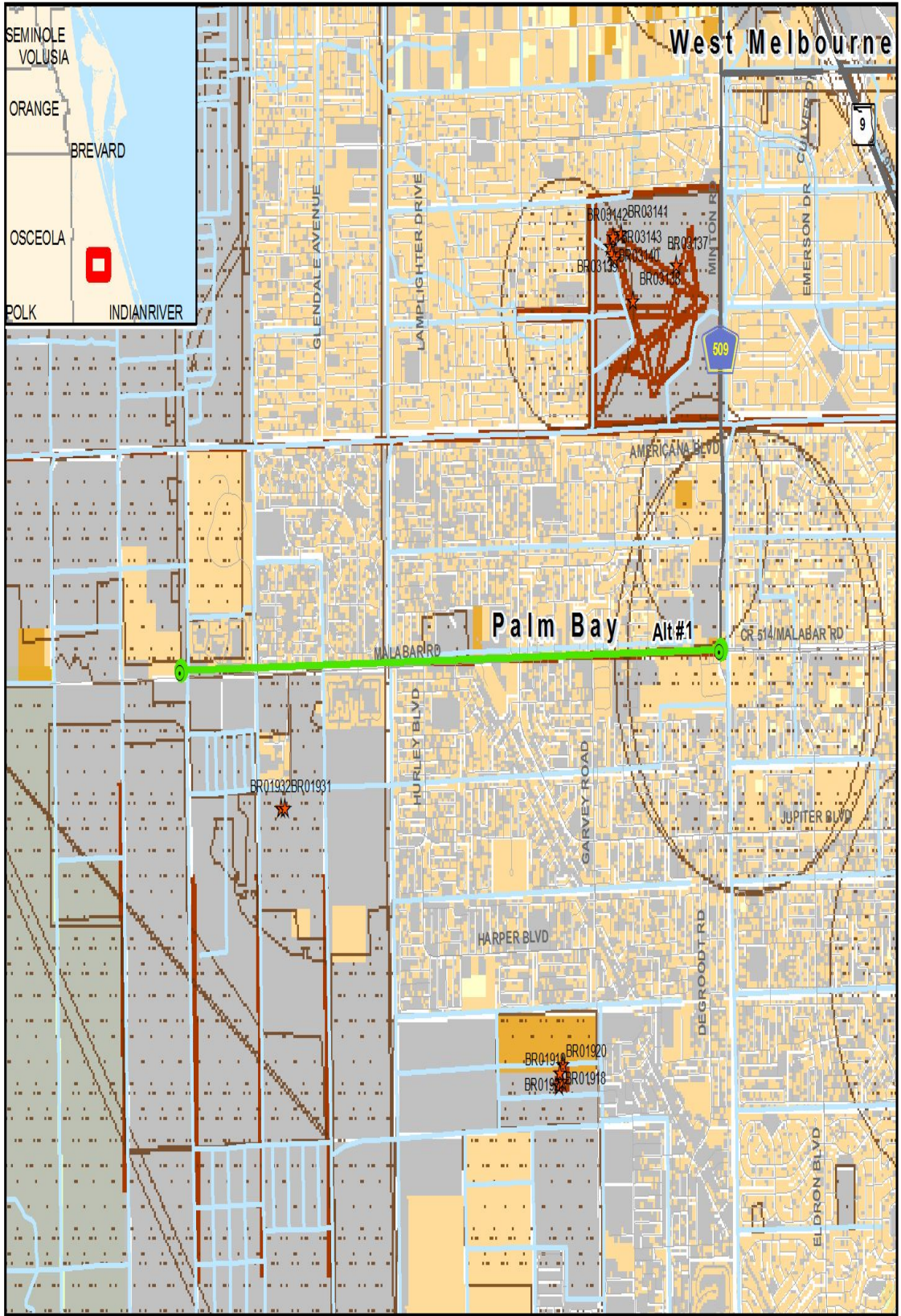


# Cultural Resources Data Map

- ETDM Alternative
  - Major Road
  - Local Road or Trail
  - ★ Historic Structure
  - Historic Bridge
  - State Historic Highway
  - ⊠ Historic Cemetery
  - ⊠ Historic Resource Group
  - Cultural Resource Field Survey Area
  - ETDM Alternative
- Year Built**
- Pre 1970
  - Post 1980
  - 1970 - 1979
  - Parcels w/ no values



Data Sources:  
 NAVTEQ  
 US Geological Survey  
 Florida Department of Transportation  
 Florida Department of State,  
 Bureau of Archaeological Research

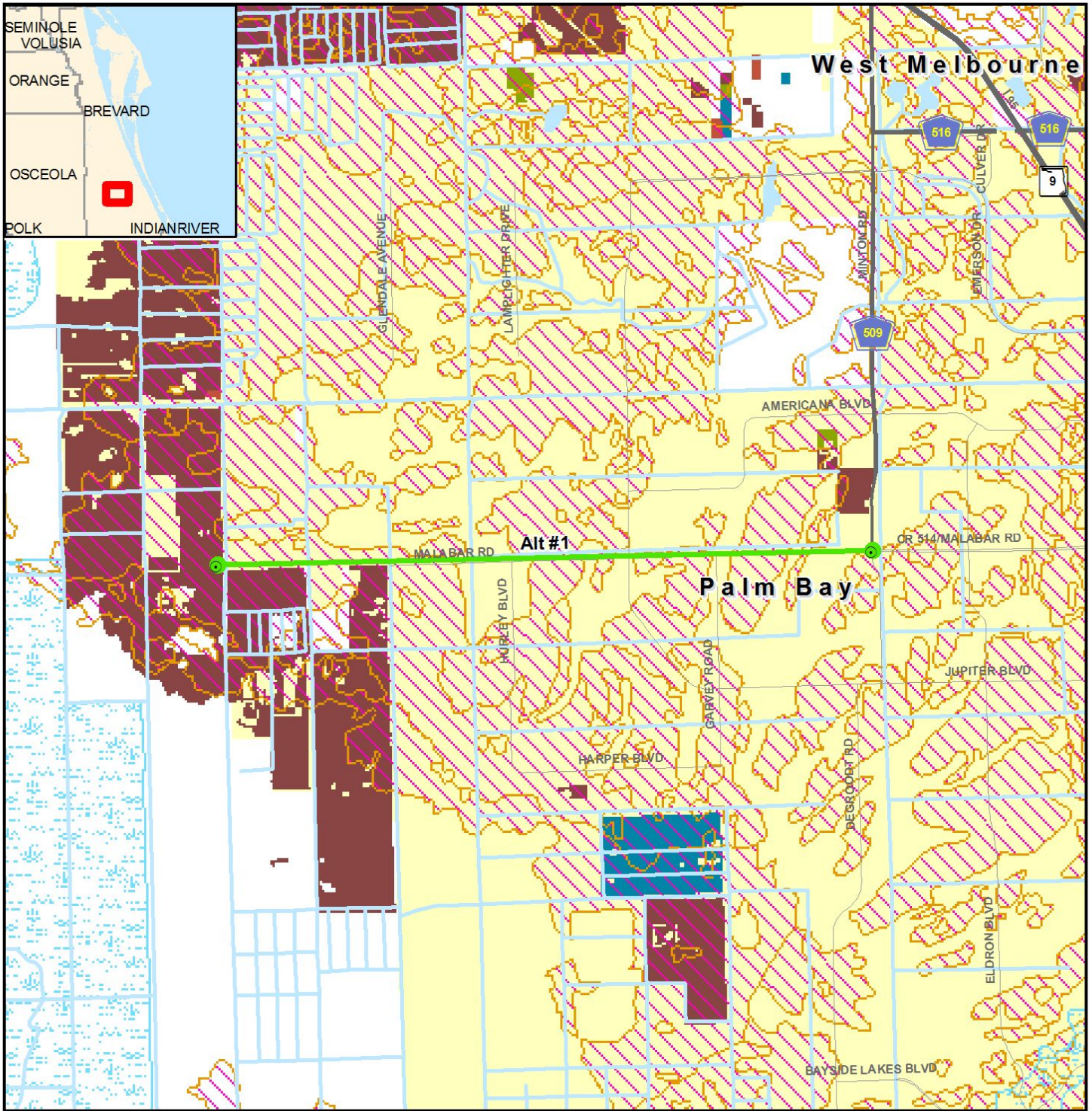


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 Note: Historic properties depicted on this map represent resources listed in the Florida Master Site File excluding archeological site locations, which, pursuant to Chapter 267.135, Florida Statutes, may be exempt from public record (Chapter 119.07, Florida Statutes). Absence of features on the map does not necessarily indicate an absence of resources in the project vicinity.



# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

## St. John's Heritage Pkwy. to Minton Rd.



### Farmlands Map

- ETDM Alternative
- ETDM Alternative Terminus
- Major Road
- Local Road or Trail
- City Limits
- Cropland/Pastureland
- Nurseries/Vineyards
- Specialty Farms
- Tree Crops
- Rural Open Lands
- Prime Farmland Soils

Data Sources:  
 NAVTEQ  
 Florida Water Management Districts  
 US Geological Survey  
 Natural Resources Conservation Services

0 0.25 0.5 1 Miles



7/30/2019

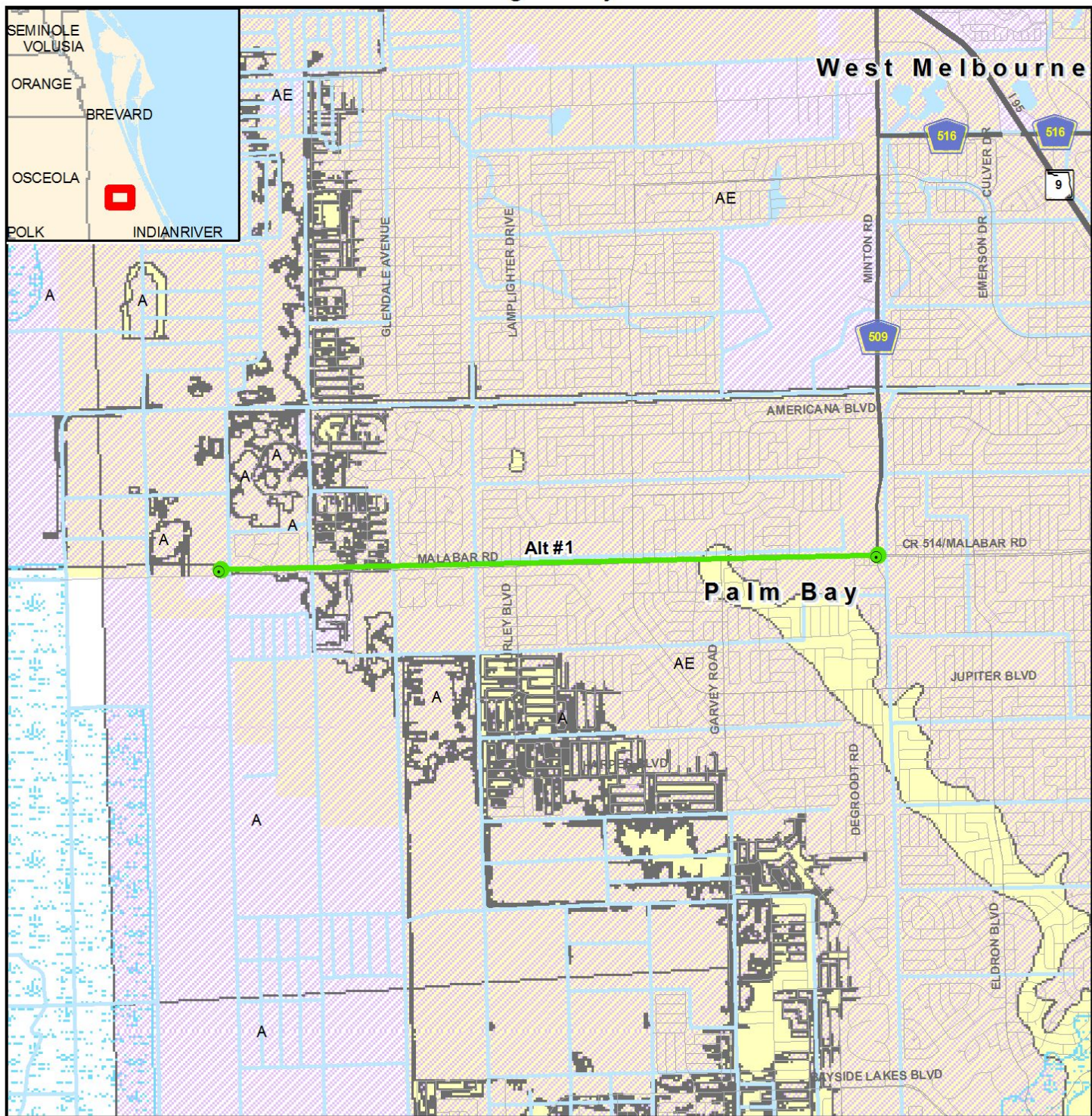
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# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

## St. John's Heritage Pkwy. to Minton Rd.



### Floodplains Map

- ETDM Alternative
- ETDM Alternative Terminus
- Major Road
- Local Road or Trail
- City Limits
- Special Flood Hazard Area

Data Sources:  
 NAVTEQ  
 US Geological Survey  
 Federal Emergency Management Agency



6/19/2019



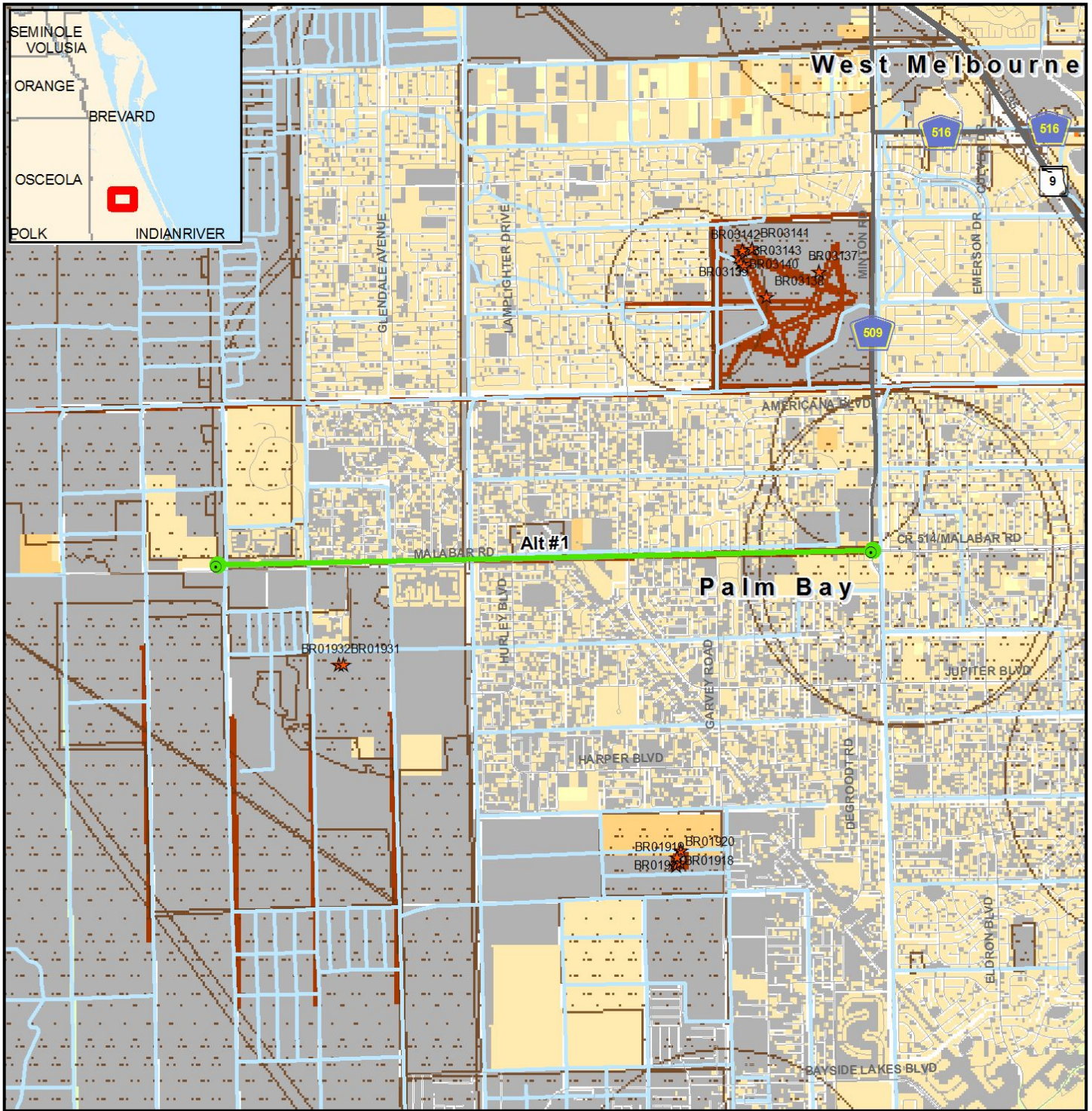
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# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

## St. John's Heritage Pkwy. to Minton Rd.



### Historic Resource Map

- ETDM Alternative
- ETDM Alternative Terminus
- Major Road
- Local Road or Trail
- Year Built
  - Pre 1970
  - Post 1980
  - 1970 - 1979
  - Parcels w/ no values
- ★ Historic Structure
- Historic Bridge
- State Historic Highway
- Historic Cemetery
- Historic Resource Group
- Cultural Resource Field Survey Area

Data Sources:  
 NAVTEQ  
 US Geological Survey  
 Florida Department of Transportation  
 Florida Department of State,  
 Bureau of Archaeological Research

Note: Historic properties depicted on this map represent resources listed in the Florida Master Site File excluding archeological site locations, which, pursuant to Chapter 267.135, Florida Statutes, may be exempt from public record (Chapter 119.07, Florida Statutes). Absence of features on the map does not necessarily indicate an absence of resources in the project vicinity.

0 0.25 0.5 1 Miles



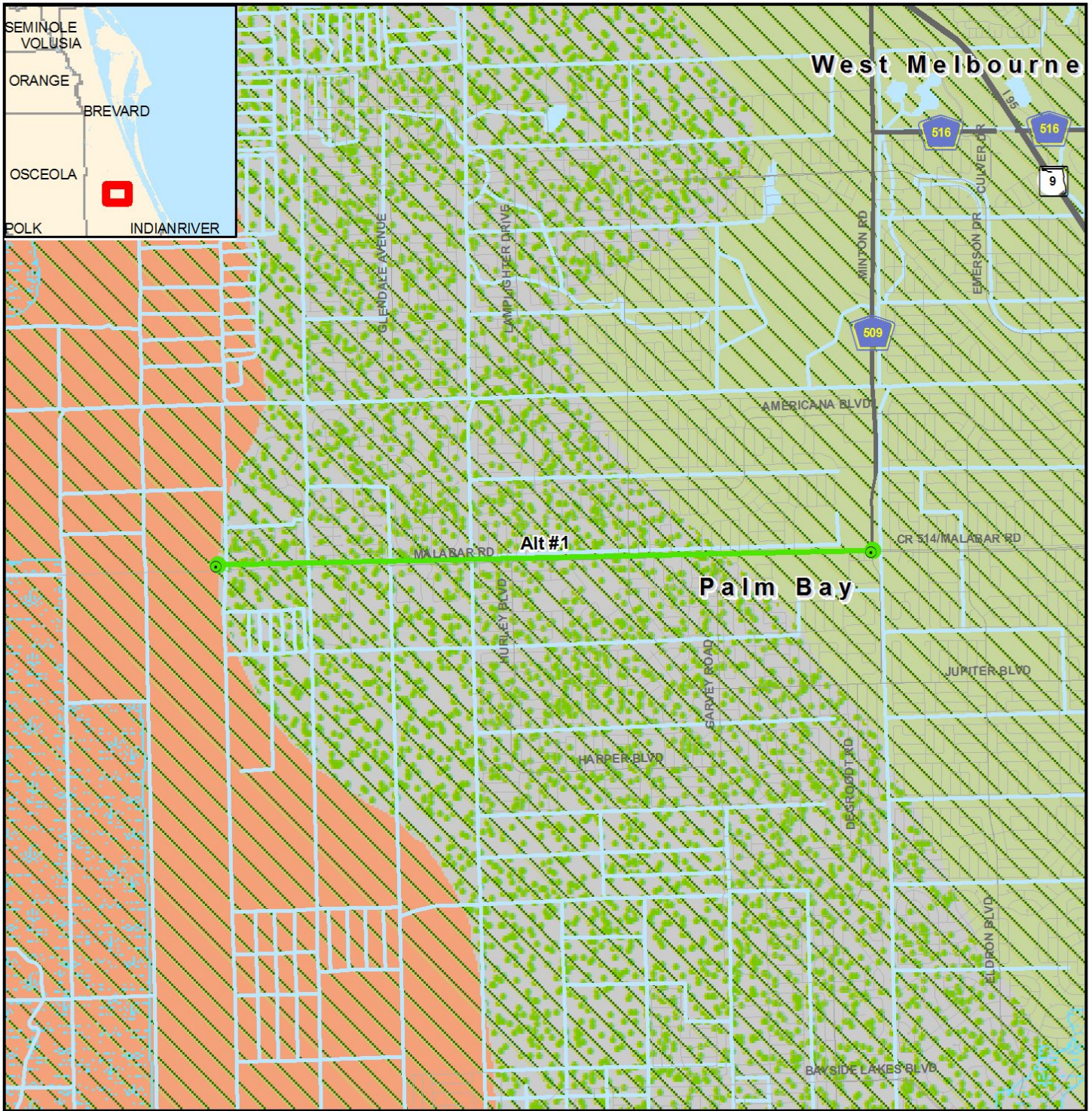
7/18/2019



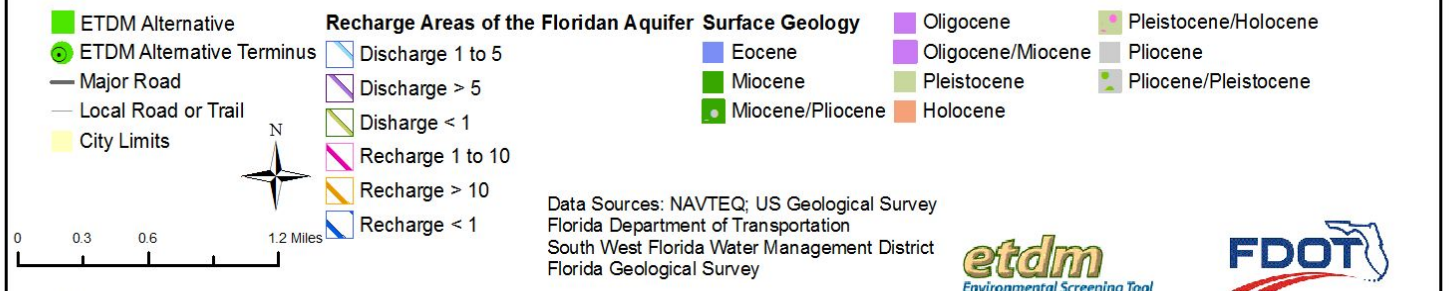


# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

## St. John's Heritage Pkwy. to Minton Rd.



### Hydrogeology Map



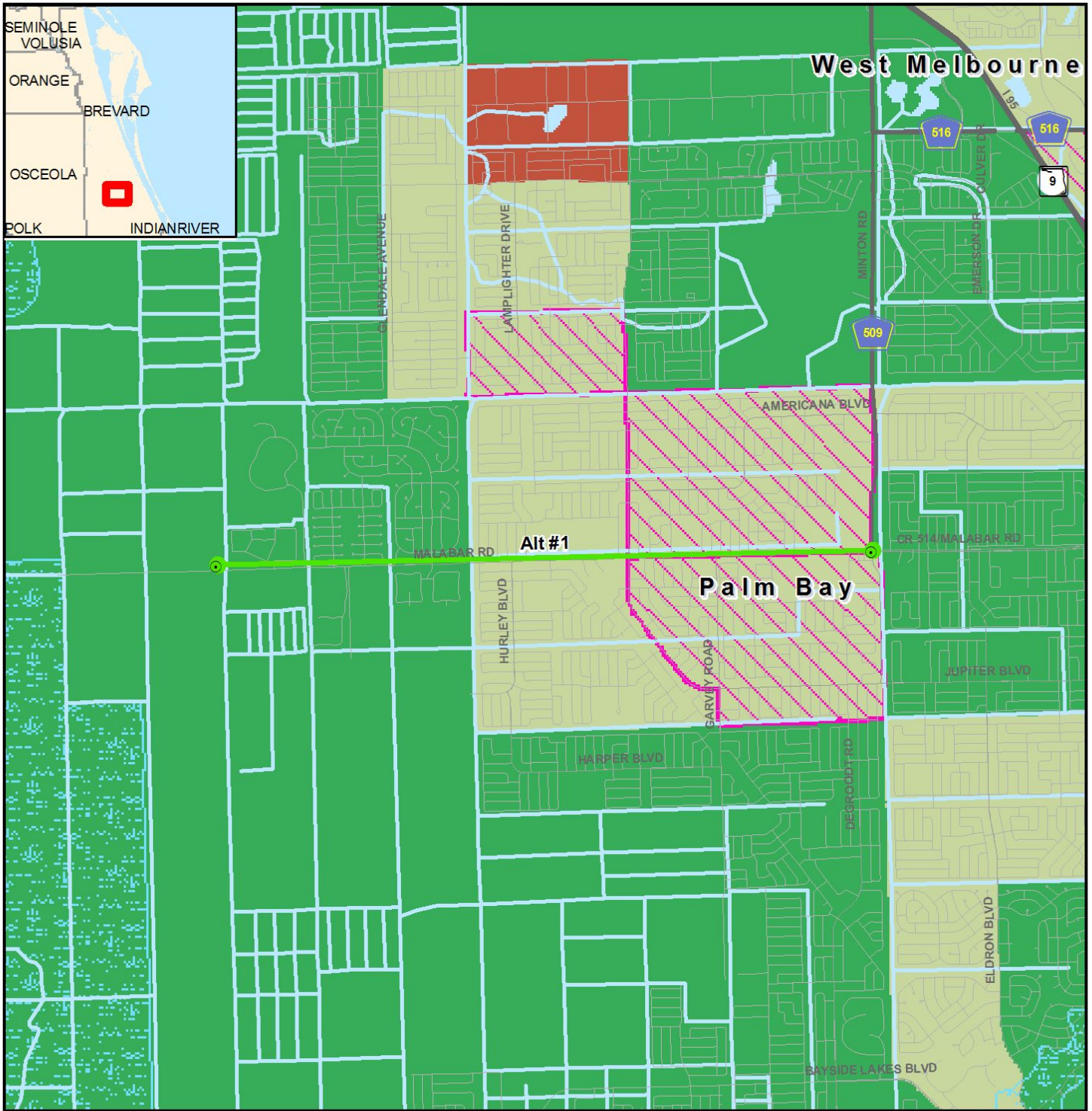
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# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

St. John's Heritage Pkwy. to Minton Rd.



## Income Map

- ETDM Alternative
  - ETDM Alternative Terminus
  - Major Road
  - Local Road or Trail
  - > 20% Below Poverty
- Median Household Income**
- 0 - 10,000
  - 10,001 - 29,999
  - 30,000 - 49,999
  - 50,000 - 79,999
  - 80,000 - 125,000
  - > 125,000

Data Sources:  
 US Geological Survey  
 FL Department of Transportation  
 NAVTEQ  
 US Census Bureau (2010)

0 0.3 0.6 1.2 Miles



6/19/2019

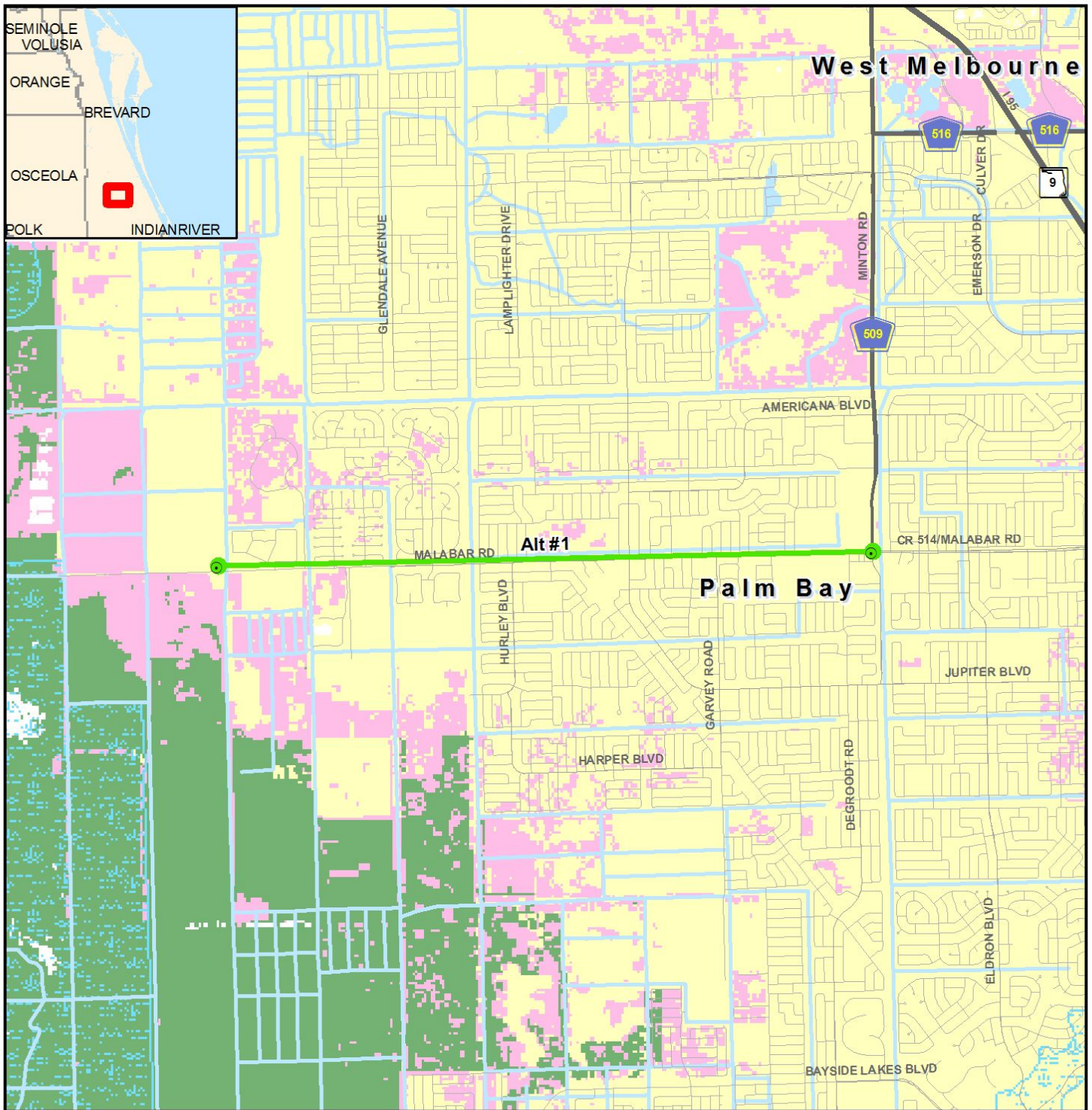
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# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

## St. John's Heritage Pkwy. to Minton Rd.



### Integrated Wildlife Model Map

- ETDM Alternative
- Low Habitat Quality
- Medium Habitat Quality
- ETDM Alternative Terminus
- Major Road
- High Habitat Quality
- Local Road or Trail

Data Sources:  
 NAVTEQ  
 US Geological Survey  
 Florida Department of Transportation  
 Florida Fish & Wildlife Conservation Commission



6/19/2019

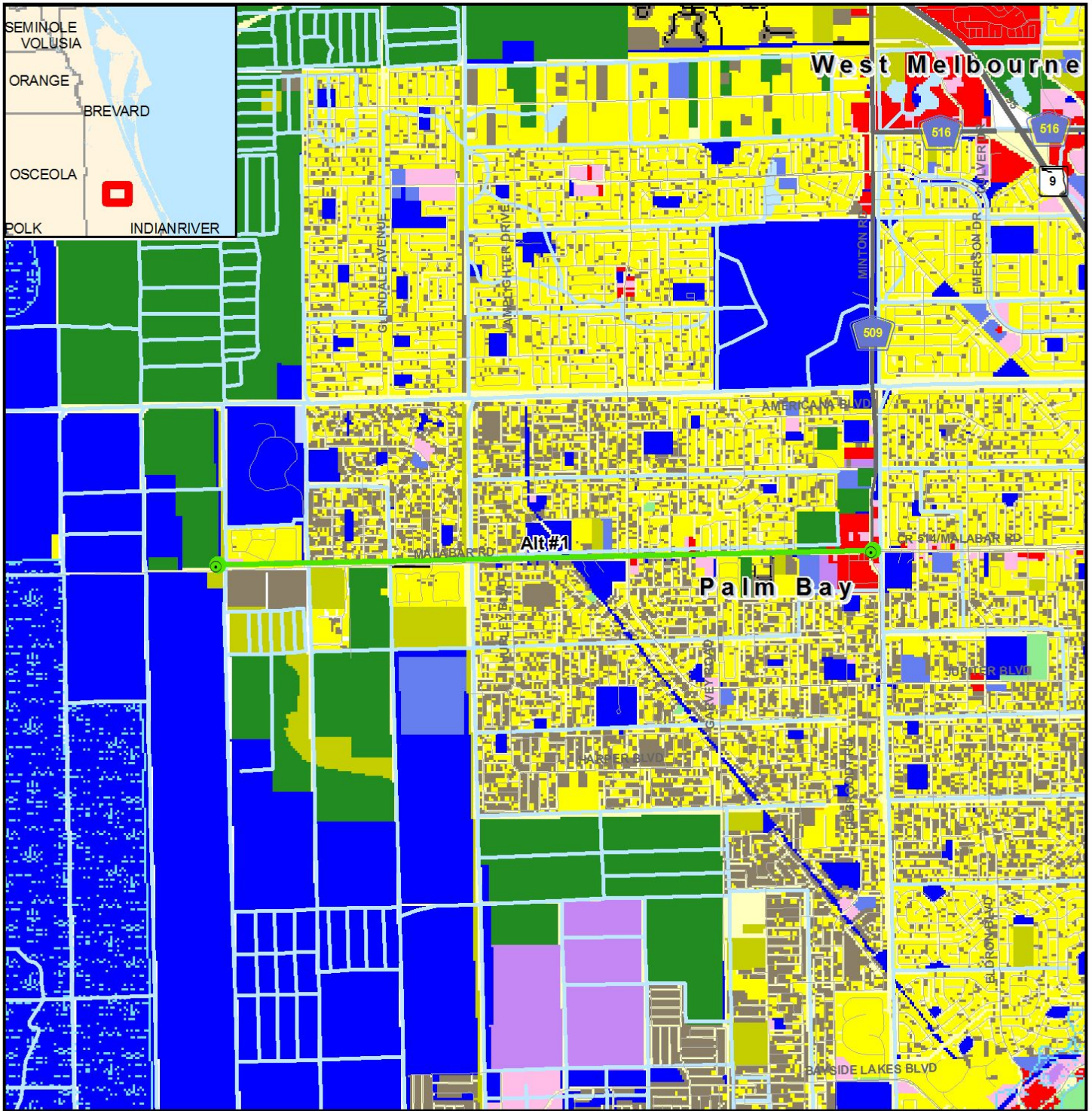


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# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

## St. John's Heritage Pkwy. to Minton Rd.



### Land Use Map

- |  |  |  |   |
|--|--|--|---|
| <span style="color: green;">■</span> ETDM Alternative          | <span style="color: green;">■</span> Agricultural                  | <span style="color: orange;">■</span> Other            | <span style="color: red;">■</span> Retail/Office            |
| <span style="color: green;">●</span> ETDM Alternative Terminus | <span style="color: purple;">■</span> Industrial                   | <span style="color: blue;">■</span> Public             | <span style="color: brown;">■</span> Vacant (Residential)   |
| <span style="color: black;">—</span> Major Road                | <span style="color: blue;">■</span> Institutional                  | <span style="color: black;">■</span> Right-of-Way      | <span style="color: pink;">■</span> Vacant (Nonresidential) |
| <span style="color: grey;">—</span> Local Road or Trail        | <span style="color: maroon;">■</span> Mining                       | <span style="color: lightgreen;">■</span> Recreational | <span style="color: lightblue;">■</span> Water              |
|  | <span style="color: yellowgreen;">■</span> Open (Not Agricultural) | <span style="color: yellow;">■</span> Residential      | <span style="border: 1px solid black;">□</span> No Data     |

Data Sources:  
 NAVTEQ  
 US Geological Survey  
 Florida Department of Revenue  
 Florida Department of Transportation  
 Florida County Property Appraiser Offices

0 0.3 0.6 1.2 Miles



6/19/2019

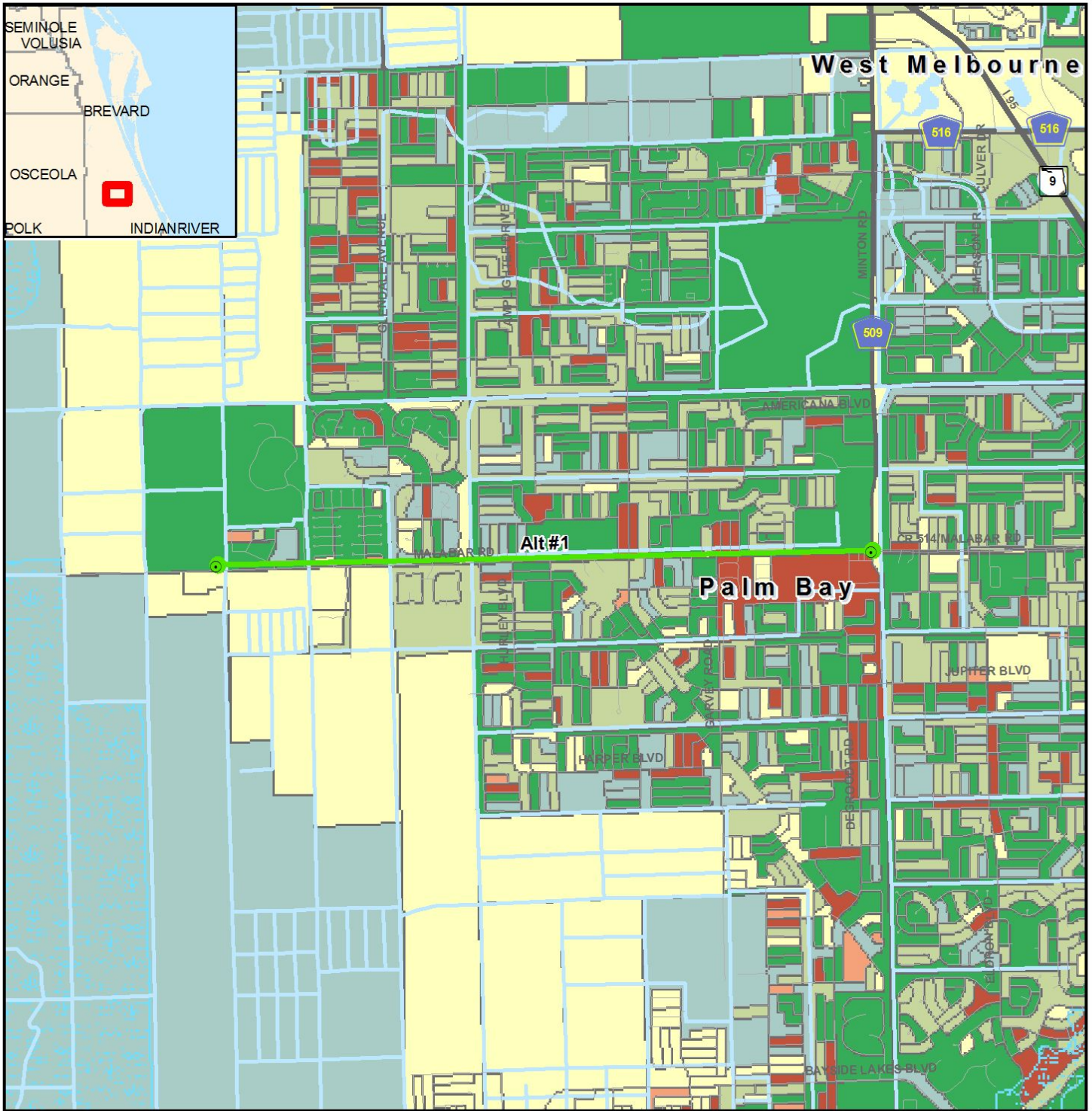
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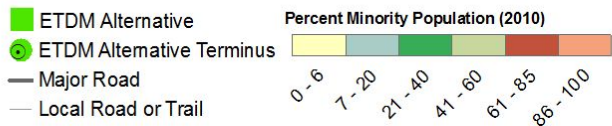


# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

## St. John's Heritage Pkwy. to Minton Rd.



### Minority Population Map



Data Sources:  
 US Geological Survey  
 FL Department of Transportation  
 NAVTEQ  
 US Census Bureau (2010)



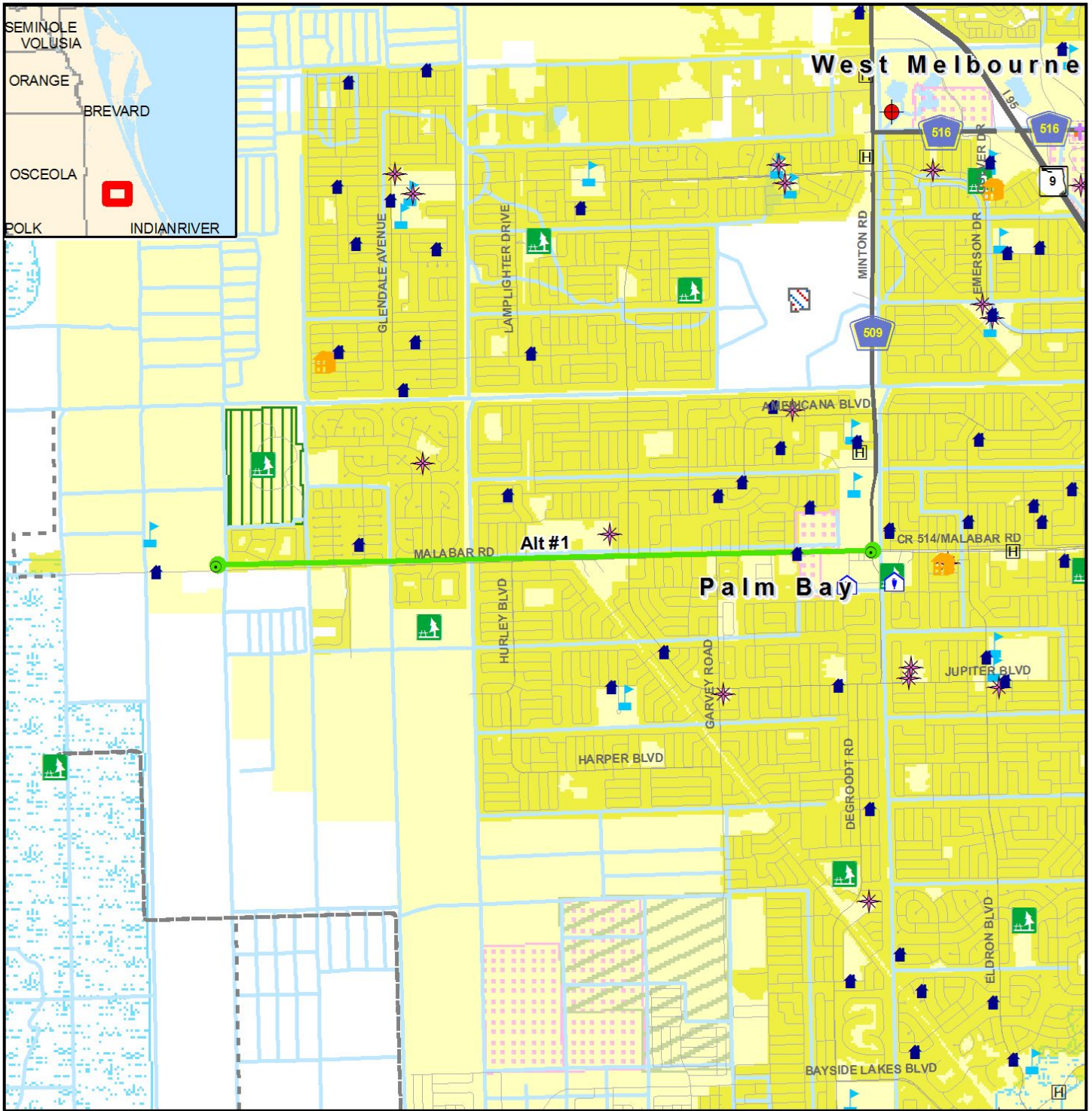
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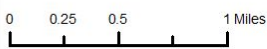
# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

## St. John's Heritage Pkwy. to Minton Rd.



### Noise Map

- |                           |                           |                  |                           |                          |
|---------------------------|---------------------------|------------------|---------------------------|--------------------------|
| ETDM Alternative          | Condo Owners Associations | Cultural Center  | Historic Cemetery         | ETAT.LU_NW_INDUSTRIAL_16 |
| ETDM Alternative Terminus | Hospitals                 | Health Care      | Planned Unit Developments | ETAT.LU_NW_RESIDENT_16   |
| City Limits               | Laser On-site             | Park             | Wildlife Refuges          | HUD Renewal              |
| Noise Barriers            | Group Care Facilities     | National Parks   | National Park Projects    | Nat'l Estuarine Reserves |
| Existing Trails           | Cemetery                  | Place of Worship | Marine Sanctuaries        | Enterprise Zones         |
|                           | Community Center          | School           | Military Installations    | DRI                      |



Data Sources:  
 GeoPlan Center, US Geological Survey, US Census Bureau,  
 HUD, Florida DOT, US Fish and Wildlife, National Park Service,  
 NOAA, National Estuarine Research, Enterprise Florida



7/30/2019

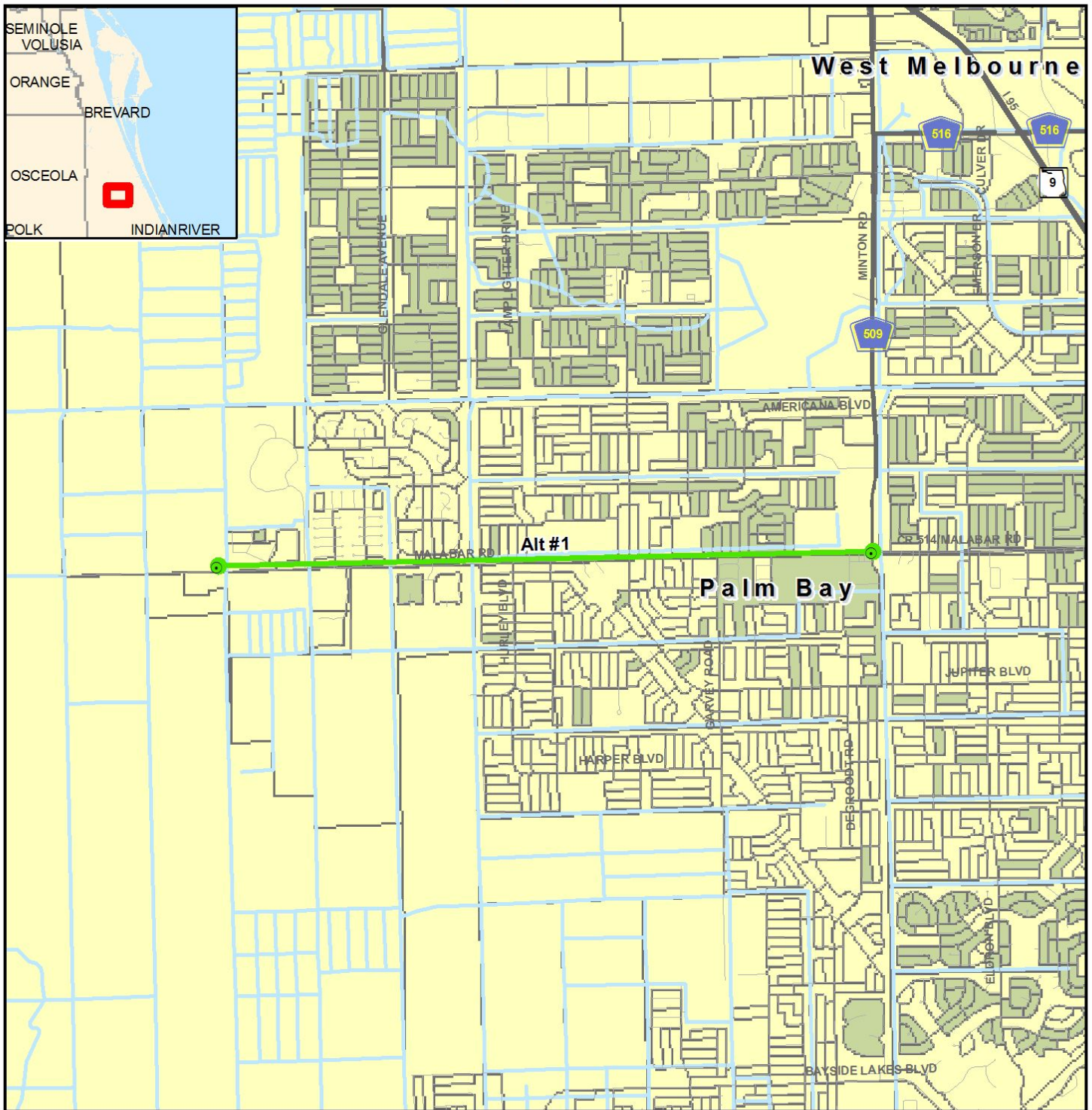
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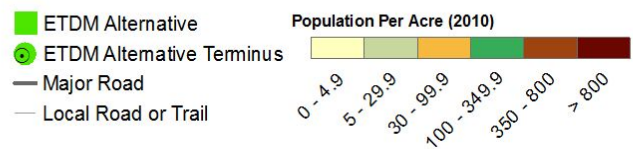


# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

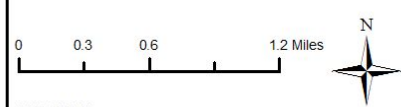
## St. John's Heritage Pkwy. to Minton Rd.



### Population Density Map



Data Sources:  
 US Geological Survey  
 FL Department of Transportation  
 NAVTEQ  
 US Census Bureau (2010)



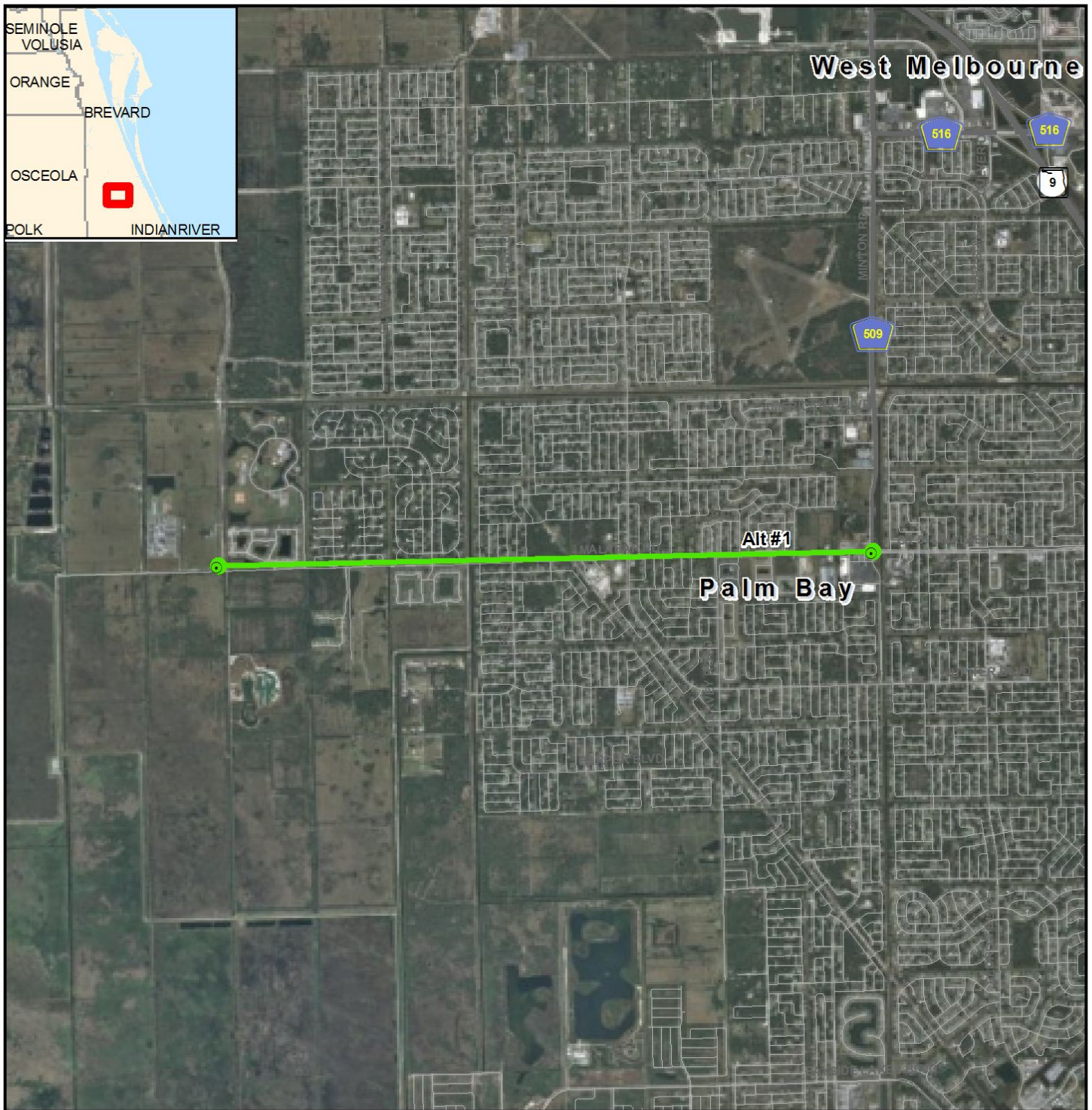
6/19/2019

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 G - 59



# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

St. John's Heritage Pkwy. to Minton Rd.



## Project Aerial Map

- ETDM Alternative
- ETDM Alternative Terminus
- Major Road
- Local Road or Trail

Data Sources:  
 Highways - NAVTEQ  
 Digital Orthophotograph - ArcGIS Online



6/19/2019

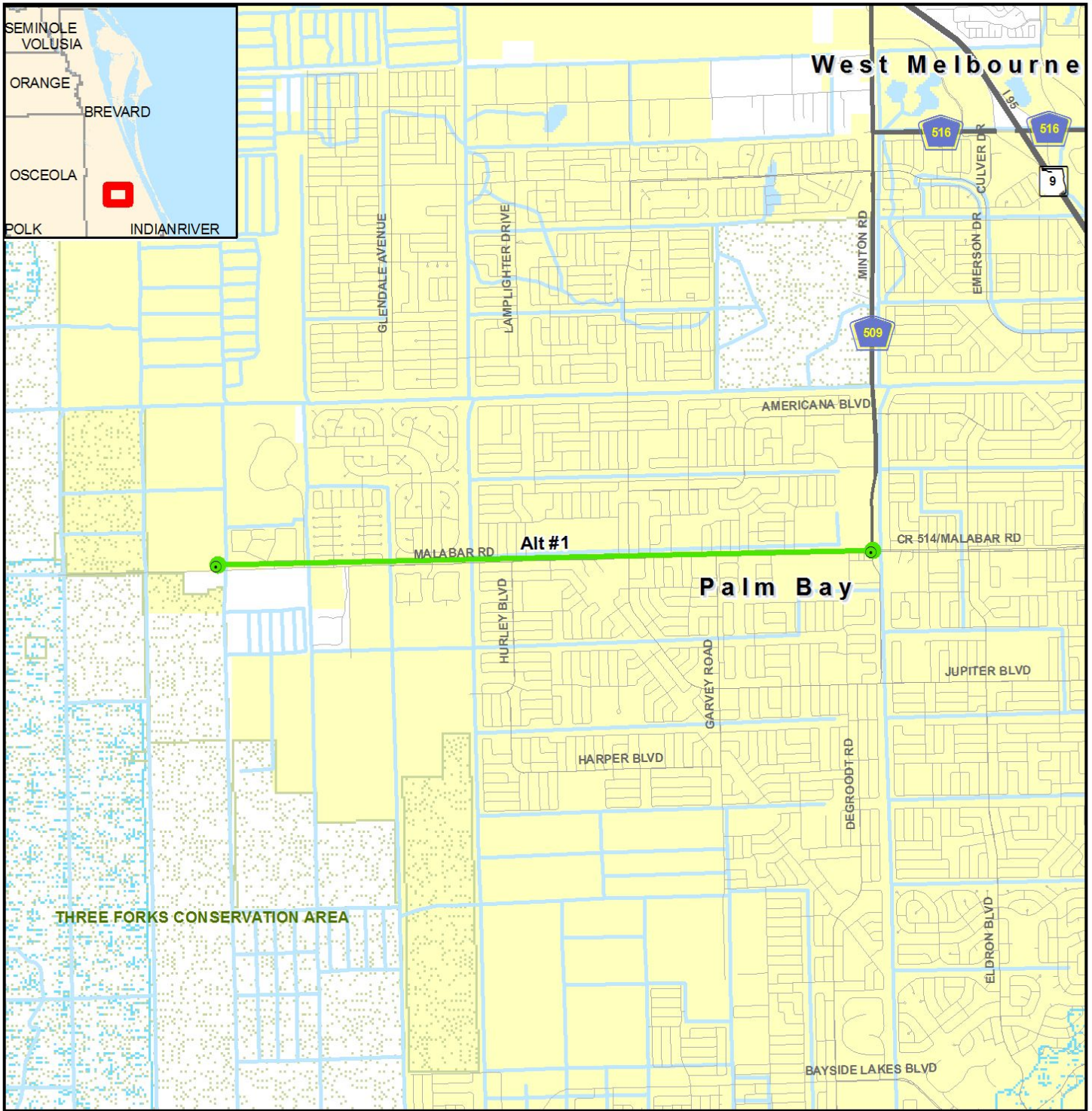


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 G - 60



# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

## St. John's Heritage Pkwy. to Minton Rd.



### Project Base Map

- ETDM Alternative Terminus
- Managed Conservation Lands
- Alt #1
- Local Road or Trail
- Major Road
- City Limits

Data Sources:  
 NAVTEQ  
 US Geological Survey  
 US Census Bureau  
 County Property Appraisers  
 Florida Natural Areas Inventory

0 0.25 0.5 1 Miles



7/30/2019

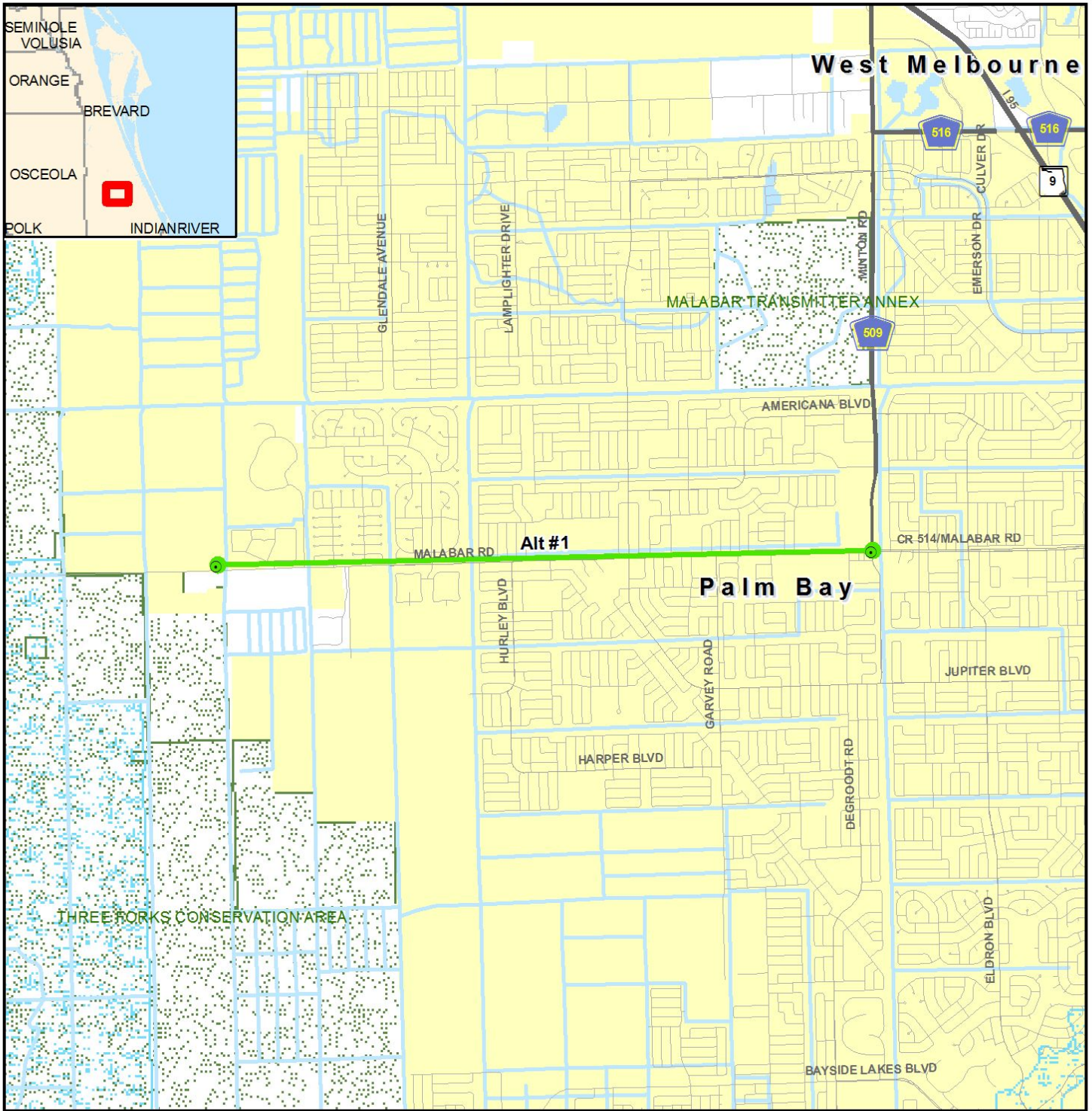
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G - 61



# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

## St. John's Heritage Pkwy. to Minton Rd.



### Recreational Areas Map

- ETDM Alternative
- ETDM Alternative Terminus
- Major Road
- Local Road or Trail
- City Limits
- Conservation or Recreation Area

Data Sources:  
 NAVTEQ  
 US Geological Survey  
 Florida Natural Areas Inventory



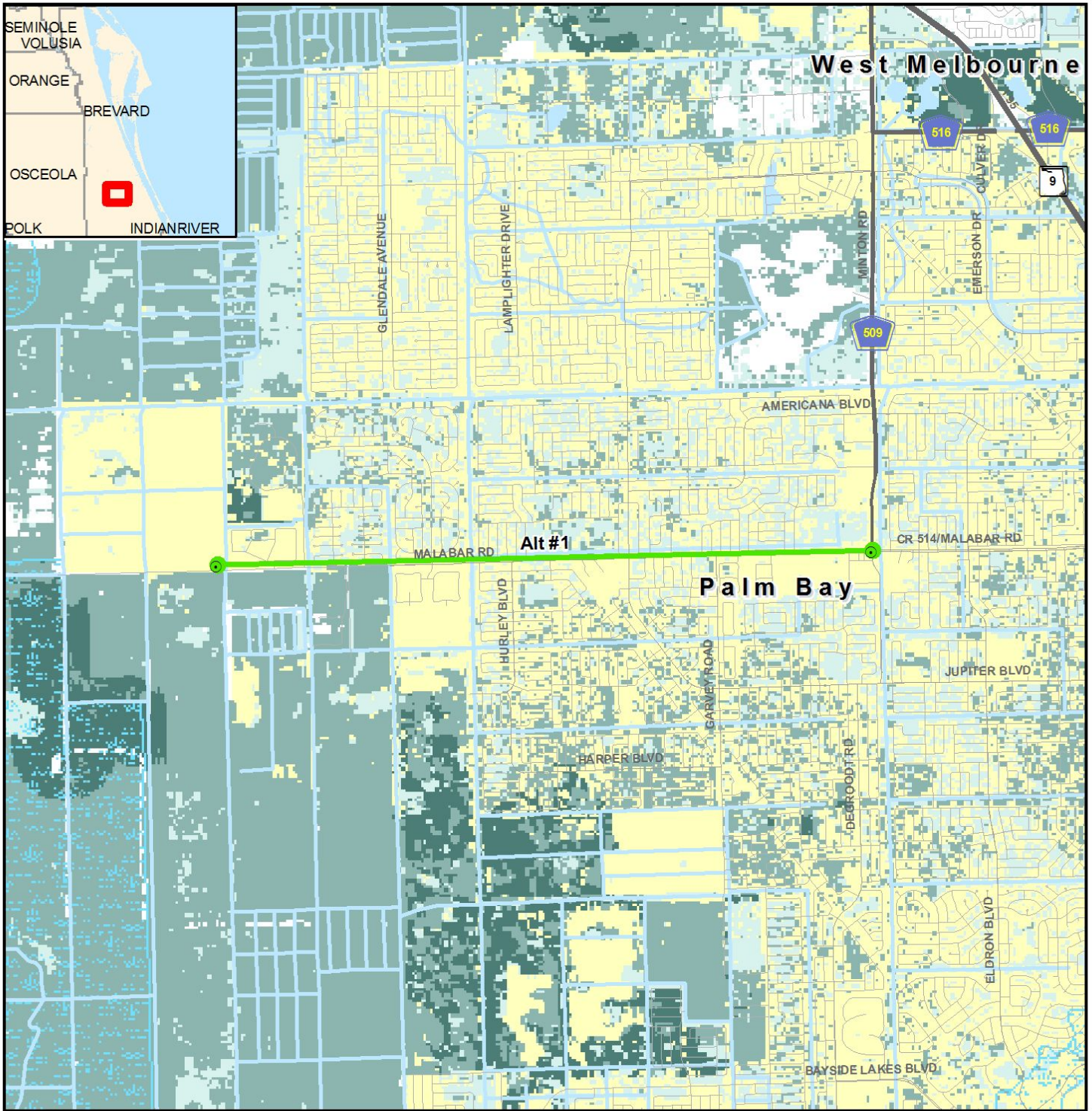
7/30/2019

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 G - 62



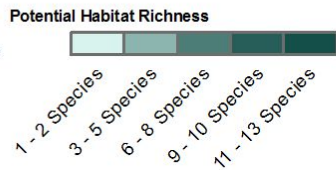
# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

## St. John's Heritage Pkwy. to Minton Rd.



### Species Potential Map

- ETDM Alternative
- ETDM Alternative Terminus
- Major Road
- Local Road or Trail
- City Limits



Data Sources:  
 NAVTEQ  
 US Geological Survey  
 Florida Department of Transportation  
 Florida Fish & Wildlife Conservation Commission



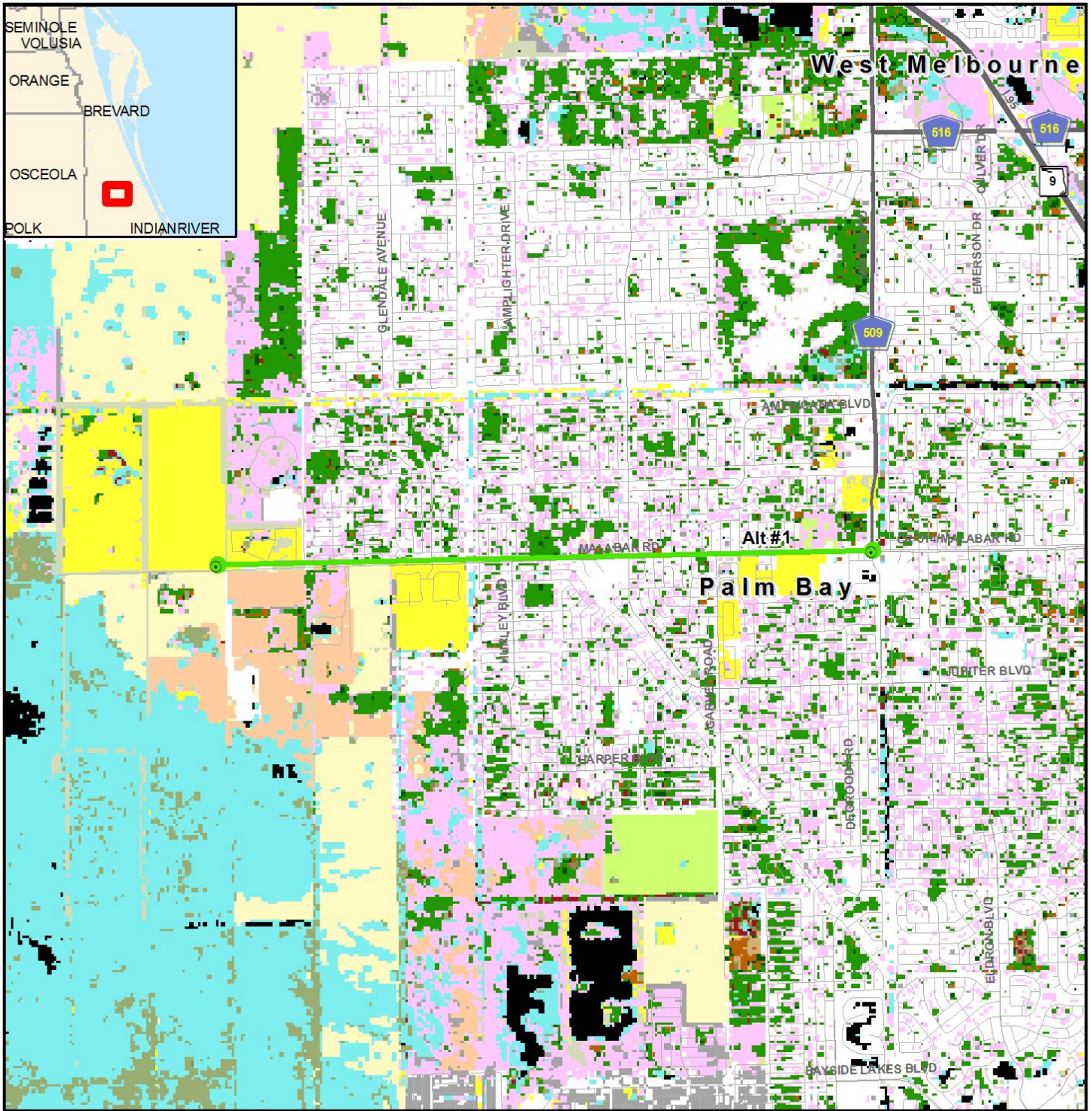
6/19/2019

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 G - 63



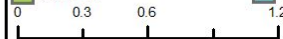
# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

## St. John's Heritage Pkwy. to Minton Rd.



### Vegetation Map

ETDM Alternative	Dry Prairie	Cattail Marsh	Bottomland Hardwood Forest	Bare Soil/Clearcut	Australian Pine
ETDM Alternative Terminus	Mixed Hardwood-pine Forest	Shrub Swamp	Salt Marsh	Improved Pasture	Melaleuca
Not Classified	Hardwood Hammocks and Forests	Bay Swamp	Mangrove Swamp	Unimproved Pasture	Brazilian Pepper
Coastal Strand	Pinelands	Cypress Swamp	Scrub Mangrove	Sugarcane	High Impact Urban
Sand/Beach	Cabbage Palm-live Oak Hammock	Cypress/Pine/Cabbage Palm	Tidal Flats	Citrus	Low Impact Urban
Xeric Oak Scrub	Tropical Hardwood Hammock	Mixed Wetland Forest	Open Water	Row and Field Crops	Extractive
Sand Pine Scrub	Freshwater Marsh and Wet Prairie	Hardwood Swamp	Shrub and Brushland	Other Agriculture	Exotic Plants
Sandhill	Sawgrass Marsh	Hydric Hammock	Grassland		



Data Sources: NAVTEQ; Florida Department of Transportation; Florida Fish and Wildlife Conservation Commission



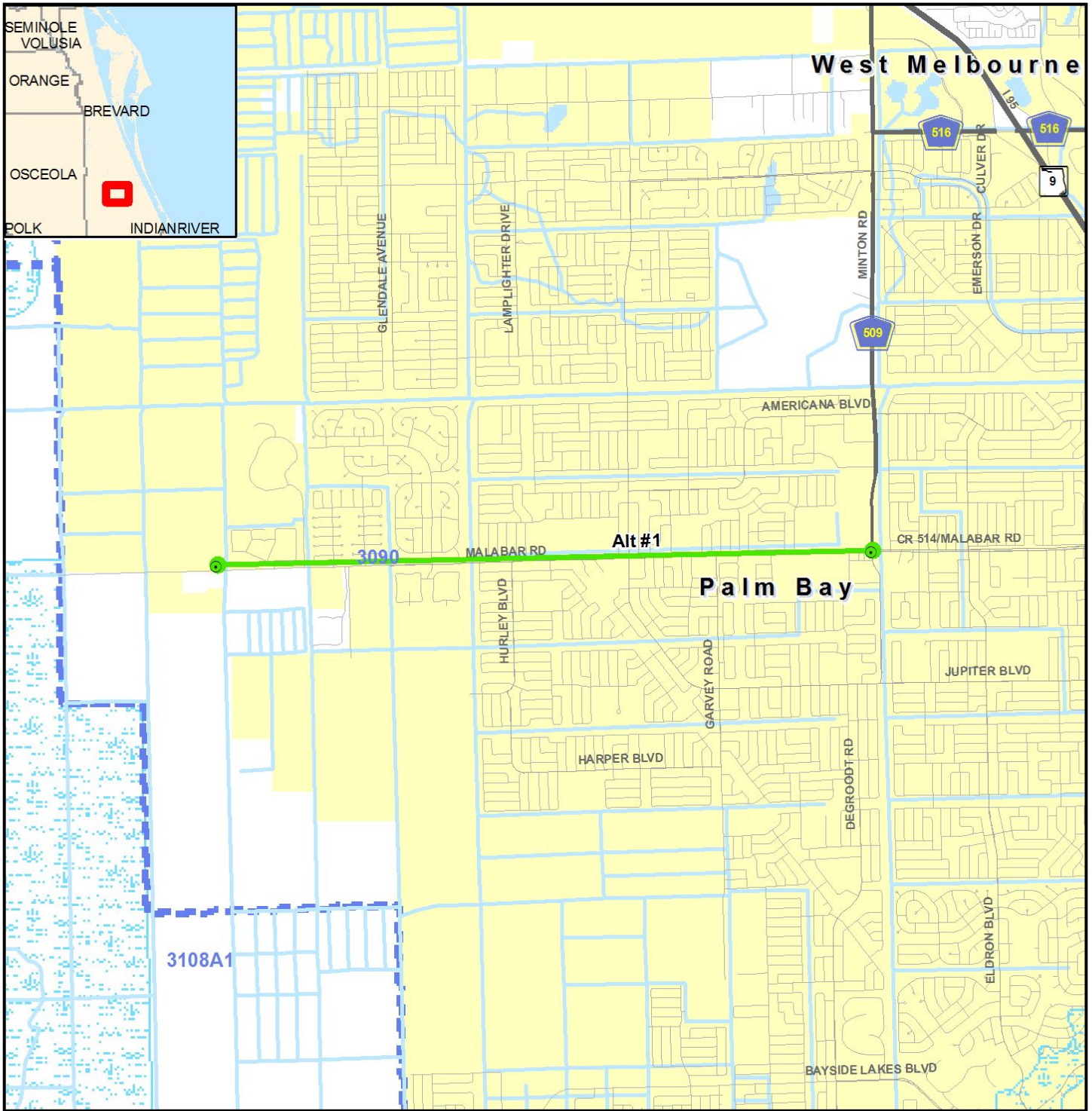
6/19/2019

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# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

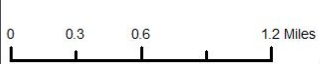
## St. John's Heritage Pkwy. to Minton Rd.



### Water Resource Map

- ETDM Alternative
- ETDM Alternative Terminus
- Major Road
- Local Road or Trail
- City Limits
- 1st Magnitude Spring
- River, Stream or Canal
- Navigable Water Way
- SFWMD Canals
- Drainage Basin
- Outstanding Florida Water
- Surface Water Class I
- Surface Water Class II
- Water Body
- Swamp/Marsh

Data Sources:  
 NAVTEQ  
 US Geological Survey  
 Florida Department of Transportation  
 Florida Department of Environmental Protection  
 Florida Geological Survey  
 US Bureau of Transportation Statistics



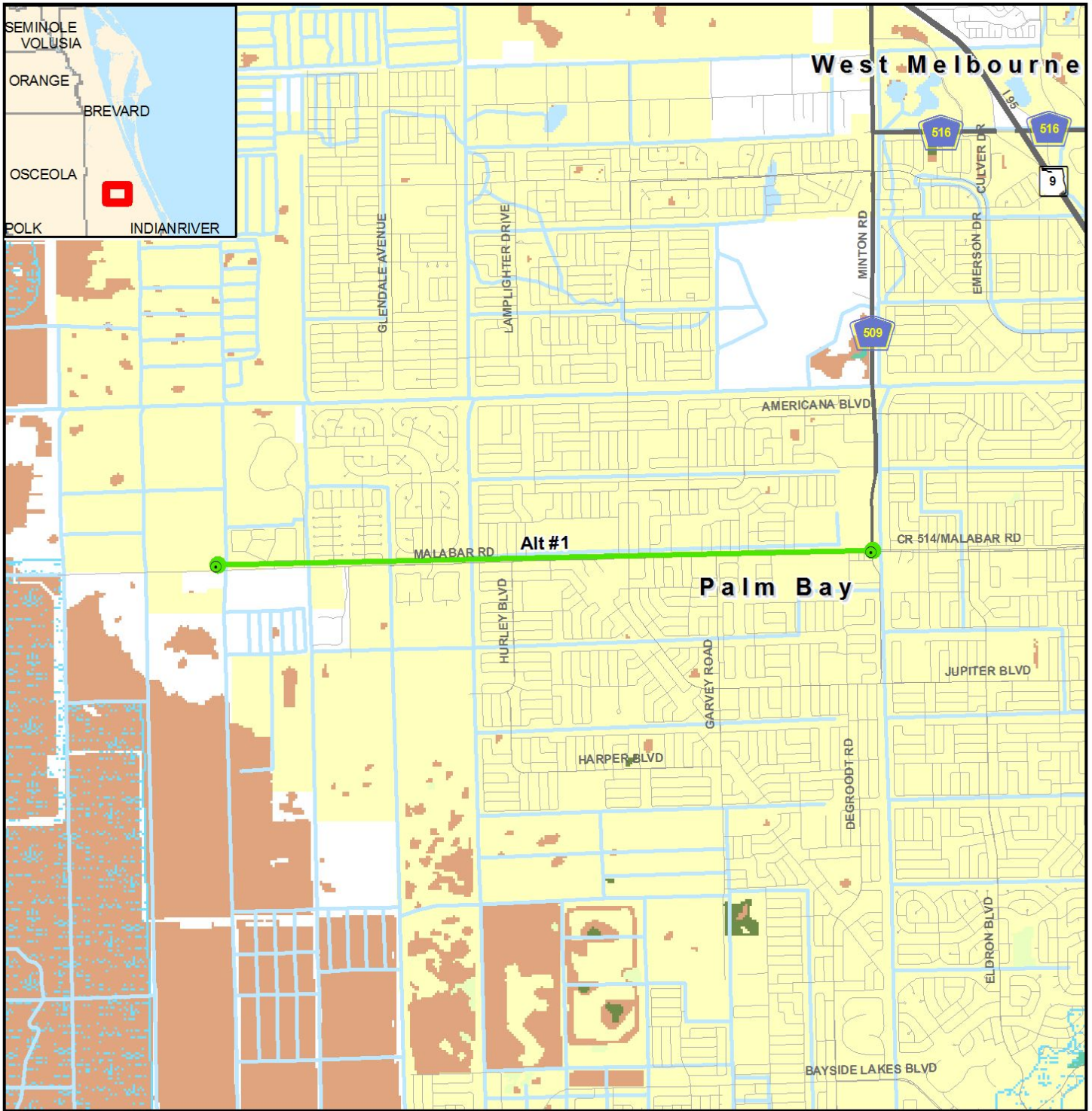
7/30/2019

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# 14396 Malabar Rd. from St. John's Heritage Pkwy. to Minton Rd.

## St. John's Heritage Pkwy. to Minton Rd.



### Wetlands and Surface Waters Map

- ETDM Alternative
- ETDM Alternative Terminus
- Major Road
- Local Road or Trail
- City Limits
- River, Stream or Canal
- Water Body
- Swamp/Marsh
- Non-vegetated Wetland
- Vegetated Non-forested Wetland
- Wetland Forested Mixed
- Wetland Coniferous Forest
- Wetland Hardwood Forest

Data Sources:  
 NAVTEQ  
 Florida Water Management Districts  
 US Geological Survey

0 0.3 0.6 1.2 Miles



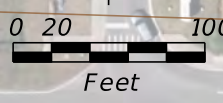
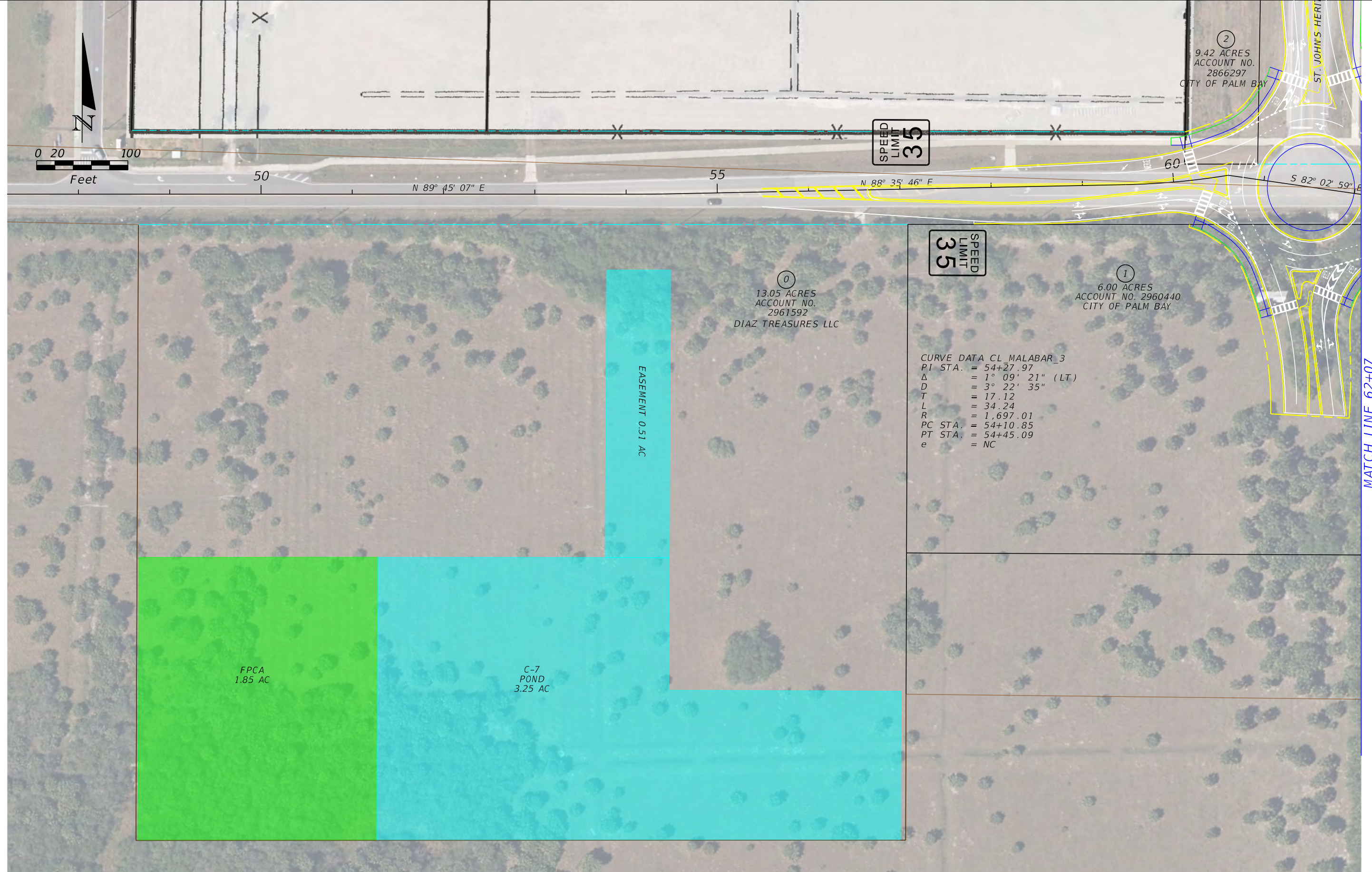
7/30/2019

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## Appendix H – Preferred Alternative Concept Plans





CURVE DATA CL\_MALABAR\_3  
 PI STA. = 54+27.97  
 Δ = 1° 09' 21" (LT)  
 D = 3° 22' 35"  
 T = 17.12  
 L = 34.24  
 R = 1,697.01  
 PC STA. = 54+10.85  
 PT STA. = 54+45.09  
 e = NC

**LEGEND**

	EXISTING PARCEL LINE		POTENTIAL HISTORIC BUILDING
	SUBDIVISION PARCEL LINES		MEDIUM RISK CONTAMINATION SITES
	EXISTING RIGHT OF WAY		CITY ACQUIRED PARCELS
	PROPOSED RIGHT OF WAY		FLOODPLAIN
	CITY BOUNDARY		UNAPPROVED DEVELOPMENT
	EXISTING BUS STOP LOCATIONS		RECOMMENDED PREFERRED POND/SWALE LOCATION
	PROPOSED BUS STOP LOCATIONS		RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

	POTENTIAL HISTORIC BUILDING
	MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

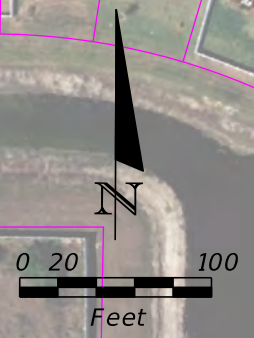
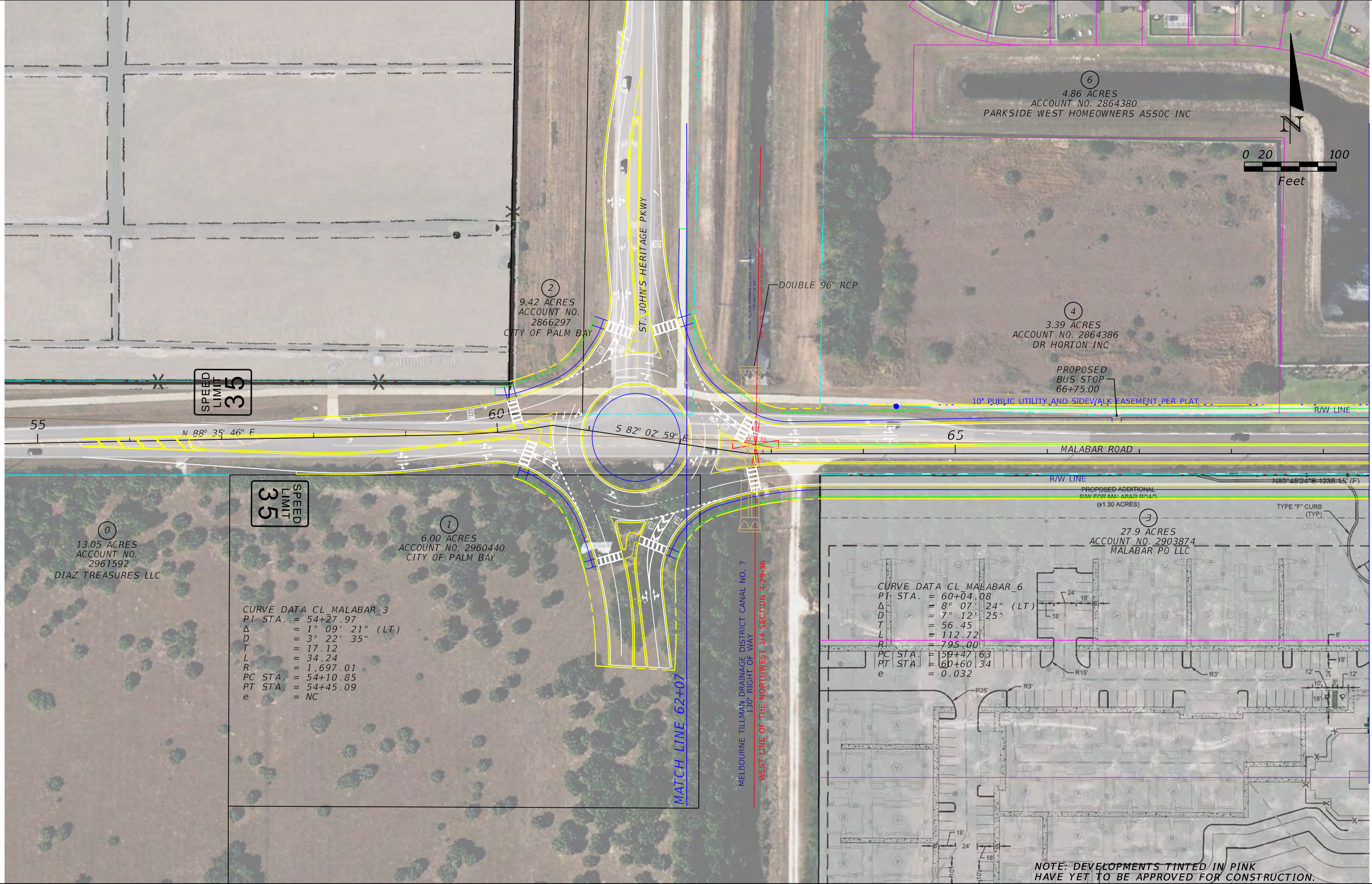


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
 PLAN SHEET  
 PREFERRED ALTERNATIVE**

SHEET NO.
H-1
1A





CURVE DATA CL MALABAR\_3  
 PI STA. = 54+27.97  
 Δ = 1° 09' 21" (LT)  
 D = 3° 22' 35"  
 T = 17.12  
 L = 34.24  
 R = 1,697.01  
 PC STA. = 54+10.85  
 PT STA. = 54+45.09  
 e = NC

CURVE DATA CL MALABAR\_6  
 PI STA. = 60+04.08  
 Δ = 8° 07' 24" (LT)  
 D = 7° 12' 25"  
 T = 56.45  
 L = 112.72  
 R = 795.00  
 PC STA. = 59+47.63  
 PT STA. = 60+60.34  
 e = 0.032

NOTE: DEVELOPMENTS TINTED IN PINK HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	CITY BOUNDARY
	EXISTING BUS STOP LOCATIONS
	PROPOSED BUS STOP LOCATIONS

	POTENTIAL HISTORIC BUILDING
	MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

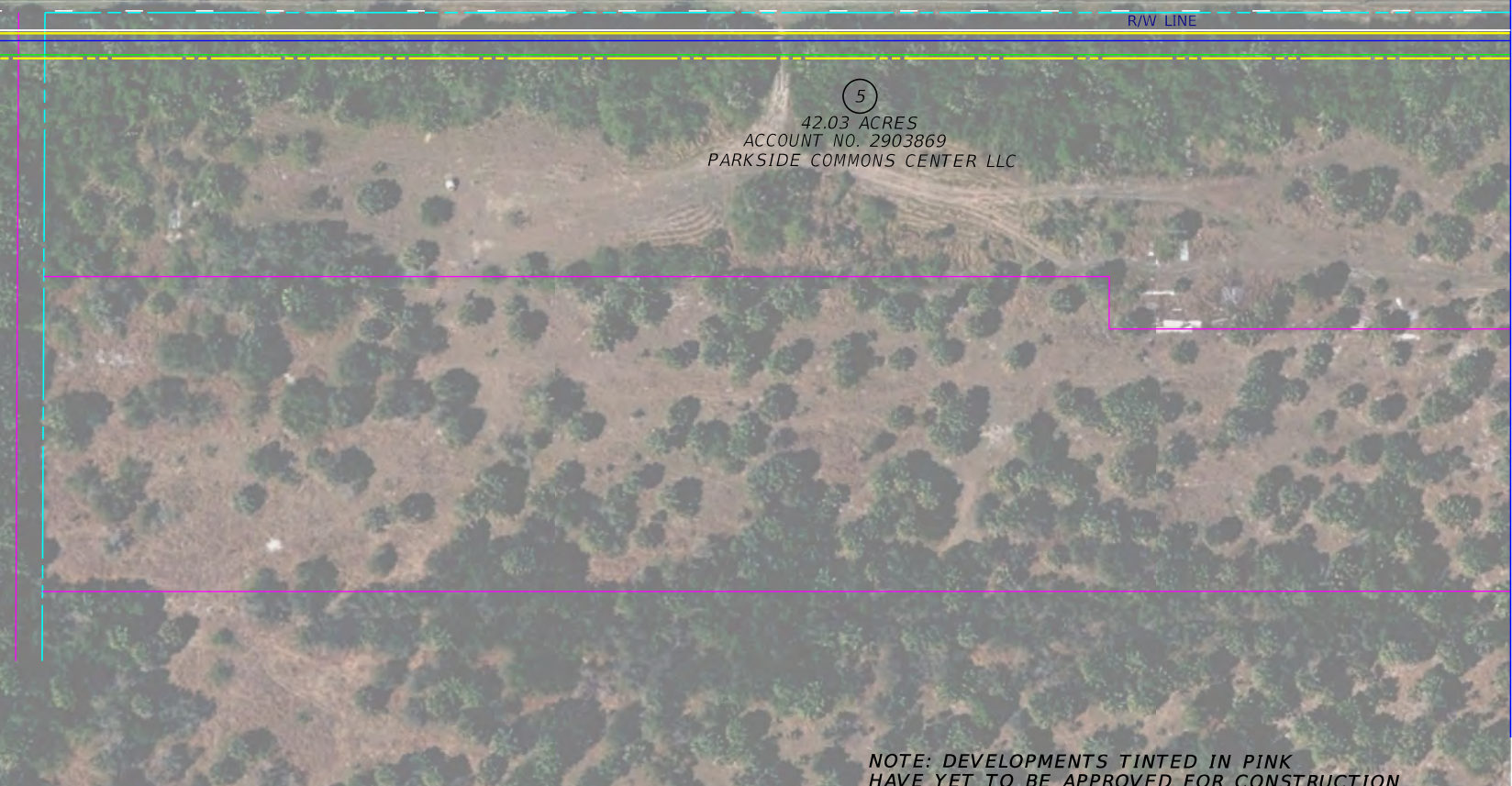
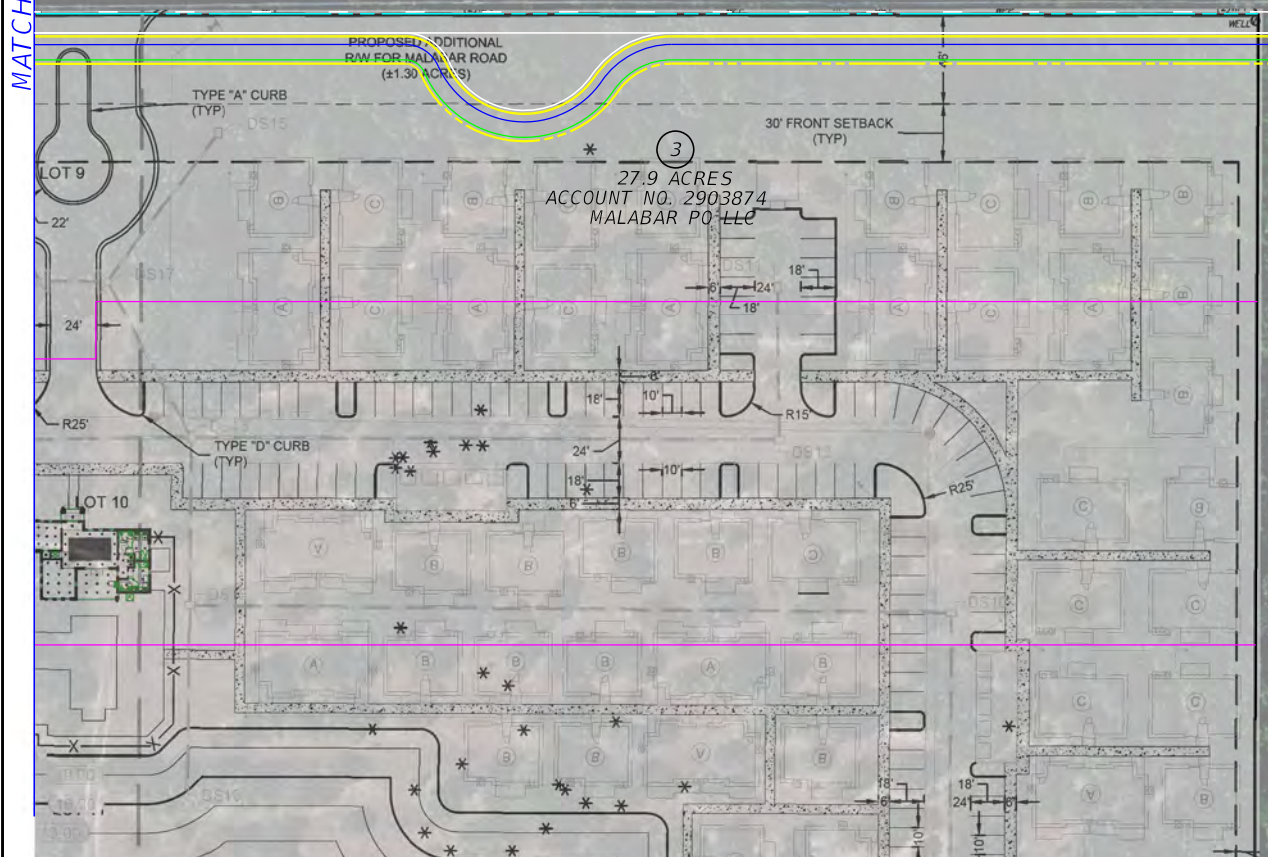
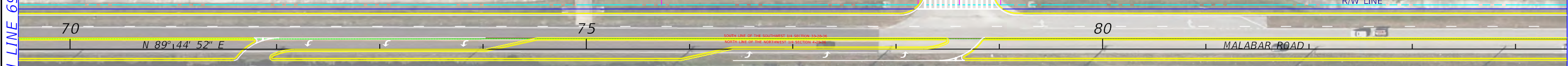


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
 PLAN SHEET  
 PREFERRED ALTERNATIVE**

SHEET NO.
H-2
1



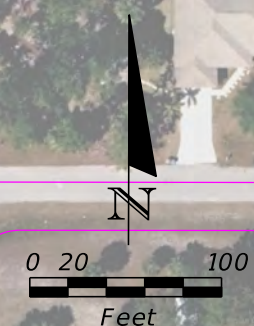
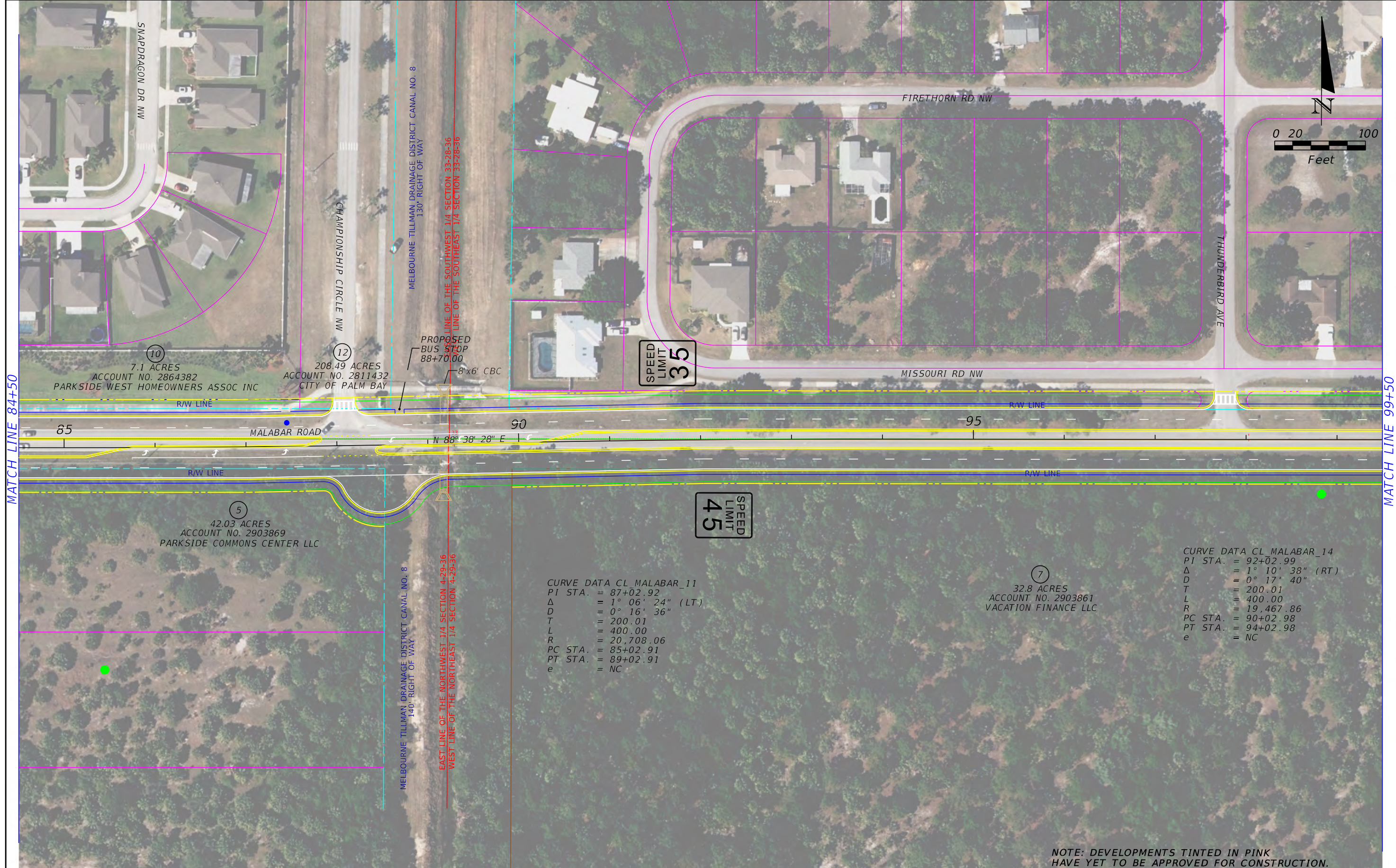


LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	CITY BOUNDARY
	EXISTING BUS STOP LOCATIONS
	PROPOSED BUS STOP LOCATIONS
	POTENTIAL HISTORIC BUILDING
	MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PEF. FLOODPLAIN COMPENSATION AREA

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

<b>MALABAR ROAD PD&amp;E STUDY</b> <b>PLAN SHEET</b> <b>PREFERRED ALTERNATIVE</b>	SHEET NO. H-3 2
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MATCH LINE 84+50

MATCH LINE 99+50

**LEGEND**

	EXISTING PARCEL LINE		POTENTIAL HISTORIC BUILDING
	SUBDIVISION PARCEL LINES		MEDIUM RISK CONTAMINATION SITES
	EXISTING RIGHT OF WAY		CITY ACQUIRED PARCELS
	PROPOSED RIGHT OF WAY		FLOODPLAIN
	CITY BOUNDARY		UNAPPROVED DEVELOPMENT
	EXISTING BUS STOP LOCATIONS		RECOMMENDED PREFERRED POND/SWALE LOCATION
	PROPOSED BUS STOP LOCATIONS		RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

	POTENTIAL HISTORIC BUILDING
	MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA



CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
PLAN SHEET  
PREFERRED ALTERNATIVE**

SHEET NO.
H-4
3

CURVE DATA CL\_MALABAR\_11  
 PI STA. = 87+02.92  
 Δ = 1° 06' 24" (LT)  
 D = 0° 16' 36"  
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 L = 400.00  
 R = 20,708.06  
 PC STA. = 85+02.91  
 PT STA. = 89+02.91  
 e = NC

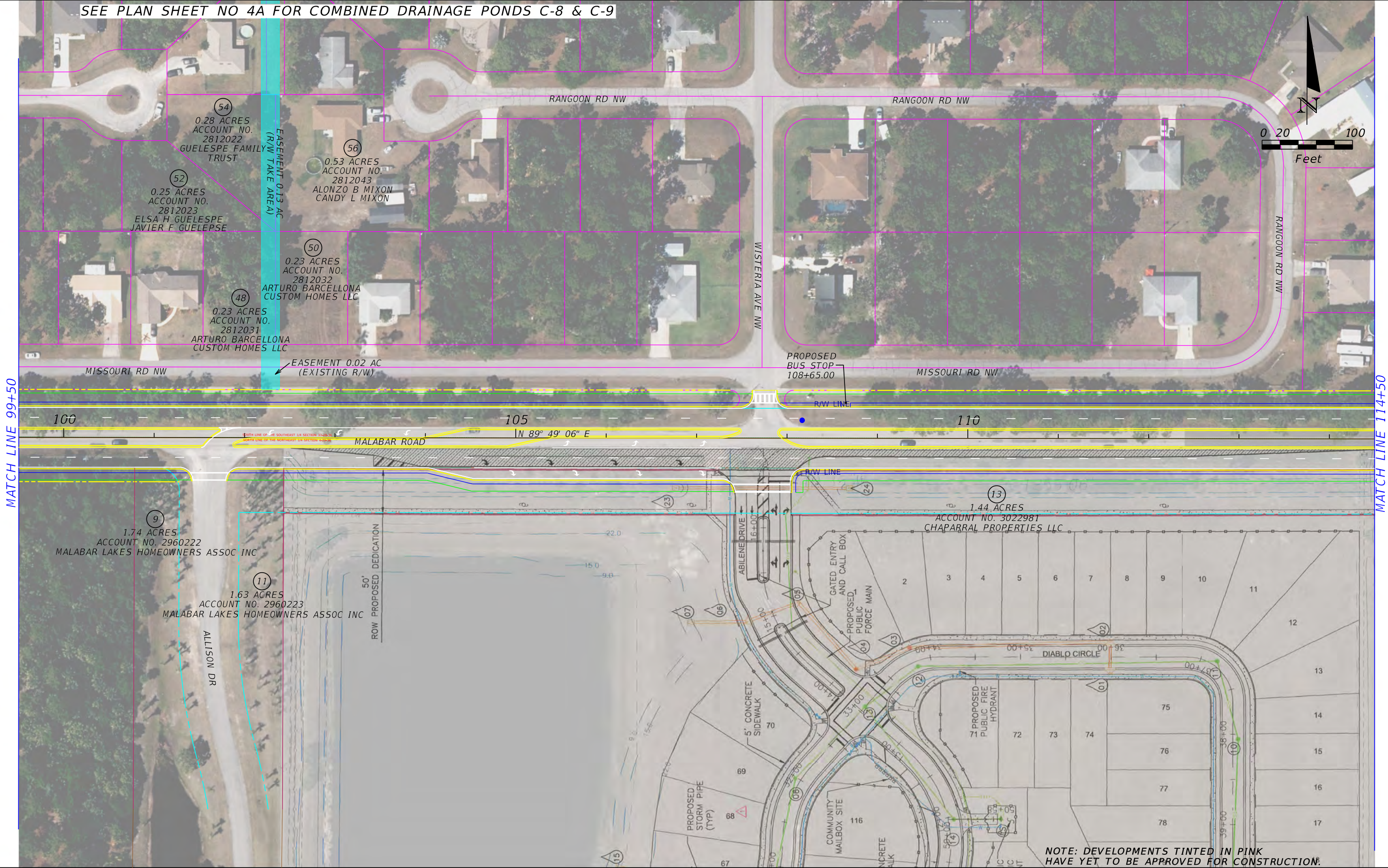
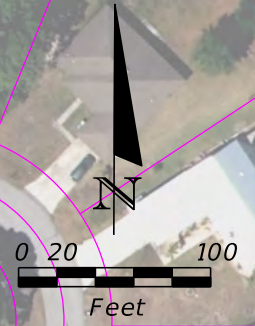
⑦  
 32.8 ACRES  
 ACCOUNT NO. 2903861  
 VACATION FINANCE LLC

CURVE DATA CL\_MALABAR\_14  
 PI STA. = 92+02.99  
 Δ = 1° 10' 38" (RT)  
 D = 0° 17' 40"  
 T = 200.01  
 L = 400.00  
 R = 19,467.86  
 PC STA. = 90+02.98  
 PT STA. = 94+02.98  
 e = NC

NOTE: DEVELOPMENTS TINTED IN PINK  
 HAVE YET TO BE APPROVED FOR CONSTRUCTION.



SEE PLAN SHEET NO 4A FOR COMBINED DRAINAGE PONDS C-8 & C-9



**LEGEND**

	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	CITY BOUNDARY
	EXISTING BUS STOP LOCATIONS
	PROPOSED BUS STOP LOCATIONS

	POTENTIAL HISTORIC BUILDING
	MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

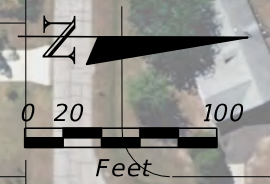


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
PLAN SHEET  
PREFERRED ALTERNATIVE**

SHEET NO.
H-5
4





REGRADE EXISTING DITCH  
AROUND PROPOSED POND

EASEMENT 0.21 AC  
(EXISTING R/W)

46  
6.79 ACRES  
ACCOUNT NO. 28-36-33-01-B  
CITY OF PALM BAY

C-8 & C-9  
COMBINED  
POND  
3.45 AC

SEE PLAN SHEET NO 4

**LEGEND**

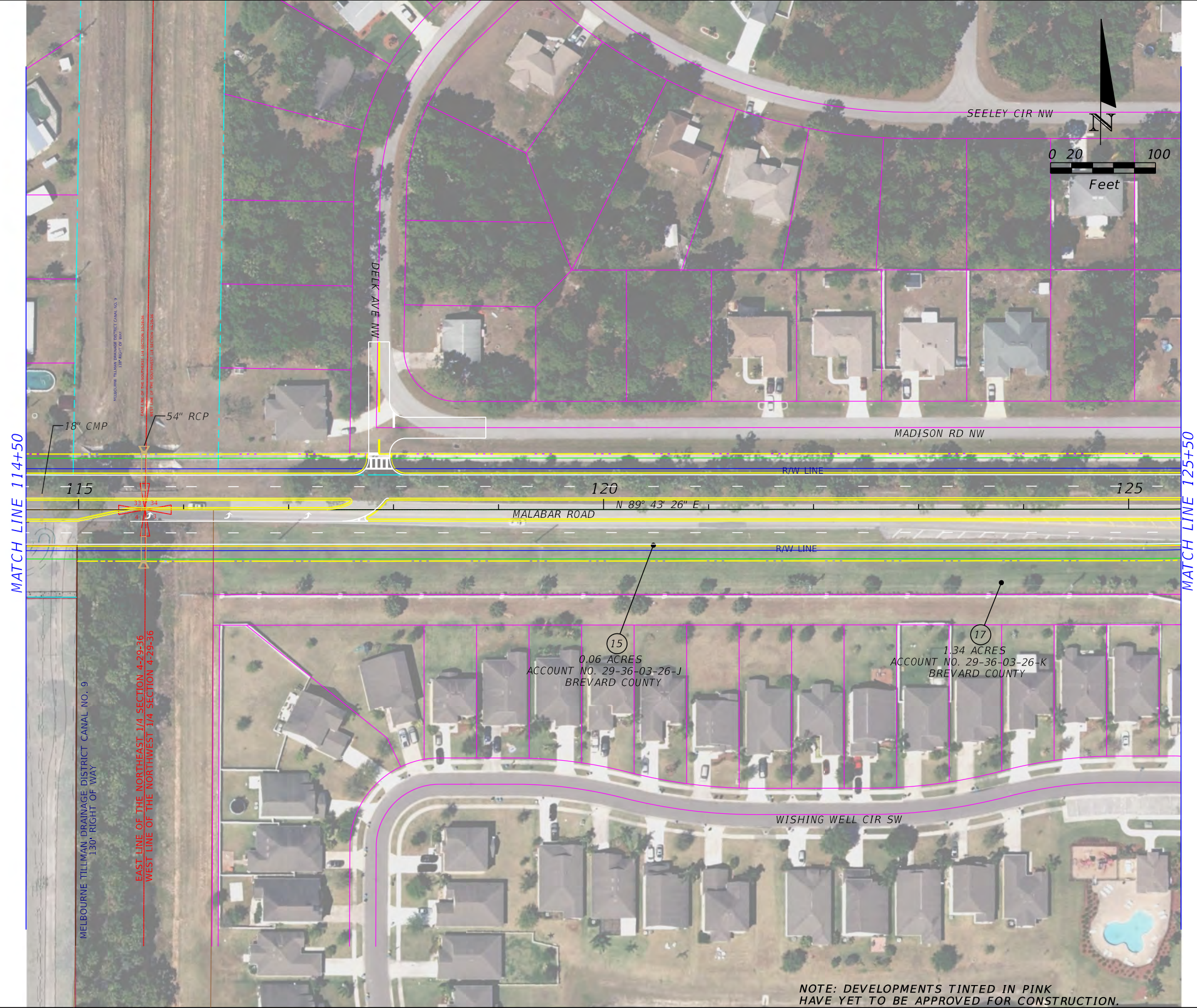
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	SUBDIVISION PARCEL LINES		MEDIUM RISK CONTAMINATION SITES
	EXISTING RIGHT OF WAY		CITY ACQUIRED PARCELS
	PROPOSED RIGHT OF WAY		FLOODPLAIN
	CITY BOUNDARY		UNAPPROVED DEVELOPMENT
	EXISTING BUS STOP LOCATIONS		RECOMMENDED PREFERRED POND/SWALE LOCATION
	PROPOSED BUS STOP LOCATIONS		RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

<b>MALABAR ROAD PD&amp;E STUDY</b> <b>PLAN SHEET</b> <b>PREFERRED ALTERNATIVE</b>		
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SHEET NO. H-6 4A
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**LEGEND**

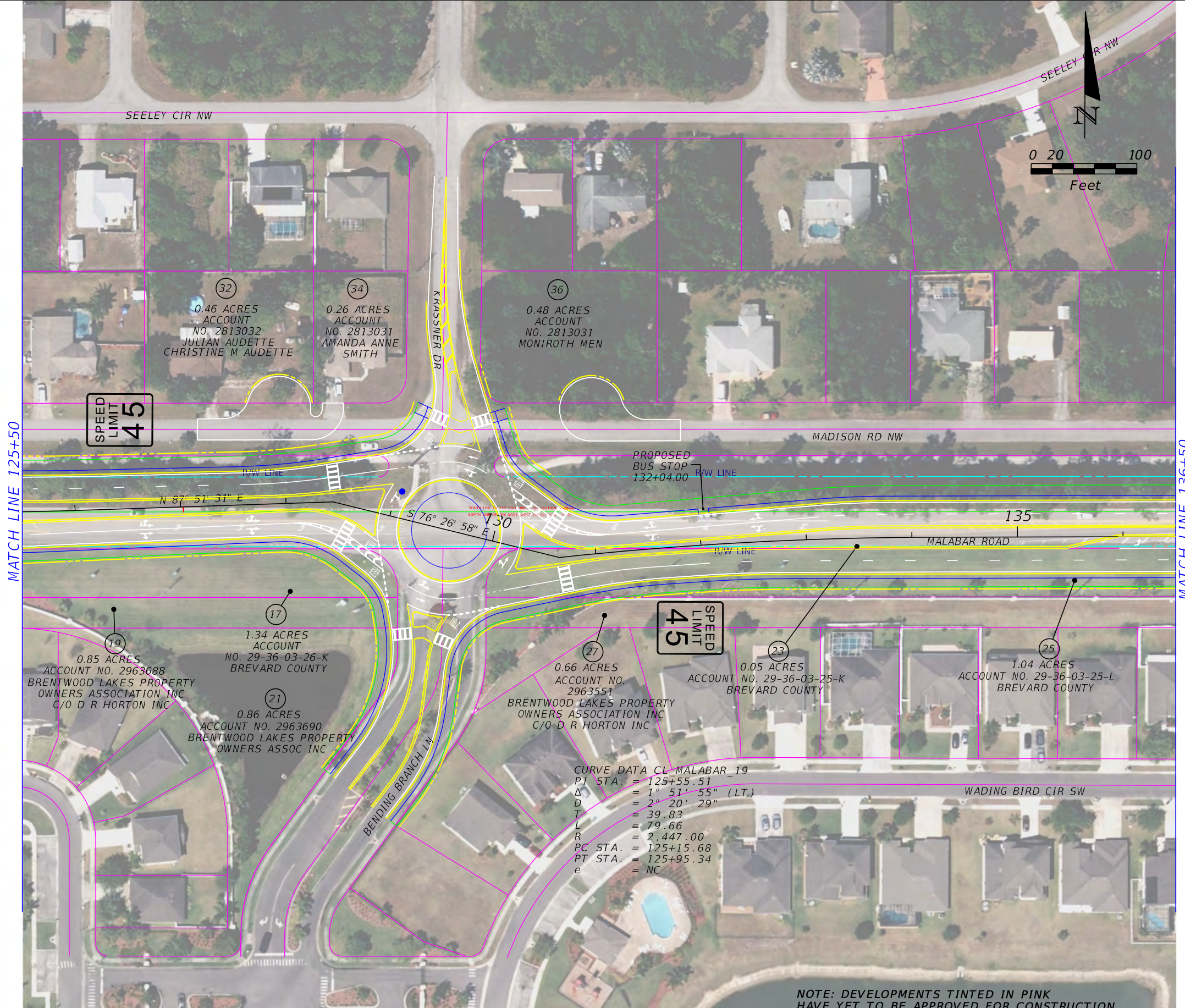
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	SUBDIVISION PARCEL LINES		MEDIUM RISK CONTAMINATION SITES
	EXISTING RIGHT OF WAY		CITY ACQUIRED PARCELS
	PROPOSED RIGHT OF WAY		FLOODPLAIN
	CITY BOUNDARY		UNAPPROVED DEVELOPMENT
	EXISTING BUS STOP LOCATIONS		RECOMMENDED PREFERRED POND/SWALE LOCATION
	PROPOSED BUS STOP LOCATIONS		RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

CITY OF PALM BAY	
ROAD NO.	COUNTY
	BREVARD
FINANCIAL PROJECT ID	

<b>MALABAR ROAD PD&amp;E STUDY</b>	
<b>PLAN SHEET</b>	
<b>PREFERRED ALTERNATIVE</b>	

SHEET NO.	
H-7	
5	





SPEED LIMIT 45

SPEED LIMIT 45

CURVE DATA CL MALABAR\_19  
 PI STA. = 125+55.51  
 Δ = 1° 51' 55" (LT.)  
 D = 2° 20' 29"  
 T = 39.83  
 L = 79.66  
 R = 2,447.00  
 PC STA. = 125+15.68  
 PT STA. = 125+95.34  
 e = NC

NOTE: DEVELOPMENTS TINTED IN PINK HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE		POTENTIAL HISTORIC BUILDING
	SUBDIVISION PARCEL LINES		MEDIUM RISK CONTAMINATION SITES
	EXISTING RIGHT OF WAY		CITY ACQUIRED PARCELS
	PROPOSED RIGHT OF WAY		FLOODPLAIN
	CITY BOUNDARY		UNAPPROVED DEVELOPMENT
	EXISTING BUS STOP LOCATIONS		RECOMMENDED PREFERRED POND/SWALE LOCATION
	PROPOSED BUS STOP LOCATIONS		RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

	POTENTIAL HISTORIC BUILDING
	MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

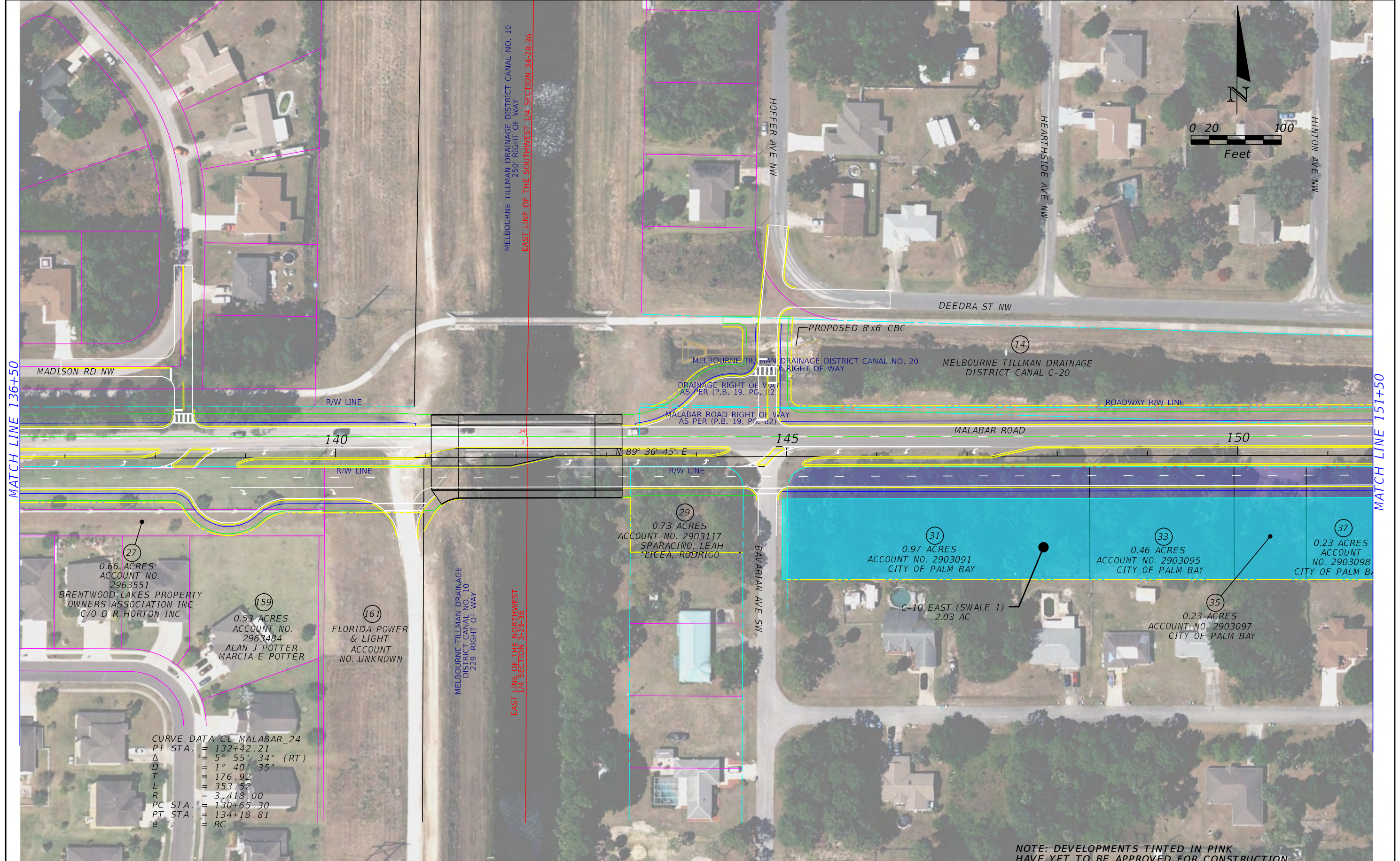


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
 PLAN SHEET  
 PREFERRED ALTERNATIVE**

SHEET NO.
H-8
6



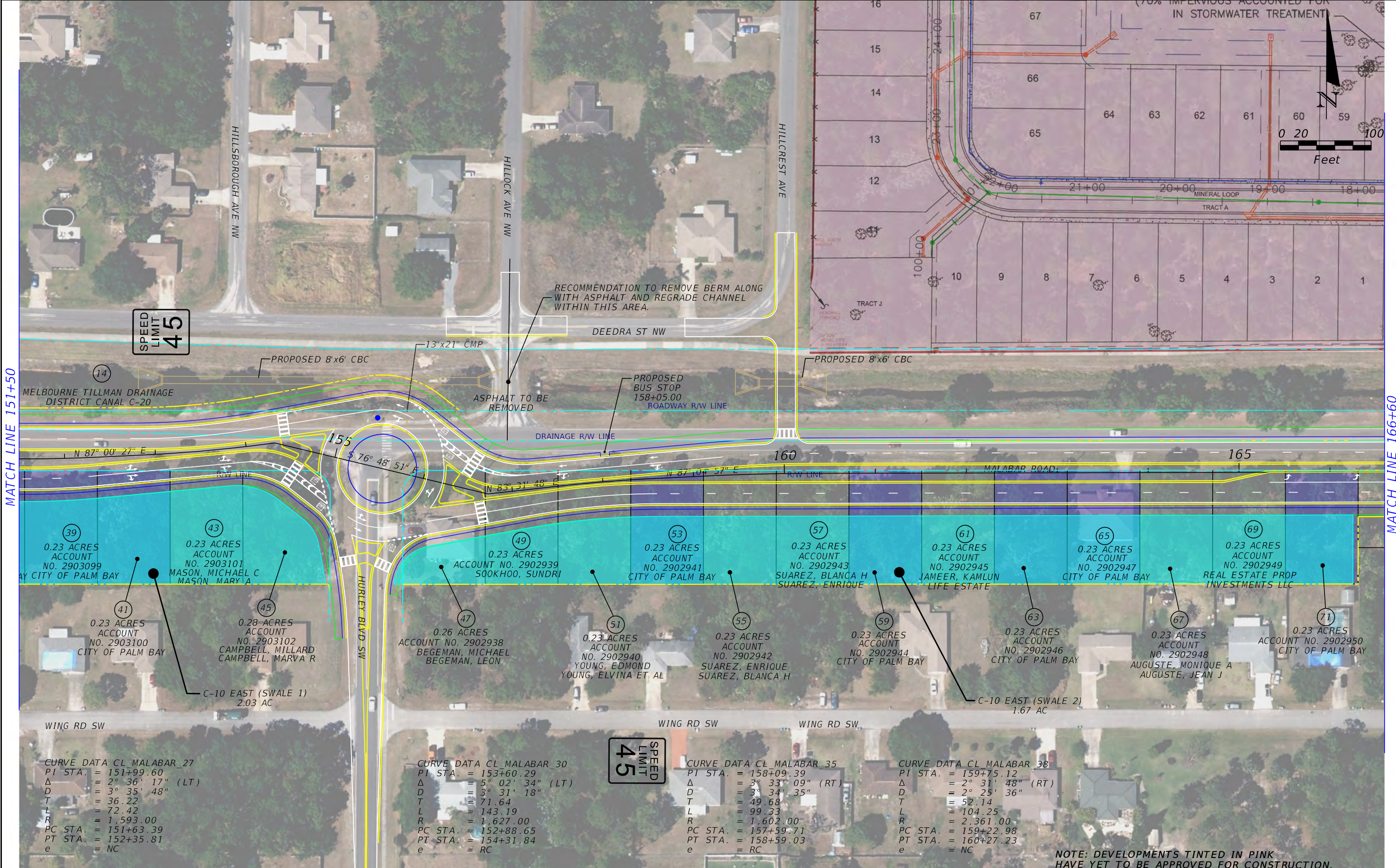


CURVE DATA CL MALABAR\_24  
 PI STA. = 132+42.21  
 Δ = 5° 55' 34" (RT)  
 D = 1° 40' 35"  
 T = 176.92  
 L = 353.52  
 R = 3,418.00  
 PC STA. = 130+65.30  
 PT STA. = 134+18.81  
 e = RC

NOTE: DEVELOPMENTS TINTED IN PINK HAVE YET TO BE APPROVED FOR CONSTRUCTION.

<b>LEGEND</b> 	POTENTIAL HISTORIC BUILDING MEDIUM RISK CONTAMINATION SITES CITY ACQUIRED PARCELS FLOODPLAIN UNAPPROVED DEVELOPMENT RECOMMENDED PREFERRED POND/SWALE LOCATION RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA	<b>CITY OF PALM BAY</b> 		<b>MALABAR ROAD PD&amp;E STUDY</b> <b>PLAN SHEET</b> <b>PREFERRED ALTERNATIVE</b>	SHEET NO. H-9 7
		ROAD NO. COUNTY BREVARD	FINANCIAL PROJECT ID		





MATCH LINE 151+50

MATCH LINE 166+60

**SPEED LIMIT 45**

**SPEED LIMIT 45**

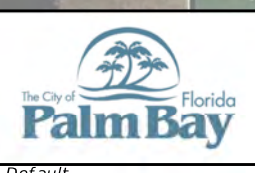
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 PI STA. = 151+99.60  
 $\Delta$  = 2° 36' 17" (LT)  
 D = 3° 35' 48"  
 T = 36.22  
 L = 72.42  
 R = 1,593.00  
 PC STA. = 151+63.39  
 PT STA. = 152+35.81  
 e = NC

**CURVE DATA CL MALABAR 30**  
 PI STA. = 153+60.29  
 $\Delta$  = 5° 02' 34" (LT)  
 D = 3° 31' 18"  
 T = 71.64  
 L = 143.19  
 R = 1,627.00  
 PC STA. = 152+88.65  
 PT STA. = 154+31.84  
 e = RC

**CURVE DATA CL MALABAR 35**  
 PI STA. = 158+09.39  
 $\Delta$  = 3° 33' 09" (RT)  
 D = 3° 34' 35"  
 T = 49.68  
 L = 99.33  
 R = 1,602.00  
 PC STA. = 157+59.71  
 PT STA. = 158+59.03  
 e = RC

**CURVE DATA CL MALABAR 38**  
 PI STA. = 159+75.12  
 $\Delta$  = 2° 31' 48" (RT)  
 D = 2° 25' 36"  
 T = 52.14  
 L = 104.25  
 R = 2,361.00  
 PC STA. = 159+22.98  
 PT STA. = 160+27.23  
 e = NC

LEGEND	
	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	CITY BOUNDARY
	EXISTING BUS STOP LOCATIONS
	PROPOSED BUS STOP LOCATIONS
	POTENTIAL HISTORIC BUILDING
	MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PEF. FLOODPLAIN COMPENSATION AREA

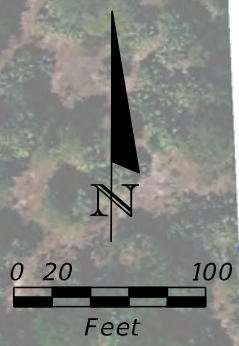
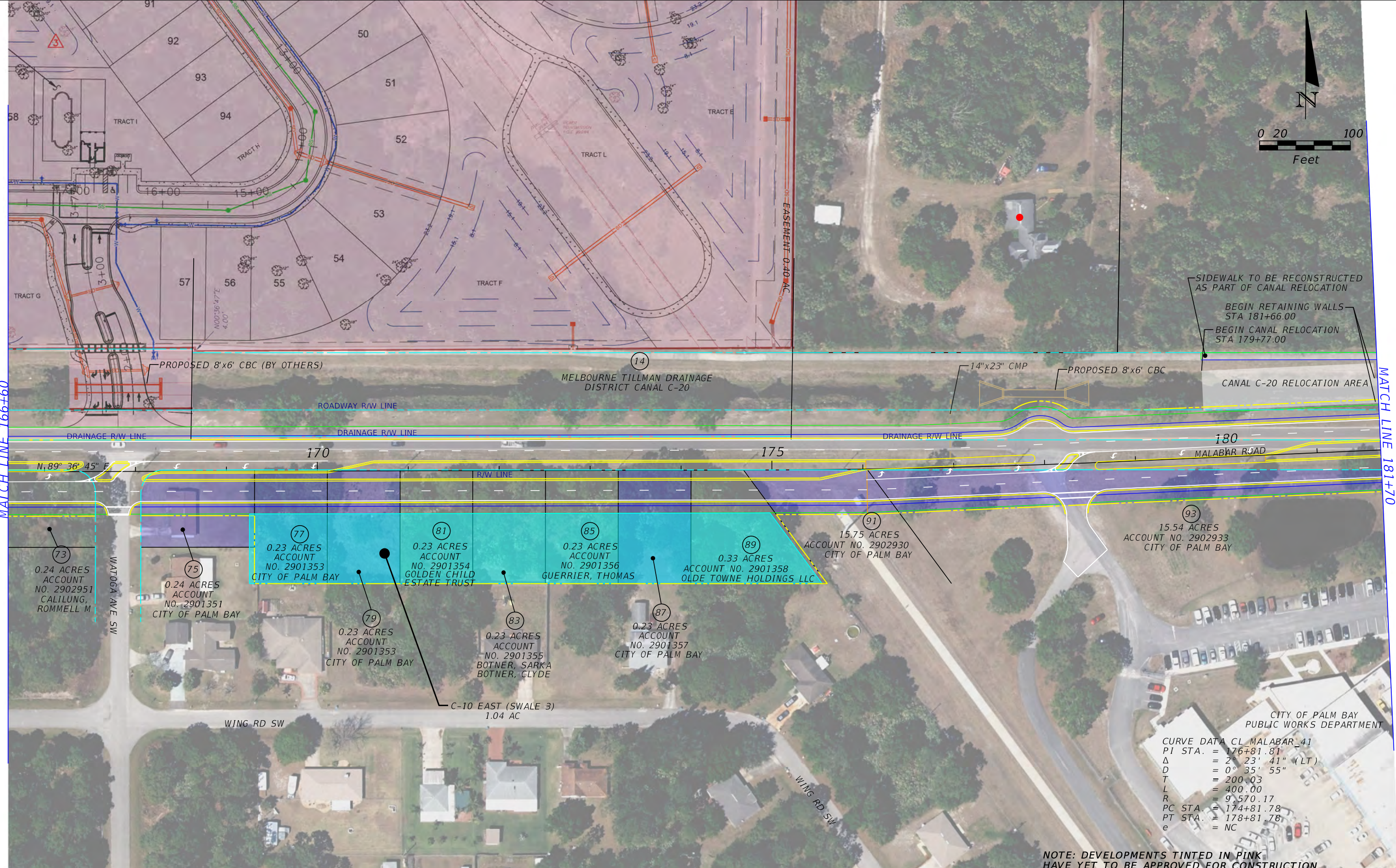


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
 PLAN SHEET  
 PREFERRED ALTERNATIVE**

SHEET NO.  
 H-10  
 8





SIDEWALK TO BE RECONSTRUCTED AS PART OF CANAL RELOCATION  
 BEGIN RETAINING WALLS STA 181+66.00  
 BEGIN CANAL RELOCATION STA 179+77.00

CANAL C-20 RELOCATION AREA

CITY OF PALM BAY  
 PUBLIC WORKS DEPARTMENT  
 CURVE DATA CL MALABAR\_41  
 PI STA. = 176+81.81  
 Δ = 2° 23' 41" (LT)  
 D = 0° 35' 55"  
 T = 200.03  
 L = 400.00  
 R = 9,570.17  
 PC STA. = 174+81.78  
 PT STA. = 178+81.78  
 e = NC

NOTE: DEVELOPMENTS TINTED IN PINK HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE		POTENTIAL HISTORIC BUILDING
	SUBDIVISION PARCEL LINES		MEDIUM RISK CONTAMINATION SITES
	EXISTING RIGHT OF WAY		CITY ACQUIRED PARCELS
	PROPOSED RIGHT OF WAY		FLOODPLAIN
	CITY BOUNDARY		UNAPPROVED DEVELOPMENT
	EXISTING BUS STOP LOCATIONS		RECOMMENDED PREFERRED POND/SWALE LOCATION
	PROPOSED BUS STOP LOCATIONS		RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

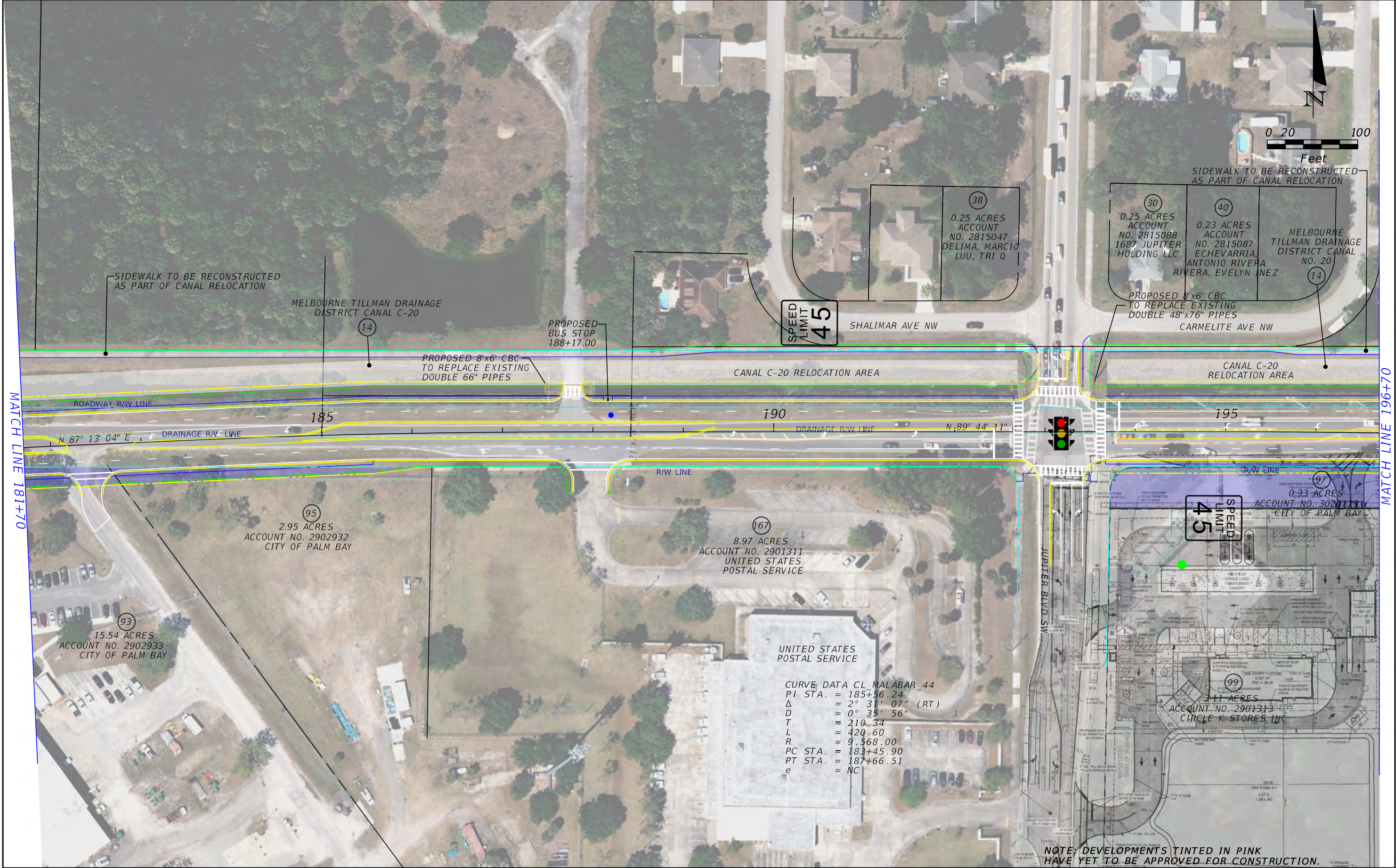
ROAD NO.	COUNTY
	BREVARD

<b>CITY OF PALM BAY</b>	
FINANCIAL PROJECT ID	

**MALABAR ROAD PD&E STUDY  
 PLAN SHEET  
 PREFERRED ALTERNATIVE**

SHEET NO.  
 H-11  
 9





SPEED LIMIT 45

SPEED LIMIT 45

CURVE DATA CL MALABAR\_44  
 PI STA. = 185+56.24  
 Δ = 2° 31' 07" (RT)  
 D = 0° 35' 56"  
 T = 210.34  
 L = 420.60  
 R = 9,568.00  
 PC STA. = 183+45.90  
 PT STA. = 187+66.51  
 e = NC

NOTE: DEVELOPMENTS TINTED IN PINK HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE		POTENTIAL HISTORIC BUILDING
	SUBDIVISION PARCEL LINES		MEDIUM RISK CONTAMINATION SITES
	EXISTING RIGHT OF WAY		CITY ACQUIRED PARCELS
	PROPOSED RIGHT OF WAY		FLOODPLAIN
	CITY BOUNDARY		UNAPPROVED DEVELOPMENT
	EXISTING BUS STOP LOCATIONS		RECOMMENDED PREFERRED POND/SWALE LOCATION
	PROPOSED BUS STOP LOCATIONS		RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

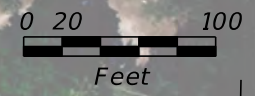


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
 PLAN SHEET  
 PREFERRED ALTERNATIVE**

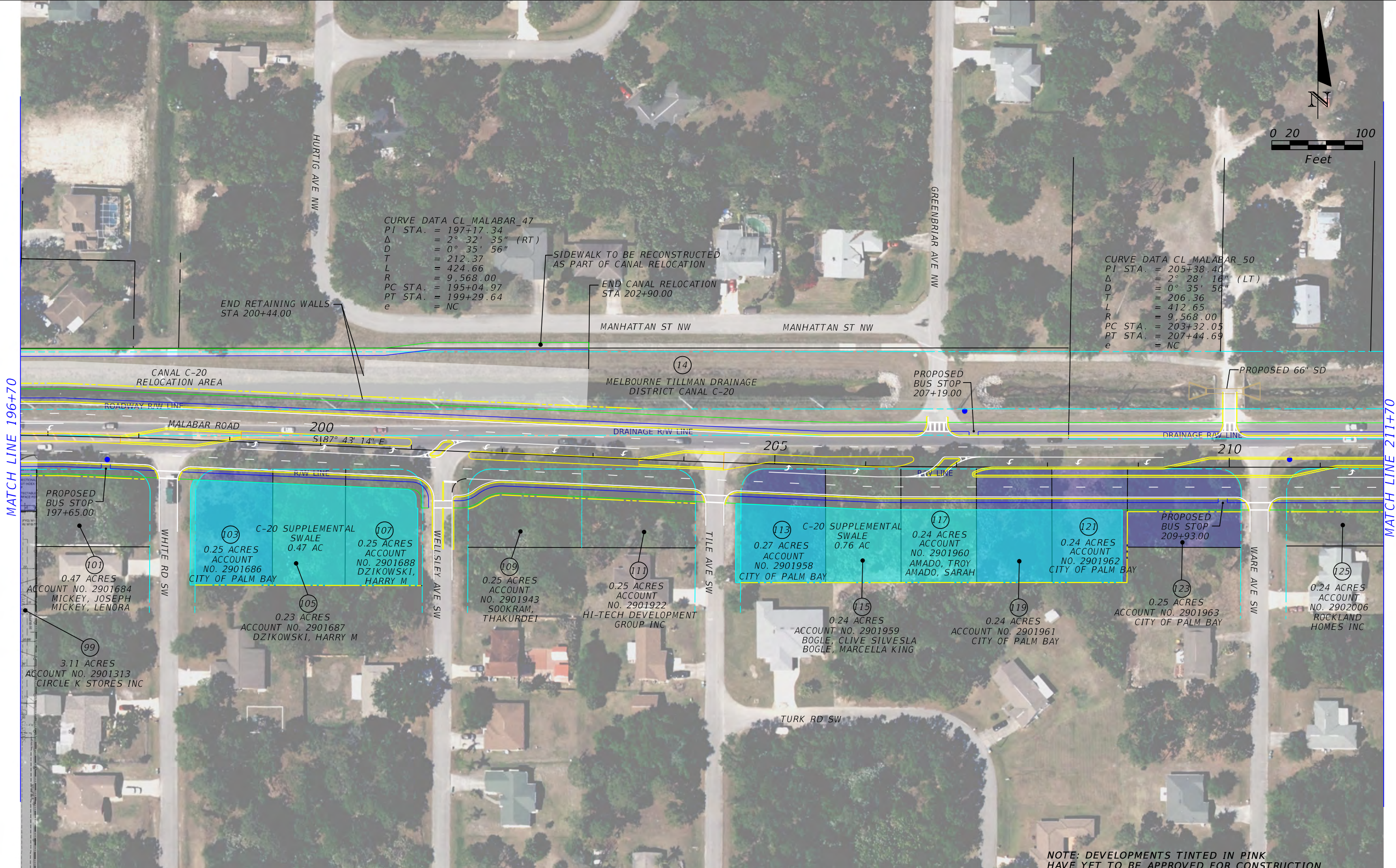
SHEET NO.  
 H-12  
 10





CURVE DATA CL\_MALABAR\_47  
 PI STA. = 197+17.34  
 Δ = 2° 32' 35" (RT)  
 D = 0° 35' 56"  
 T = 212.37  
 L = 424.66  
 R = 9,568.00  
 PC STA. = 195+04.97  
 PT STA. = 199+29.64  
 e = NC

CURVE DATA CL\_MALABAR\_50  
 PI STA. = 205+38.40  
 Δ = 2° 28' 16" (LT)  
 D = 0° 35' 56"  
 T = 206.36  
 L = 412.65  
 R = 9,568.00  
 PC STA. = 203+32.05  
 PT STA. = 207+44.69  
 e = NC



MATCH LINE 196+70

MATCH LINE 211+70

**LEGEND**

	EXISTING PARCEL LINE		POTENTIAL HISTORIC BUILDING
	SUBDIVISION PARCEL LINES		MEDIUM RISK CONTAMINATION SITES
	EXISTING RIGHT OF WAY		CITY ACQUIRED PARCELS
	PROPOSED RIGHT OF WAY		FLOODPLAIN
	CITY BOUNDARY		UNAPPROVED DEVELOPMENT
	EXISTING BUS STOP LOCATIONS		RECOMMENDED PREFERRED POND/SWALE LOCATION
	PROPOSED BUS STOP LOCATIONS		RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

	POTENTIAL HISTORIC BUILDING
	MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA



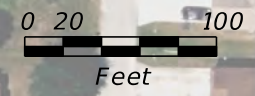
CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
 PLAN SHEET  
 PREFERRED ALTERNATIVE**

SHEET NO.  
 H-13  
 11

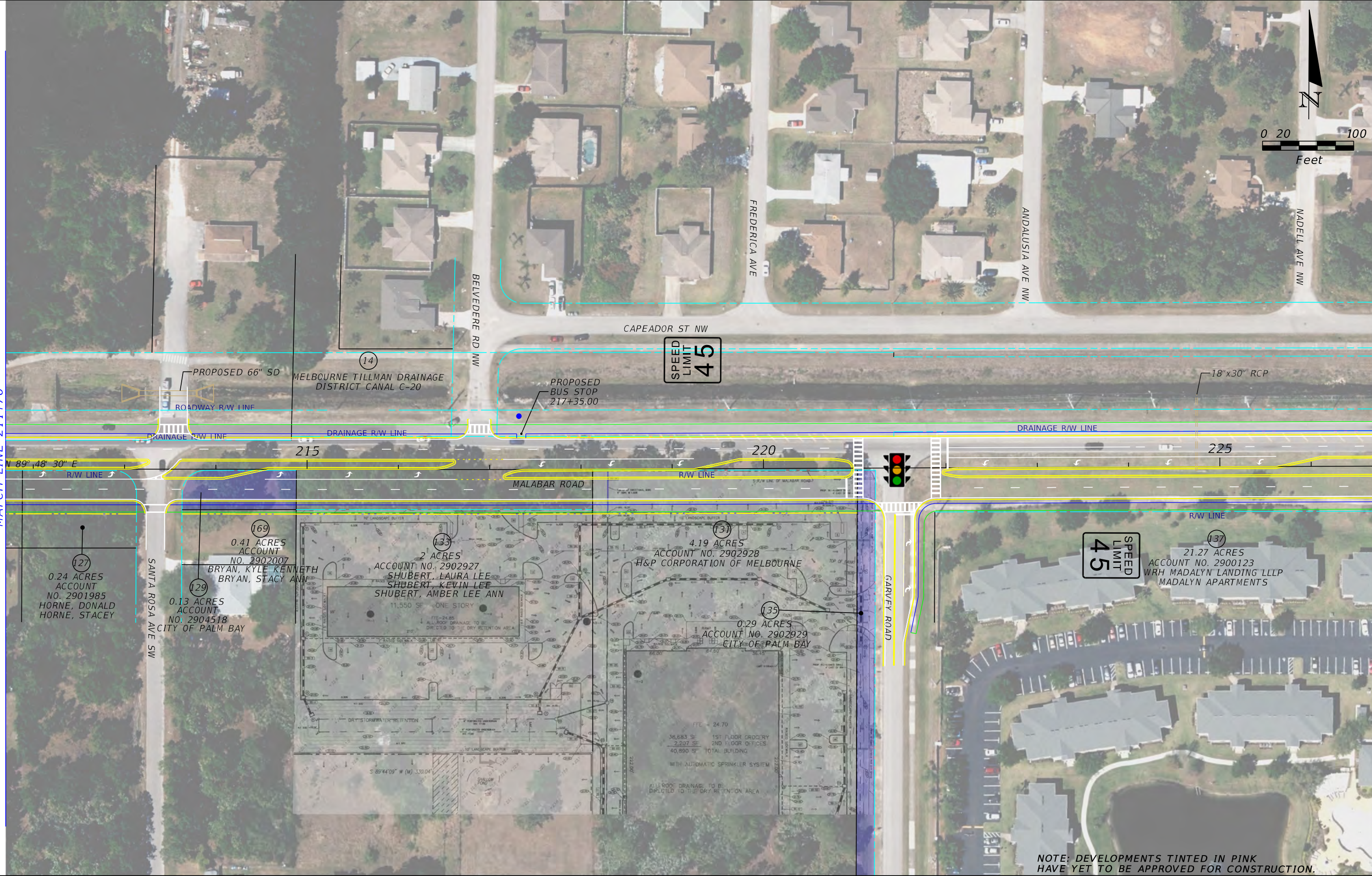
NOTE: DEVELOPMENTS TINTED IN PINK HAVE YET TO BE APPROVED FOR CONSTRUCTION.





MATCH LINE 211+70

MATCH LINE 226+70



NOTE: DEVELOPMENTS TINTED IN PINK HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE
	SUBDIVISION PARCEL LINES
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	CITY BOUNDARY
	EXISTING BUS STOP LOCATIONS
	PROPOSED BUS STOP LOCATIONS

	POTENTIAL HISTORIC BUILDING
	MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

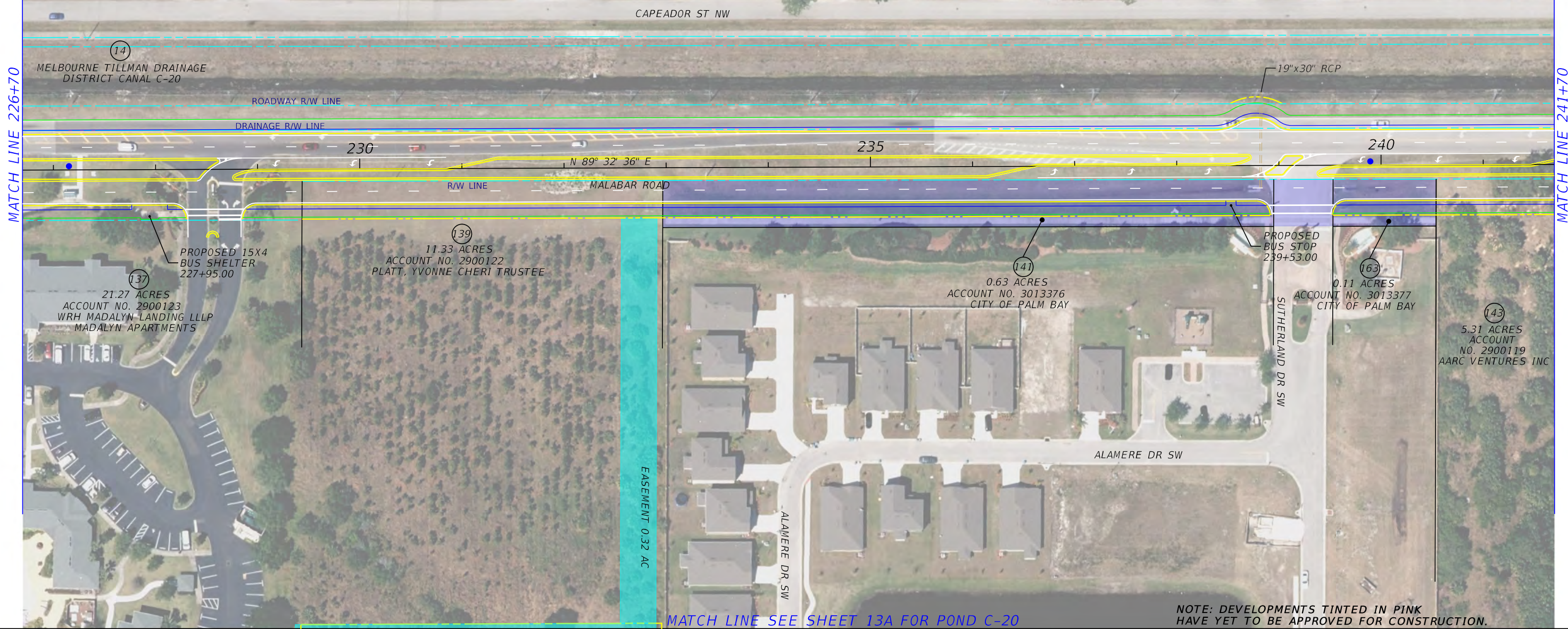


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
PLAN SHEET  
PREFERRED ALTERNATIVE**

SHEET NO.
H-14
12





MATCH LINE 226+70

MATCH LINE 241+70

MATCH LINE SEE SHEET 13A FOR POND C-20

NOTE: DEVELOPMENTS TINTED IN PINK HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE		POTENTIAL HISTORIC BUILDING
	SUBDIVISION PARCEL LINES		MEDIUM RISK CONTAMINATION SITES
	EXISTING RIGHT OF WAY		CITY ACQUIRED PARCELS
	PROPOSED RIGHT OF WAY		FLOODPLAIN
	CITY BOUNDARY		UNAPPROVED DEVELOPMENT
	EXISTING BUS STOP LOCATIONS		RECOMMENDED PREFERRED POND/SWALE LOCATION
	PROPOSED BUS STOP LOCATIONS		RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

	POTENTIAL HISTORIC BUILDING
	MEDIUM RISK CONTAMINATION SITES
	CITY ACQUIRED PARCELS
	FLOODPLAIN
	UNAPPROVED DEVELOPMENT
	RECOMMENDED PREFERRED POND/SWALE LOCATION
	RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

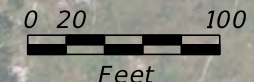


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
PLAN SHEET  
PREFERRED ALTERNATIVE**

SHEET NO.
H-15 13





SPEED LIMIT 45

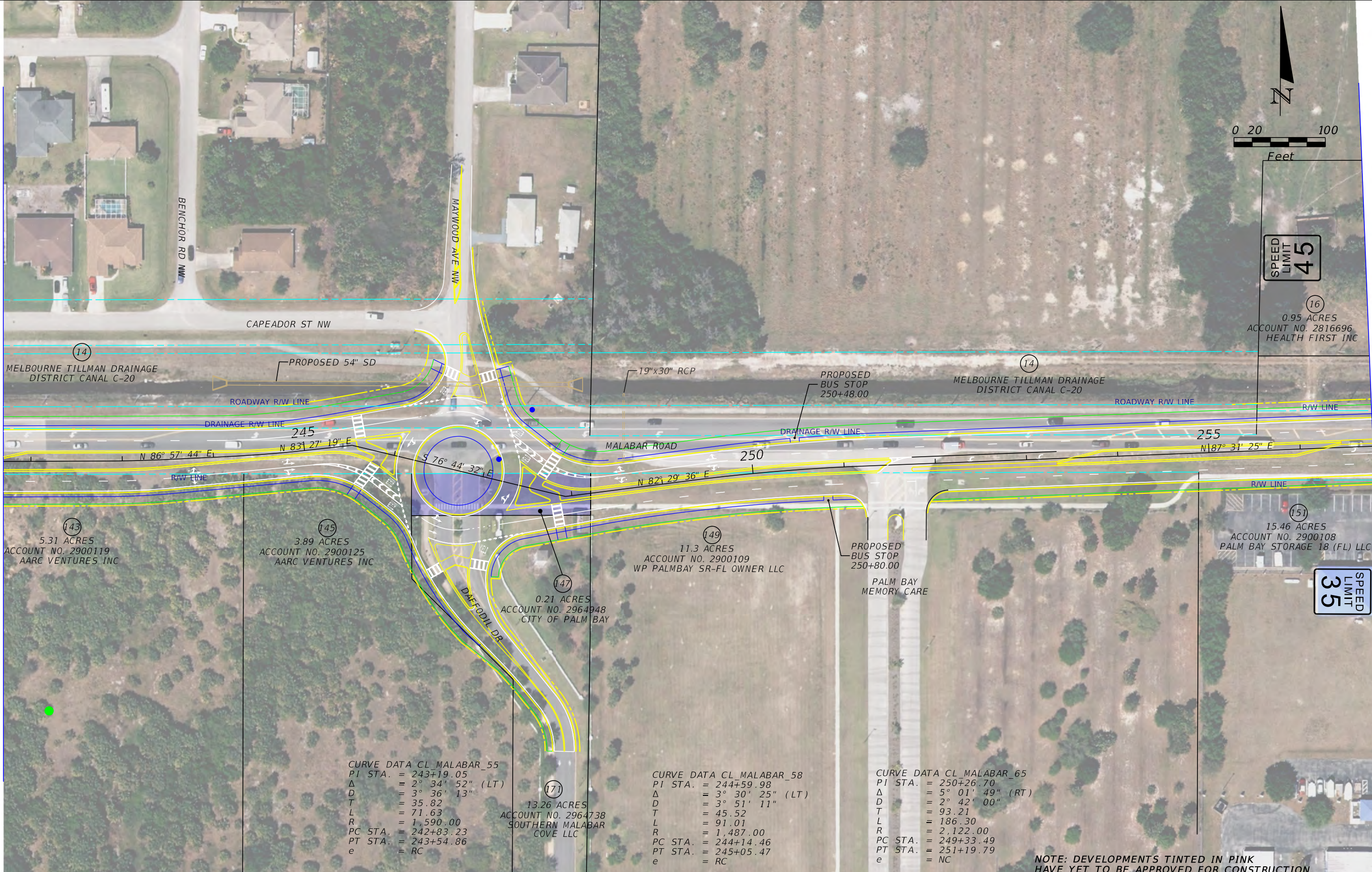
16  
0.95 ACRES  
ACCOUNT NO. 2816696  
HEALTH FIRST INC

SPEED LIMIT 35

151  
15.46 ACRES  
ACCOUNT NO. 2900108  
PALM BAY STORAGE 18 (FL) LLC

MATCH LINE 241+70

MATCH LINE 256+80



CURVE DATA CL\_MALABAR\_55  
PI STA. = 243+19.05  
Δ = 2° 34' 52" (LT)  
D = 3° 36' 13"  
T = 35.82  
L = 71.63  
R = 1,590.00  
PC STA. = 242+83.23  
PT STA. = 243+54.86  
e = RC

CURVE DATA CL\_MALABAR\_58  
PI STA. = 244+59.98  
Δ = 3° 30' 25" (LT)  
D = 3° 51' 11"  
T = 45.52  
L = 91.01  
R = 1,487.00  
PC STA. = 244+14.46  
PT STA. = 245+05.47  
e = RC

CURVE DATA CL\_MALABAR\_65  
PI STA. = 250+26.70  
Δ = 5° 01' 49" (RT)  
D = 2° 42' 00"  
T = 93.21  
L = 186.30  
R = 2,122.00  
PC STA. = 249+33.49  
PT STA. = 251+19.79  
e = NC

NOTE: DEVELOPMENTS TINTED IN PINK HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE		POTENTIAL HISTORIC BUILDING
	SUBDIVISION PARCEL LINES		MEDIUM RISK CONTAMINATION SITES
	EXISTING RIGHT OF WAY		CITY ACQUIRED PARCELS
	PROPOSED RIGHT OF WAY		FLOODPLAIN
	CITY BOUNDARY		UNAPPROVED DEVELOPMENT
	EXISTING BUS STOP LOCATIONS		RECOMMENDED PREFERRED POND/SWALE LOCATION
	PROPOSED BUS STOP LOCATIONS		RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA



CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY**  
**PLAN SHEET**  
**PREFERRED ALTERNATIVE**

SHEET NO.  
H-16  
14





NOTE: DEVELOPMENTS TINTED IN PINK HAVE YET TO BE APPROVED FOR CONSTRUCTION.

**LEGEND**

	EXISTING PARCEL LINE		POTENTIAL HISTORIC BUILDING
	SUBDIVISION PARCEL LINES		MEDIUM RISK CONTAMINATION SITES
	EXISTING RIGHT OF WAY		CITY ACQUIRED PARCELS
	PROPOSED RIGHT OF WAY		FLOODPLAIN
	CITY BOUNDARY		UNAPPROVED DEVELOPMENT
	EXISTING BUS STOP LOCATIONS		RECOMMENDED PREFERRED POND/SWALE LOCATION
	PROPOSED BUS STOP LOCATIONS		RECOM. PREFERRED FLOODPLAIN COMPENSATION AREA

<b>CITY OF PALM BAY</b>		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	



<b>MALABAR ROAD PD&amp;E STUDY</b>		
<b>PLAN SHEET</b>		
<b>PREFERRED ALTERNATIVE</b>		

SHEET NO.
H-17
15



# Appendix I – Typical Section Package

STATE OF FLORIDA  
 DEPARTMENT OF TRANSPORTATION

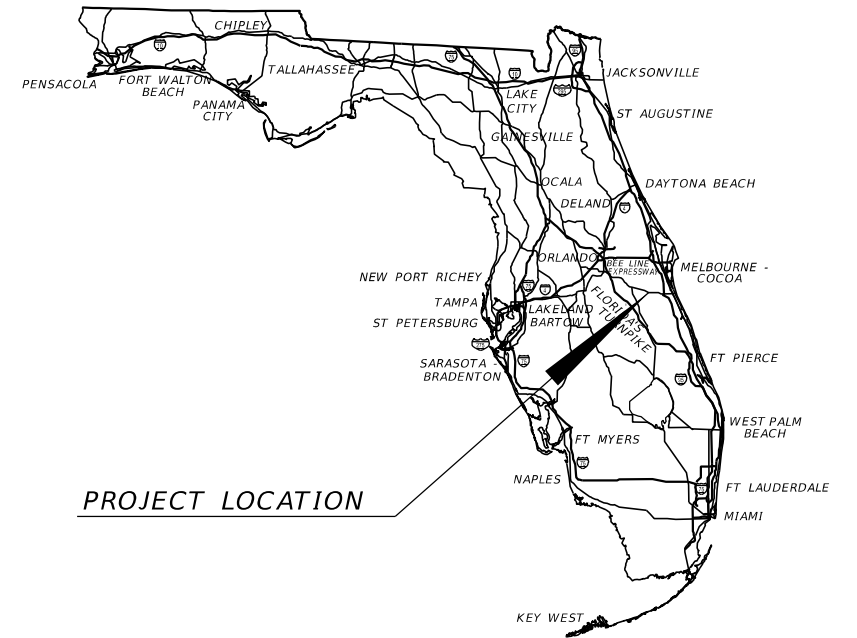
TYPICAL SECTION PACKAGE

FINANCIAL PROJECT ID 437210-1-28-01

BREVARD COUNTY

MALABAR ROAD

FROM WEST OF ST. JOHNS HERITAGE PKWY TO MINTON ROAD  
 WIDENING OF MALABAR ROAD FROM 2-LANES TO 4-LANES



CITY OF PALM BAY  
 CITY ENGINEER

CONCURRING WITH:  
 TYPICAL SECTION ELEMENTS  
 DESIGN AND POSTED SPEED

INDEX OF SHEETS

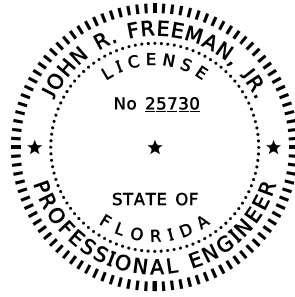
SHEET NO	SHEET DESCRIPTION
1	COVER SHEET
2	SIGNATURE SHEET
3	TYPICAL SECTION NO. 1
4	TYPICAL SECTION NO. 2
5	TYPICAL SECTION NO. 3
6	BRIDGE TYPICAL
7	TYPICAL SECTION NO. 4
8	TYPICAL SECTION NO. 5
9	TYPICAL SECTION NO. 6
10	TYPICAL SECTION NO. 7
11	TYPICAL SECTION NO. 8
12	TYPICAL SECTION NO. 9
13	TYPICAL SECTION NO. 10

SHEET NO.

1



THIS ITEM HAS BEEN DIGITALLY  
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ON THE DATE ADJACENT TO THE SEAL

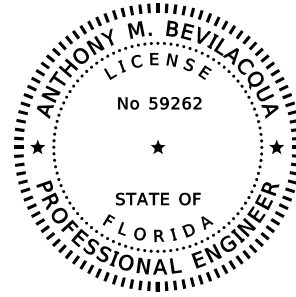
PRINTED COPIES OF THIS DOCUMENT ARE  
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AND THE SIGNATURE MUST BE VERIFIED  
ON ANY ELECTRONIC COPIES.

KITTELSON & ASSOCIATES, INC  
225 E ROBINSON STREET, SUITE 355  
ORLANDO, FL 32801  
CERTIFICATE OF AUTHORIZATION: 007524  
JOHN R. FREEMAN, JR., P.E. NO. 25730

THE ABOVE NAMED PROFESSIONAL ENGINEER SHALL BE RESPONSIBLE FOR THE  
FOLLOWING SHEETS IN ACCORDANCE WITH RULE 61G15-23.004, F.A.C.

SHEET NO	SHEET DESCRIPTION
3	TYPICAL SECTION NO. 1
4	TYPICAL SECTION NO. 2
5	TYPICAL SECTION NO. 3
7	TYPICAL SECTION NO. 4
8	TYPICAL SECTION NO. 5
9	TYPICAL SECTION NO. 6
10	TYPICAL SECTION NO. 7
11	TYPICAL SECTION NO. 8
12	TYPICAL SECTION NO. 9
13	TYPICAL SECTION NO. 10

THIS ITEM HAS BEEN DIGITALLY  
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ON THE DATE ADJACENT TO THE SEAL

PRINTED COPIES OF THIS DOCUMENT ARE  
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AND THE SIGNATURE MUST BE VERIFIED  
ON ANY ELECTRONIC COPIES.

INWOOD CONSULTING ENGINEERS, INC.  
3000 DOVERA DR, SUITE 200  
OVIEDO, FL 32765  
CERTIFICATE OF AUTHORIZATION: 007074  
ANTHONY M. BEVILACQUA, PE NO. 59262

THE ABOVE NAMED PROFESSIONAL ENGINEER SHALL BE RESPONSIBLE FOR THE  
FOLLOWING SHEETS IN ACCORDANCE WITH RULE 61G15-23.004, F.A.C.

SHEET NO	SHEET DESCRIPTION
6	BRIDGE TYPICAL

FINANCIAL PROJECT ID	SHEET NO.
437210-1-28-01	2

**PROJECT CONTROLS**

CONTEXT CLASSIFICATION

- ( ) C1 : NATURAL            ( ) C3C : SUBURBAN COMM.
- ( ) C2 : RURAL             ( ) C4 : URBAN GENERAL
- ( ) C2T : RURAL TOWN    ( ) C5 : URBAN CENTER
- ( ) C3R : SUBURBAN RES. ( ) C6 : URBAN CORE
- (X) N/A : LOCAL ROAD

FUNCTIONAL CLASSIFICATION

- ( ) INTERSTATE            ( ) MAJOR COLLECTOR
- ( ) FREEWAY/EXPWY.    ( ) MINOR COLLECTOR
- ( ) PRINCIPAL ARTERIAL ( ) LOCAL
- (X) MINOR ARTERIAL

HIGHWAY SYSTEM

- ( ) NATIONAL HIGHWAY SYSTEM
- ( ) STRATEGIC INTERMODAL SYSTEM
- ( ) STATE HIGHWAY SYSTEM
- (X) OFF-STATE HIGHWAY SYSTEM

ACCESS CLASSIFICATION

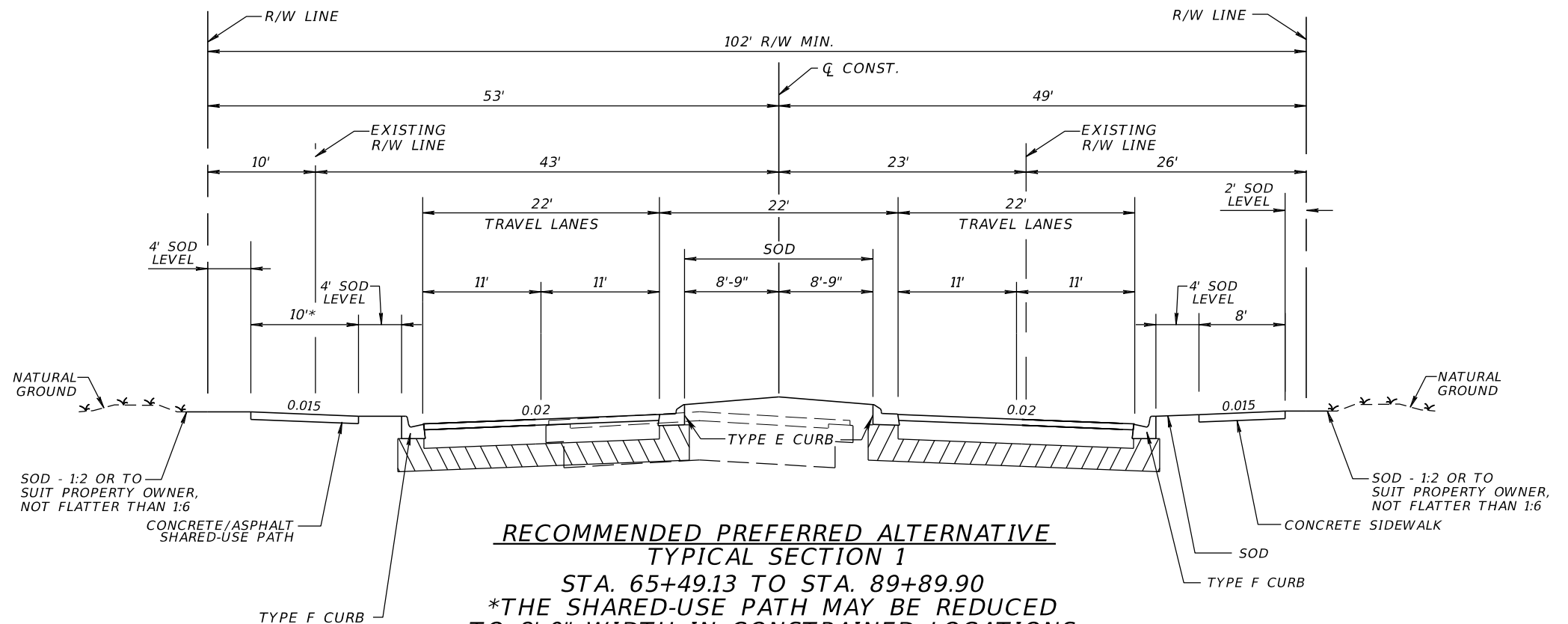
- ( ) 1 - FREEWAY
- ( ) 2 - RESTRICTIVE w/Service Roads
- ( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
- ( ) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
- ( ) 5 - RESTRICTIVE w/440 ft. Connection Spacing
- ( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
- ( ) 7 - BOTH MEDIAN TYPES
- (X) 8 - N/A: OFF-STATE HIGHWAY SYSTEM

CRITERIA

- (X) NEW CONSTRUCTION / RECONSTRUCTION
- ( ) RESURFACING (LA FACILITIES)
- ( ) RRR (ARTERIALS & COLLECTORS)

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

**TYPICAL SECTION No. 1**



**RECOMMENDED PREFERRED ALTERNATIVE  
TYPICAL SECTION 1**  
 STA. 65+49.13 TO STA. 89+89.90  
 \*THE SHARED-USE PATH MAY BE REDUCED TO 8'-0" WIDTH IN CONSTRAINED LOCATIONS  
 \*\*SIDEWALK LIMITS MAY REQUIRE ADJUSTMENT FOR INSTALLATION OF BUS STOPS AND SHELTERS. SEE PLANS FOR LOCATIONS.

**TRAFFIC DATA**  
 STA. 65+ 49. 13 TO STA. 89+ 89. 90

CURRENT YEAR = 2020 AADT = 7200  
 ESTIMATED OPENING YEAR = 2030 AADT = 11000  
 ESTIMATED DESIGN YEAR = 2050 AADT = 16000  
 K = 9% D = 60% T = 4.5% (24 HOUR)  
 DESIGN HOUR T = 2.25%  
 DESIGN SPEED = 40 MPH  
 POSTED SPEED = 35 MPH

FINANCIAL PROJECT ID	SHEET NO.
437210-1-28-01	3



**PROJECT CONTROLS**

**CONTEXT CLASSIFICATION**

- ( ) C1 : NATURAL            ( ) C3C : SUBURBAN COMM.
- ( ) C2 : RURAL            ( ) C4 : URBAN GENERAL
- ( ) C2T : RURAL TOWN    ( ) C5 : URBAN CENTER
- ( ) C3R : SUBURBAN RES. ( ) C6 : URBAN CORE
- (X) N/A : LOCAL ROAD

**FUNCTIONAL CLASSIFICATION**

- ( ) INTERSTATE            ( ) MAJOR COLLECTOR
- ( ) FREEWAY/EXPWY.    ( ) MINOR COLLECTOR
- ( ) PRINCIPAL ARTERIAL ( ) LOCAL
- (X) MINOR ARTERIAL

**HIGHWAY SYSTEM**

- ( ) NATIONAL HIGHWAY SYSTEM
- ( ) STRATEGIC INTERMODAL SYSTEM
- ( ) STATE HIGHWAY SYSTEM
- (X) OFF-STATE HIGHWAY SYSTEM

**ACCESS CLASSIFICATION**

- ( ) 1 - FREEWAY
- ( ) 2 - RESTRICTIVE w/Service Roads
- ( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
- ( ) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
- ( ) 5 - RESTRICTIVE w/440 ft. Connection Spacing
- ( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
- ( ) 7 - BOTH MEDIAN TYPES
- (X) 8 - N/A: OFF-STATE HIGHWAY SYSTEM

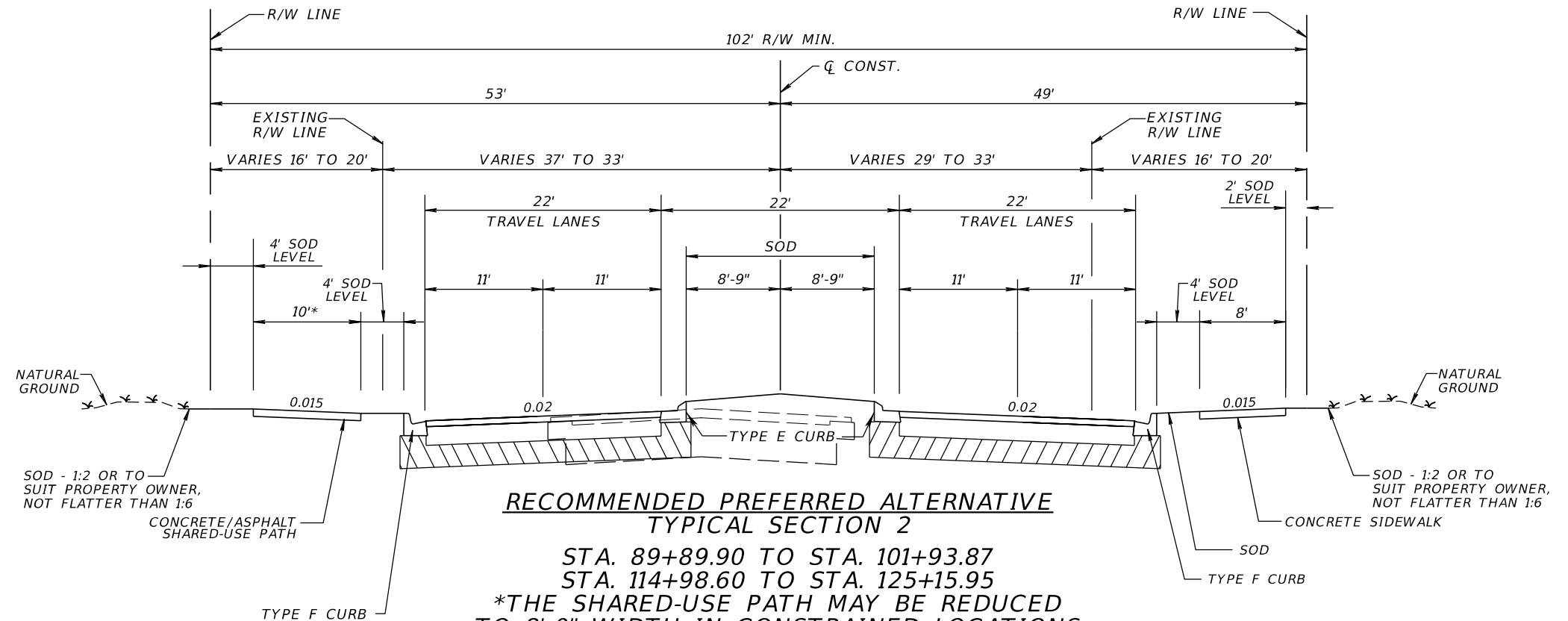
**CRITERIA**

- (X) NEW CONSTRUCTION / RECONSTRUCTION
- ( ) RESURFACING (LA FACILITIES)
- ( ) RRR (ARTERIALS & COLLECTORS)

**POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:**

I-4

**TYPICAL SECTION No. 2**



**RECOMMENDED PREFERRED ALTERNATIVE TYPICAL SECTION 2**

STA. 89+89.90 TO STA. 101+93.87  
 STA. 114+98.60 TO STA. 125+15.95  
 \*THE SHARED-USE PATH MAY BE REDUCED TO 8'-0" WIDTH IN CONSTRAINED LOCATIONS  
 \*\*SIDEWALK LIMITS MAY REQUIRE ADJUSTMENT FOR INSTALLATION OF BUS STOPS AND SHELTERS. SEE PLANS FOR LOCATIONS.

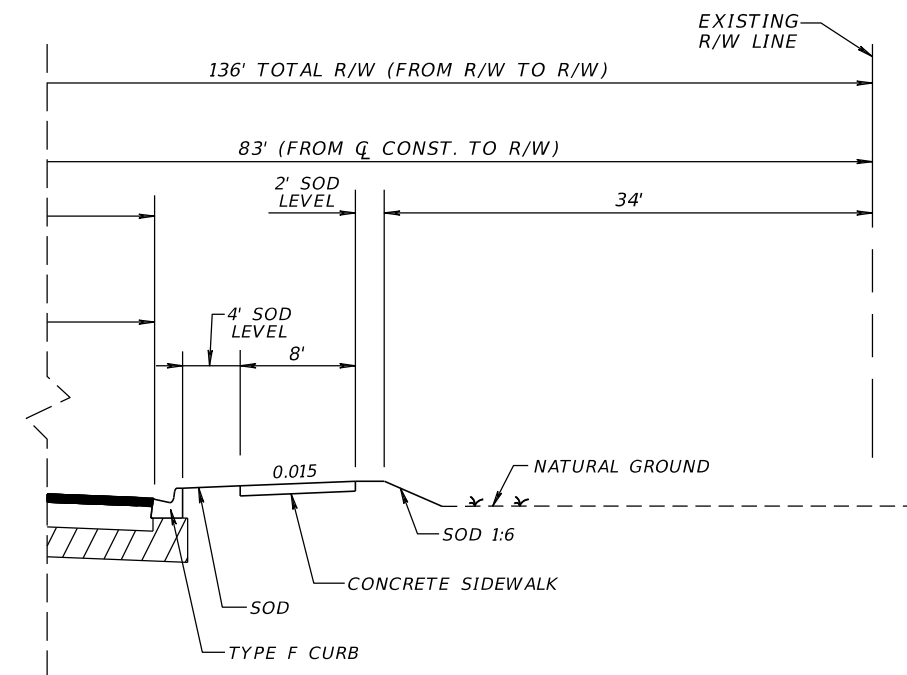
**TRAFFIC DATA  
 STA. 89+ 89. 90 TO STA. 92+ 00. 00**

CURRENT YEAR = 2020 AADT = 7200  
 ESTIMATED OPENING YEAR = 2030 AADT = 11000  
 ESTIMATED DESIGN YEAR = 2050 AADT = 16000  
 K = 9% D = 60% T = 4.5% (24 HOUR)  
 DESIGN HOUR T = 2.25%  
 DESIGN SPEED = 40 MPH  
 POSTED SPEED = 35 MPH

**TRAFFIC DATA  
 STA. 92+ 00. 00 TO STA. 125+ 15. 95**

CURRENT YEAR = 2020 AADT = 7200  
 ESTIMATED OPENING YEAR = 2030 AADT = 11000  
 ESTIMATED DESIGN YEAR = 2050 AADT = 16000  
 K = 9% D = 60% T = 4.5% (24 HOUR)  
 DESIGN HOUR T = 2.25%  
 DESIGN SPEED = 45 MPH  
 POSTED SPEED = 45 MPH

**NOTE:**  
 BETWEEN STA. 125+15.95 TO STA. 133+77.21 THE TYPICAL SECTION VARIES FOR THE KRASSNER/BENDING BRANCH ROUNDABOUT



**STA. 101+93.87 TO STA. 114+98.60**

FINANCIAL PROJECT ID	SHEET NO.
437210-1-28-01	4

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

**PROJECT CONTROLS**

CONTEXT CLASSIFICATION

- ( ) C1 : NATURAL            ( ) C3C : SUBURBAN COMM.
- ( ) C2 : RURAL            ( ) C4 : URBAN GENERAL
- ( ) C2T : RURAL TOWN    ( ) C5 : URBAN CENTER
- ( ) C3R : SUBURBAN RES. ( ) C6 : URBAN CORE
- (X) N/A : LOCAL ROAD

FUNCTIONAL CLASSIFICATION

- ( ) INTERSTATE            ( ) MAJOR COLLECTOR
- ( ) FREEWAY/EXPWY.    ( ) MINOR COLLECTOR
- ( ) PRINCIPAL ARTERIAL ( ) LOCAL
- (X) MINOR ARTERIAL

HIGHWAY SYSTEM

- ( ) NATIONAL HIGHWAY SYSTEM
- ( ) STRATEGIC INTERMODAL SYSTEM
- ( ) STATE HIGHWAY SYSTEM
- (X) OFF-STATE HIGHWAY SYSTEM

ACCESS CLASSIFICATION

- ( ) 1 - FREEWAY
- ( ) 2 - RESTRICTIVE w/Service Roads
- ( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
- ( ) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
- ( ) 5 - RESTRICTIVE w/440 ft. Connection Spacing
- ( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
- ( ) 7 - BOTH MEDIAN TYPES
- (X) 8 - N/A: OFF-STATE HIGHWAY SYSTEM

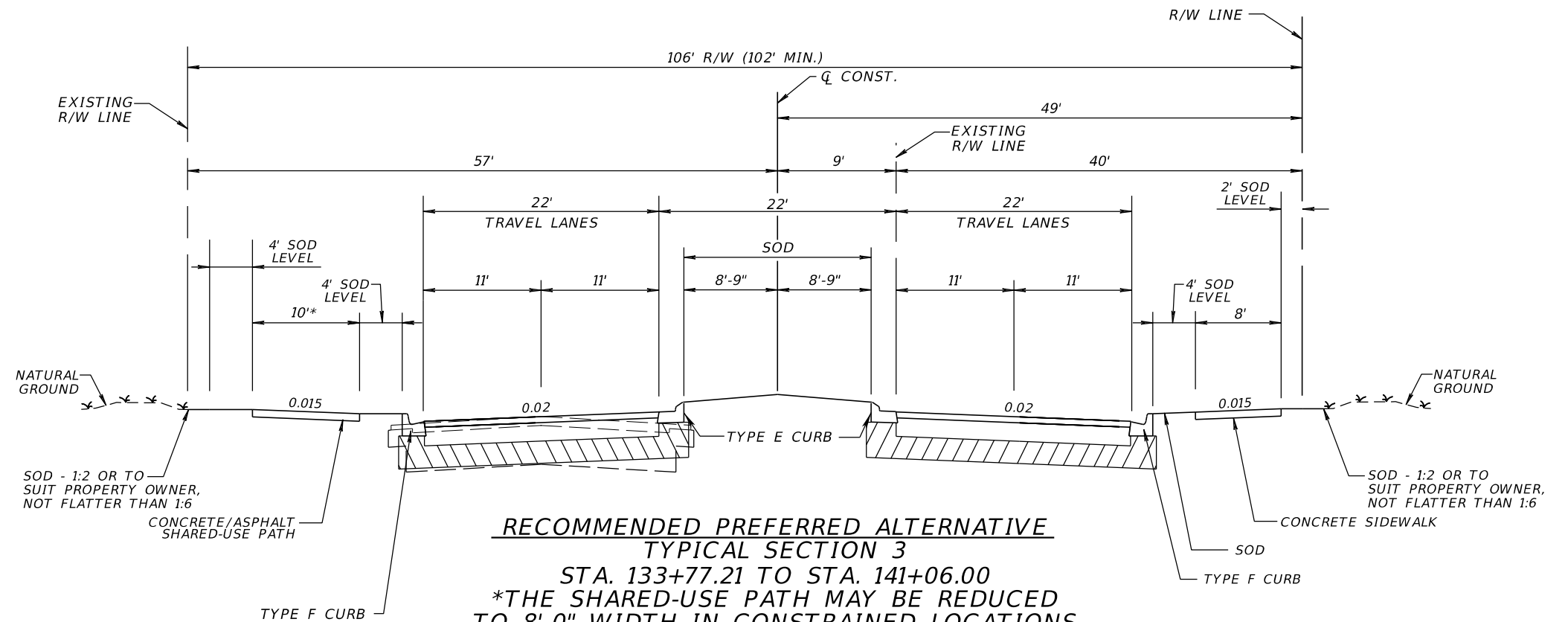
CRITERIA

- (X) NEW CONSTRUCTION / RECONSTRUCTION
- ( ) RESURFACING (LA FACILITIES)
- ( ) RRR (ARTERIALS & COLLECTORS)

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

I-5

**TYPICAL SECTION No. 3**



**RECOMMENDED PREFERRED ALTERNATIVE**  
**TYPICAL SECTION 3**  
**STA. 133+77.21 TO STA. 141+06.00**  
**\*THE SHARED-USE PATH MAY BE REDUCED TO 8'-0" WIDTH IN CONSTRAINED LOCATIONS**  
**\*\*SIDEWALK LIMITS MAY REQUIRE ADJUSTMENT FOR INSTALLATION OF BUS STOPS AND SHELTERS.**  
**SEE PLANS FOR LOCATIONS.**

**TRAFFIC DATA**  
**STA. 125+ 15. 95 TO STA. 193+ 14. 00**

CURRENT YEAR = 2020 AADT = 11000  
 ESTIMATED OPENING YEAR = 2030 AADT = 16000  
 ESTIMATED DESIGN YEAR = 2050 AADT = 21000  
 K = 9% D = 55% T = 5.5% (24 HOUR)  
 DESIGN HOUR T = 2.75%  
 DESIGN SPEED = 45 MPH  
 POSTED SPEED = 45 MPH

FINANCIAL PROJECT ID	SHEET NO.
437210-1-28-01	5

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.



**PROJECT CONTROLS**

CONTEXT CLASSIFICATION

- ( ) C1 : NATURAL                      ( ) C3C : SUBURBAN COMM.
- ( ) C2 : RURAL                        ( ) C4 : URBAN GENERAL
- ( ) C2T : RURAL TOWN                ( ) C5 : URBAN CENTER
- ( ) C3R : SUBURBAN RES.            ( ) C6 : URBAN CORE
- (X) N/A : LOCAL ROAD

FUNCTIONAL CLASSIFICATION

- ( ) INTERSTATE                        ( ) MAJOR COLLECTOR
- ( ) FREEWAY/EXPWY.                ( ) MINOR COLLECTOR
- ( ) PRINCIPAL ARTERIAL            ( ) LOCAL
- (X) MINOR ARTERIAL

HIGHWAY SYSTEM

- ( ) NATIONAL HIGHWAY SYSTEM
- ( ) STRATEGIC INTERMODAL SYSTEM
- ( ) STATE HIGHWAY SYSTEM
- (X) OFF-STATE HIGHWAY SYSTEM

ACCESS CLASSIFICATION

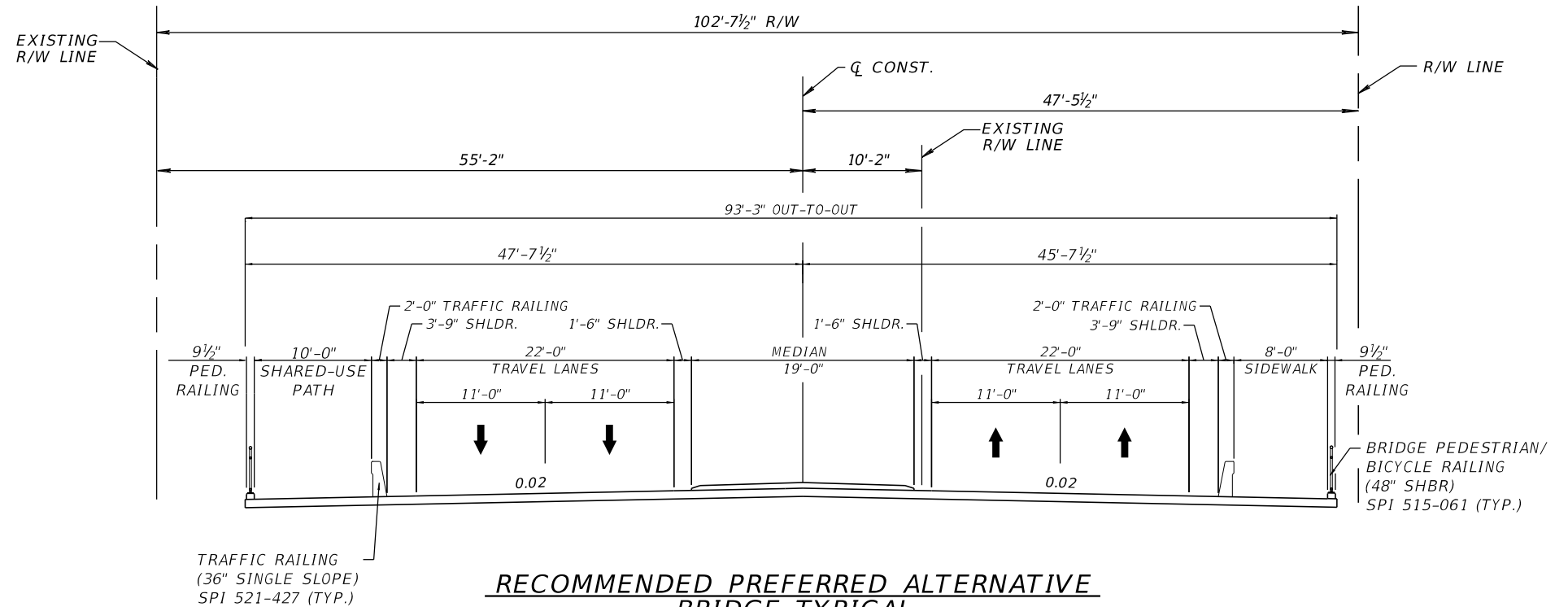
- ( ) 1 - FREEWAY
- ( ) 2 - RESTRICTIVE w/Service Roads
- ( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
- ( ) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
- ( ) 5 - RESTRICTIVE w/440 ft. Connection Spacing
- ( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
- ( ) 7 - BOTH MEDIAN TYPES
- (X) 8 - N/A: OFF-STATE HIGHWAY SYSTEM

CRITERIA

- (X) NEW CONSTRUCTION / RECONSTRUCTION
- ( ) RESURFACING (LA FACILITIES)
- ( ) RRR (ARTERIALS & COLLECTORS)

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

**BRIDGE TYPICAL SECTION**



**RECOMMENDED PREFERRED ALTERNATIVE  
BRIDGE TYPICAL**

STA. 141+06.00 TO STA. 143+17.62

**TRAFFIC DATA  
STA. 125+ 15. 95 TO STA. 193+ 14. 00**

CURRENT YEAR = 2020 AADT = 11000  
 ESTIMATED OPENING YEAR = 2030 AADT = 16000  
 ESTIMATED DESIGN YEAR = 2050 AADT = 21000  
 K = 9% D = 55% T = 5.5% (24 HOUR)  
 DESIGN HOUR T = 2.75%  
 DESIGN SPEED = 45 MPH  
 POSTED SPEED = 45 MPH

FINANCIAL PROJECT ID	SHEET NO.
437210-1-28-01	6

**PROJECT CONTROLS**

**CONTEXT CLASSIFICATION**

- ( ) C1 : NATURAL                      ( ) C3C : SUBURBAN COMM.
- ( ) C2 : RURAL                        ( ) C4 : URBAN GENERAL
- ( ) C2T : RURAL TOWN                ( ) C5 : URBAN CENTER
- ( ) C3R : SUBURBAN RES.            ( ) C6 : URBAN CORE
- (X) N/A : LOCAL ROAD

**FUNCTIONAL CLASSIFICATION**

- ( ) INTERSTATE                        ( ) MAJOR COLLECTOR
- ( ) FREEWAY/EXPWY.                ( ) MINOR COLLECTOR
- ( ) PRINCIPAL ARTERIAL            ( ) LOCAL
- (X) MINOR ARTERIAL

**HIGHWAY SYSTEM**

- ( ) NATIONAL HIGHWAY SYSTEM
- ( ) STRATEGIC INTERMODAL SYSTEM
- ( ) STATE HIGHWAY SYSTEM
- (X) OFF-STATE HIGHWAY SYSTEM

**ACCESS CLASSIFICATION**

- ( ) 1 - FREEWAY
- ( ) 2 - RESTRICTIVE w/Service Roads
- ( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
- ( ) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
- ( ) 5 - RESTRICTIVE w/440 ft. Connection Spacing
- ( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
- ( ) 7 - BOTH MEDIAN TYPES
- (X) 8 - N/A: OFF-STATE HIGHWAY SYSTEM

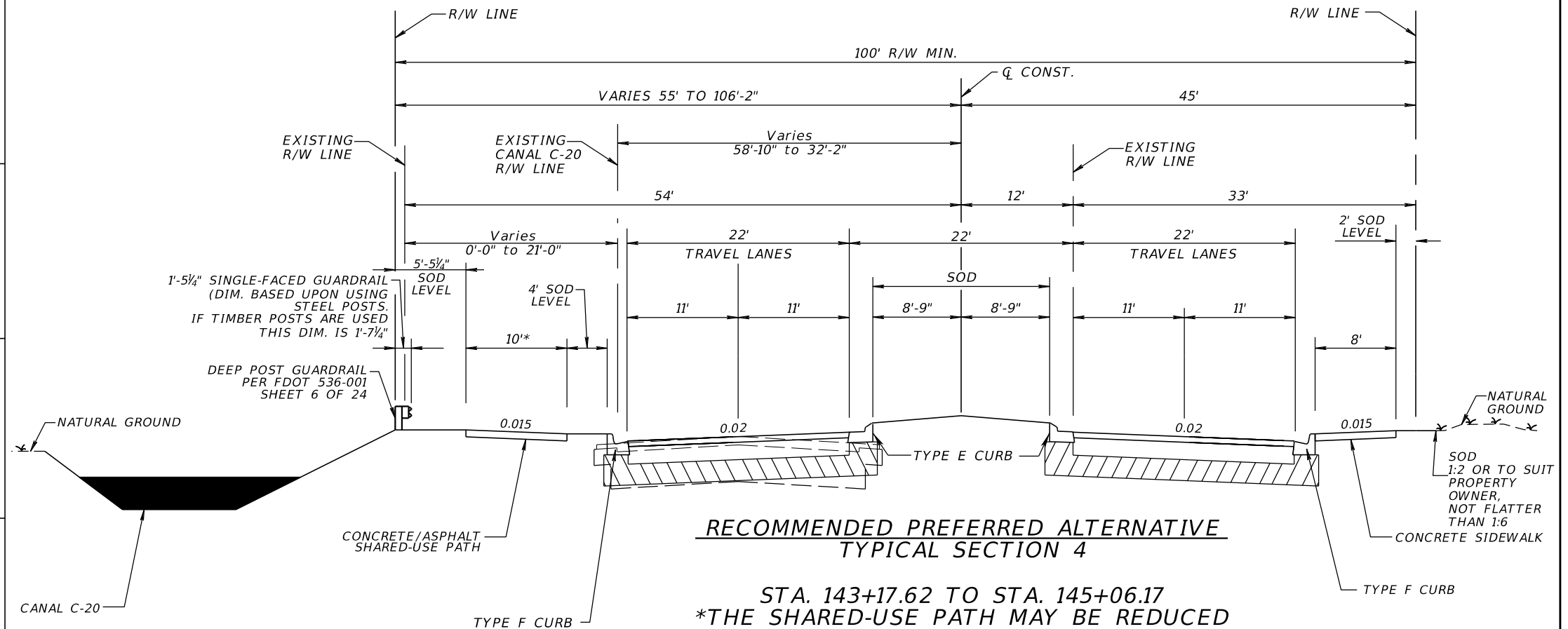
**CRITERIA**

- (X) NEW CONSTRUCTION / RECONSTRUCTION
- ( ) RESURFACING (LA FACILITIES)
- ( ) RRR (ARTERIALS & COLLECTORS)

**POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:**

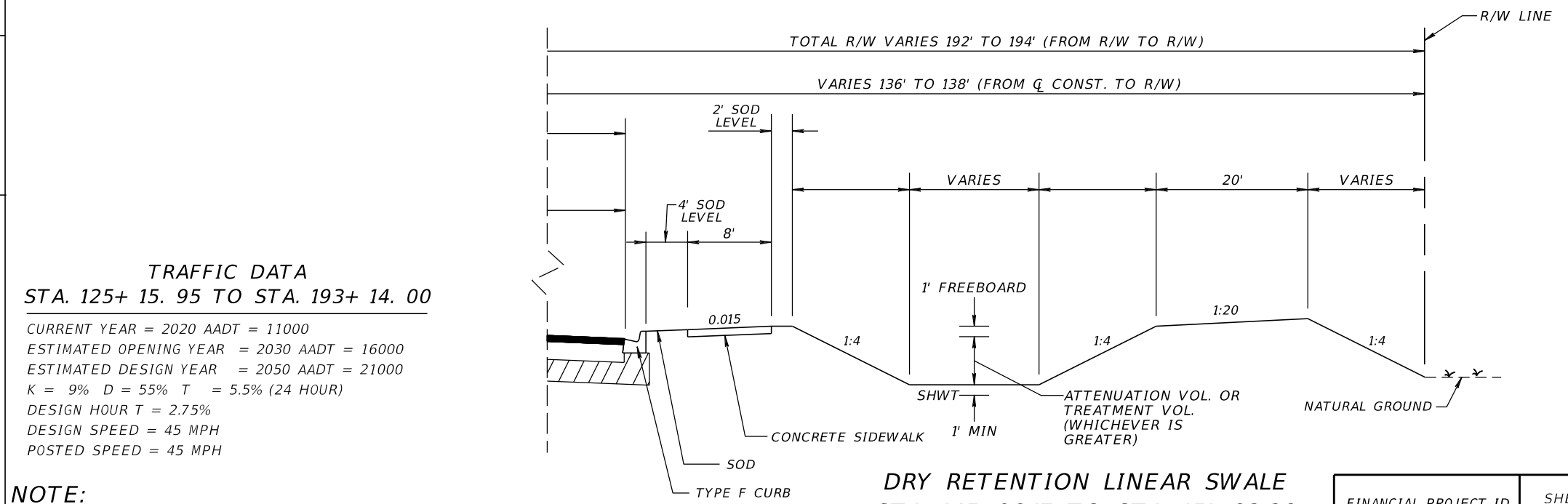
<14' BORDER WIDTH ON SOUTH SIDE

**TYPICAL SECTION No. 4**



**RECOMMENDED PREFERRED ALTERNATIVE TYPICAL SECTION 4**

STA. 143+17.62 TO STA. 145+06.17  
 \*THE SHARED-USE PATH MAY BE REDUCED TO 8'-0" WIDTH IN CONSTRAINED LOCATIONS  
 \*\*SIDEWALK LIMITS MAY REQUIRE ADJUSTMENT FOR INSTALLATION OF BUS STOPS AND SHELTERS.  
 SEE PLANS FOR LOCATIONS.



**TRAFFIC DATA**  
 STA. 125+ 15. 95 TO STA. 193+ 14. 00  
 CURRENT YEAR = 2020 AADT = 11000  
 ESTIMATED OPENING YEAR = 2030 AADT = 16000  
 ESTIMATED DESIGN YEAR = 2050 AADT = 21000  
 K = 9% D = 55% T = 5.5% (24 HOUR)  
 DESIGN HOUR T = 2.75%  
 DESIGN SPEED = 45 MPH  
 POSTED SPEED = 45 MPH

**NOTE:**  
 BETWEEN STA. 151+63.38 TO STA. 160+26.96  
 THE TYPICAL SECTION VARIES FOR THE HURLEY BLVD. ROUNDABOUT

**DRY RETENTION LINEAR SWALE**  
 STA. 145+06.17 TO STA. 151+63.38

FINANCIAL PROJECT ID	SHEET NO.
437210-1-28-01	7



**PROJECT CONTROLS**

CONTEXT CLASSIFICATION

- ( ) C1 : NATURAL
- ( ) C2 : RURAL
- ( ) C2T : RURAL TOWN
- ( ) C3R : SUBURBAN RES.
- (X) N/A : LOCAL ROAD
- ( ) C3C : SUBURBAN COMM.
- ( ) C4 : URBAN GENERAL
- ( ) C5 : URBAN CENTER
- ( ) C6 : URBAN CORE

FUNCTIONAL CLASSIFICATION

- ( ) INTERSTATE
- ( ) FREEWAY/EXPWY.
- ( ) PRINCIPAL ARTERIAL
- (X) MINOR ARTERIAL
- ( ) MAJOR COLLECTOR
- ( ) MINOR COLLECTOR
- ( ) LOCAL

HIGHWAY SYSTEM

- ( ) NATIONAL HIGHWAY SYSTEM
- ( ) STRATEGIC INTERMODAL SYSTEM
- ( ) STATE HIGHWAY SYSTEM
- (X) OFF-STATE HIGHWAY SYSTEM

ACCESS CLASSIFICATION

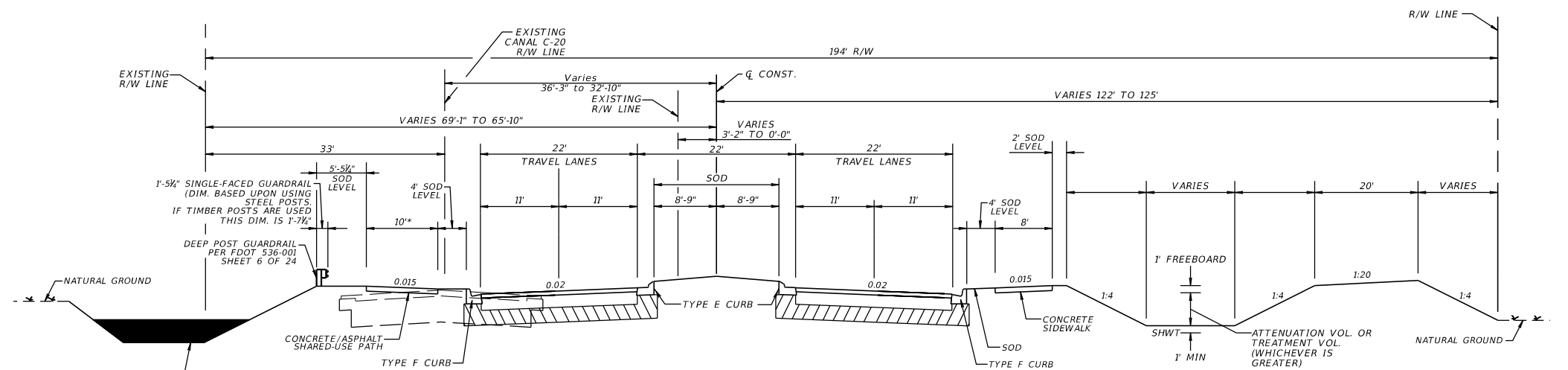
- ( ) 1 - FREEWAY
- ( ) 2 - RESTRICTIVE w/Service Roads
- ( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
- ( ) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
- ( ) 5 - RESTRICTIVE w/440 ft. Connection Spacing
- ( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
- ( ) 7 - BOTH MEDIAN TYPES
- (X) 8 - N/A: OFF-STATE HIGHWAY SYSTEM

CRITERIA

- (X) NEW CONSTRUCTION / RECONSTRUCTION
- ( ) RESURFACING (LA FACILITIES)
- ( ) RRR (ARTERIALS & COLLECTORS)

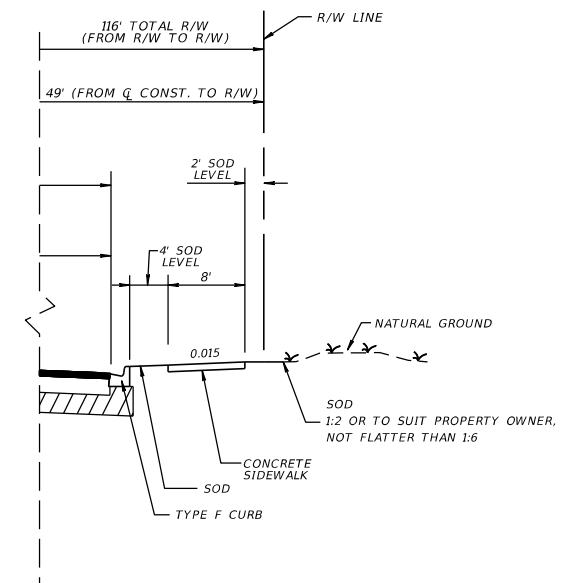
POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

**TYPICAL SECTION No. 5**



**RECOMMENDED PREFERRED ALTERNATIVE  
TYPICAL SECTION 5**  
**DRY RETENTION LINEAR SWALE**  
 STA. 160+26.96 TO STA. 166+30.88  
 STA. 169+30.88 TO STA. 176+03.60  
 \*THE SHARED-USE PATH MAY BE REDUCED TO 8'-0" WIDTH IN CONSTRAINED LOCATIONS  
 \*\*SIDEWALK LIMITS MAY REQUIRE ADJUSTMENT FOR INSTALLATION OF BUS STOPS AND SHELTERS. SEE PLANS FOR LOCATIONS.

**TRAFFIC DATA**  
 STA. 125+ 15. 95 TO STA. 193+ 14. 00  
 CURRENT YEAR = 2020 AADT = 11000  
 ESTIMATED OPENING YEAR = 2030 AADT = 16000  
 ESTIMATED DESIGN YEAR = 2050 AADT = 21000  
 K = 9% D = 55% T = 5.5% (24 HOUR)  
 DESIGN HOUR T = 2.75%  
 DESIGN SPEED = 45 MPH  
 POSTED SPEED = 45 MPH



STA. 166+30.88 TO STA. 169+30.88

FINANCIAL PROJECT ID	SHEET NO.
437210-1-28-01	8

**PROJECT CONTROLS**

**CONTEXT CLASSIFICATION**

- ( ) C1 : NATURAL
- ( ) C2 : RURAL
- ( ) C2T : RURAL TOWN
- ( ) C3R : SUBURBAN RES.
- (X) N/A : LOCAL ROAD
- ( ) C3C : SUBURBAN COMM.
- ( ) C4 : URBAN GENERAL
- ( ) C5 : URBAN CENTER
- ( ) C6 : URBAN CORE

**FUNCTIONAL CLASSIFICATION**

- ( ) INTERSTATE
- ( ) FREeway/EXPwy.
- ( ) PRINCIPAL ARTERIAL
- (X) MINOR ARTERIAL
- ( ) MAJOR COLLECTOR
- ( ) MINOR COLLECTOR
- ( ) LOCAL

**HIGHWAY SYSTEM**

- ( ) NATIONAL HIGHWAY SYSTEM
- ( ) STRATEGIC INTERMODAL SYSTEM
- ( ) STATE HIGHWAY SYSTEM
- (X) OFF-STATE HIGHWAY SYSTEM

**ACCESS CLASSIFICATION**

- ( ) 1 - FREEWAY
- ( ) 2 - RESTRICTIVE w/Service Roads
- ( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
- ( ) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
- ( ) 5 - RESTRICTIVE w/440 ft. Connection Spacing
- ( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
- ( ) 7 - BOTH MEDIAN TYPES
- (X) 8 - N/A: OFF-STATE HIGHWAY SYSTEM

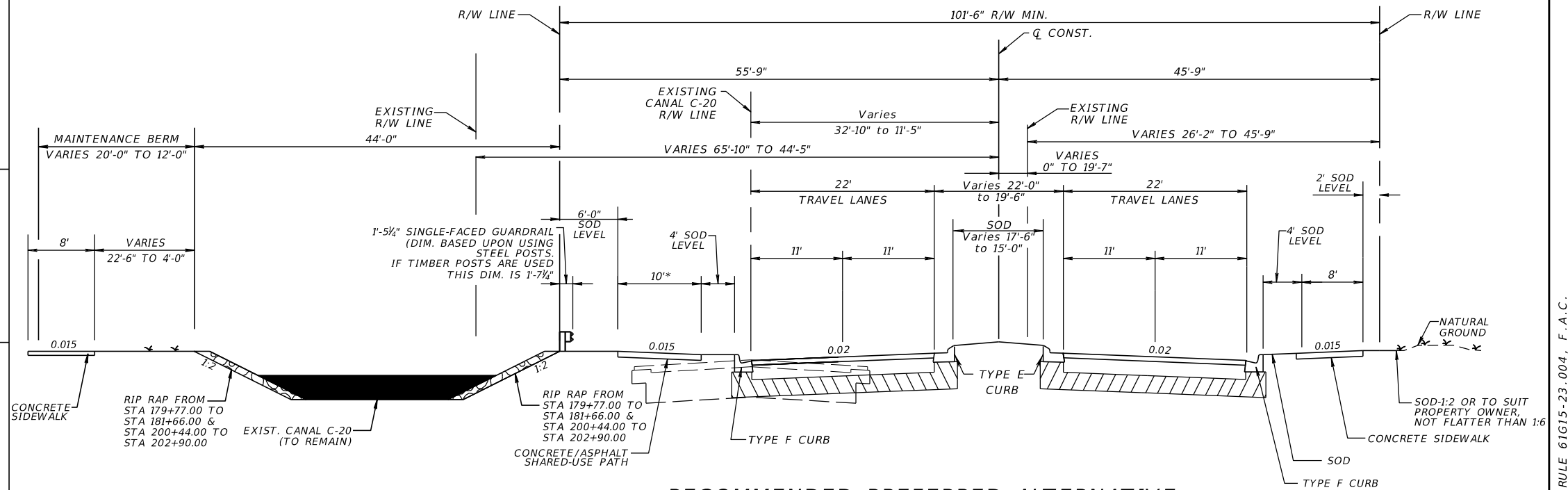
**CRITERIA**

- (X) NEW CONSTRUCTION / RECONSTRUCTION
- ( ) RESURFACING (LA FACILITIES)
- ( ) RRR (ARTERIALS & COLLECTORS)

**POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:**

-19'-6" MEDIAN WIDTH

**TYPICAL SECTION No. 6**



**RECOMMENDED PREFERRED ALTERNATIVE TYPICAL SECTION 6**

STA. 176+03.60 TO STA. 181+66.00  
 STA. 200+44.00 TO STA. 202+90.00  
 \*THE SHARED-USE PATH MAY BE REDUCED TO 8'-0" WIDTH IN CONSTRAINED LOCATIONS  
 \*\*SIDEWALK LIMITS MAY REQUIRE ADJUSTMENT FOR INSTALLATION OF BUS STOPS AND SHELTERS. SEE PLANS FOR LOCATIONS.

NOTE: FROM STA. 200+44.00 TO STA. 201+18.89 A DRY RETENTION LINEAR SWALE IS PRESENT ON EAST SIDE OF ROAD. SEE SECTION ON SHEET NO. 7.

**TRAFFIC DATA**  
 STA. 125+ 15. 95 TO STA. 193+ 14. 00

CURRENT YEAR = 2020 AADT = 11000  
 ESTIMATED OPENING YEAR = 2030 AADT = 16000  
 ESTIMATED DESIGN YEAR = 2050 AADT = 21000  
 K = 9% D = 55% T = 5.5% (24 HOUR)  
 DESIGN HOUR T = 2.75%  
 DESIGN SPEED = 45 MPH  
 POSTED SPEED = 45 MPH

FINANCIAL PROJECT ID	SHEET NO.
437210-1-28-01	9



**PROJECT CONTROLS**

**CONTEXT CLASSIFICATION**

- ( ) C1 : NATURAL            ( ) C3C : SUBURBAN COMM.
- ( ) C2 : RURAL            ( ) C4 : URBAN GENERAL
- ( ) C2T : RURAL TOWN    ( ) C5 : URBAN CENTER
- ( ) C3R : SUBURBAN RES. ( ) C6 : URBAN CORE
- (X) N/A : LOCAL ROAD

**FUNCTIONAL CLASSIFICATION**

- ( ) INTERSTATE            ( ) MAJOR COLLECTOR
- ( ) FREEWAY/EXPWY.    ( ) MINOR COLLECTOR
- ( ) PRINCIPAL ARTERIAL ( ) LOCAL
- (X) MINOR ARTERIAL

**HIGHWAY SYSTEM**

- ( ) NATIONAL HIGHWAY SYSTEM
- ( ) STRATEGIC INTERMODAL SYSTEM
- ( ) STATE HIGHWAY SYSTEM
- (X) OFF-STATE HIGHWAY SYSTEM

**ACCESS CLASSIFICATION**

- ( ) 1 - FREEWAY
- ( ) 2 - RESTRICTIVE w/Service Roads
- ( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
- ( ) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
- ( ) 5 - RESTRICTIVE w/440 ft. Connection Spacing
- ( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
- ( ) 7 - BOTH MEDIAN TYPES
- (X) 8 - N/A: OFF-STATE HIGHWAY SYSTEM

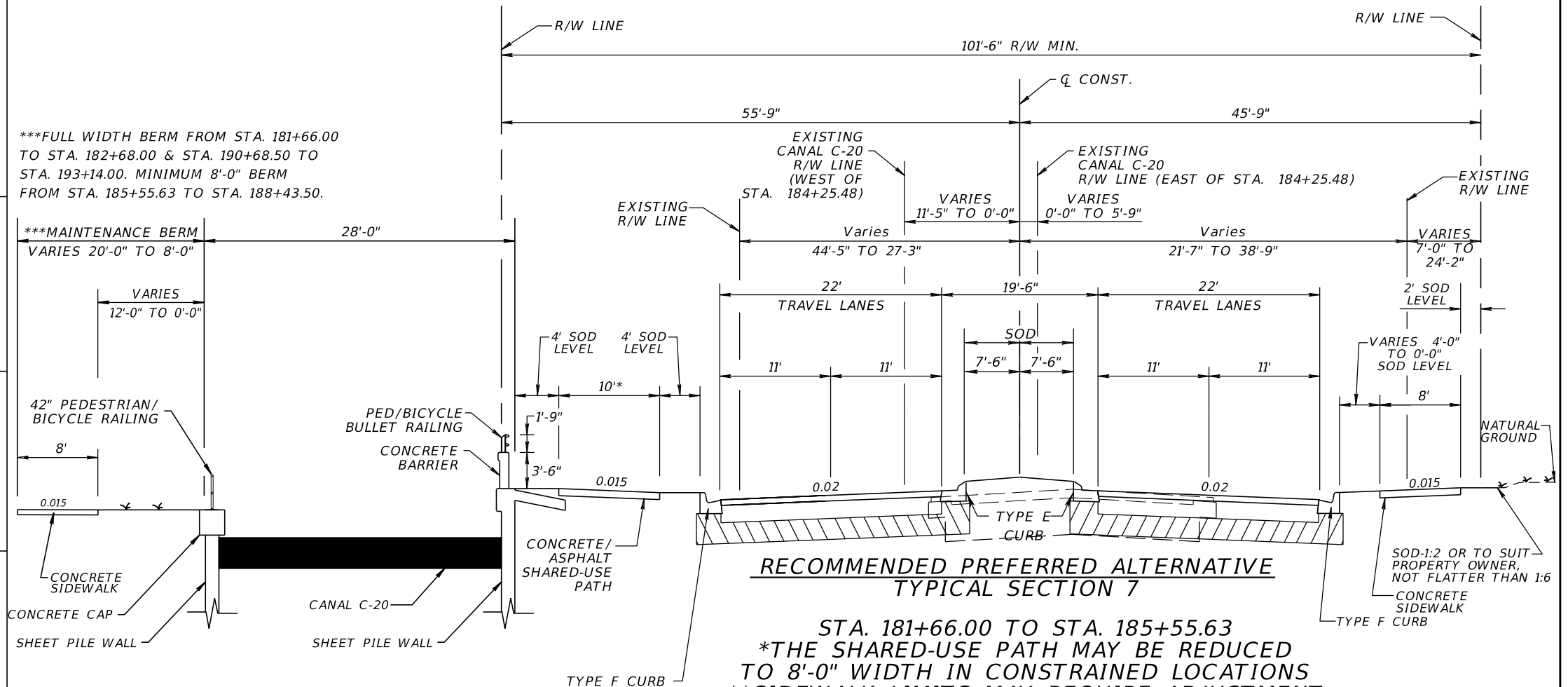
**CRITERIA**

- (X) NEW CONSTRUCTION / RECONSTRUCTION
- ( ) RESURFACING (LA FACILITIES)
- ( ) RRR (ARTERIALS & COLLECTORS)

**POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:**

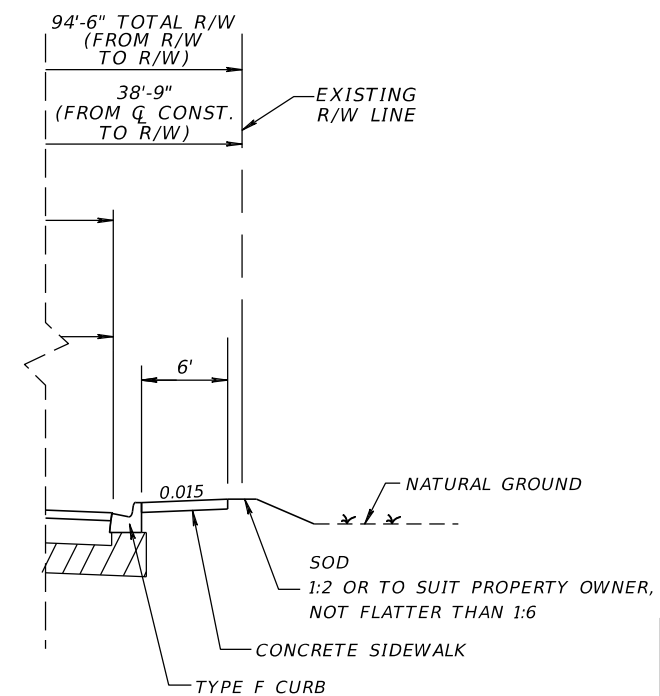
-19'-6" MEDIAN WIDTH  
 -<14' BORDER WIDTH ON SOUTH SIDE

**TYPICAL SECTION No. 7**



**RECOMMENDED PREFERRED ALTERNATIVE  
 TYPICAL SECTION 7**  
 STA. 181+66.00 TO STA. 185+55.63  
 \*THE SHARED-USE PATH MAY BE REDUCED TO 8'-0" WIDTH IN CONSTRAINED LOCATIONS  
 \*\*SIDEWALK LIMITS MAY REQUIRE ADJUSTMENT FOR INSTALLATION OF BUS STOPS AND SHELTERS.  
 SEE PLANS FOR LOCATIONS.

**TRAFFIC DATA**  
 STA. 125+ 15. 95 TO STA. 193+ 14. 00  
 CURRENT YEAR = 2020 AADT = 11000  
 ESTIMATED OPENING YEAR = 2030 AADT = 16000  
 ESTIMATED DESIGN YEAR = 2050 AADT = 21000  
 K = 9% D = 55% T = 5.5% (24 HOUR)  
 DESIGN HOUR T = 2.75%  
 DESIGN SPEED = 45 MPH  
 POSTED SPEED = 45 MPH



STA. 185+55.63 TO STA. 193+14.00

FINANCIAL PROJECT ID	SHEET NO.
437210-1-28-01	10





**PROJECT CONTROLS**

**CONTEXT CLASSIFICATION**

- ( ) C1 : NATURAL                      ( ) C3C : SUBURBAN COMM.
- ( ) C2 : RURAL                        ( ) C4 : URBAN GENERAL
- ( ) C2T : RURAL TOWN                ( ) C5 : URBAN CENTER
- ( ) C3R : SUBURBAN RES.            ( ) C6 : URBAN CORE
- (X) N/A : LOCAL ROAD

**FUNCTIONAL CLASSIFICATION**

- ( ) INTERSTATE                        ( ) MAJOR COLLECTOR
- ( ) FREEWAY/EXPWY.                ( ) MINOR COLLECTOR
- ( ) PRINCIPAL ARTERIAL            ( ) LOCAL
- (X) MINOR ARTERIAL

**HIGHWAY SYSTEM**

- ( ) NATIONAL HIGHWAY SYSTEM
- ( ) STRATEGIC INTERMODAL SYSTEM
- ( ) STATE HIGHWAY SYSTEM
- (X) OFF-STATE HIGHWAY SYSTEM

**ACCESS CLASSIFICATION**

- ( ) 1 - FREEWAY
- ( ) 2 - RESTRICTIVE w/Service Roads
- ( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
- ( ) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
- ( ) 5 - RESTRICTIVE w/440 ft. Connection Spacing
- ( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
- ( ) 7 - BOTH MEDIAN TYPES
- (X) 8 - N/A: OFF-STATE HIGHWAY SYSTEM

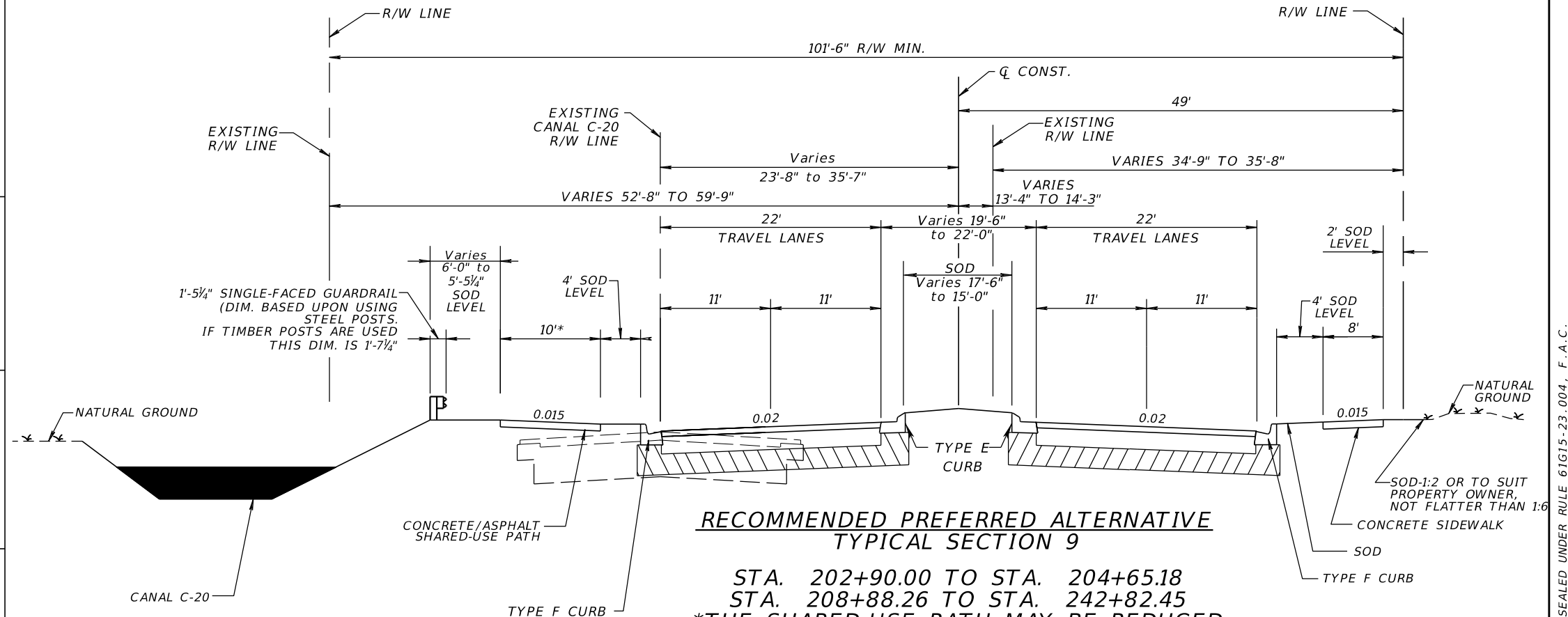
**CRITERIA**

- (X) NEW CONSTRUCTION / RECONSTRUCTION
- ( ) RESURFACING (LA FACILITIES)
- ( ) RRR (ARTERIALS & COLLECTORS)

**POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:**

**-19'-6" MEDIAN WIDTH**

**TYPICAL SECTION No. 9**



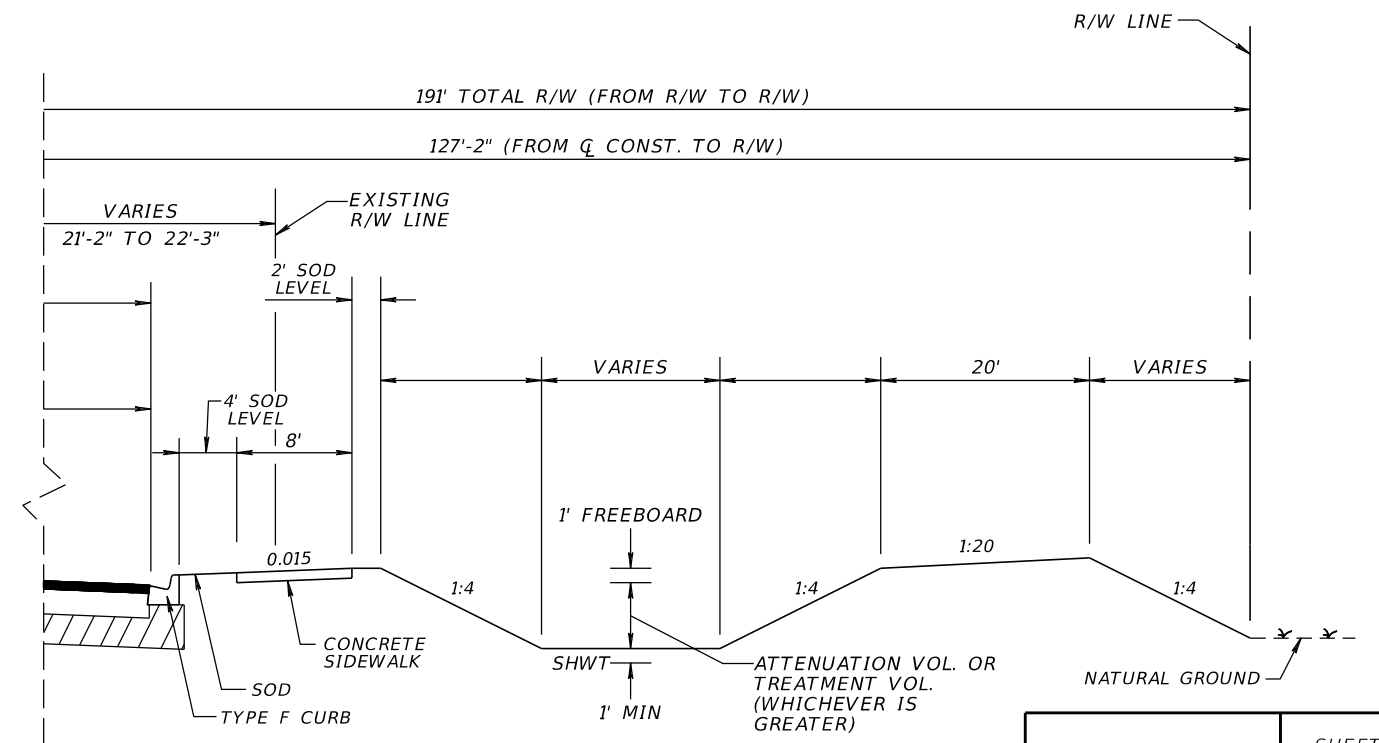
**RECOMMENDED PREFERRED ALTERNATIVE  
TYPICAL SECTION 9**  
 STA. 202+90.00 TO STA. 204+65.18  
 STA. 208+88.26 TO STA. 242+82.45  
 \*THE SHARED-USE PATH MAY BE REDUCED TO 8'-0" WIDTH IN CONSTRAINED LOCATIONS  
 \*\*SIDEWALK LIMITS MAY REQUIRE ADJUSTMENT FOR INSTALLATION OF BUS STOPS AND SHELTERS.  
 SEE PLANS FOR LOCATIONS.

**TRAFFIC DATA  
STA. 193+ 14. 00 TO STA. 221+ 50. 00**

CURRENT YEAR = 2020 AADT = 11000  
 ESTIMATED OPENING YEAR = 2030 AADT = 18000  
 ESTIMATED DESIGN YEAR = 2050 AADT = 28000  
 K = 9% D = 55% T = 5.5% (24 HOUR)  
 DESIGN HOUR T = 2.75%  
 DESIGN SPEED = 45 MPH  
 POSTED SPEED = 45 MPH

**TRAFFIC DATA  
STA. 221+ 50. 00 TO STA. 256+ 00. 00**

CURRENT YEAR = 2020 AADT = 16000  
 ESTIMATED OPENING YEAR = 2030 AADT = 18000  
 ESTIMATED DESIGN YEAR = 2050 AADT = 28000  
 K = 9% D = 55% T = 2.5% (24 HOUR)  
 DESIGN HOUR T = 1.25%  
 DESIGN SPEED = 45 MPH  
 POSTED SPEED = 45 MPH



**DRY RETENTION LINEAR SWALE  
STA. 204+65.18 TO STA. 208+88.26**

FINANCIAL PROJECT ID	SHEET NO.
437210-1-28-01	12

**PROJECT CONTROLS**

**CONTEXT CLASSIFICATION**

- ( ) C1 : NATURAL                      ( ) C3C : SUBURBAN COMM.
- ( ) C2 : RURAL                        ( ) C4 : URBAN GENERAL
- ( ) C2T : RURAL TOWN              ( ) C5 : URBAN CENTER
- ( ) C3R : SUBURBAN RES.          ( ) C6 : URBAN CORE
- (X) N/A : LOCAL ROAD

**FUNCTIONAL CLASSIFICATION**

- ( ) INTERSTATE                      ( ) MAJOR COLLECTOR
- ( ) FREEWAY/EXPWY.              ( ) MINOR COLLECTOR
- ( ) PRINCIPAL ARTERIAL          ( ) LOCAL
- (X) MINOR ARTERIAL

**HIGHWAY SYSTEM**

- ( ) NATIONAL HIGHWAY SYSTEM
- ( ) STRATEGIC INTERMODAL SYSTEM
- ( ) STATE HIGHWAY SYSTEM
- (X) OFF-STATE HIGHWAY SYSTEM

**ACCESS CLASSIFICATION**

- ( ) 1 - FREEWAY
- ( ) 2 - RESTRICTIVE w/Service Roads
- ( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
- ( ) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
- ( ) 5 - RESTRICTIVE w/440 ft. Connection Spacing
- ( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
- ( ) 7 - BOTH MEDIAN TYPES
- (X) 8 - N/A: OFF-STATE HIGHWAY SYSTEM

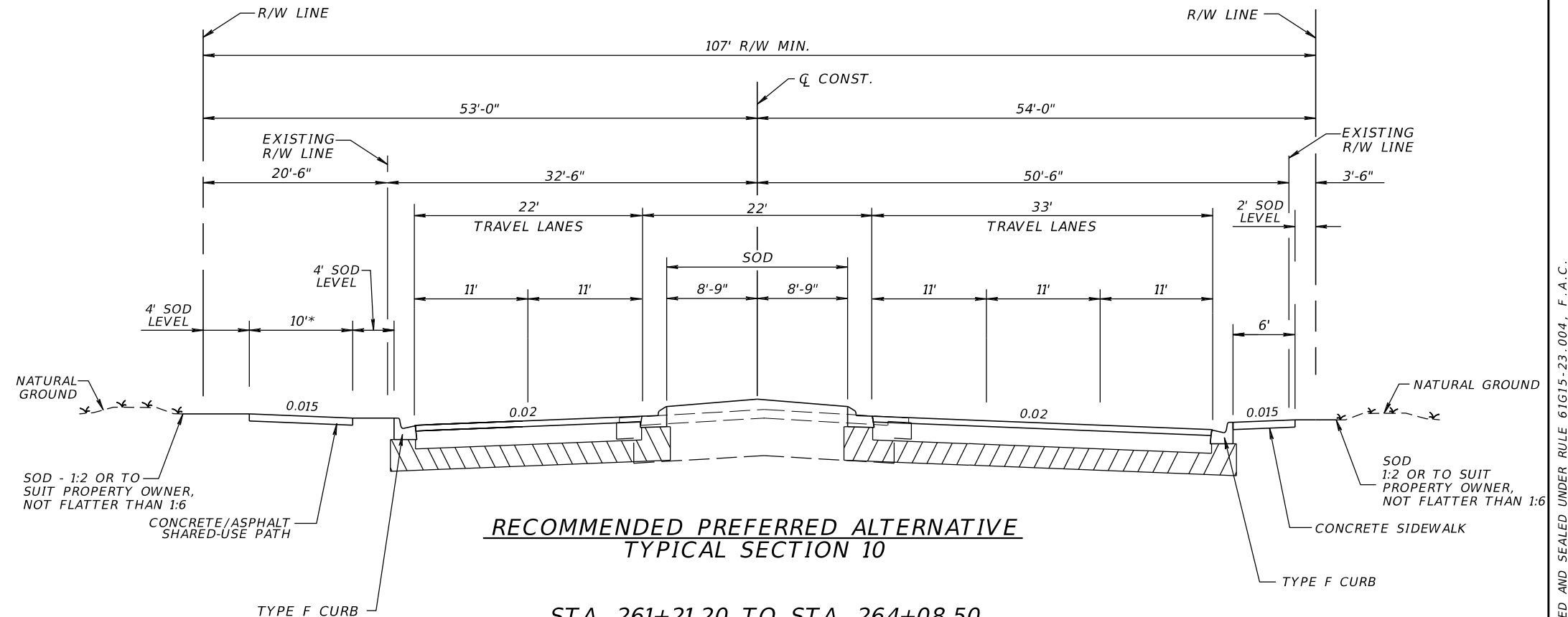
**CRITERIA**

- (X) NEW CONSTRUCTION / RECONSTRUCTION
- ( ) RESURFACING (LA FACILITIES)
- ( ) RRR (ARTERIALS & COLLECTORS)

**POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:**

-<12' BORDER WIDTH ON SOUTH SIDE

**TYPICAL SECTION No. 10**



**RECOMMENDED PREFERRED ALTERNATIVE TYPICAL SECTION 10**

STA. 261+21.20 TO STA. 264+08.50  
 \*THE SHARED-USE PATH MAY BE REDUCED TO 8'-0" WIDTH IN CONSTRAINED LOCATIONS  
 \*\*SIDEWALK LIMITS MAY REQUIRE ADJUSTMENT FOR INSTALLATION OF BUS STOPS AND SHELTERS. SEE PLANS FOR LOCATIONS.

**TRAFFIC DATA**

STA. 256+ 00. 00 TO STA. 264+ 08. 50

CURRENT YEAR = 2020 AADT = 16000  
 ESTIMATED OPENING YEAR = 2030 AADT = 18000  
 ESTIMATED DESIGN YEAR = 2050 AADT = 28000  
 K = 9% D = 55% T = 2.5% (24 HOUR)  
 DESIGN HOUR T = 1.25%  
 DESIGN SPEED = 40 MPH  
 POSTED SPEED = 35 MPH

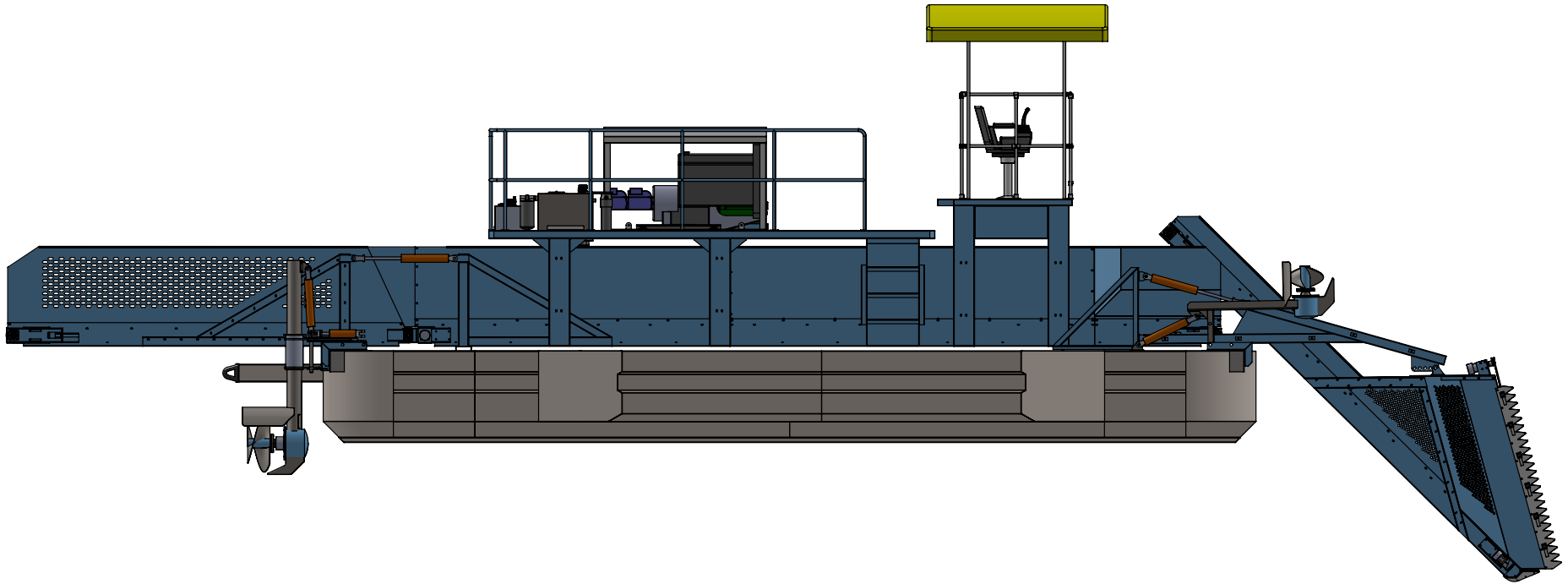
**NOTE:**

BETWEEN STA. 242+82.45 TO STA. 261+21.20 THE TYPICAL SECTION VARIES FOR THE MAYWOOD AVE./DAFFODIL DR. ROUNDABOUT

FINANCIAL PROJECT ID	SHEET NO.
437210-1-28-01	13



## Appendix J – MTWCD Equipment Specifications



**AQUATIC TECHNOLOGY INTERNATIONAL** Aquatic Harvester Model **AT-9150 V-4**

(A Division of SENWATEC, LLC)





# AQUATIC PLANT & WEED HARVESTER



## AQUATIC TECHNOLOGY INTERNATIONAL \*)

### **SPECIFICATIONS MODEL AT-9150 V-4**

Page 1 of 3

#### **Dimensions 1)**

Operating length	15,25 m	50'-0"
Shipping length (domestic)	15,25 m	50'-0"
<i>Shipping length, reduced for overseas</i>	13,10 m	43'-0"
Operating width (with side pontoons)	4,57 m	15'-0"
Shipping width	3,65 m	11'-11"
Operating height 2)	2,75 m	9'-0"
Shipping height 2)	3,05 m	10'-0"
<i>Shipping height, reduced for overseas</i>	2,44 m	8'-0"
<b>Weight</b> (light, without options)	8200 kg	18,000 lbs.

#### **Hull**

Length	9,15 m	30'-0"
Beam (inbrackets with side pontoons)	3,55 m (4,57 m)	11'-11" (15'-0")
Draft, light : loaded 3)	41 : 66 cm	16" : 26" (at average water line)
Material	Ship steel hull & internal frame work ( <b>stainless</b> optional)	
Vessel type	Catamaran with (2) extra side pontoons	
Lift lugs & tow eyes	4 lugs for crane lifting & launching & 2 for towing	
Bottom protection	Steel skids (2)	
Number of compartments	(8) Total (4) per catamaran hull + side pontoons	
Side pontoons (2 aluminum)	(2) 4,88 x 0.61 x 0.84 m 18'-0" x 1'-6" x 2'-9" each	
Adaptation for road transport	Removable side pontoons to 3,65m /11-11" road width	

#### **Harvesting Head**

Cutting width x depth	3,05 x 1,83 m	10'-0" x 6'-0"
Cutter system	U-shaped with vertical & horizontal knives	
Drive arms, rod end bearings & brackets	<b>Stainless steel</b>	
Conveyor belting material & type	<b>Stainless steel</b> heavy duty metal mesh belts	
Cutter drives	3 Independent hydraulic motors with eccentric arms	
Drive motor protection	HD bearing load adaptors	
Idler shaft journals & bearings	<b>Stainless steel</b> materials	
Conveyor belt drive ( 2 motors)	Powered by hydraulic motors via flex couplings	

**Storage / Cargo system**

Classification	Dual system with independent on-deck & over stern conveyors	
Capacity, by volume, uncompressed (compressed)	28 m3 (24 m3)	1000 cubic feet (850 cubic feet)
Capacity, by weight	6800 kg	15,000 lbs.--evenly loaded <b>3)</b>
Over-stern unloading reach	2,75 m	9'-0"
Discharge height from deck level, elevated	2,00 m	6'-2" (for total add freeboard)
Conveyor belting , on-deck conveyor, material & type	Galvanized heavy duty metal mesh belts	
Conveyor belting, over-stern conveyor, material & type	Galvanized heavy duty metal mesh belts	
Conveyor belt drives	Powered by (2) hydraulic motors per each conveyor	
Shaft bearings	Standard steel flange housing & insert type	
Drive journals	<b>Stainless steel</b> material	

**Propulsion System**

Classification ( <b>ATI V-4 Helix Drive System</b> ):	Four (4) auger/screw propeller drives	
Over-stern, two position	Two (2) hydraulic drives with power lift, swing & twin steering	
Over-bow, two position	Two (2) hydraulic drives with, power lift, twin steering	
Speed control	Infinitely variable, independently bi-directional	
Auger propeller Speeds	Infinitely variable & bi-directional to max RPM	
Auger propeller drives	High torque hydraulic motors (4)	
Vessel cruising speed	10 km/hr	6 miles/hour
Bottom protection	Swing back drive arms and skegs	
Adaptation for road transport	Removable side pontoons to 3,65m /11-11" road width	

**Power System**

Classification	Stationary engine powering a hydraulic system	
Engine type	Four-cycle, liquid cooled Diesel motor, Tier IV std.	
Power output	85 kW	114 HP @ maximum RPM
Fuel tank capacity	170 liter	45 US gallons (20 hours)
Hydraulic pump (s)	Variable volume axial piston units (2) with load sensing	
Hydraulic fluid tank capacity / type	225 liter	60 US gallons / bio-degradable
Hydraulic oil filtration	High pressure and low pressure return filters	
Hydraulic directional valves	Multi-stack unit with load sensing & pressure relief	
System monitoring	Gauge package for engine and hydraulic system	
Electrical system	12 Volt DC with HD marine battery in lock box	

**Bridge & Operations Control Center**

Position & material	Elevated bridge for allround operator visibility, <b>aluminum</b>
Engine controls	CAN Bus 5emote for start, stop & RPM throttle setting
Hydraulic controls	CAN Bus remote & adjustable for all operating functions
Operator seat	Rotates, adjustable for height & horizontal setting
Weather protection	Sun/rain canopy (cab optional)
Access & guards	Two side steps up, allround railing & chain gates
Transport mode	Bridge tilts down to reduce height for road transport



**General Information & Accessories**

Hydraulic circuit	Hard lines & flex hoses to all component points
Conveyor track protection	UHMW plastic liner on all belt top and return tracks
Fastening materials	<b>Stainless steel</b> , except at special strength positions
Corrosion protection	Corrosible parts coated with two part marine epoxy <b>Stainless steel</b> & plastic parts professionally finished and remain uncoated
Lights and signals	Navigation lights, work lights & horn to international code

**Options**

- A. Operators cab (light weight type with wind shield, canvass sides & hard top)
- B. Operators cab (aluminum structure, wind shield wiper, tinted safety windows, 2 doors, sound attenuation)
- C. Air conditioner for operator cab (with Item B only.)
- D. Harvest head conveyor flights (cross bars attached to belts to prevent roll back of some materials)
- E. Hydraulic power anchor
- F. Water cannon wash down pump
- G. **Stainless steel** belting on storage and rear conveyors
- H. Alternate engine choice
- I. Skimmer head for trash and debris collection (interchangable with harvesting head)
- J. Spare parts package
- K. **Stainless steel** catamaran barge

**NOTES:**

- 1) Consult Senwatec for international shipping options
- 2) Height without sun canopy or cab
- 3) Evenly loaded and at side to side balance.

*Specifications are subject to change without notice due to continued updates & improvements. August 20, 2015*

**AQUATIC TECHNOLOGY INTERNATIONAL \*)** 6449 S. Tex Point, Homosassa, FL, **USA**  
**info@senwatec.com** Telephone: (352) 503-9363 Fax: (352) 503-6884 **www.dredgeboats.com**  
**Schröer Environment & Water Technology, GmbH & Co. KG., Germany. \*) A Division of SENWATEC, LLC**

## INDEPENDENT DRIVING INTO THE WATER

The **6740 TREX-DUKE** is multi-functional for suction, excavation and clearing work. Four hydraulic adjustable spuds ensure high stability during work. The amphibious boat

impresses with its ability to drive from a trailer directly into the water and still providing an excavator boom for various attachments. The areas of application are endless. With the

double auger propulsion and the track drive the machine is prepared for shallow, swampy and deep water areas alike.



- high pump and delivery rate
- high working depth
- high stability while working
- independent loading



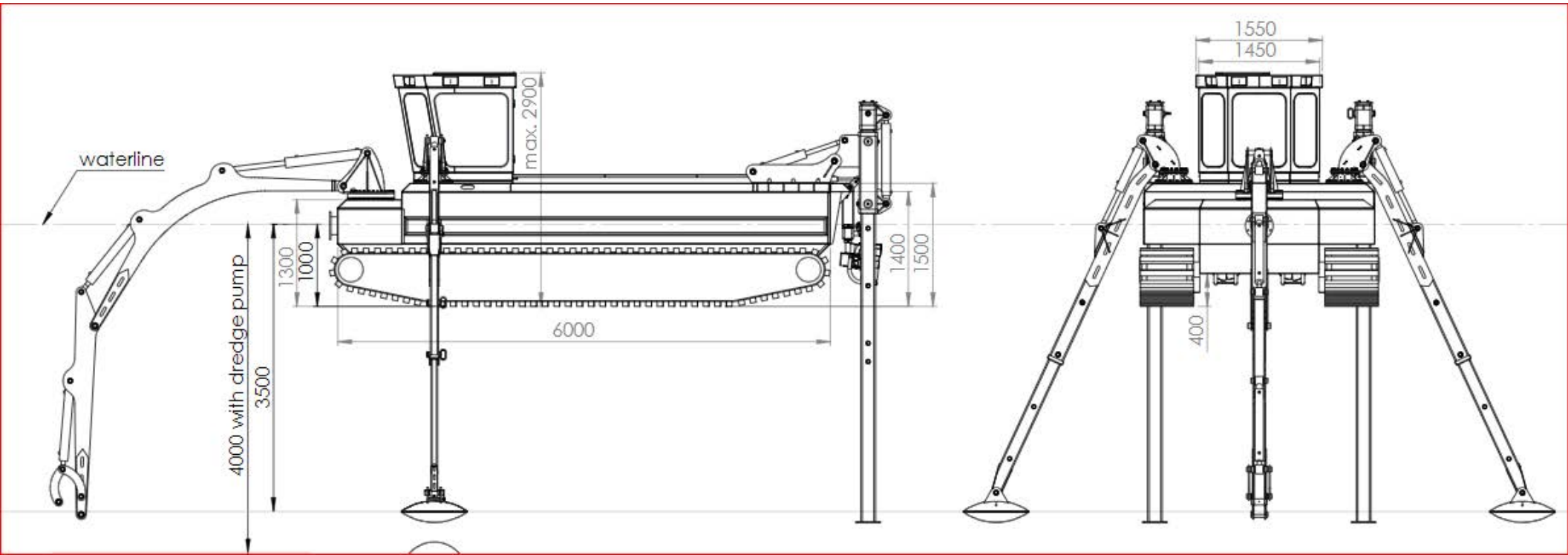
## TECHNICAL DATA

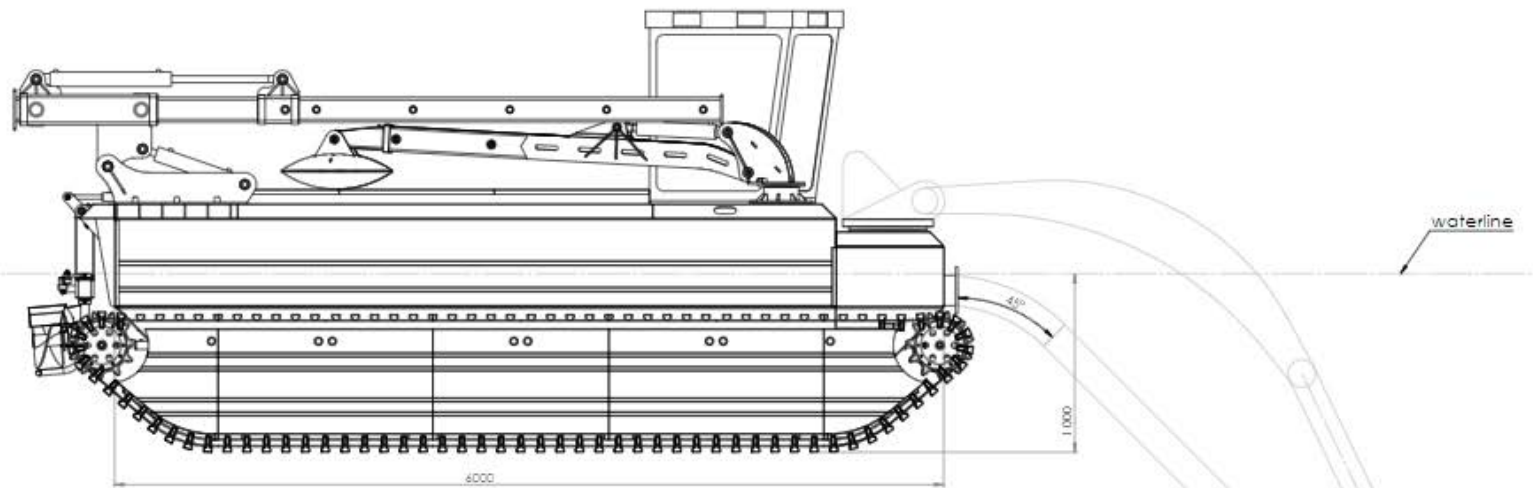
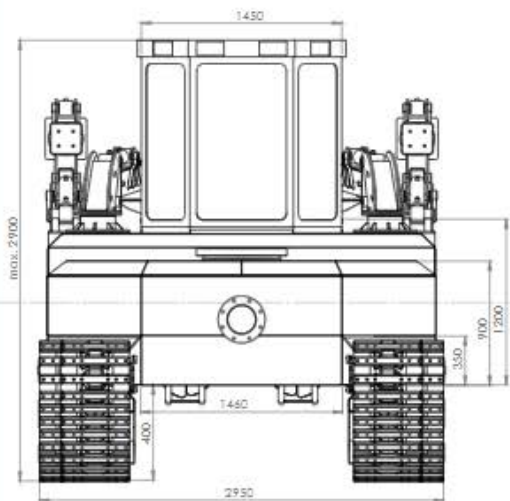
Engine	○ 6-cylinder 186 kW/252 HP diesel
Fuel tank	○ 400 l
Cooling	○ water cooling
Drive	○ two hydraulic driven augers with collision and weed protection ○ propulsion hydraulically depth-adjustable and tiltable upwards ○ two tracks with two oil motors each
Steering	○ hydraulic swivelling of the auger by 60° each side ○ tracks can be controlled independently
Control unit	○ joysticks for boom, auger propulsion and track drive ○ foot pedals for chain drive
Hydraulics*	○ L/S pump for drive, sludge pump, tracks, boom, spuds approx. 260 l/min bei 300 bar ○ gear pump for cutter head approx. 40 l/min at 250 bar
Boom	○ two-part articulated boom ○ swivel range up to 350° ○ length approx. 5.00 m ○ working depth up to approx. 4.50 m with excavating bucket ○ working depth up to approx. 5.00 m with cutting head
Sludge pump	○ stationary 8/6" pump ○ delivery rate up to approx. 770 m³/h
Dimensions **	
Hull	○ 7.00 m x 3.00 m x 1.20 m
Pontoons	○ 3.00 m x 1.00 m (LxW)
Spuds	○ bis zu 4.00 m Arbeitstiefe
Operation	○ 14.00 m x 5.00 m x 1.90 m on the water / 3.00 m on land
Transport	○ 12.00 m x 3.00 m x 3.00 m
Draft	○ 1.10 m
Weight	○ approx. 17,000 kg
Ground pressure	○ 0.24 kg/cm²
Speed	○ water: 7 km/h forward and 5 km/h backward ○ land: 4 km/h forward and backward
Options	○ sludge spray pipe ○ floater for pipeline ○ suction and pressure hose
Color	○ basic machine: RAL 5013 (cobalt blue) with decorative stripes in RAL 1037 (sun yellow) ○ driver's cab: RAL 5013 (cobalt blue), cabin roof: RAL 1037 (sun yellow) ○ engine compartment: white

\* pump capacities at maximum speed of the diesel engine

\*\* dimensions (LxWxH) and weights without attachments; operating dimensions from waterline, incl. pontoons







Front and rear supports maximum depth

Maximum depth with bucket

Maximum depth with dredge pump



# Appendix K – Space Coast Area Transit Coordination

Project Name: Malabar Road PD&E Study

Project Description: Space Coast Area Transit Bus Stop Review Meeting

Event Date: September 23, 2021 @ 11:00 am

Event Location: Virtual Meeting

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## MEETING ATTENDEES

- Frank Watanabe, PE – City of Palm Bay
- Terry Jordan – Space Coast Area Transit (SCAT)
- Lance Parker – SCAT
- Ron Shepard – SCAT
- Jack Freeman, PE, PTOE, RSP<sub>1</sub> – Kittelson
- Brandon Kelley, PE – Kittelson
- Travis Hills, PE, RSP<sub>1</sub> – Kittelson

## MEETING NOTES

The purpose of the meeting was to review proposed bus stop locations with SCAT based on the proposed 4-lane widening of Malabar Road. Travis Hills led the discussion and performed a page-turn of the proposed 4-lane widening concept to review each proposed bus stop location. Generally, SCAT would prefer near side bus stops unless a specific reason necessitates a far side bus stop. The list below reviews each bus stop location and the comments received from SCAT regarding the proposed location:

- St. Johns Heritage Parkway
  - SCAT requested the proposed bus stop to be moved an additional 100' to the east so it is outside the influence area of the turn lane for the roundabout.
  - Frank noted this intersection is going to be signalized in the near future and also discussed the parcel in the NW quadrant may develop into a grocery store.
- Championship Circle
  - SCAT requested the proposed bus stop to be moved near side to the NE corner of the intersection.
- Wisteria Avenue
  - Frank noted a signal is being incorporated at this intersection in late 2021.
  - For this reason, SCAT requested to move the proposed bus stop approximately 50'-100' to the east to accommodate the new east leg crosswalk for the signal.
- Krassner Drive
  - SCAT requested the proposed bus stop to be moved near side of the proposed roundabout, approximately the same distance from the roundabout entrance as the St. Johns Heritage Parkway bus stop.
- Hurley Boulevard
  - SCAT requested the proposed bus stop to be moved near side of the proposed roundabout, approximately halfway between Hillock Avenue and Hillcrest Avenue.
- Across from USPS
  - SCAT confirmed the proposed bus stop location
- White Road
  - SCAT confirmed the proposed bus stop location
- Greenbriar Avenue



- 
- SCAT confirmed the proposed bus stop location
  - Ware Avenue
    - SCAT confirmed the proposed bus stop location
  - Belvedere Road
    - SCAT confirmed the proposed bus stop location
  - Madalyn Landing Apartments
    - SCAT confirmed the proposed bus stop location
  - Sutherland Drive
    - SCAT requested the proposed bus stop to be moved near side to the SW corner of the intersection.
  - Maywood Avenue/Daffodil Drive
    - SCAT requested the proposed WB bus stop in the NE corner to be moved near side of the proposed roundabout, approximately the same distance from the roundabout entrance as the St. Johns Heritage Parkway bus stop.
    - SCAT requested the proposed EB bus stop to be moved the near side of the Palm Bay Memory Care driveway entrance.
  - West of Plaza Shopping Center
    - SCAT confirmed the proposed bus stop location
  - West of Minton Road
    - SCAT confirmed the proposed bus stop location

**Table 1** provides the full bus stop list, the existing station locations, and the proposed station locations based on the proposed 4-lane widening concept. The revised concept is provided at the end of these meeting notes.

**Table 1: Existing and Proposed Bus Stop Locations**

Bus Stop Location	Direction	Existing Station	Proposed Station
St. Johns Heritage Parkway	WB	64+25	66+75
Championship Circle	WB	87+50	88+70
Wisteria Avenue	WB	108+25	108+65
Krassner Drive	WB	129+00	132+04
Hurley Boulevard	WB	155+50	158+05
Across from USPS West of Jupiter Boulevard	WB	188+25	188+17
White Road	EB	197+50	197+65
Greenbriar Avenue	WB	207+00	207+19
Ware Avenue	EB	210+75	209+93
Belvedere Road	WB	217+25	217+35
At Madalyn Landing Apartments <sup>1</sup>	EB	227+25	227+95
Sutherland Drive	EB	239+85	239+53
Maywood Avenue/Daffodil Drive	WB	247+50	250+48
Maywood Avenue/Daffodil Drive	EB	247+15	250+80
Plaza Shopping Center	WB	262+75	262+76
Minton Road	EB	270+15	270+19

<sup>1</sup> Bus stop has an existing shelter, and a shelter is also proposed in the future condition.

Additional follow-up:

1. Kittelson will provide these notes and the revised concept to SCAT for review.
2. SCAT will review the revised proposed bus stop locations and provide any additional feedback to Kittelson.

The foregoing represents Travis Hills' understanding of discussion items at the September 23, 2021 SCAT Bus Stop Review Meeting. If any edits are desired, please contact him at [thills@kittelson.com](mailto:thills@kittelson.com).



**From:** [Jordan, Terry](#)  
**To:** [Travis Hills](#)  
**Cc:** [Andrew Garrison](#); [Jack Freeman](#); [Kraum, Sarah](#); [Nelson, Scott](#)  
**Subject:** RE: Malabar Road Transit Stops  
**Date:** Monday, February 1, 2021 10:28:10 AM

---

Good Morning Travis,

Doing well this way thanks, and hope the same for you as well. Below is the listing of stop locations for the two routes that operate along that segment of Malabar each route only operates in one direction on the roadway (opposite of the other). Also, you were correct in your count while out, the stop at Sutherland Dr. is not there on google but no signs are missing. At this present time there are no plans for the addition of any new bus stop locations along this segment in the near future. However, with the development going on the area we may end up with requests for a stop or two to be installed once the new subdivisions are built out.

#### Route 23 Eastbound Stop Locations

MALABAR RD. & JUPITER BLVD.
MALABAR RD / WARE AVE
MALABAR RD @ MADALYN LANDING
MALABAR RD @ SUTHERLAND DR.
MALABAR RD / MAYWOOD AVE
MALABAR RD. @ PALM BAY WEST

#### Route 20 Westbound Stop Locations

MALABAR RD Across from PALM BAY WEST
MALABAR RD / MAYWOOD AVE NE Corner
MALABAR RD/ BELVEDERE RD NE Corner
MALABAR RD. / GREENBRIER AVE.
MALABAR RD Across from Post Office
MALABAR RD / HURLEY BLVD NW Corner
MALABAR RD / KRASSER DR NE Corner

MALABAR RD / WISTERIA AVE NE Corner
MALABAR RD. @ FRED POPPE REGIONAL PARK
MALABAR RD. / St. JOHN'S HERITAGE PKWY.

Thanks again for keeping Transit at the forefront of your discussions/plans and please let me know if you have any questions or need of additional information.

Regards,

Terry A. Jordan, Planner  
Space Coast Area Transit  
401 South Varr Ave  
Cocoa, FL 32922  
Tel: (321) 349-2960  
Fax: (321) 633-1905  
[Terry.Jordan@brevardfl.gov](mailto:Terry.Jordan@brevardfl.gov)

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Due to Florida's broad public records law, most written communications to or from government employees regarding public education are public records. Therefore, this e-mail communication may be subject to public disclosure.

---

**From:** Travis Hills <thills@kittelton.com>  
**Sent:** Thursday, January 28, 2021 11:51 AM  
**To:** Jordan, Terry <Terry.Jordan@brevardfl.gov>  
**Cc:** Andrew Garrison <agarrison@kittelton.com>; Jack Freeman <jfreeman@kittelton.com>  
**Subject:** Malabar Road Transit Stops

**[EXTERNAL EMAIL]** DO NOT CLICK links or attachments unless you recognize the sender and know the content is safe.

Hey Terry,

Hope you are doing well! I am working on the Malabar Road PD&E that spans from the St. Johns Heritage Parkway to Minton Road. I was wondering if you could verify the number of transit stops you all have along that section of Malabar Road? We counted 15 total in Google



Streetview, but I went out Tuesday and counted 16 total (6 EB and 10 WB). There is a bunch of construction going on out there so I wanted to confirm the number of stops in case some signs had been pulled up or if you all are planning more stops in the near future. It looks like the City is currently building new sidewalk from Hurley Boulevard to just west of Jupiter Boulevard, so not sure if you all are planning more EB bus stops once that gets built. Thanks in advance for your help!!

Travis Hills, PE  
Associate Engineer  
[Kittelson & Associates, Inc.](#)  
Transportation Engineering / Planning  
225 East Robinson Street, Suite 355  
Orlando, Florida 32801  
407.540.0555  
407.373.1125 (direct)  
407.730.0300 (cell)  
[Streetwise](#) [Twitter](#) [Facebook](#)

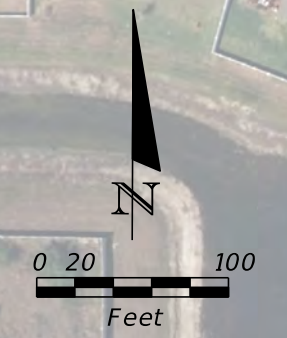
# Appendix L – Access Management Documentation

Malabar Road PD&E Median Access Control - Brevard County											
Location & Station	Proposed Median Opening Type	Distance To/From Nearest Proposed Median Opening (FT)				Distance To/From Nearest Proposed FULL Median Opening (FT)				Connectivity To	Comments
		To the West		To the East		To the West		To the East			
		Distance	Variance	Distance	Variance	Distance	Variance	Distance	Variance		
<b>Access Management Class 5 Spacing (1320-ft FULL &amp; 660-ft DIRECTIONAL) - 45 MPH</b>											
St. Johns Heritage Parkway @ Sta. 61+50	Roundabout	N/A	N/A	950	0%	N/A	N/A	2650	0%	North: St. Johns Heritage Parkway South: Future Roadway Access	Begin project.
New Directional @ Sta. 71+00	Westbound Directional	950	0%	750	0%					North: None South: None	To accommodate u-turns
Snapdragon Drive @ Sta. 78+50	Eastbound Directional	750	0%	950	0%					North: Snapdragon Drive South: None	Access to Snapdragon Drive
Championship Circle @ Sta. 88+00	Full	950	0%	1375	0%	2650	0%	1975	0%	North: Championship Circle South: None	Access to Championship Circle, to accommodate u-turns
Allison Drive @ Sta. 101+75	Westbound Directional	1375	0%	600	9%					North: None South: Allison Drive	Access to Allison Drive
Wisteria Avenue/ Abilene Drive @ Sta. 107+75	Full	600	9%	1000	0%	1975	0%	2175	0%	North: Wisteria Avenue South: Abilene Drive	Access to Wisteria Avenue/Abilene Drive
Delk Avenue @ Sta. 117+75	Eastbound Directional	1000	0%	1175	0%					North: Delk Avenue South: None	Access to Delk Avenue
Krassner Drive/ Bending Branch Lane @ Sta. 129+50	Roundabout	1175	0%	875	0%	2175	0%	2575	0%	North: Krassner Drive South: Bending Branch Lane	Access to Krassner Drive/Bending Branch Lane
Delia Avenue @ Sta. 138+25	Bi-directional	875	0%	650	2%					North: Delia Avenue South: None	Access to Delia Avenue, to accommodate u-turns
Hoffer Avenue/ Bavarian Avenue @ Sta. 144+75	Bi-directional	650	2%	1050	0%					North: Hoffer Avenue South: Bavarian Avenue	Access to Hoffer Avenue/Bavarian Avenue
Hurley Boulevard @ Sta. 155+25	Roundabout	1050	0%	1250	0%	2575	0%	2800	0%	North: None South: Hurley Boulevard	Access to Hurley Boulevard
Watoga Avenue @ Sta. 167+75	Bi-directional	1250	0%	1050	0%					North: Avery Springs Development South: Watoga Avenue	Access to Watoga Avenue/Avery Springs Development
Palm Bay Public Works (W) @ Sta. 178+25	Bi-directional	1050	0%	500	24%					North: None South: Palm Bay Public Works (W)	Access to Palm Bay Public Works (W), to accommodate u-turns
Palm Bay Public Works (E) @ Sta. 183+25	Full	500	24%	975	26%	2800	0%	975	26%	North: None South: Palm Bay Public Works (E)	Access to Palm Bay Public Works (E)
Jupiter Boulevard @ Sta. 193+00	Signal	975	26%	850	0%	975	26%	2400	0%	North: Jupiter Boulevard South: Jupiter Boulevard	Access to Jupiter Boulevard
Wellsley Avenue @ Sta. 201+50	Bi-directional	850	0%	525	20%					North: None South: Wellsley Avenue	Access to Wellsley Avenue, to accommodate u-turns
Greenbriar Avenue @ Sta. 206+75	Bi-directional	525	20%	675	0%					North: Greenbriar Avenue South: None	Access to Greenbriar Avenue, to accommodate u-turns
Santa Rosa Avenue @ Sta. 213+50	Eastbound Directional	675	0%	350	47%					North: Private driveway South: None	To accommodate u-turns
Belvedere Road @ Sta. 217+00	Full	350	47%	450	66%	2400	0%	450	66%	North: Belvedere Road South: None	Access to Belvedere Road
Garvey Road @ Sta. 221+50	Signal	450	66%	700	0%	450	66%	2525	0%	North: None South: Garvey Road	Access to Garvey Road
Madalyn Landing @ Sta. 228+50	Westbound Directional	700	0%	1075	0%					North: None South: Madalyn Landing	Access to Madalyn Landing
Sutherland Drive @ Sta. 239+25	Bi-directional	1075	0%	750	0%					North: None South: Sutherland Drive	Access to Sutherland Drive, to accommodate u-turns
Maywood Avenue/ Daffodil Drive @ Sta. 246+75	Roundabout	750	0%	475	28%	2525	0%	1775	0%	North: Maywood Avenue South: Daffodil Drive	Access to Maywood Avenue/Daffodil Drive
Palm Bay Memory Care @ Sta. 251+50	Westbound Directional	475	28%	700	0%					North: None South: Palm Bay Memory Care	Access to Palm Bay Memory Care
Dollar General/ Autozone @ Sta. 258+50	Bi-directional	700	0%	600	9%					North: Dollar General South: Autozone	Access to Dollar General/Autozone, to accommodate u-turns
Plaza Shopping Center @ Sta. 264+50	Signal	600	9%	750	43%	1775	0%	750	43%	North: Plaza Shopping Center South: Plaza Shopping Center	Access to Plaza Shopping Center
Minton Road @ Sta. 272+00	Signal	750	43%	N/A	N/A	750	43%	N/A	N/A	North: Minton Road South: Minton Road	Access to Minton Road



## Appendix M – Roundabout Design Checks





MATCH LINE 69+50

R1 = 280 ft  
V1 = 30 mph

R2 = 150 ft  
V2 = 24 mph

R5 = 165 ft  
V5 = 25 mph

R5 = 215 ft  
V5 = 27 mph

R2 = 165 ft  
V2 = 25 mph

R1 = 275 ft  
V1 = 30 mph

R1 = 280 ft  
V1 = 30 mph

R2 = 180 ft  
V2 = 26 mph

R5 = 200 ft  
V5 = 27 mph

R5 = 160 ft  
V5 = 24 mph

R2 = 205 ft  
V2 = 27 mph

R1 = 285 ft  
V1 = 30 mph

**ST. JOHNS HERITAGE  
PARKWAY  
ROUNDBABOUT  
FASTEST PATHS**

M - 1

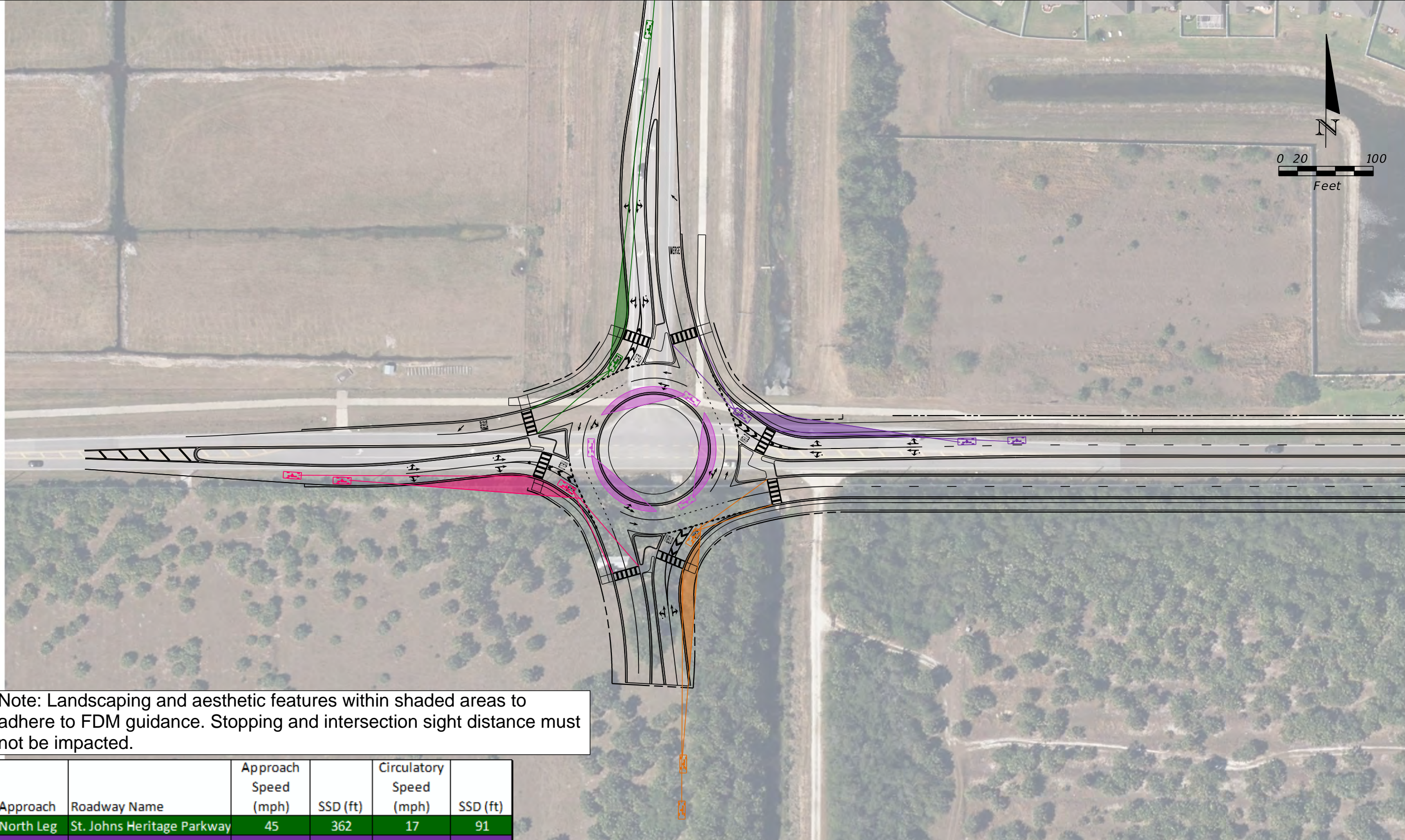


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

*MALABAR ROAD PD&E STUDY  
PLAN SHEET  
RECOMMENDED  
PREFERRED ALTERNATIVE*

SHEET NO.  
1



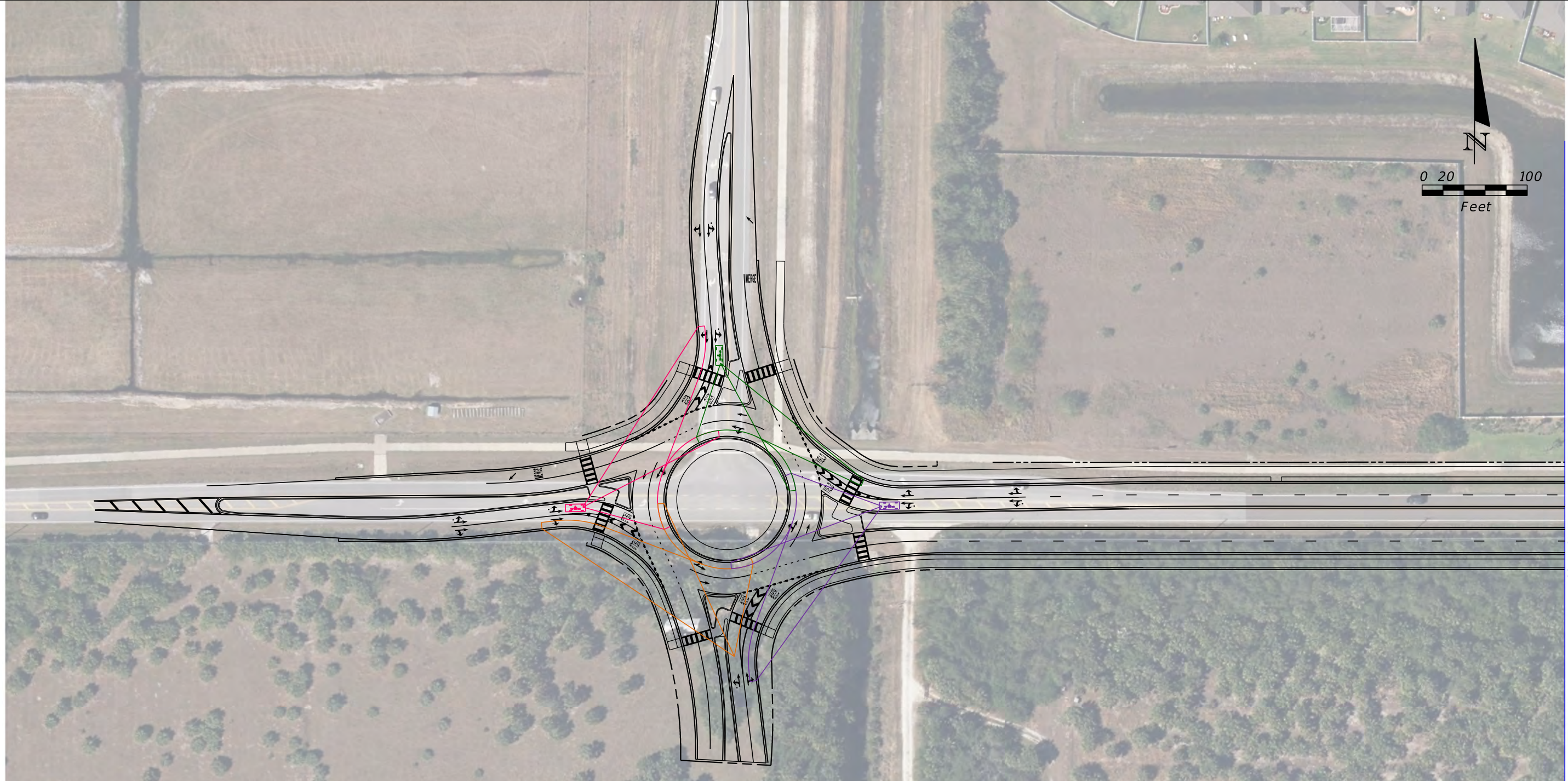


Note: Landscaping and aesthetic features within shaded areas to adhere to FDM guidance. Stopping and intersection sight distance must not be impacted.

Approach	Roadway Name	Approach Speed (mph)	SSD (ft)	Circulatory Speed (mph)	SSD (ft)
North Leg	St. Johns Heritage Parkway	45	362	17	91
East Leg	Malabar Road	35	248	17	91
South Leg	St. Johns Heritage Parkway	35	248	17	91
West Leg	Malabar Road	35	248	17	91

**ST. JOHNS HERITAGE PARKWAY ROUNDABOUT STOPPING SIGHT DISTANCE**



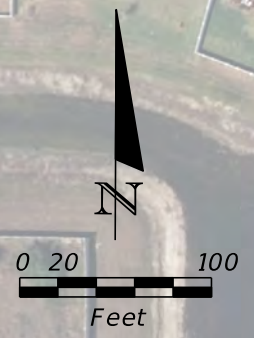
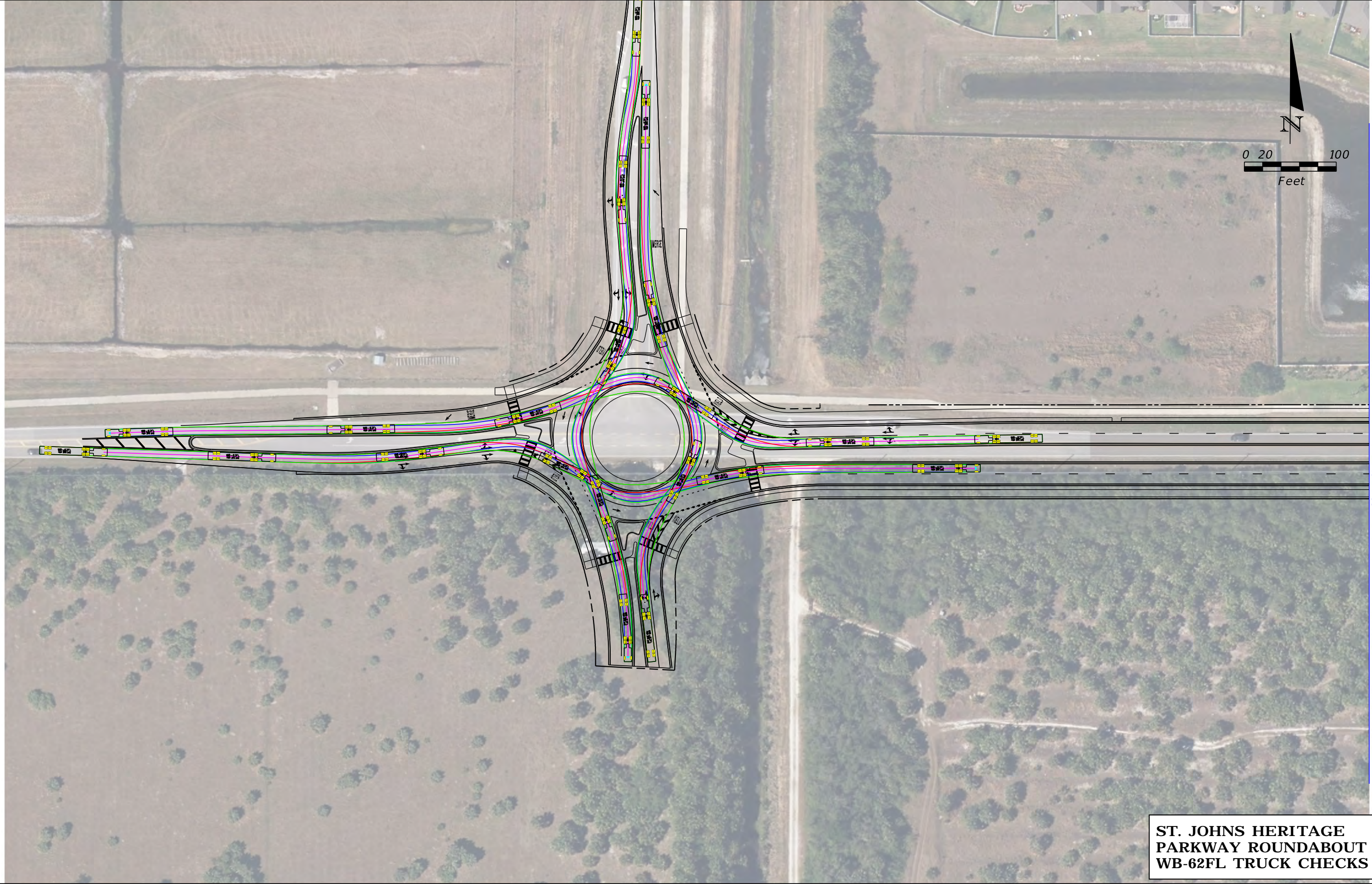


Note: Landscaping and aesthetic features within shaded areas to adhere to FDM guidance. Stopping and intersection sight distance must not be impacted.

Approach	Roadway Name	Upstream Entry Speed (mph)	ISD d1 (ft)	Circulating Speed (mph)	ISD d2 (ft)
North Leg	St. Johns Heritage Parkway	23	169	17	125
East Leg	Malabar Road	28	206	17	125
South Leg	St. Johns Heritage Parkway	28.5	210	17	125
West Leg	Malabar Road	27.5	202	17	125

**ST. JOHNS HERITAGE PARKWAY  
 ROUNDABOUT  
 INTERSECTION SIGHT  
 DISTANCE**



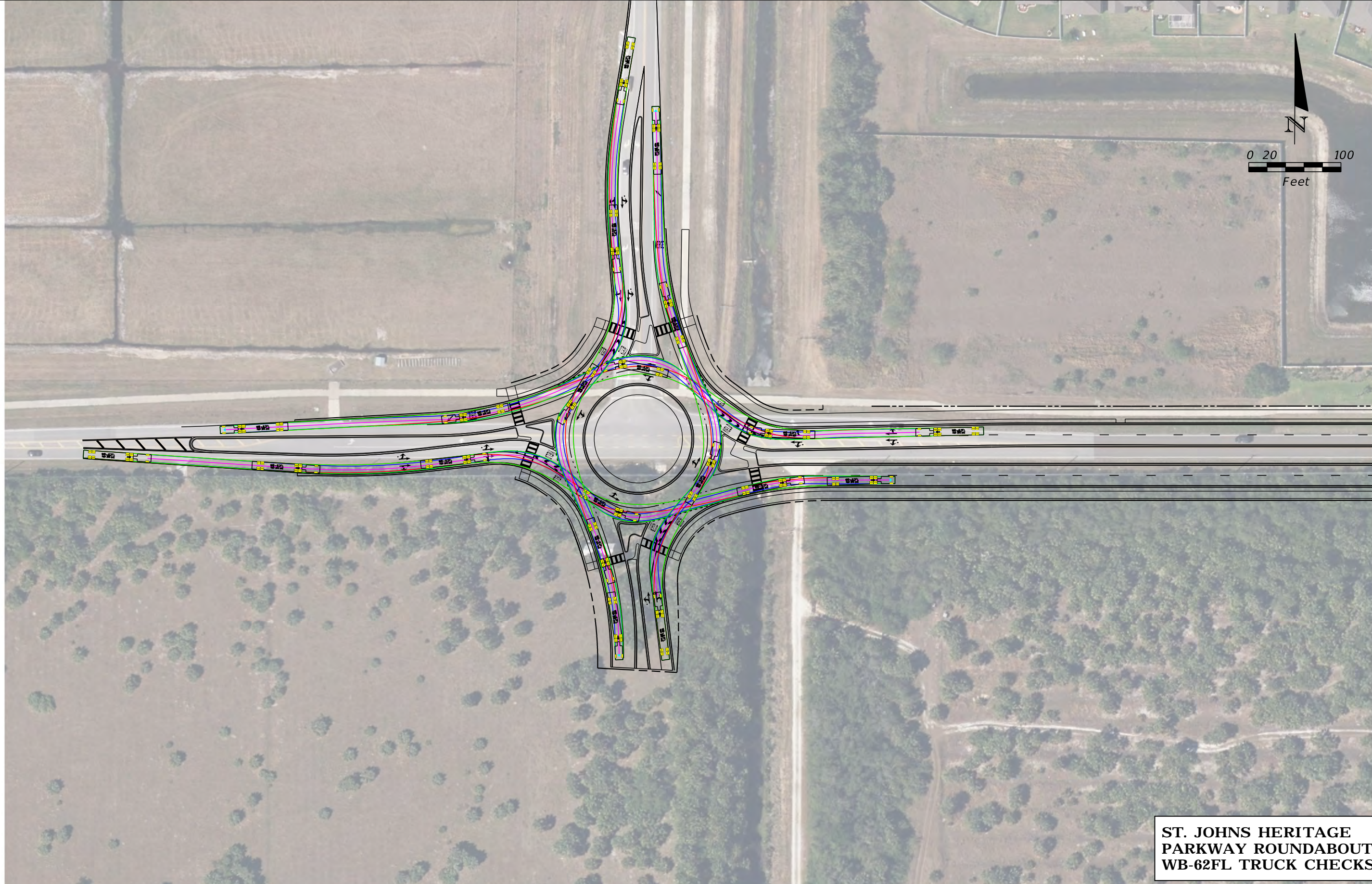


MATCH LINE 69+50

**ST. JOHNS HERITAGE  
 PARKWAY ROUNDABOUT  
 WB-62FL TRUCK CHECKS**

M - 4		CITY OF PALM BAY		<b>MALABAR ROAD PD&amp;E STUDY          PLAN SHEET          RECOMMENDED          PREFERRED ALTERNATIVE</b>	SHEET NO.
		ROAD NO.	COUNTY		FINANCIAL PROJECT ID
			BREVARD		





MATCH LINE 69+50

**ST. JOHNS HERITAGE  
 PARKWAY ROUNDABOUT  
 WB-62FL TRUCK CHECKS**

M - 5

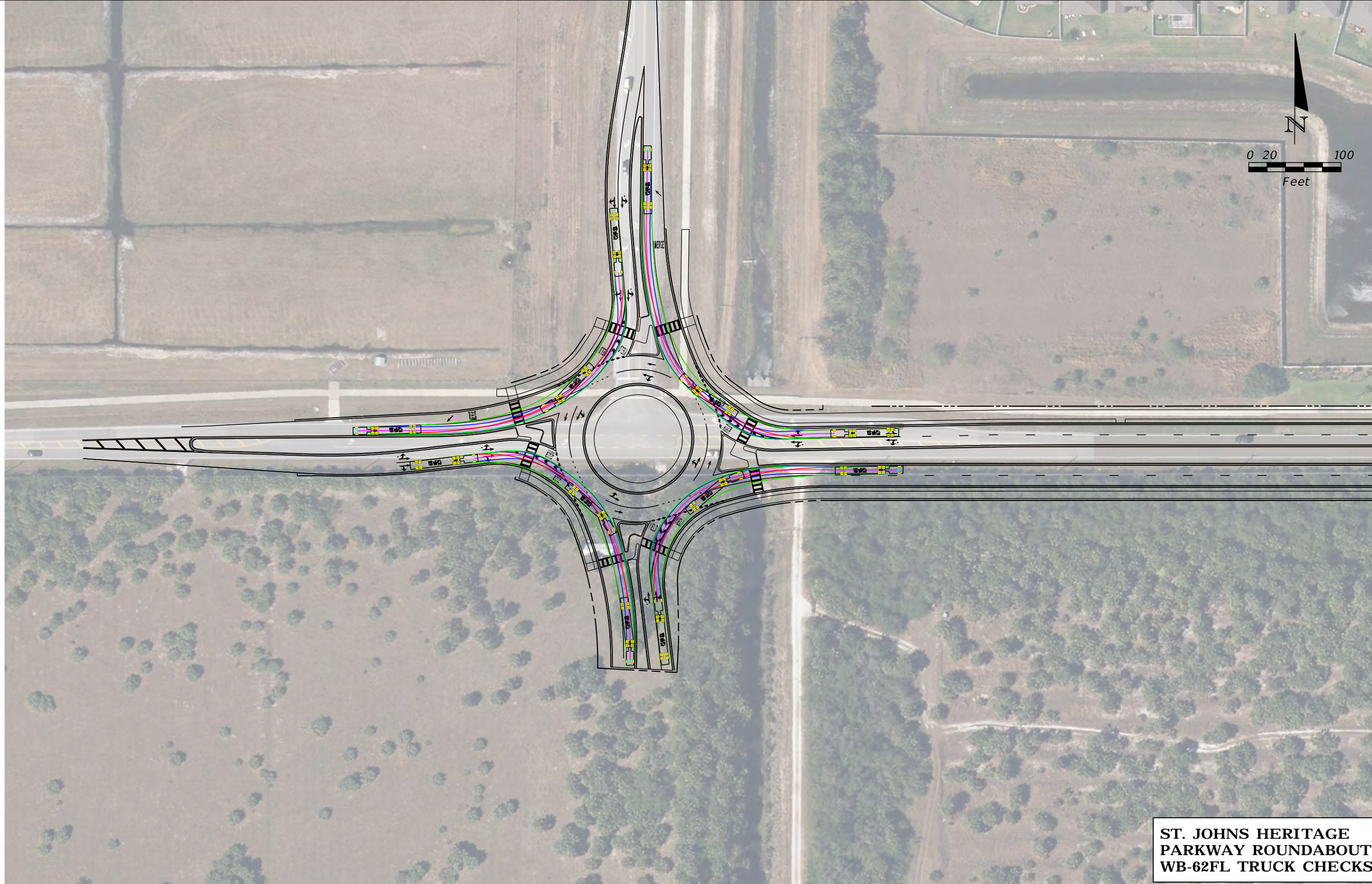


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

*MALABAR ROAD PD&E STUDY  
 PLAN SHEET  
 RECOMMENDED  
 PREFERRED ALTERNATIVE*

SHEET NO.
5





MATCH LINE 69+50

**ST. JOHNS HERITAGE  
PARKWAY ROUNDABOUT  
WB-62FL TRUCK CHECKS**

M - 6

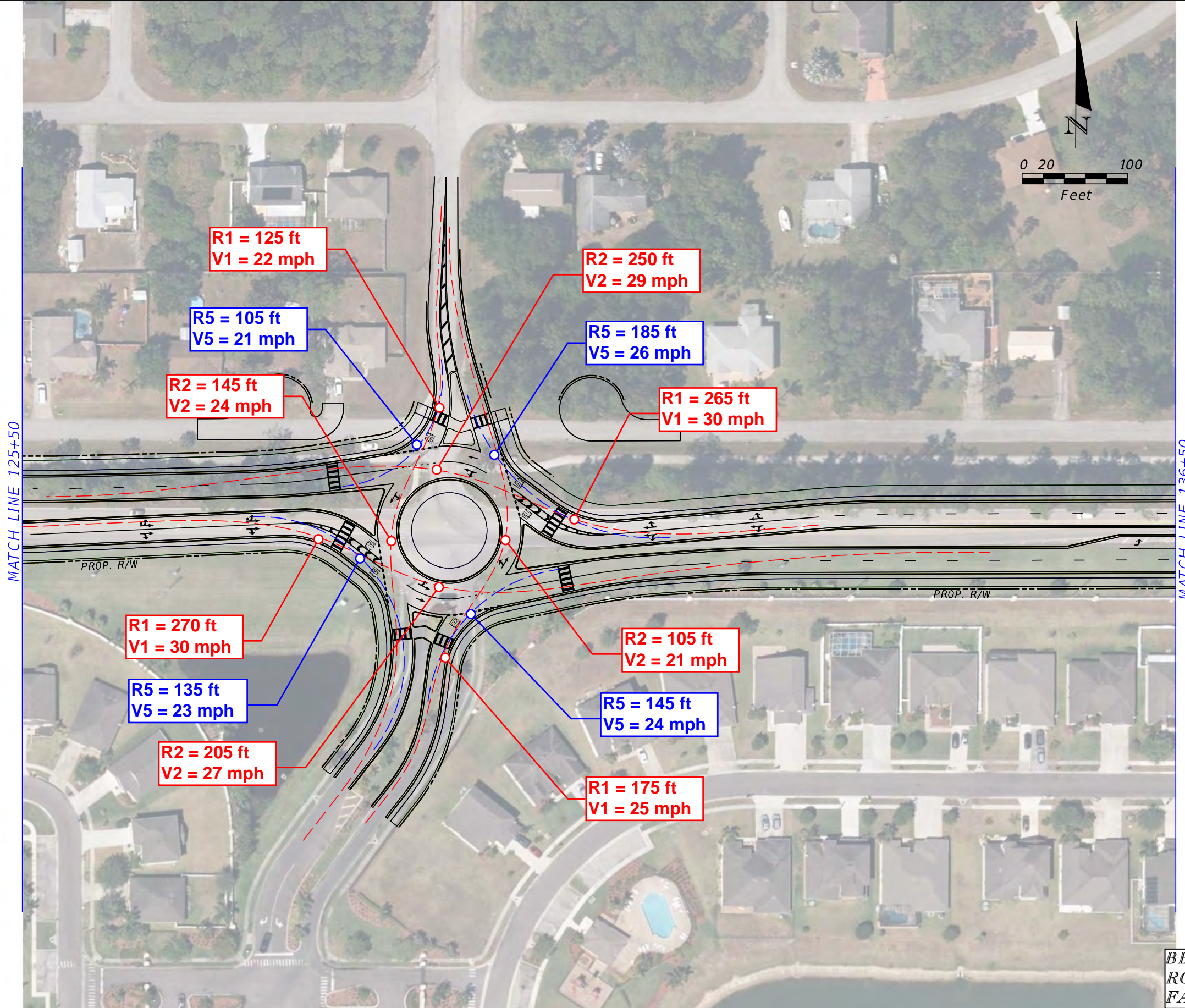


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

*MALABAR ROAD PD&E STUDY  
PLAN SHEET  
RECOMMENDED  
PREFERRED ALTERNATIVE*

SHEET NO.
6





R1 = 125 ft  
V1 = 22 mph

R2 = 250 ft  
V2 = 29 mph

R5 = 105 ft  
V5 = 21 mph

R5 = 185 ft  
V5 = 26 mph

R2 = 145 ft  
V2 = 24 mph

R1 = 265 ft  
V1 = 30 mph

R1 = 270 ft  
V1 = 30 mph

R2 = 105 ft  
V2 = 21 mph

R5 = 135 ft  
V5 = 23 mph

R5 = 145 ft  
V5 = 24 mph

R2 = 205 ft  
V2 = 27 mph

R1 = 175 ft  
V1 = 25 mph

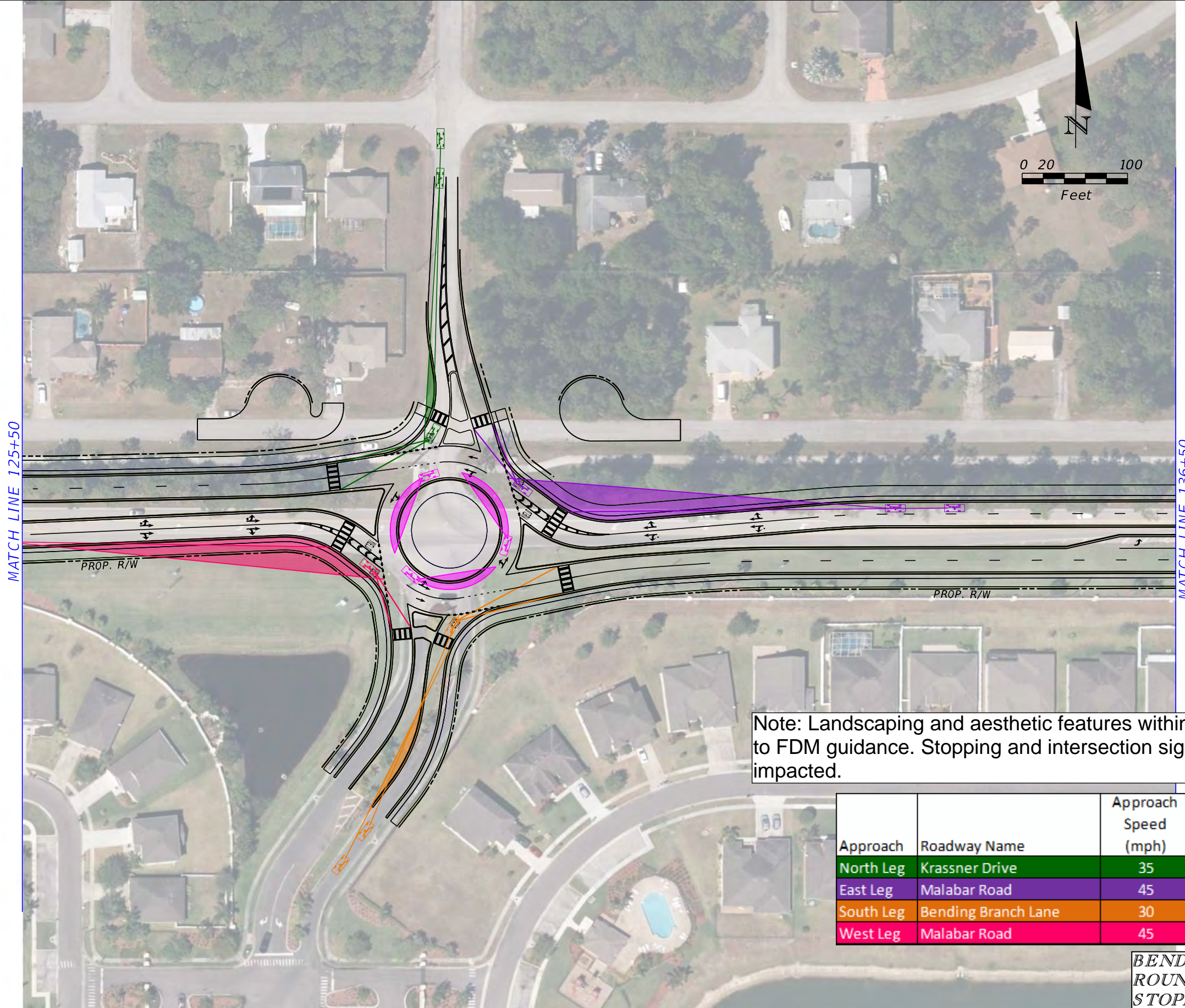
BENDING BRANCH LANE  
ROUNDABOUT  
FASTEST PATHS



CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

MALABAR ROAD PD&E STUDY  
PLANSHEET  
RECOMMENDED  
PREFERRED ALTERNATIVE



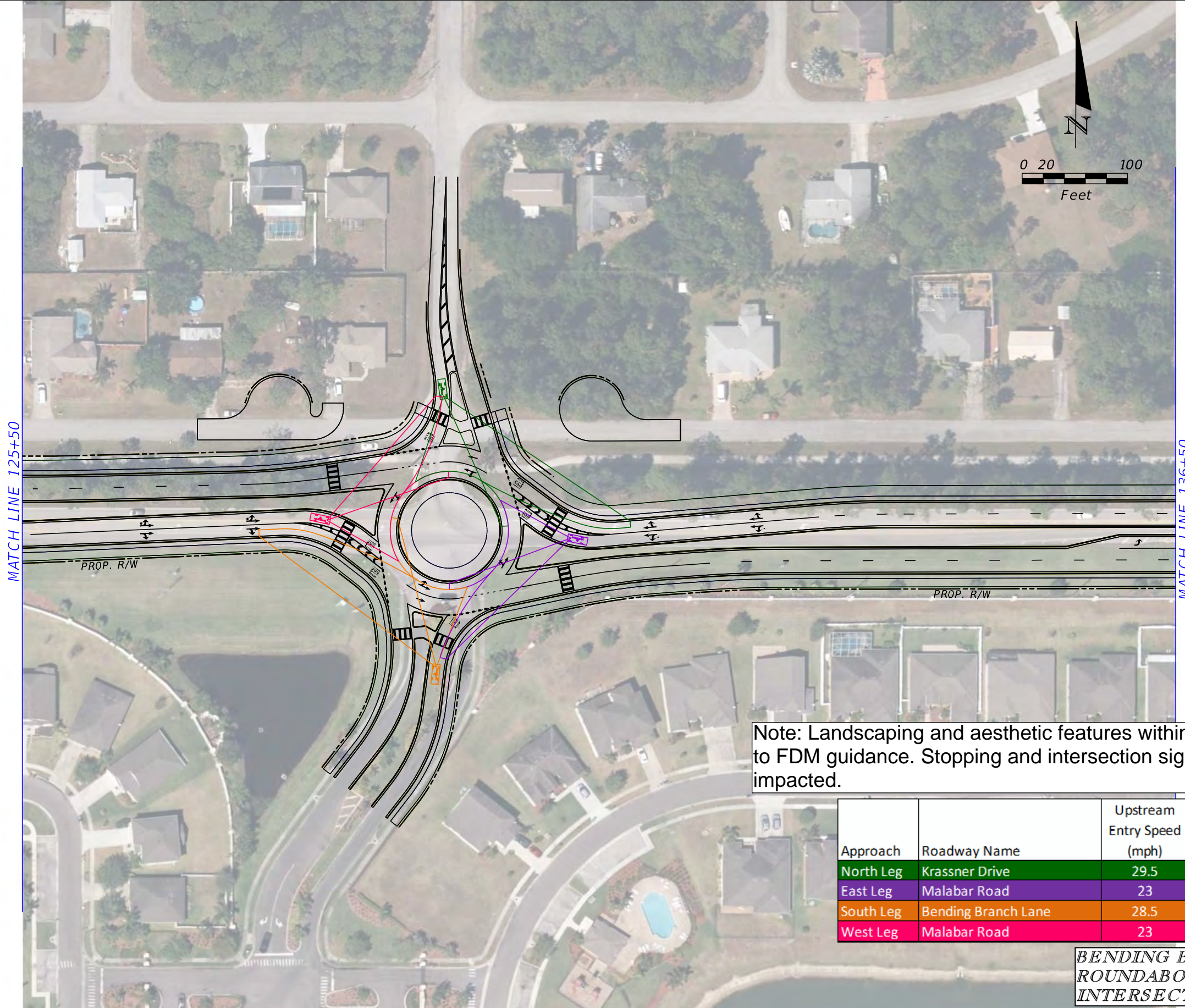


Note: Landscaping and aesthetic features within shaded areas to adhere to FDM guidance. Stopping and intersection sight distance must not be impacted.

Approach	Roadway Name	Approach Speed (mph)	SSD (ft)	Circulatory Speed (mph)	SSD (ft)
North Leg	Krassner Drive	35	248	16	84
East Leg	Malabar Road	45	362	16	84
South Leg	Bending Branch Lane	30	198	16	84
West Leg	Malabar Road	45	362	16	84

*BENDING BRANCH LANE  
ROUNDBOUT  
STOPPING SIGHT DISTANCE*





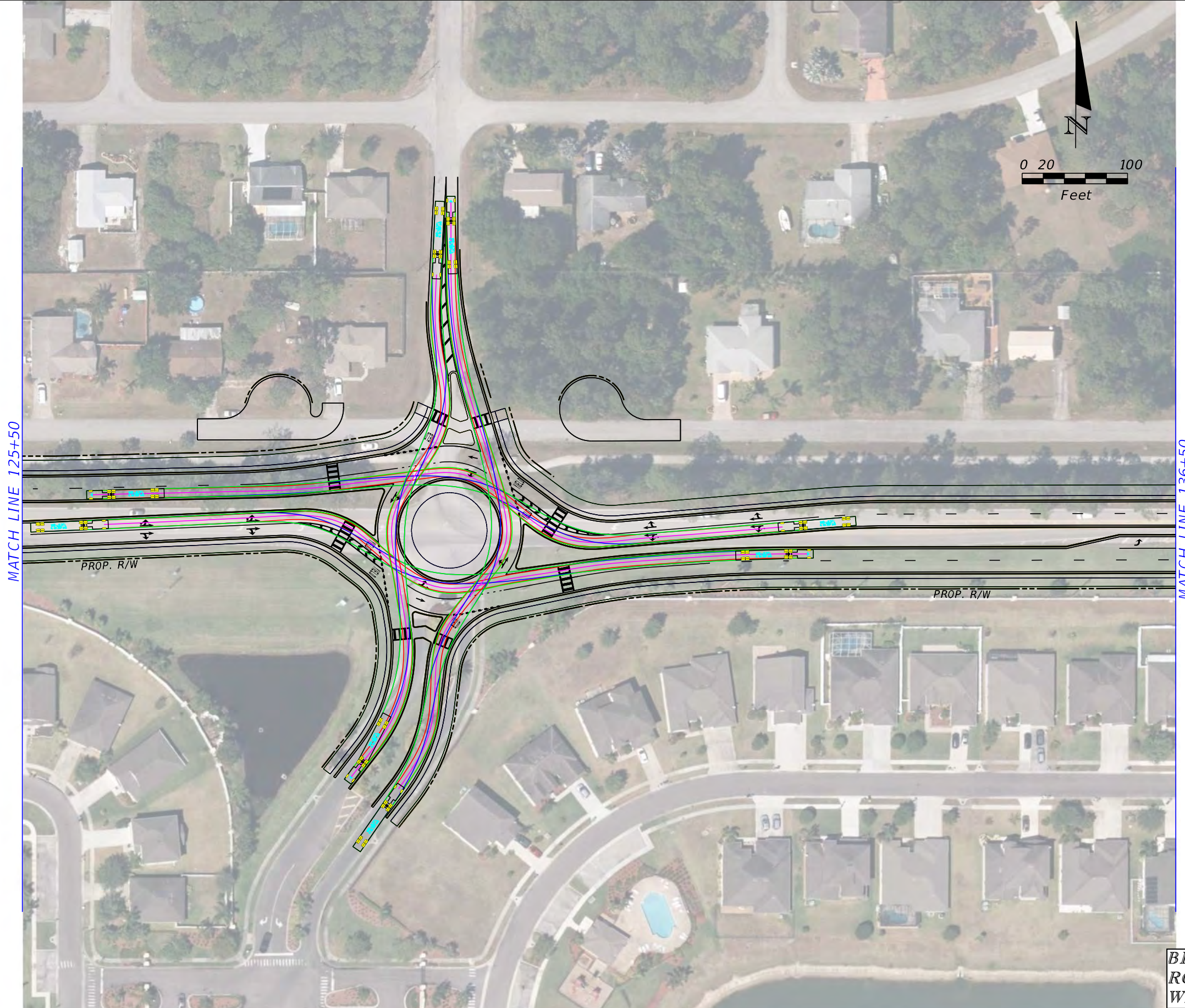
Note: Landscaping and aesthetic features within shaded areas to adhere to FDM guidance. Stopping and intersection sight distance must not be impacted.

Approach	Roadway Name	Upstream Entry Speed (mph)	ISD d1 (ft)	Circulating Speed (mph)	ISD d2 (ft)
North Leg	Krassner Drive	29.5	217	16	118
East Leg	Malabar Road	23	169	16	118
South Leg	Bending Branch Lane	28.5	210	16	118
West Leg	Malabar Road	23	169	16	118

*BENDING BRANCH LANE  
ROUNDAABOUT  
INTERSECTION SIGHT DISTANCE*







**BENDING BRANCH LANE  
 ROUNDABOUT  
 WB-62FL TRUCK CHECKS**

M - 10

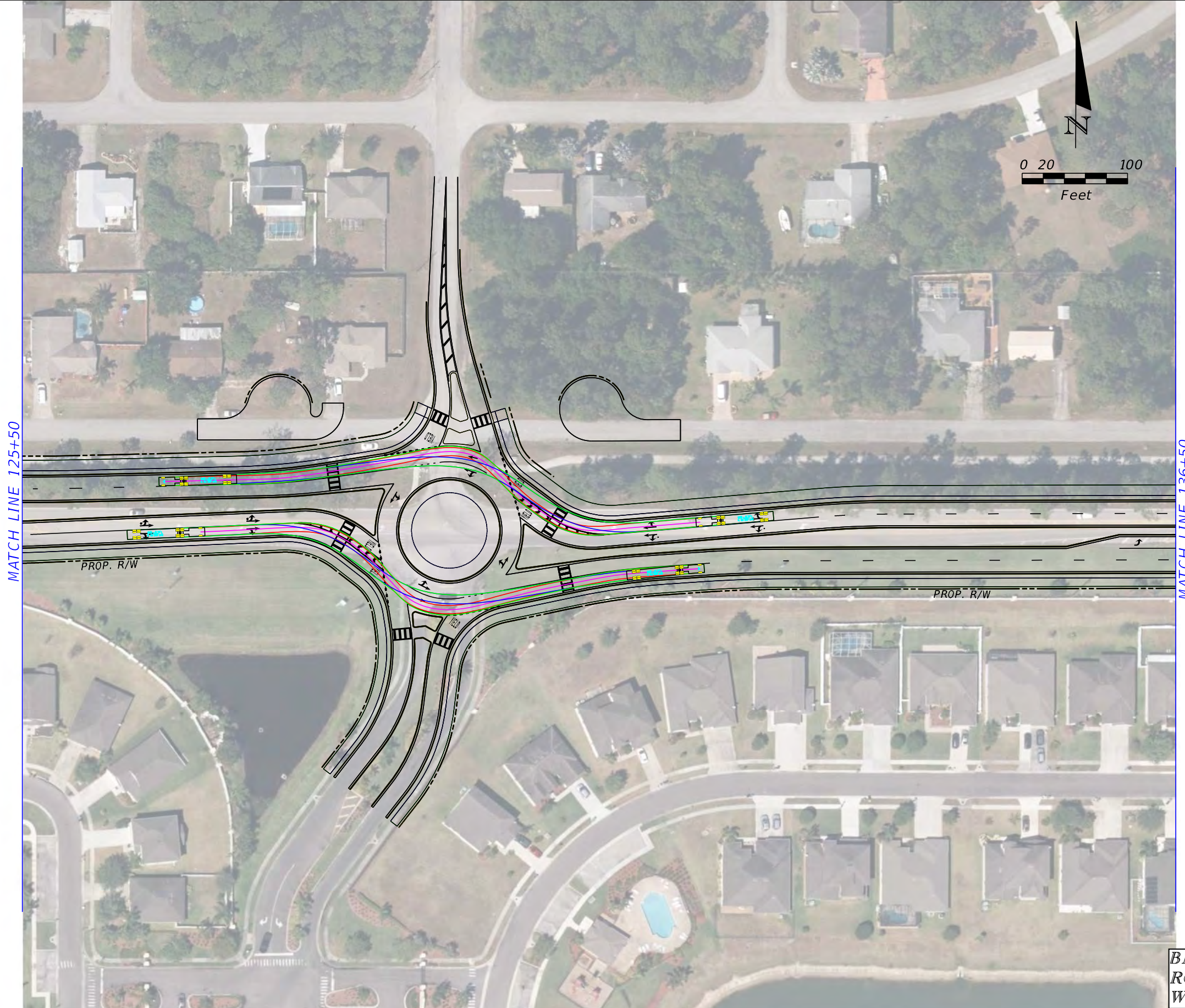


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
 PLANSHEET  
 RECOMMENDED  
 PREFERRED ALTERNATIVE**

SHEET NO.  
 10





*BENDING BRANCH LANE  
 ROUNDABOUT  
 WB-62FL TRUCK CHECKS*

M - 11

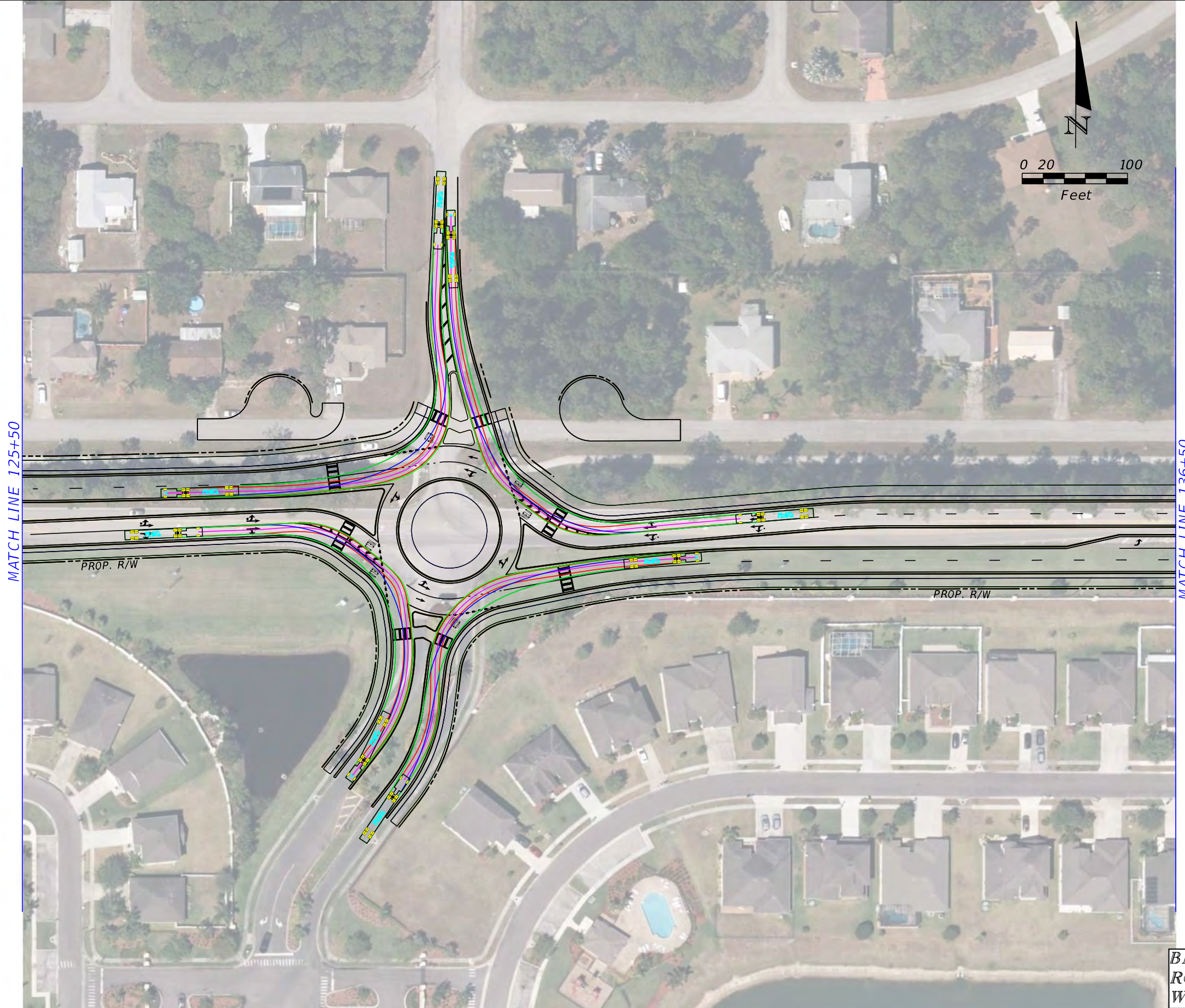


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

*MALABAR ROAD PD&E STUDY  
 PLANSHEET  
 RECOMMENDED  
 PREFERRED ALTERNATIVE*

SHEET NO.
11





*BENDING BRANCH LANE  
 ROUNDABOUT  
 WB-62FL TRUCK CHECKS*

M - 12

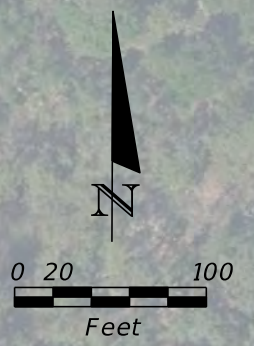


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

*MALABAR ROAD PD&E STUDY  
 PLANSHEET  
 RECOMMENDED  
 PREFERRED ALTERNATIVE*

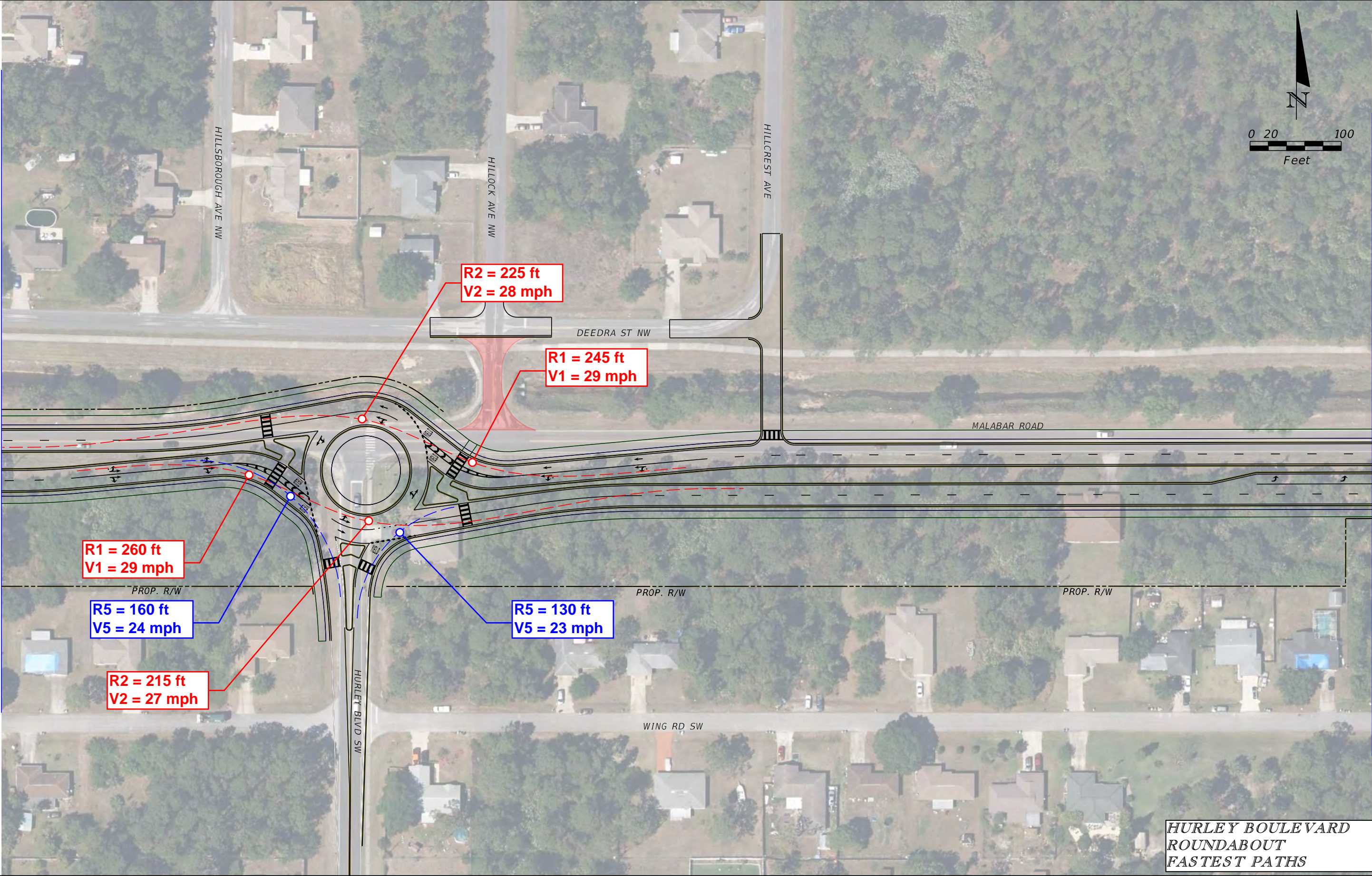
SHEET NO.
12





MATCH LINE 151+50

MATCH LINE 166+60



**R2 = 225 ft**  
**V2 = 28 mph**

**R1 = 245 ft**  
**V1 = 29 mph**

**R1 = 260 ft**  
**V1 = 29 mph**

**R5 = 160 ft**  
**V5 = 24 mph**

**R2 = 215 ft**  
**V2 = 27 mph**

**R5 = 130 ft**  
**V5 = 23 mph**

**HURLEY BOULEVARD  
ROUNDBOUT  
FASTEST PATHS**



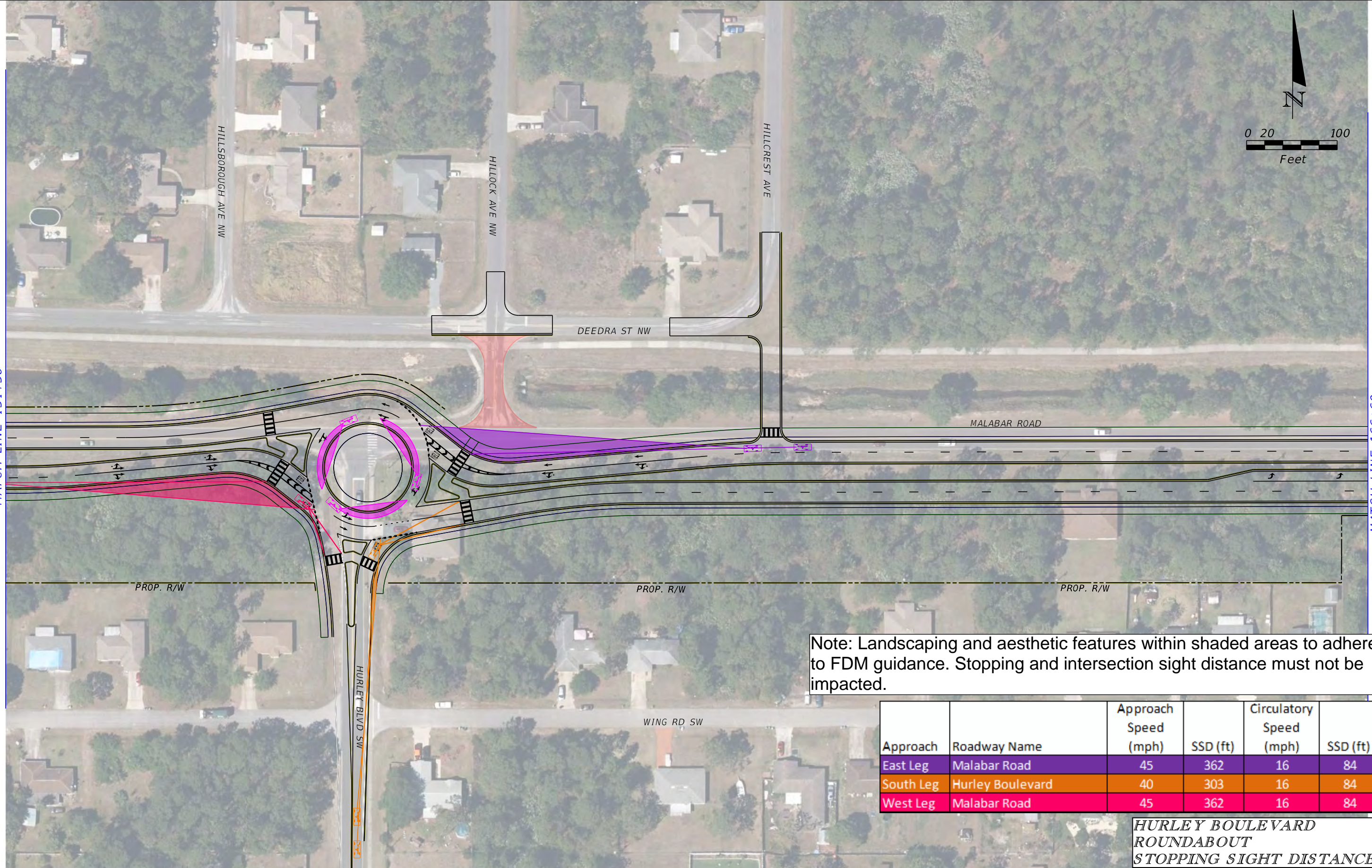
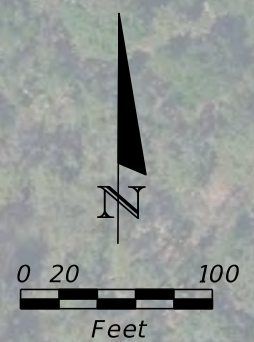
CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
PLANSHEET  
RECOMMENDED  
PREFERRED ALTERNATIVE**



MATCH LINE 151+50

MATCH LINE 166+60



Note: Landscaping and aesthetic features within shaded areas to adhere to FDM guidance. Stopping and intersection sight distance must not be impacted.

Approach	Roadway Name	Approach Speed (mph)	SSD (ft)	Circulatory Speed (mph)	SSD (ft)
East Leg	Malabar Road	45	362	16	84
South Leg	Hurley Boulevard	40	303	16	84
West Leg	Malabar Road	45	362	16	84

**HURLEY BOULEVARD  
ROUNDAABOUT  
STOPPING SIGHT DISTANCE**



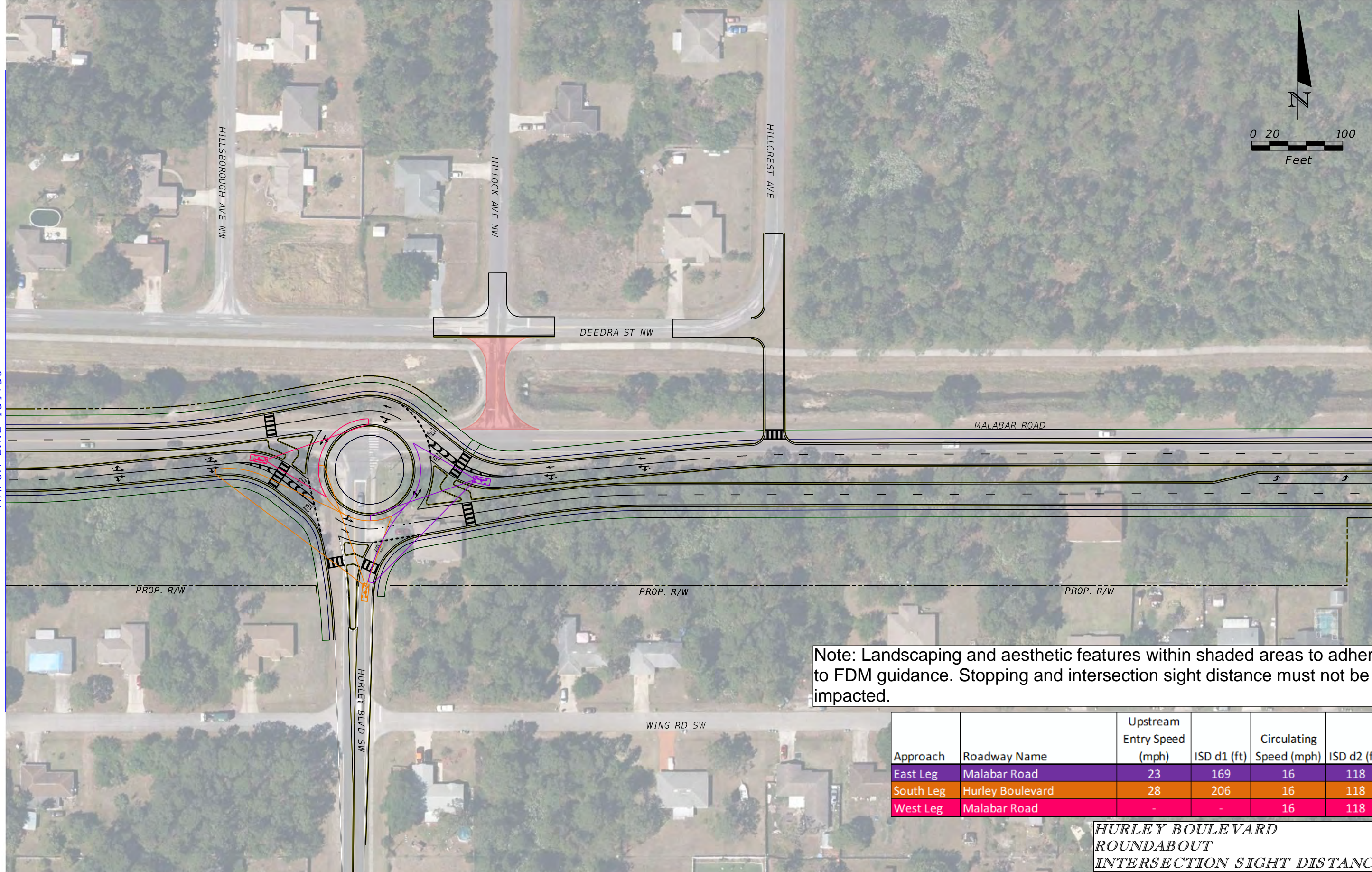
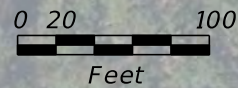
CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
PLANSHEET  
RECOMMENDED  
PREFERRED ALTERNATIVE**



MATCH LINE 151+50

MATCH LINE 166+60



Note: Landscaping and aesthetic features within shaded areas to adhere to FDM guidance. Stopping and intersection sight distance must not be impacted.

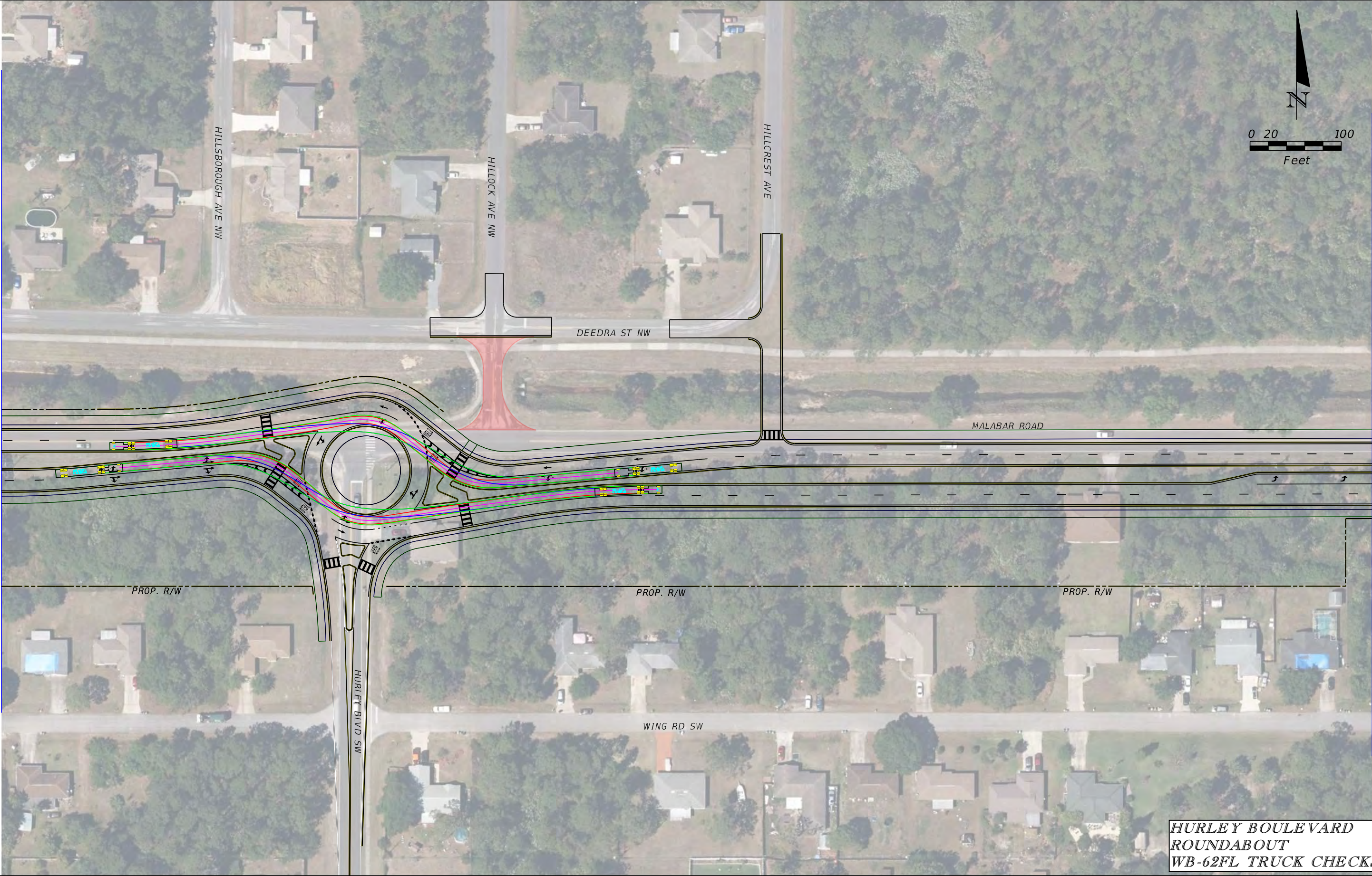
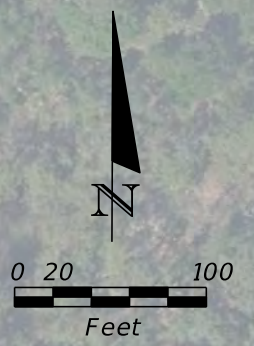
Approach	Roadway Name	Upstream Entry Speed (mph)	ISD d1 (ft)	Circulating Speed (mph)	ISD d2 (ft)
East Leg	Malabar Road	23	169	16	118
South Leg	Hurley Boulevard	28	206	16	118
West Leg	Malabar Road	-	-	16	118

**HURLEY BOULEVARD  
ROUNDBOUT  
INTERSECTION SIGHT DISTANCE**



MATCH LINE 151+50

MATCH LINE 166+60



**HURLEY BOULEVARD  
 ROUNDABOUT  
 WB-62FL TRUCK CHECKS**

M - 16



CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

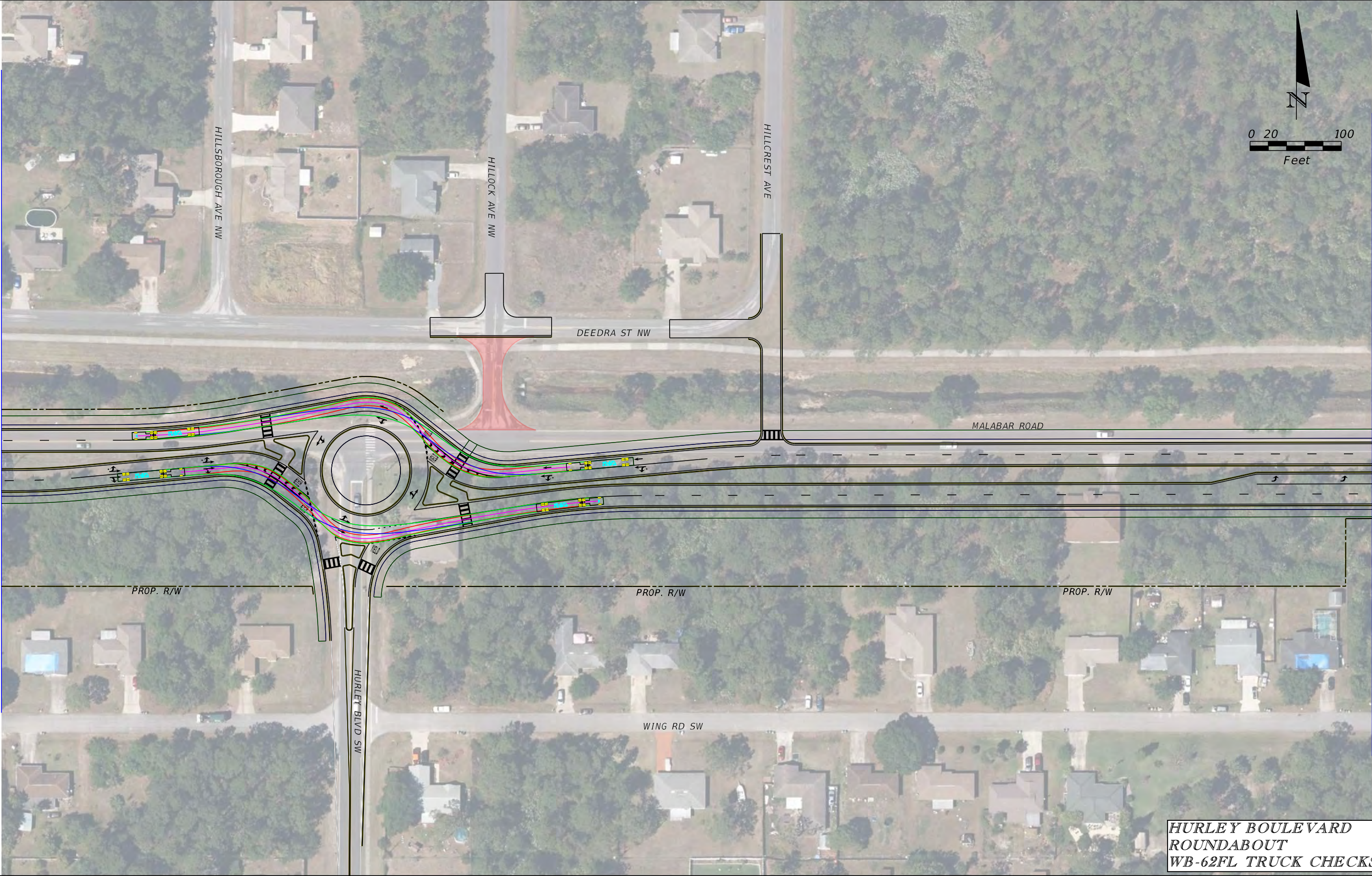
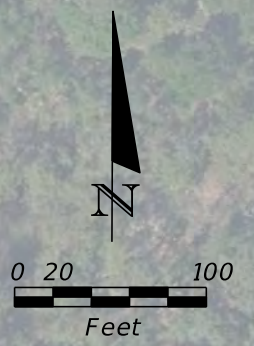
**MALABAR ROAD PD&E STUDY  
 PLANSHEET  
 RECOMMENDED  
 PREFERRED ALTERNATIVE**

SHEET NO.  
 16



MATCH LINE 151+50

MATCH LINE 166+60



**HURLEY BOULEVARD  
 ROUNDABOUT  
 WB-62FL TRUCK CHECKS**

M - 17



CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

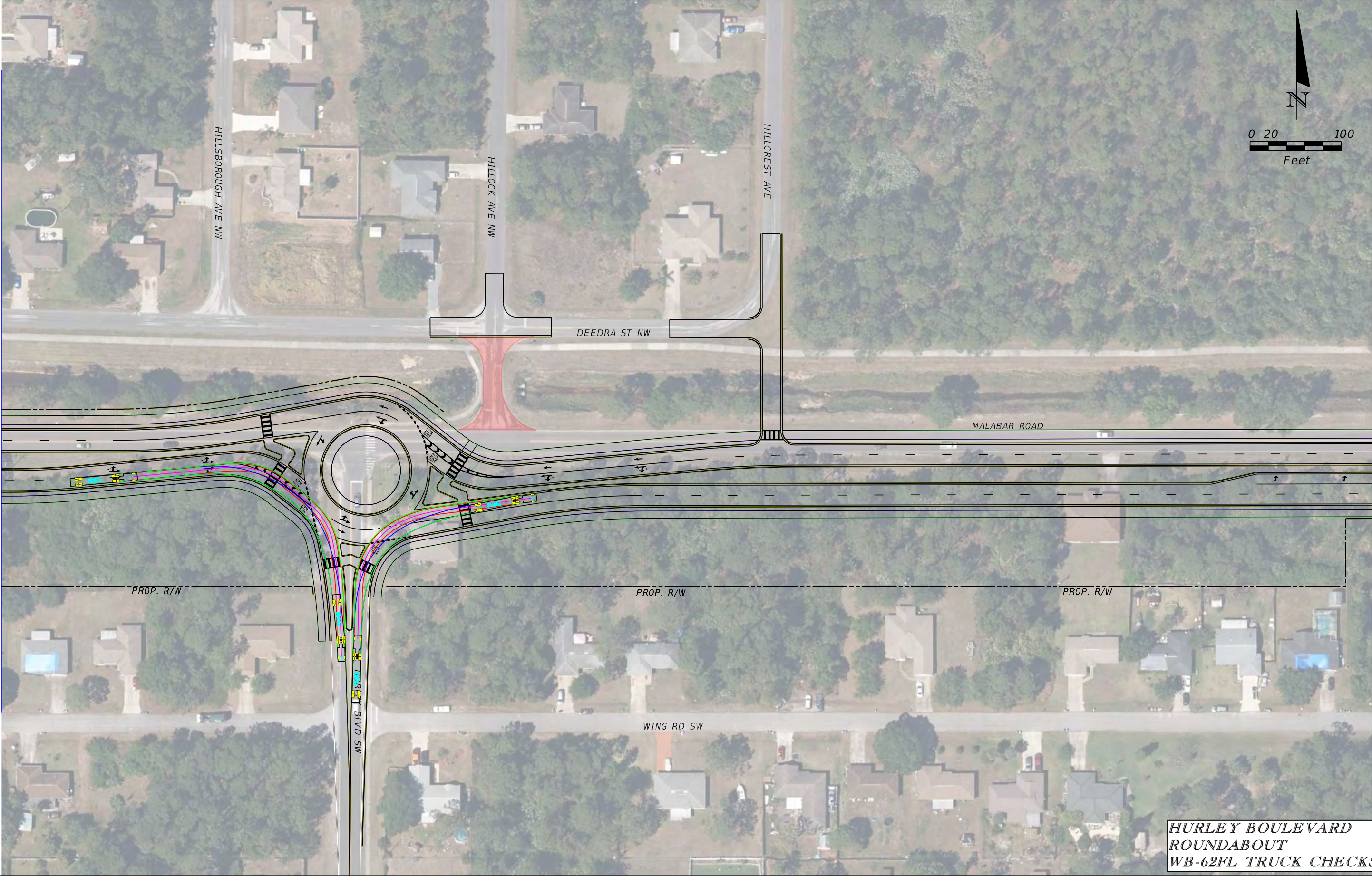
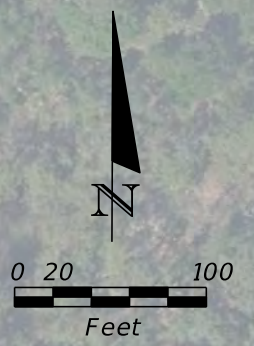
**MALABAR ROAD PD&E STUDY  
 PLANSHEET  
 RECOMMENDED  
 PREFERRED ALTERNATIVE**

SHEET NO.  
 17



MATCH LINE 151+50

MATCH LINE 166+60



**HURLEY BOULEVARD  
ROUNDBOUT  
WB-62FL TRUCK CHECKS**

M - 18

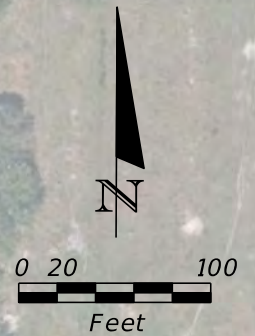


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
PLANSHEET  
RECOMMENDED  
PREFERRED ALTERNATIVE**

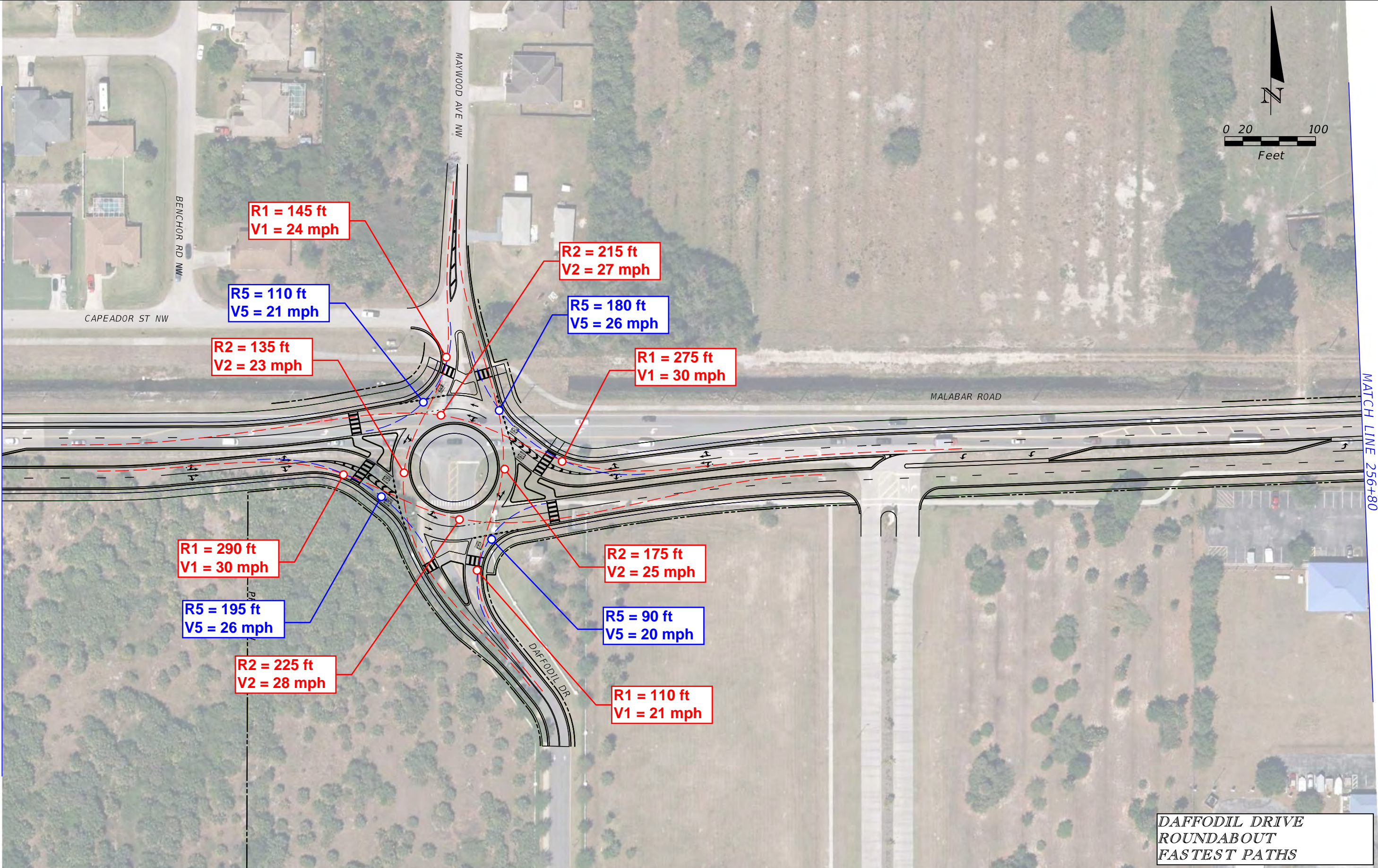
SHEET NO.  
18





MATCH LINE 241+70

MATCH LINE 256+80



**R1 = 145 ft**  
**V1 = 24 mph**

**R2 = 215 ft**  
**V2 = 27 mph**

**R5 = 110 ft**  
**V5 = 21 mph**

**R5 = 180 ft**  
**V5 = 26 mph**

**R2 = 135 ft**  
**V2 = 23 mph**

**R1 = 275 ft**  
**V1 = 30 mph**

**R1 = 290 ft**  
**V1 = 30 mph**

**R2 = 175 ft**  
**V2 = 25 mph**

**R5 = 195 ft**  
**V5 = 26 mph**

**R5 = 90 ft**  
**V5 = 20 mph**

**R2 = 225 ft**  
**V2 = 28 mph**

**R1 = 110 ft**  
**V1 = 21 mph**

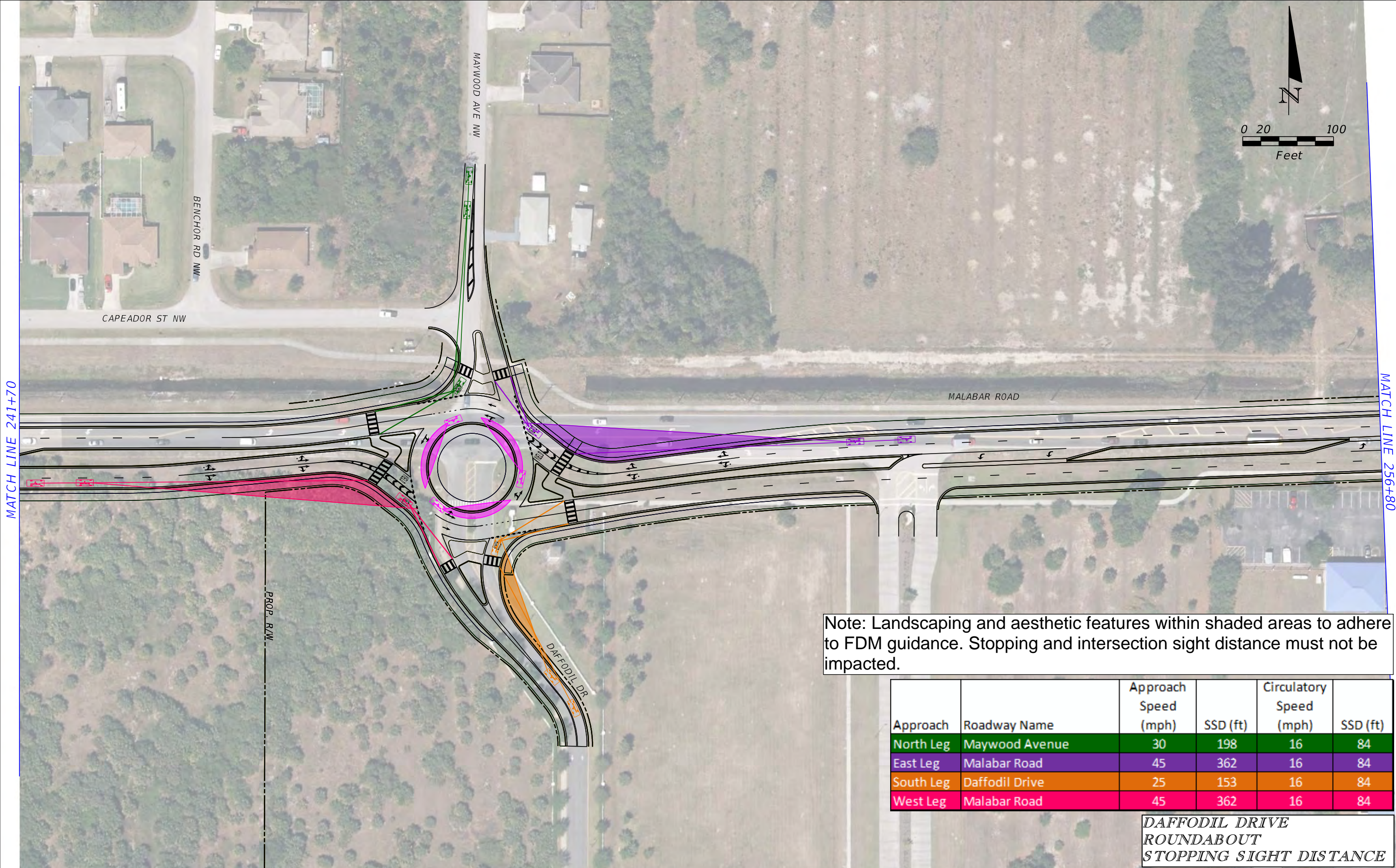
**DAFFODIL DRIVE  
ROUNDBABOUT  
FASTEST PATHS**



CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
PLANSHEET  
RECOMMENDED  
PREFERRED ALTERNATIVE**



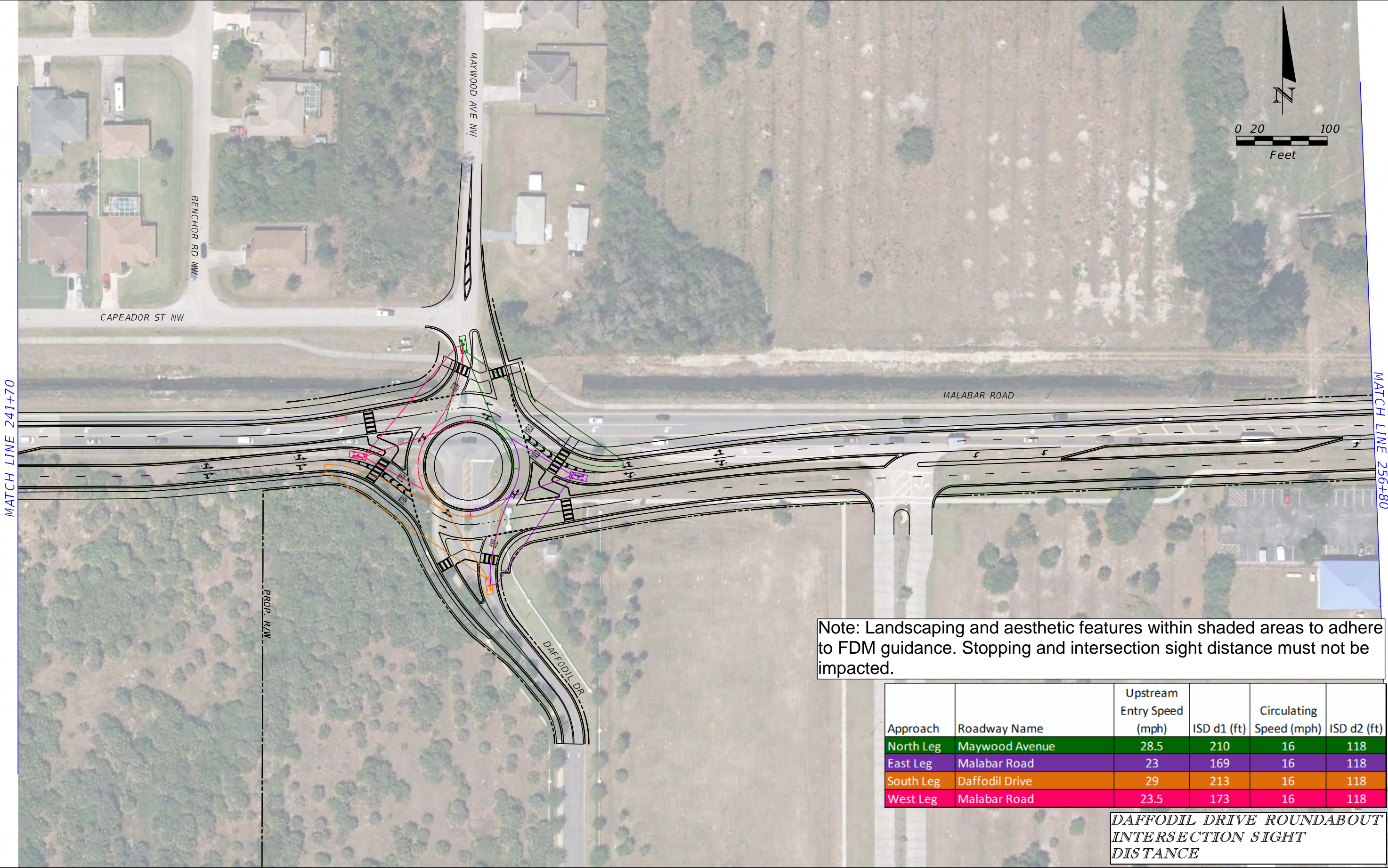


Note: Landscaping and aesthetic features within shaded areas to adhere to FDM guidance. Stopping and intersection sight distance must not be impacted.

Approach	Roadway Name	Approach Speed (mph)	SSD (ft)	Circulatory Speed (mph)	SSD (ft)
North Leg	Maywood Avenue	30	198	16	84
East Leg	Malabar Road	45	362	16	84
South Leg	Daffodil Drive	25	153	16	84
West Leg	Malabar Road	45	362	16	84

*DAFFODIL DRIVE  
 ROUNDABOUT  
 STOPPING SIGHT DISTANCE*



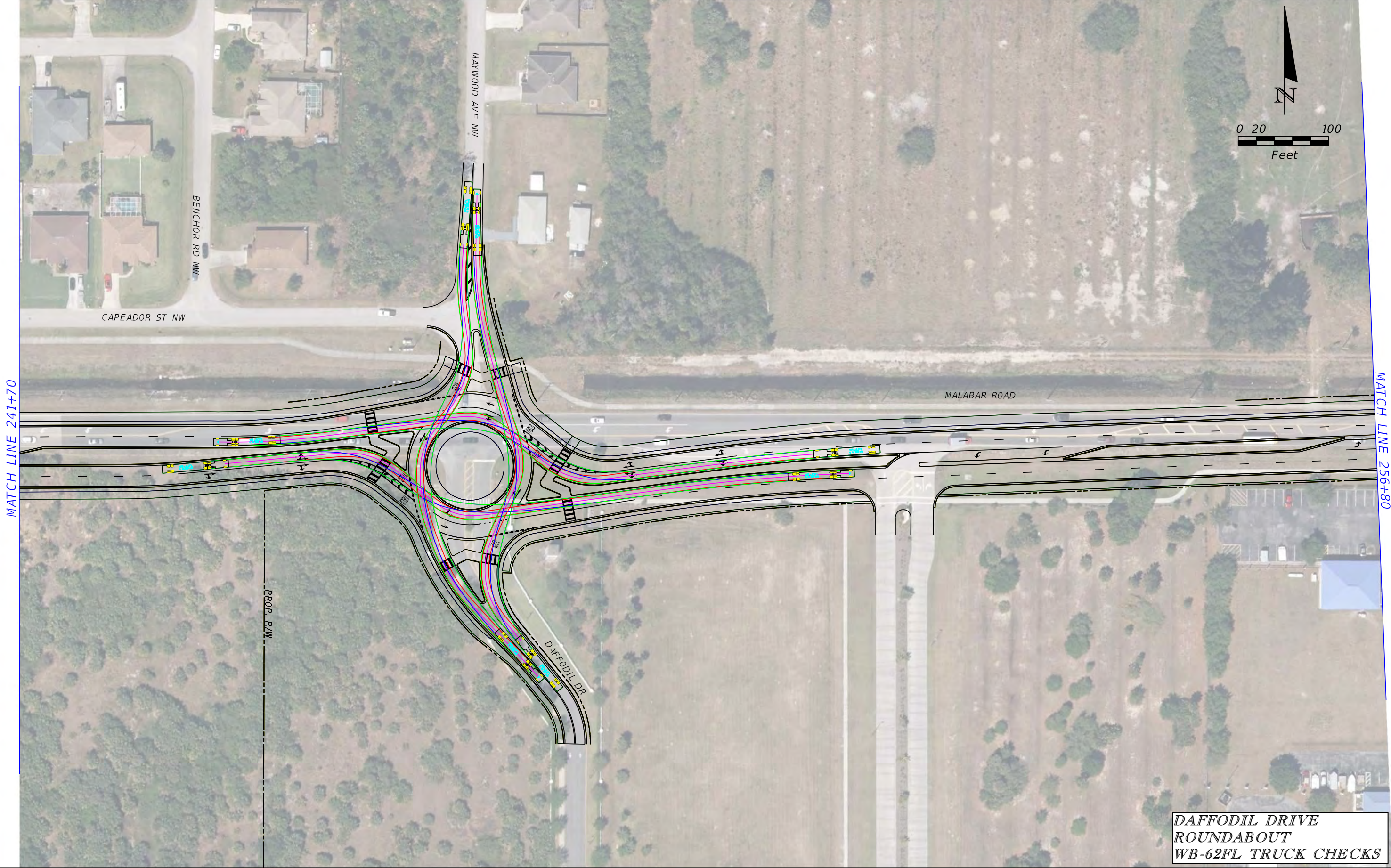


Note: Landscaping and aesthetic features within shaded areas to adhere to FDM guidance. Stopping and intersection sight distance must not be impacted.

Approach	Roadway Name	Upstream Entry Speed (mph)	ISD d1 (ft)	Circulating Speed (mph)	ISD d2 (ft)
North Leg	Maywood Avenue	28.5	210	16	118
East Leg	Malabar Road	23	169	16	118
South Leg	Daffodil Drive	29	213	16	118
West Leg	Malabar Road	23.5	173	16	118

*DAFFODIL DRIVE ROUNDABOUT INTERSECTION SIGHT DISTANCE*





DAFFODIL DRIVE  
 ROUNDABOUT  
 WB-62FL TRUCK CHECKS

M - 22



CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

MALABAR ROAD PD&E STUDY  
 PLANSHEET  
 RECOMMENDED  
 PREFERRED ALTERNATIVE

SHEET NO.
22





DAFFODIL DRIVE  
 ROUNDABOUT  
 WB-62FL TRUCK CHECKS

M - 23

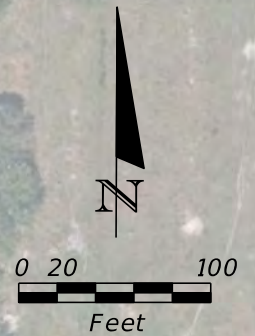


CITY OF PALM BAY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

MALABAR ROAD PD&E STUDY  
 PLANSHEET  
 RECOMMENDED  
 PREFERRED ALTERNATIVE

SHEET NO.
23





**DAFFODIL DRIVE  
 ROUNDABOUT  
 WB-62FL TRUCK CHECKS**

M - 24



CITY OF PALM BAY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	BREVARD	

**MALABAR ROAD PD&E STUDY  
 PLANSHEET  
 RECOMMENDED  
 PREFERRED ALTERNATIVE**

SHEET NO.

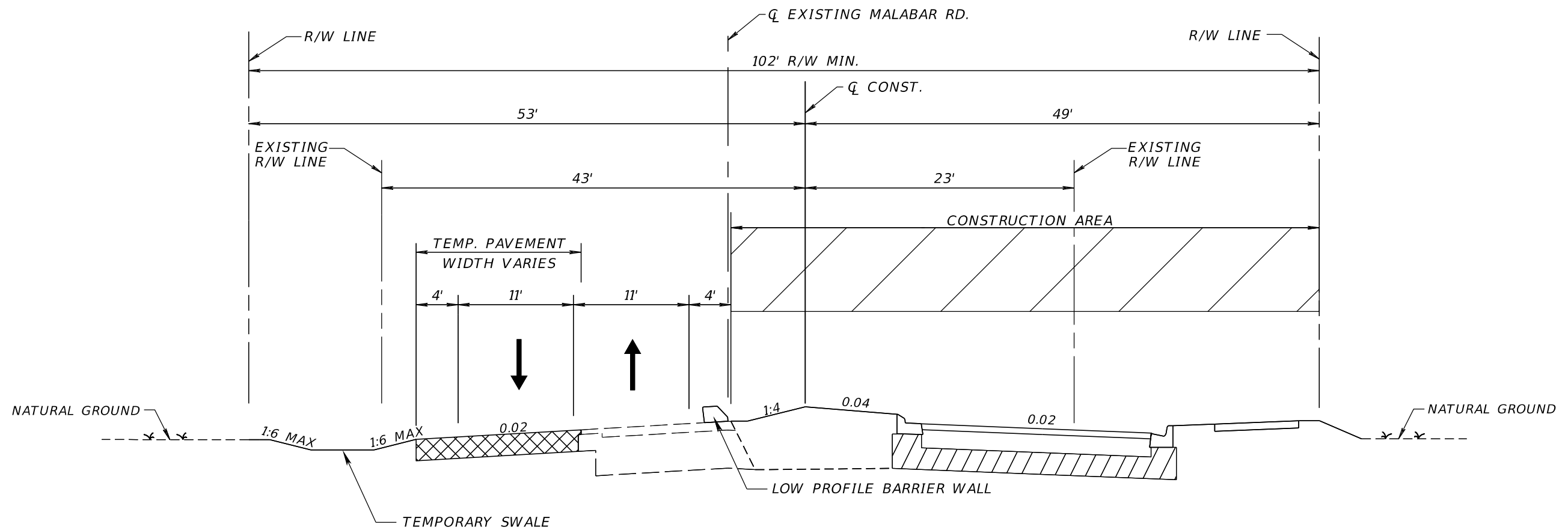
24



# Appendix N – Transportation Management Plan Typical Sections



BEGIN STATION	END STATION	CONSTRUCTION TYPICAL
NOTE: PHASE I IS RE-CONSTRUCTION OF CANAL AND CONSTRUCTION OF BOX CULVERT AT JUPITER BLVD.		
PHASE II		
55+00.00	59+00.00	CONSTRUCT EASTBOUND LANES (TYP 1)
59+00.00	64+00.00	CONSTRUCT ST. JOHN'S HERITAGE ROUNDABOUT
64+00.00	125+00.00	CONSTRUCT EASTBOUND LANES (TYP 1)
125+00.00	132+00.00	CONSTRUCT KRASSNER/BENDING BRANCH ROUNDABOUT
132+00.00	141+16.00	CONSTRUCT EASTBOUND LANES (TYP 2)
141+16.00	143+07.62	BRIDGE OVER MTDD CANAL 10
143+07.62	152+00.00	CONSTRUCT EASTBOUND LANES (TYP 3)
152+00.00	157+00.00	CONSTRUCT HURLEY ROUNDABOUT
157+00.00	175+00.00	CONSTRUCT EASTBOUND LANES (TYP 3)
175+00.00	185+00.00	TRANSITION AREA (TYP 3 AND TYP 4)
185+00.00	197+00.00	CONSTRUCT EASTBOUND LANES (TYP 4)
197+00.00	206+00.00	TRANSITION AREA (TYP 4 AND TYP 3)
206+00.00	243+00.00	CONSTRUCT EASTBOUND LANES (TYP 3)
243+00.00	249+00.00	CONSTRUCT MAYWOOD/DAFFODIL ROUNDABOUT
249+00.00	257+00.00	TRANSITION AREA (TYP 5 AND TYP 6)
257+00.00	271+80.00	CONSTRUCT EASTBOUND LANES (TYP 6)
PHASE III		
55+00.00	59+00.00	CONSTRUCT WESTBOUND LANES (TYP 7)
59+00.00	64+00.00	CONSTRUCT ST. JOHN'S HERITAGE ROUNDABOUT
64+00.00	125+00.00	CONSTRUCT WESTBOUND LANES (TYP 7)
125+00.00	132+00.00	CONSTRUCT KRASSNER/BENDING BRANCH ROUNDABOUT
132+00.00	141+16.00	CONSTRUCT WESTBOUND LANES (TYP 8)
141+16.00	143+07.62	BRIDGE OVER MTDD CANAL 10
143+07.62	152+00.00	CONSTRUCT WESTBOUND LANES (TYP 9)
152+00.00	157+00.00	CONSTRUCT HURLEY ROUNDABOUT
157+00.00	175+00.00	CONSTRUCT WESTBOUND LANES (TYP 9)
175+00.00	185+00.00	TRANSITION AREA (TYP 9 AND TYP 10)
185+00.00	197+00.00	CONSTRUCT WESTBOUND LANES (TYP 10)
197+00.00	206+00.00	TRANSITION AREA (TYP 10 AND TYP 9)
206+00.00	243+00.00	CONSTRUCT WESTBOUND LANES (TYP 9)
243+00.00	249+00.00	CONSTRUCT MAYWOOD/DAFFODIL ROUNDABOUT
249+00.00	257+00.00	TRANSITION AREA (TYP 11 AND TYP 12)
257+00.00	271+80.00	CONSTRUCT WESTBOUND LANES (TYP 12)

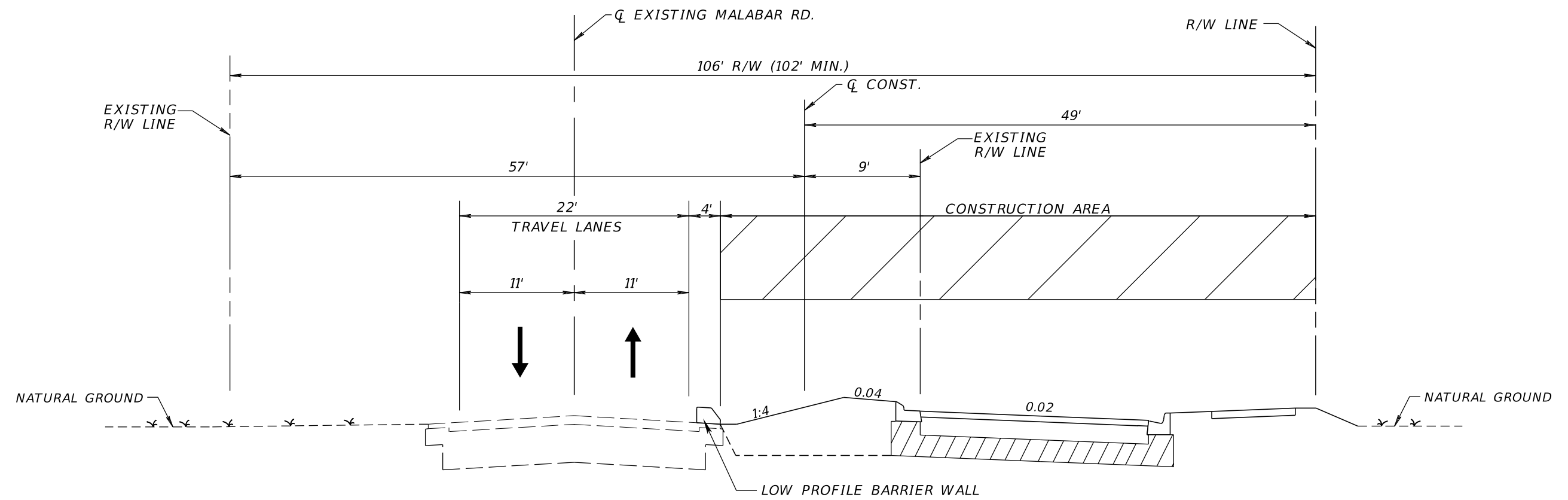


**PROPOSED TEMPORARY TRAFFIC CONTROL  
TYPICAL SECTION 1  
EASTBOUND CONSTRUCTION**

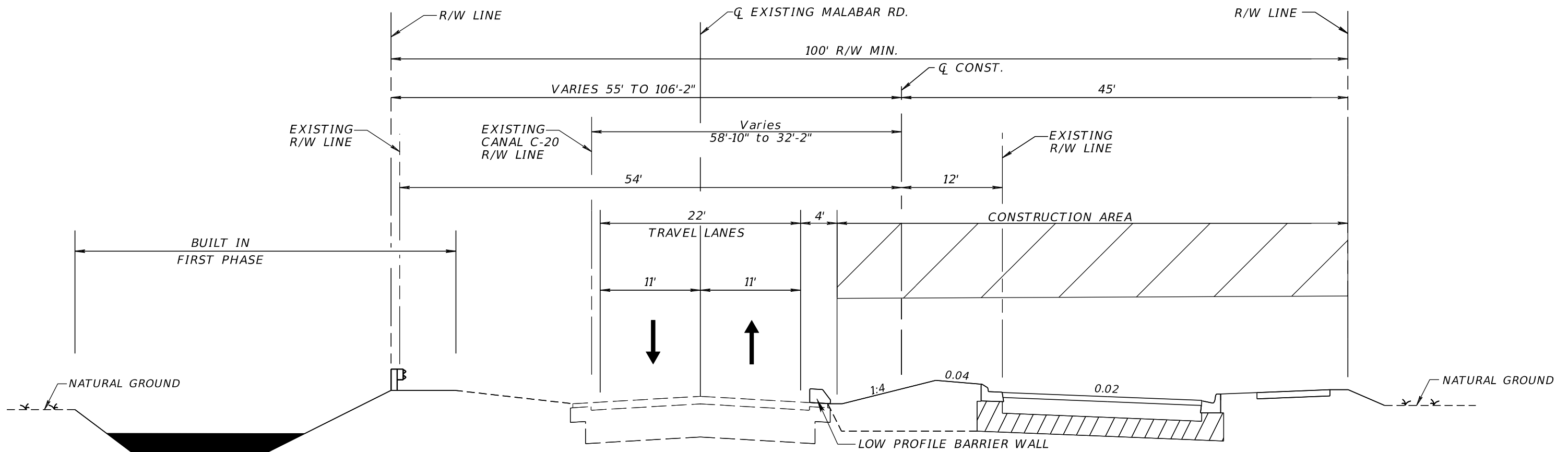
**PHASE II**

**STA. 55+00.00 TO STA. 59+00.00  
STA. 64+00.00 TO STA. 125+00.00**





**PROPOSED TEMPORARY TRAFFIC CONTROL**  
**TYPICAL SECTION 2**  
**EASTBOUND CONSTRUCTION**  
**PHASE II**  
**STA. 132+00.00 TO STA. 141+16.00**

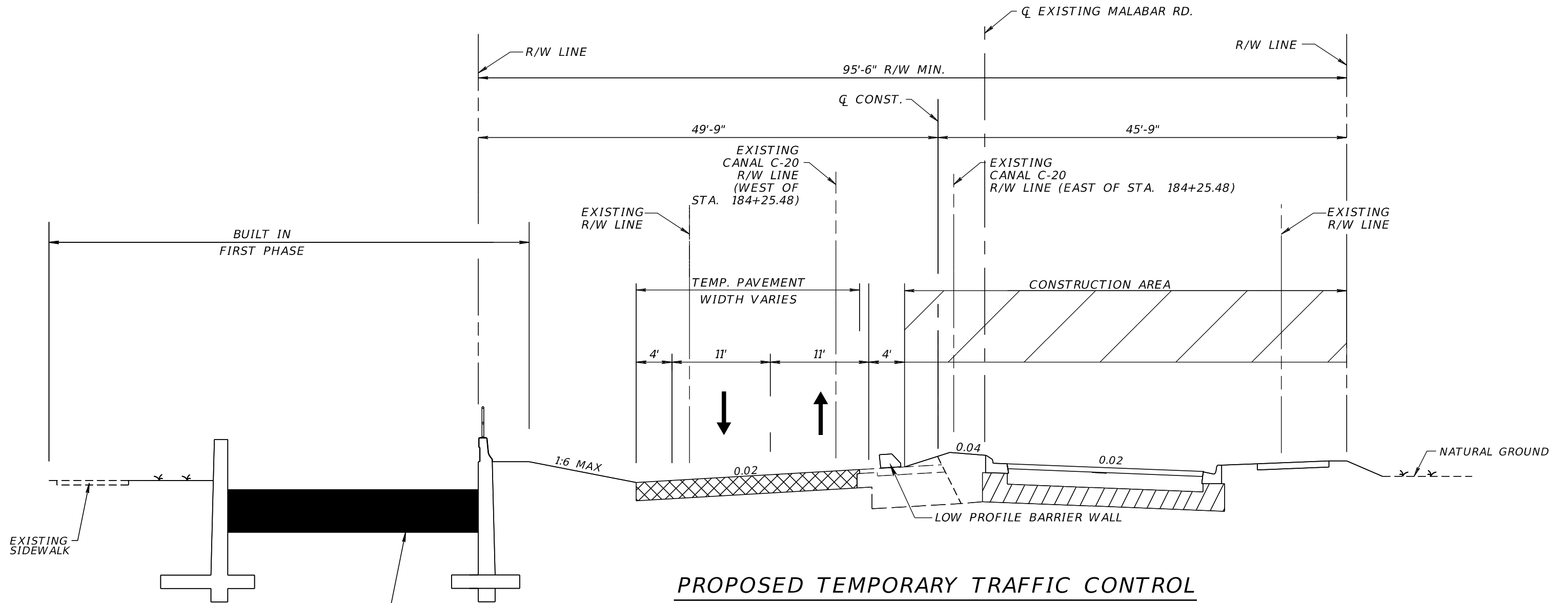


**PROPOSED TEMPORARY TRAFFIC CONTROL**  
**TYPICAL SECTION 3**  
**EASTBOUND CONSTRUCTION**

**PHASE II**

STA. 143+07.62 TO STA. 152+00.00  
 STA. 157+00.00 TO STA. 175+00.00  
 STA. 206+00.00 TO STA. 243+00.00

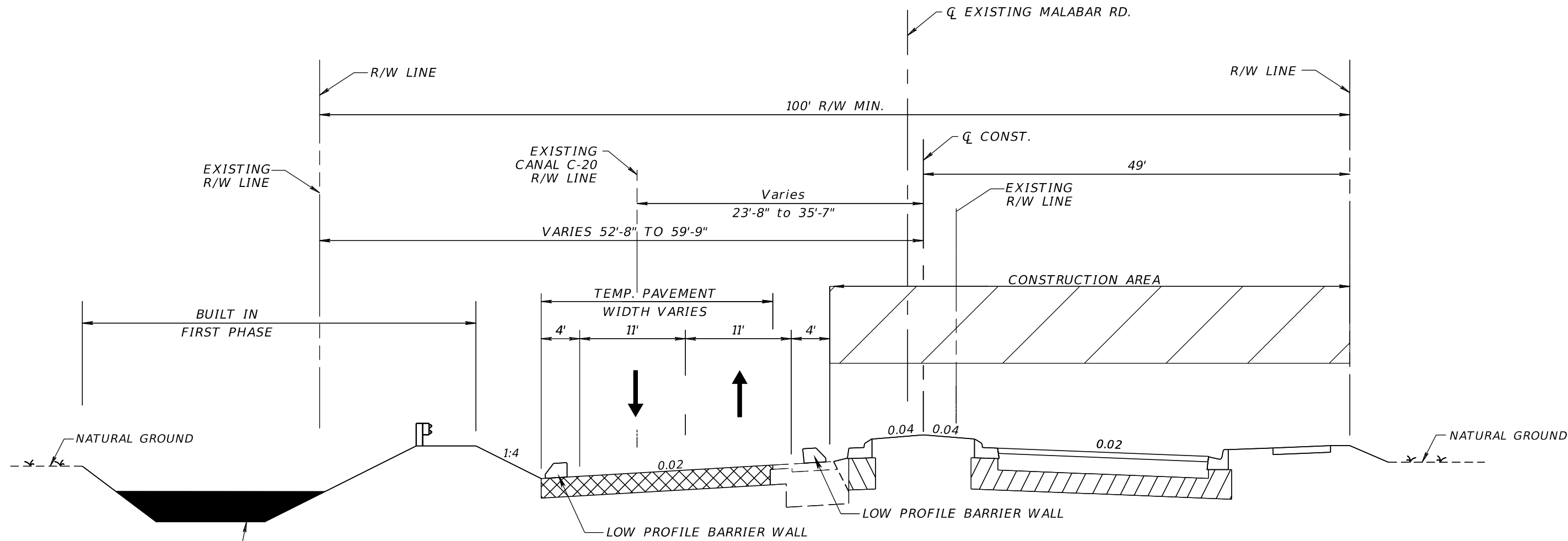




**PROPOSED TEMPORARY TRAFFIC CONTROL  
TYPICAL SECTION 4  
EASTBOUND CONSTRUCTION**

**PHASE II**

**STA. 185+00.00 TO STA. 197+00.00**

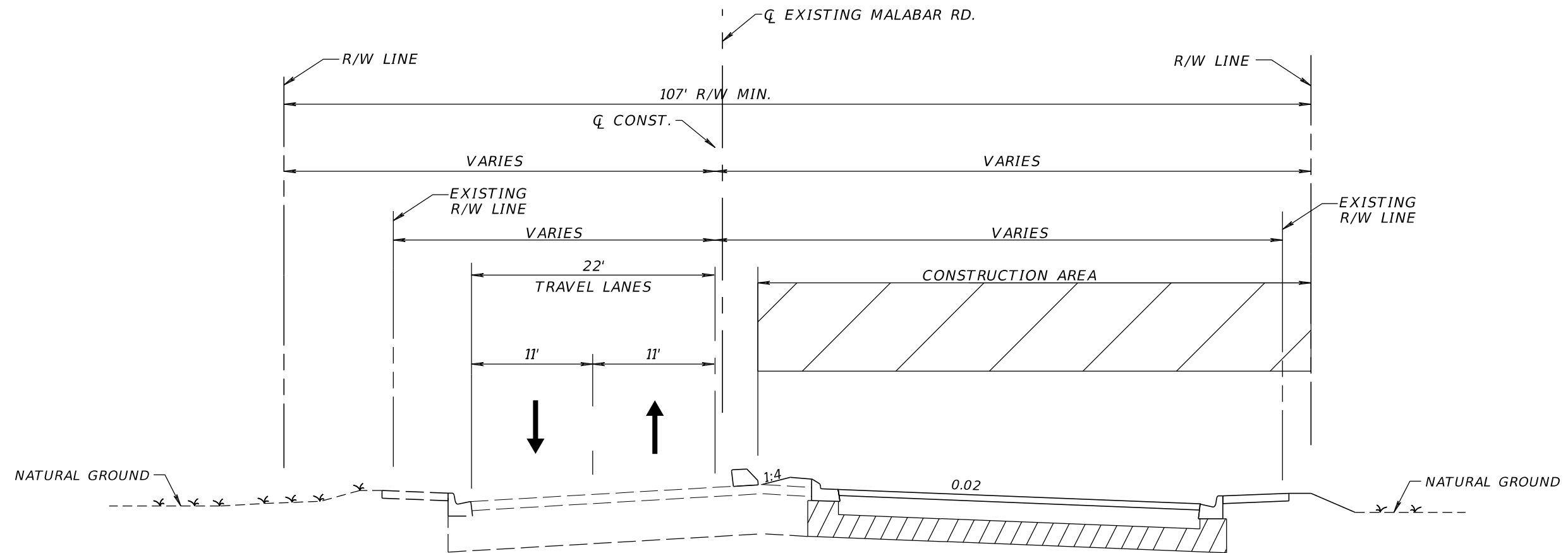


**PROPOSED TEMPORARY TRAFFIC CONTROL  
TYPICAL SECTION 5  
EASTBOUND CONSTRUCTION**

**PHASE II**

**STA. 249+00.00 TO STA. 257+00.00**

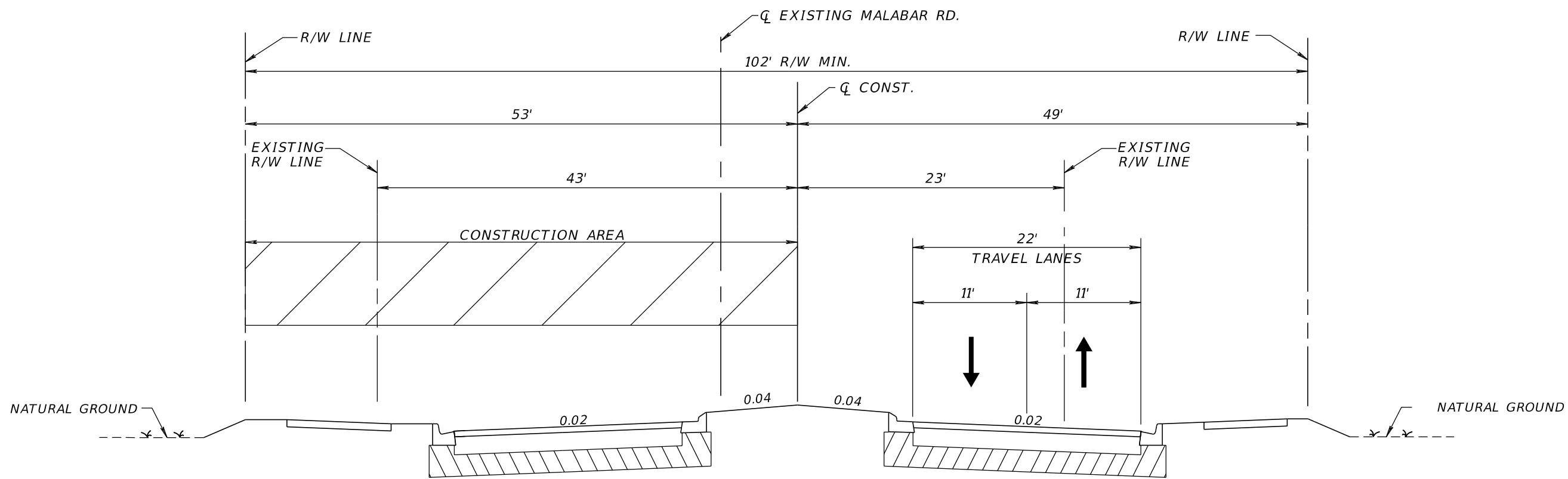




**RECOMMENDED PREFERRED ALTERNATIVE**  
**TYPICAL SECTION 6**  
**EASTBOUND CONSTRUCTION**

**PHASE II**

**STA. 257+00.00 TO STA. 271+80.00**

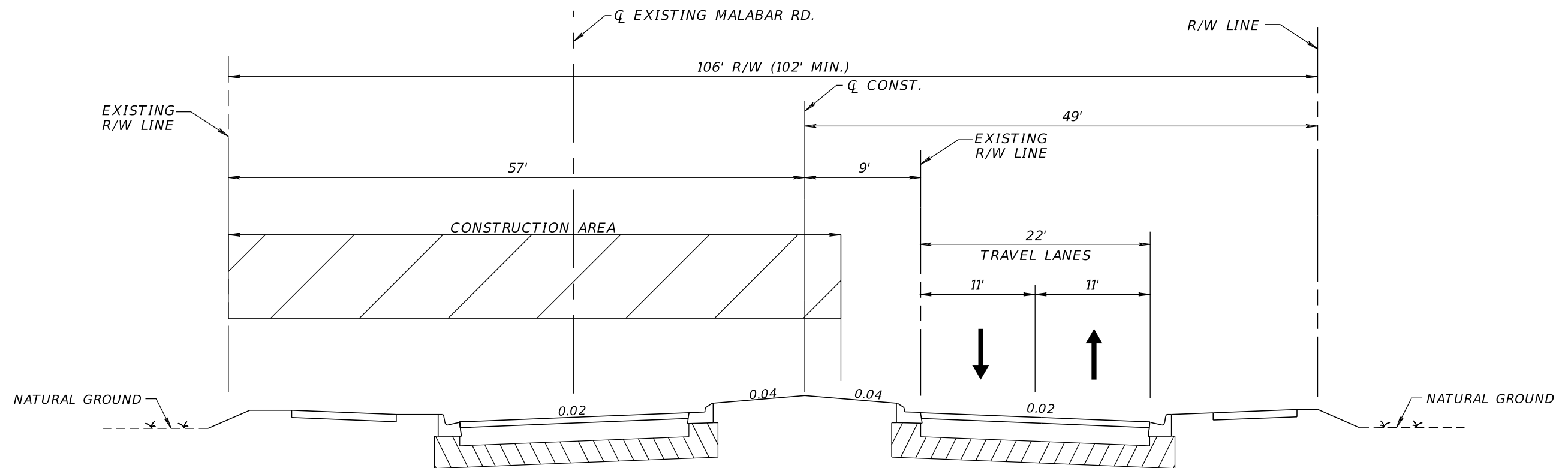


**PROPOSED TEMPORARY TRAFFIC CONTROL**  
**TYPICAL SECTION 7**  
**WESTBOUND CONSTRUCTION**

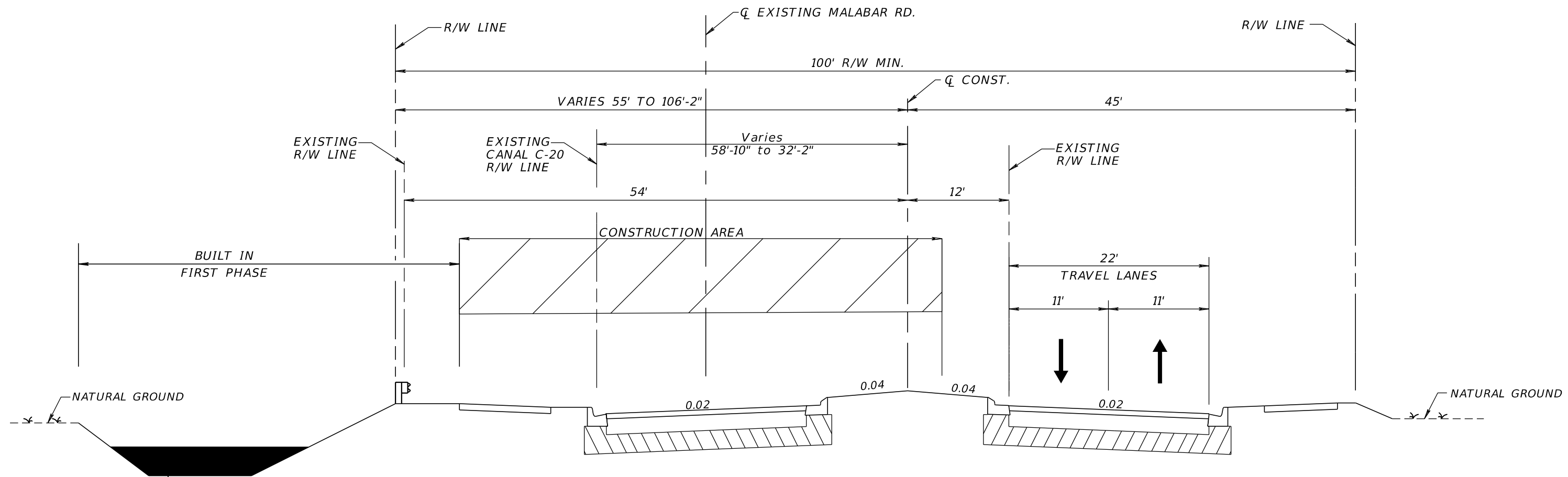
**PHASE III**

STA. 55+00.00 TO STA. 59+00.00  
 STA. 64+00.00 TO STA. 125+00.00





**PROPOSED TEMPORARY TRAFFIC CONTROL**  
**TYPICAL SECTION 8**  
**WESTBOUND CONSTRUCTION**  
**PHASE III**  
**STA. 132+00.00 TO STA. 141+16.00**

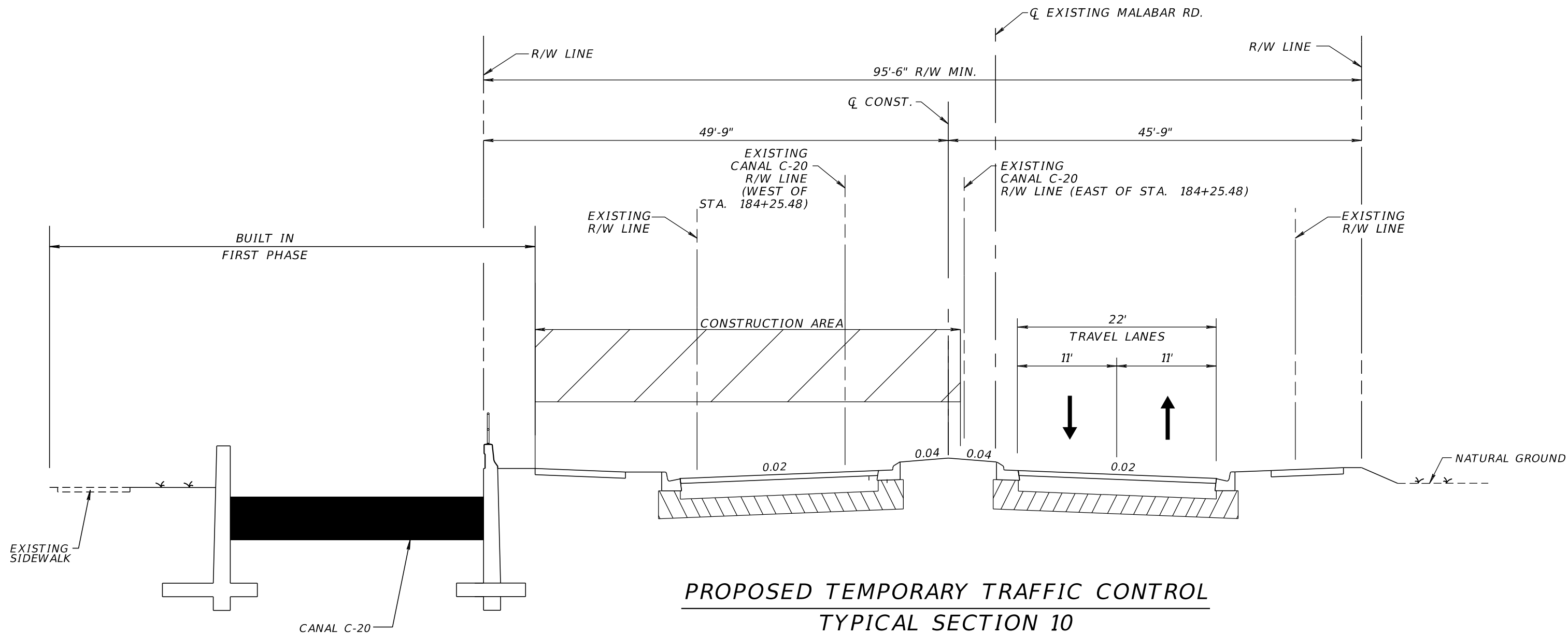


**PROPOSED TEMPORARY TRAFFIC CONTROL**  
**TYPICAL SECTION 9**  
**WESTBOUND CONSTRUCTION**

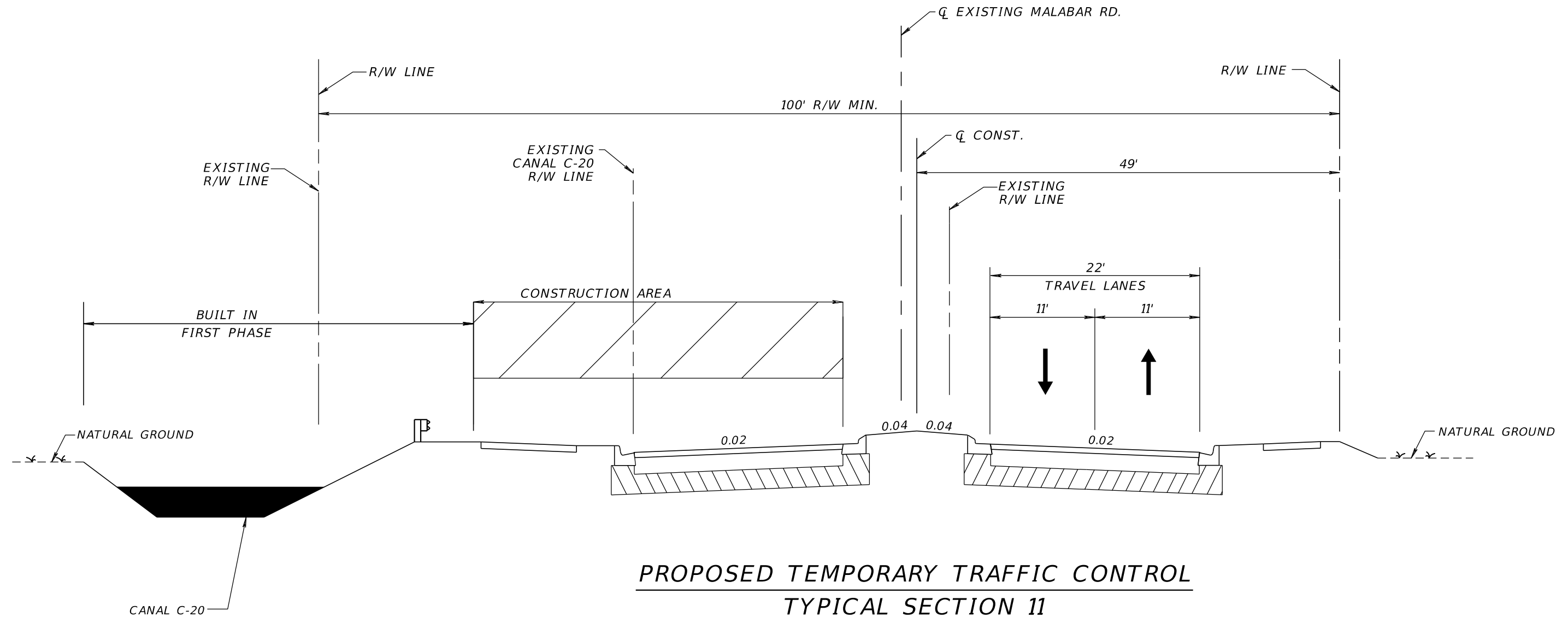
**PHASE III**

STA. 143+07.62 TO STA. 152+00.00  
 STA. 157+00.00 TO STA. 175+00.00  
 STA. 206+00.00 TO STA. 243+00.00





**PROPOSED TEMPORARY TRAFFIC CONTROL**  
**TYPICAL SECTION 10**  
**WESTBOUND CONSTRUCTION**  
**PHASE III**  
**STA. 185+00.00 TO STA. 197+00.00**

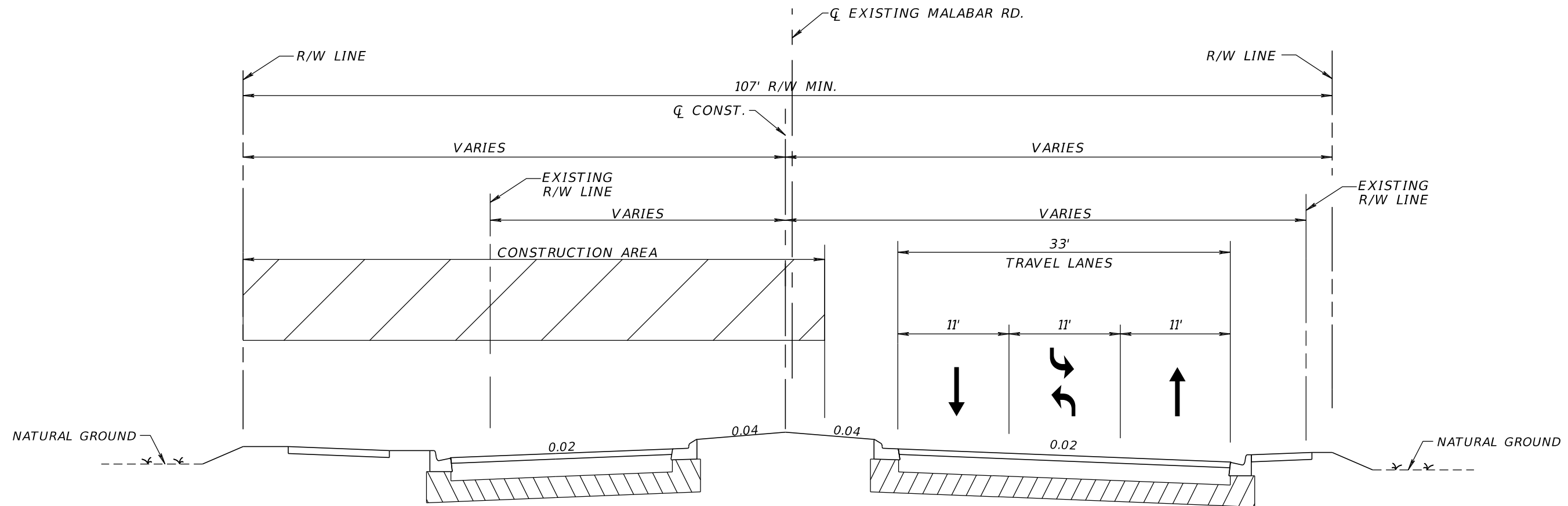


**PROPOSED TEMPORARY TRAFFIC CONTROL  
TYPICAL SECTION 11  
WESTBOUND CONSTRUCTION**

**PHASE III**

**STA. 249+00.00 TO STA. 257+00.00**





**RECOMMENDED PREFERRED ALTERNATIVE**  
**TYPICAL SECTION 12**  
**WESTBOUND CONSTRUCTION**

**PHASE III**

**STA. 257+00.00 TO STA. 271+80.00**

# Appendix O – Protected Species Summary



**Table O-1: Effect Determinations for Protected Species**

Common Name	Scientific Name	Status	Effect Determination
<b>Reptiles</b>			
Eastern indigo snake	<i>Drymarchon couperi</i>	FT	MANLAA
Florida pine snake	<i>Pituophis melanoleucus</i>	ST	NAEA
Gopher tortoise	<i>Gopherus polyphemus</i>	ST	NAEA
<b>Birds</b>			
Audubon's crested caracara	<i>Polyborus plancus audubonii</i>	FT	MANLAA
Bald eagle	<i>Haliaeetus leucocephalus</i>	BGEPA / MBTA	---
Eastern black rail	<i>Laterallus jamaicensis jamaicensis</i>	FT	MAY EFFECT
Everglade snail kite	<i>Rostrhamus sociabilis plumbeus</i>	FE	NO EFFECT
Florida burrowing owl	<i>Athene cunicularia floridana</i>	ST	NAEA
Florida grasshopper sparrow	<i>Ammodramus savannarum floridanus</i>	FE	NO EFFECT
Florida sandhill crane	<i>Antigone canadensis pratensis</i>	ST	NAEA
Florida scrub-jay	<i>Aphelocoma coerulescens</i>	FT	MANLAA
Little blue heron	<i>Egretta caerulea</i>	ST	NAEA
Red-cockaded woodpecker	<i>Dryobates borealis</i>	FE	NO EFFECT
Reddish egret	<i>Egretta rufescens</i>	ST	NAEA
Roseate spoonbill	<i>Platalea ajaja</i>	ST	NAEA
Southeastern American kestrel	<i>Falco sparverius Paulus</i>	ST	NAEA
Tricolored heron	<i>Egretta tricolor</i>	ST	NAEA
Wood stork	<i>Mycteria americana</i>	FT	MANLAA
<b>Mammals</b>			
Florida black bear	<i>Ursus americanus floridanus</i>	M	---
Tricolored bat	<i>Perimyotis subflavus</i>	C	---
<b>Insects</b>			
Monarch butterfly	<i>Danaus Plexippus</i>	C	---
<b>Plants</b>			
Blue-flowered butterwort	<i>Deeringothamnus pulchellus</i>	ST	NAEA
Carter's werea	<i>Warea carteri</i>	FE	NO EFFECT
Celestial lily	<i>Nemastylis floridana</i>	SE	NEA
Coastal vervain	<i>Glandularia maritima</i>	SE	NEA

Common Name	Scientific Name	Status	Effect Determination
Cut-throat grass	<i>Panicum abscissum</i>	SE	NEA
Florida beargrass	<i>Nolina atopocarpa</i>	ST	NEA
Giant Orchid	<i>Pteroglossaspis ecristata</i>	ST	NEA
Large-flowered rosemary	<i>Conradina grandiflora</i>	ST	NEA
Lewton's polygala	<i>Polygala lewtonii</i>	SE	NO EFFECT
Many-flowered grass pink	<i>Calopogon multiflorus</i>	ST	NAEA
Nodding pinweed	<i>Lechea cernua</i>	ST	NEA
Plume polypody	<i>Polypodium plumula</i>	SE	NEA
Redmargin Zephyrlily	<i>Zephranthes simpsonii</i>	ST	NEA
Sand butterfly pea	<i>Centrosema Arenicola</i>	SE	NEA
Short-leaved rosemary	<i>Conradina brevifolia</i>	FE	NO EFFECT
Small's flax	<i>Linum carteri var. smallii</i>	SE	NEA
Swamp plume polypody	<i>Polypodium ptilodon</i>	SE	NEA
Widespread polypody	<i>Polypodium dispersum</i>	SE	NEA
Yellow-flowered butterwort	<i>Pinguicula lutea</i>	SE	NEA

MANLAA = May Affect, Not Likely to Adversely Affect

NEA = No Effect Anticipated

NAEA = No Adverse Effect Anticipated