INDIAN HARBOUR BEACH Florida

Final Report

Banana River/Pine Tree Drive Complete Streets Study

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SPACE COAST TPO

FINAL REPORT

Banana River/Pine Tree Drive Complete Streets Study

From Mathers Bridge to SR A1A
Indian Harbour Beach, Florida

Prepared For:
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Report Purpose

This document serves as the final report for the Banana River/Pine Tree Drive Complete Streets Study. This report provides an overview of the study, defines project goals, summarizes existing conditions, and reviews the future alternatives. This report also provides potential improvement alternatives for future phases of project development (i.e. Resurfacing/Design).

Introduction

PROJECT DESCRIPTION

The Space Coast Transportation Planning Organization (SCTPO) has been requested by the City of Indian Harbour Beach to study the Banana River Drive/Pine Tree Drive corridor from the Mathers Bridge to SR A1A. The Banana River/Pine Tree Drive Complete Streets Study will attempt to incorporate enhanced multi-modal solutions to facilitate pedestrian/bicycle movement along the corridor. Banana River Drive/Pine Tree Drive connects the southern end of Merritt Island, via the Mathers Bridge, to SR A1A in Brevard County and the City of Indian Harbour Beach.

PROJECT GOALS

The following are the goals identified for the Banana River/Pine Tree Drive Complete Streets Study:

- Define the key issues, opportunities, and needs of the corridor as they relate to multi-modal mobility and safety. This understanding will be based on data analysis as well as stakeholder and community input.
- Identify short- and long-term strategies to provide improved pedestrian, bicycle, and vehicular safety, mobility, and access along the study corridor. These strategies may include potential typical section changes.
- Evaluate and compare improvement alternatives against how well these alternatives address multi-modal safety and mobility needs.
- Select and recommend short-term and long-term alternatives that address multi-modal safety and mobility.
- Solicit input from the public throughout the course of the project. The Project Advisory Team (PAT) will provide guidance throughout the study, including the selection of the alternative(s).

STUDY AREA DESCRIPTION

The Banana River Drive/Pine Tree Drive study corridor is classified as an urban minor arterial and consists of a two-lane undivided typical section (one lane in each direction). The average daily traffic (ADT) along the corridor ranges from approximately 3,180 vehicles on the west end of the corridor to 11,540 vehicles near SR A1A, based on the traffic counts collected in 2017 and 2018. Residential land uses (mostly single family-oriented) are directly adjacent to the corridor. Single-family and multi-family neighborhoods surround the corridor. The study corridor is shown in **Figure 1** and **Figure 2**.

Figure 1: Banana River Drive/Pine Tree Drive (Looking East from Mathers Bridge)

513

A1A

Pine Tree Dr.

Banana River Dr.

Wimico Dr.

Palmer Rd.

Coconut Dr.

Marina Isles Blvd.

Mayaca Dr.

Osceola Dr.

School Rd.

Central Rd.

Palm Springs Blvd.

Mathers Bridge

South Patrick Dr.

3

LEGEND

Study Corridor

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CONSOR

Scale in Feet

0 600 North

FIGURE 2

Study Corridor

Public Involvement

Summary of Public Involvement

The Banana River/Pine Tree Drive Complete Streets Study allowed for an ideal opportunity to engage stakeholder groups in understanding issues and opportunities along the corridor and soliciting input and feedback in identifying and evaluating potential improvements along Banana River Drive/Pine Tree Drive. Two key groups were included throughout the course of the study to solicit guidance and input:

- Project Advisory Team (PAT); and
- Members of the community.

The SCTPO project website, which contains files such as the study scope, the Existing Conditions Report, and public meeting materials for the Study, can be found at https://spacecoasttpo.com/projects-and-studies/sctpo-corridor-studies/banana-river-pine-tree-drive-complete-street-feasibility-study/.

Project Advisory Team (PAT) and Meetings

A PAT comprised of regional agency and municipal representatives was organized to act as a sounding board for the Study Team as they shared findings and developed strategies to address the needs along the corridor. The PAT met at key milestones throughout the study process. The PAT is comprised of members from the following partner organizations:

- SCTPO;
- Brevard County;
- City of Indian Harbour Beach; and
- Florida Department of Transportation (FDOT) District 5.

A kick-off meeting was held with the PAT group on July 17, 2018 to review the study scope and schedule and discuss project planning approach. The second PAT meeting was held on January 25, 2019 to present existing conditions, issues/opportunities, and guiding principles for the study. The third meeting was held on March 13, 2019 to discuss the results of the first public meeting, discuss the future alternatives, and the Measures of Effectiveness to evaluate the alternatives. The fourth meeting, held on May 3, 2019, reviewed the final preferred alternative concept to be presented at the second public meeting on May 22, 2019. The meeting summaries from each of the PAT meetings can be found in **Appendix A**.

Public Meetings

The Study Team obtained public feedback and input on the project through two open houses. The Existing Conditions/Future Alternatives Open House was held on February 13, 2019 and the Alternatives Open House was held on May 22, 2019. The Existing Conditions/Future Alternatives Open House reviewed the existing conditions analysis and presented potential typical section alternatives for

the Banana River Drive/Pine Tree Drive corridor. The Alternatives Open House detailed the roadway improvement concept, based on input received from the first public meeting, and also included a virtual reality station that allowed members of the public to experience the proposed concept renderings in a 360-degree panoramic, fully immersive virtual reality environment.

These public meetings were held in an open house type format, allowing the public to review the concept boards/handouts and ask questions of the Study Team. The Existing Conditions Open House also included hands-on exercises such as 'make-your-own roadway section' to allow the members of the public to develop alternatives.

The public was encouraged to review the concept boards and ask any additional questions of the Study Team. The summary packages from the public meetings can be found in **Appendix A**.

Summary of Existing Conditions

This section summarizes the existing conditions analysis. The purpose of the existing conditions analysis was to gain an understanding of how the corridor functions today from a multimodal perspective to inform possible future improvement efforts. Topics assessed include previous studies, land use, environment characteristics, roadway characteristics, traffic operations, pedestrian, bicycle, and transit facilities, and a multimodal safety assessment. The information presented in this section has been summarized from the Banana River/Pine Tree Drive Existing Conditions Report. For more details on the existing conditions analysis, please refer to the Banana River/Pine Tree Drive Existing Conditions Report in **Appendix B**.

PREVIOUS/ONGOING STUDIES AND FUTURE IMPROVEMENTS

One construction project and one corridor planning study have been performed on roadways within one mile of the Banana River Drive/Pine Tree Drive study corridor. The following describes these two projects.

SR A1A Roadway Resurfacing

FDOT District 5 is finalizing a roadway construction project to resurface a nearly 7-mile section of SR A1A in Satellite Beach/Indian Harbour Beach/Melbourne. The resurfacing project includes adding five-foot shoulders, designated bicycle lanes, and left turn lanes. It also includes extending drainage pipes beneath the roadway, repairing damaged portions of existing sidewalk, and adding wheelchair accessible ramps at minor street intersections.

SR 518/Eau Gallie Boulevard Beachside Corridor Planning Study

FDOT District 5 recently evaluated safety and multi-modal transportation improvements along the approximately 1.4-mile section of SR 518 (Eau Gallie Boulevard) between the Eau Gallie Causeway Bridge and SR A1A. The corridor is located along the border of the City of Indian Harbour Beach and the City of Melbourne. This five (5) lane arterial serves as a primary east-west evacuation route; serving local traffic as well as the many beach visitors. The goal of this Study was to identify improvements related to safety and multi-modal transportation. After planning and analysis efforts, several improvements were identified, evaluated, and recommended to move forward into the next analysis step. The proposed improvements provide enhanced facilities for bicyclists, pedestrians, and transit riders.

LAND USE AND COMMUNITY CHARACTERISTICS

Existing Land Uses and Community Facilities

Figure 3 displays neighborhoods and community features along the study corridor. Residential land uses form the majority of parcels fronting Banana River Drive/Pine Tree Drive. The commercial land use is characterized by gas stations, commercial services, and large retailers at both the west and east ends of the study corridor. Institutional properties including the fire station and churches also front Banana River Drive/Pine Tree Drive. In addition, there are large clusters of multi-family residential land uses to the south and north of the study corridor.

EXISTING ROADWAY CHARACTERISTICS

The following summarizes the general roadway characteristics along the study corridor:

- Functional classification: Urban minor arterial
- Two-lane typical section: one eastbound lane and one westbound lane
- Posted speed Limit: 25 miles per hour (MPH)
- Closed drainage system with curb and sidewalk along a majority of the corridor.
- Vehicular streetlights are present along both sides of Banana River/Pine Tree Drive. Pedestrian level street lighting is not present.
- The existing right-of-way (ROW) varies along the corridor from approximately 80’ to 100’.

PEDESTRIAN AND BICYCLE FACILITIES

Pedestrian Facilities

Figure 4 illustrates the existing pedestrian facilities along the study corridor. A 4’ to 8’ wide sidewalk is present along Banana River Drive/Pine Tree Drive for almost the entire length of the study corridor. The following locations on or near the study corridor do not have sidewalk:

- Two locations along the south side of Banana River Drive/Pine Tree Drive –
  - From the Mathers Bridge to the end of the Telemar Bay Marina property; and
  - From Wimico Drive to Osceola Drive.
- Along Marina Isles Boulevard north of Banana River Drive/Pine Tree Drive.
- Along Coconut Drive north of Banana River Drive /Pine Tree Drive.
- Along Wimico Drive north of Banana River Drive /Pine Tree Drive.
- Along School Road north of Banana River Drive /Pine Tree Drive and to the south on the east side.
- Along Central Road north of Banana River Drive/Pine Tree Drive.
- Along Palm Springs Boulevard south of Banana River Drive/Pine Tree Drive.
- Along SR A1A along the west side north of Banana River Drive /Pine Tree Drive intersection.

Satelite Beach Park
Algonquin Sports Complex
513
Enclave
Wimico Dr.
Indian Harbour Montessori
Pine Tree Condominiums
Central Rd.
Bicentennial Park
Marina Isles
Pine Resort & Apartments
Palmer Rd.
Pine Tree Dr.
Marina Isles Blvd.
Coconut Dr.
Banana River Dr.
Mayaca Dr.
Indian Harbour Beach Fire Department
Osceola Dr.
Ascension Lutheran Church
School Rd.
Palm Springs Blvd.
A1A
Church for the Beach
Ocean Breeze Elementary School
Oars & Paddles Park
Mathers Bridge
3
South Patrick Dr.

LEGEND
- Study Corridor
- Park
- Community / Neighborhood
- Church
- School
- Fire Station

Scale in Feet
0 600 North

INDIAN HARBOUR BEACH Florida
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CONSOR

FIGURE 3
Neighborhood and Community Features

There are no in-road bicycle facilities along the study corridor. From field observations and stakeholder conversations, experienced cyclists ride in the roadway as opposed to riding on the sidewalk. The overall width of the sidewalks along the corridor make it difficult for pedestrians and less experienced cyclists to use the facility at the same time.

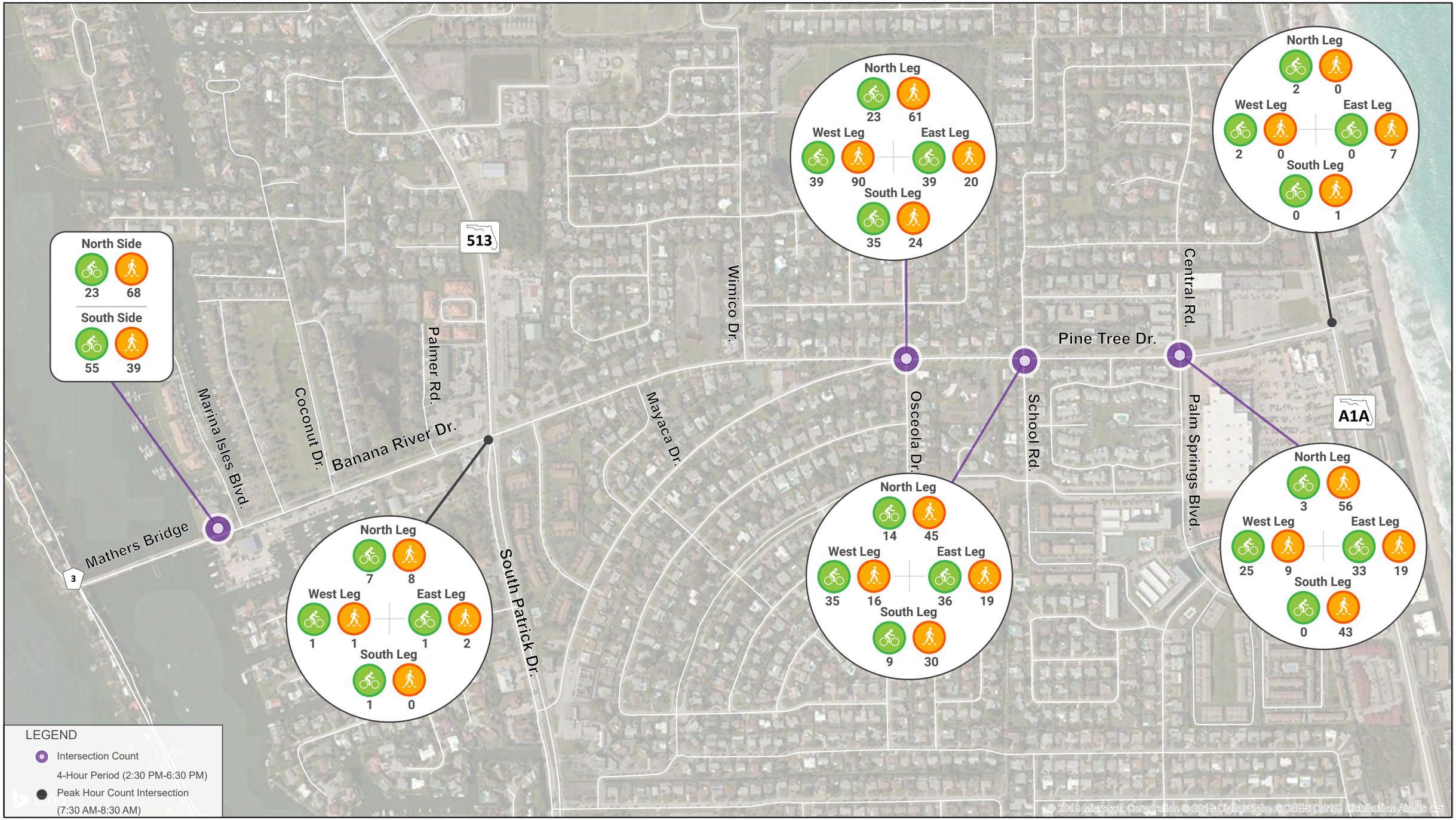
Figure 4: Sidewalk on North Side of Banana River/Pine Tree Drive

Bicycle Facilities

During the field review, it was observed that pedestrians and bicyclists are mostly students from nearby schools. **Figure 5** shows student bicyclists crossing at the intersection of Banana River Drive/Pine Tree Drive and Osceola Drive. No dedicated bicycle facilities are present along the Banana River Drive/Pine Tree Drive study corridor, as shown in **Figure 6**. Pedestrian/bicycle counts were collected by the SCTPO along the study corridor and are shown in **Figure 7**.

Figure 5: Students Crossing at Banana River/Pine Tree Drive/Osceola Drive

Figure 6: No Dedicated Bicycle Facilities Present



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Scale in Feet
0 600 North

FIGURE 7

Peak Period Pedestrian and Bike Counts

EXISTING VEHICULAR TRAFFIC OPERATIONS

An existing traffic operations analysis was completed using Highway Capacity Manual (HCM) methodologies to evaluate potential vehicular traffic challenges. Weekday 24-hour volume and speed counts were collected at two locations along the corridor, and 4-hour turning movement counts were collected at the five study intersections. All intersections are operating at level-of-service (LOS) C or better during the peak hours. The detailed operational analysis is provided in the Existing Conditions Report in **Appendix B**.

SUMMARY OF CORRIDOR ISSUES AND OPPORTUNITIES

The following opportunities for improvement were identified along the Banana River Drive/Pine Tree Drive study corridor based on the results of the existing conditions, meetings with the PAT, and stakeholder interviews.

- There is a desire and need for enhanced/continuous pedestrian facilities along the corridor.
    - Discontinuous and broken sidewalks are present along Banana River Drive/Pine Tree Drive, especially on the south side of the corridor.
    - Add sidewalk on south side of Banana River Drive from the Mathers Bridge to Oars and Paddles Park and from Wimico Drive to Osceola Drive.
    - There is a desire to add pedestrian level lighting along the corridor and enhance the landscaping/pedestrian environment.
- Refresh striping along the entire study corridor, with a short-term focus on the four-lane, undivided section from Palm Springs Boulevard to SR A1A.
- Address the perceived speeding issues along the corridor.
- The City would like bicycle facilities along the corridor due to a high number of cyclists riding along the corridor.
    - Existing ROW could accommodate bicycle facilities throughout the corridor.
- Pedestrian mobility intersections have been identified at S. Patrick Drive, Wimico Drive, Osceola Drive, School Road, and Palm Springs Boulevard.
    - Pedestrian safety and comfort are concerns, especially for students walking to and from school. Create new connections to and from the school throughout the neighborhoods and public spaces to increase overall walkability.
    - S. Patrick Drive – Shortening crossing distances for pedestrians and potentially reducing the turning radii to reduce vehicle turning speed.
    - Wimico Drive – Create north/south crossing opportunities at this AWSC intersection.
    - Osceola Drive – Enhancing pedestrian safety and potentially adding traffic calming elements such as a raised intersection treatment.
    - School Road – Create north/south crossing opportunities at this intersection. Enhancing pedestrian safety and potentially adding traffic calming elements such as a raised intersection treatment.

  - Palm Springs Boulevard – Create north/south crossing opportunities at this intersection. Enhancing pedestrian safety and potentially adding traffic calming elements such as a raised intersection treatment.
- Miscellaneous issues that could be addressed in the short term were also identified.
  - Safety improvements at the S. Patrick Drive intersection, potentially adding retro-reflective backplates to the signal heads and advanced intersection warning signage.
  - Review the drainage issues on the northeast corner of the Banana River Drive/Pine Tree Drive/Osceola Drive intersection.
  - Extend the green time for the eastbound left turn movement at SR A1A. This intersection may need a simple timing adjustment once the resurfacing project is complete.

An issue identified during the existing conditions analysis was to fill in the sidewalk gap on west side of School Road south of Pine Tree Drive. The City of Indian Harbour Beach was able to construct the sidewalk gap during the course of this study, as shown in **Figure 8**.

Figure 8: New Sidewalk along School Road

The corridor issues and opportunities are summarized in **Figure 9**.

513

A1A

3

Pine Tree Dr.

Banana River Dr.

Mathers Bridge

Marina Isles Blvd.

Coconut Dr.

Palmer Rd.

Mayaca Dr.

Wimtico Dr.

Osceola Dr.

School Rd.

Central Rd.

Palm Springs Blvd.

South Patrick Dr.

Ocean Breeze
Elementary School

LEGEND

- Bicycle Facility Enhancements, Pedestrian Level Lighting, and Landscaping Opportunities
- Striping Refresh
- Pedestrian Facility Gaps
- Pedestrian Mobility Emphasis Intersection
- School Pedestrian/Bicycle Traffic Route

Scale in Feet
0 600 North

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FIGURE 9

Corridor Issues and Opportunities

Typical Section Alternative Analysis

This section describes the existing and potential typical section alternatives along the corridor. The corridor was divided into three distinct segments based on the unique characteristics as described below:

- Segment 1 – Mathers Bridge to S. Patrick Drive
  - Segment is Brevard County maintained.
  - Segment is two-lane undivided with sidewalk on the north side and partial sidewalk on the south side.
  - Segment has unique constraints when it comes to adding sidewalks on the south side in front of the Telemar Bay Marina.
  - Segment has open drainage with large swales on the north side of the road.
- Segment 2 – S. Patrick Drive to Palm Springs Boulevard
  - Segment is City of Indian Harbour Beach maintained.
  - Segment is two-lane undivided with sidewalk on the north side and partial sidewalk on the south side.
  - Segment has closed drainage with curb and gutter on both sides of the roadway.
- Segment 3 – Palm Springs Boulevard to SR A1A
  - Segment is City of Indian Harbour Beach maintained.
  - Segment is four-lane undivided with sidewalk on both sides.
  - Segment has closed drainage with curb and gutter on both sides of the roadway.

Four alternatives were identified for Segment 1, two alternatives for Segment 2, and three alternatives for Segment 3. The remainder of this section reviews the nine potential alternatives in more detail.

SEGMENT 1: MATHERS BRIDGE TO S. PATRICK DRIVE

- Existing (**Figure 10**)
  - One lane eastbound and westbound – lanes are 11' wide
  - North side 8' sidewalk present, with south sidewalk existing in front of Oars and Paddles Park to S. Patrick Drive
  - Estimated 100' right of way

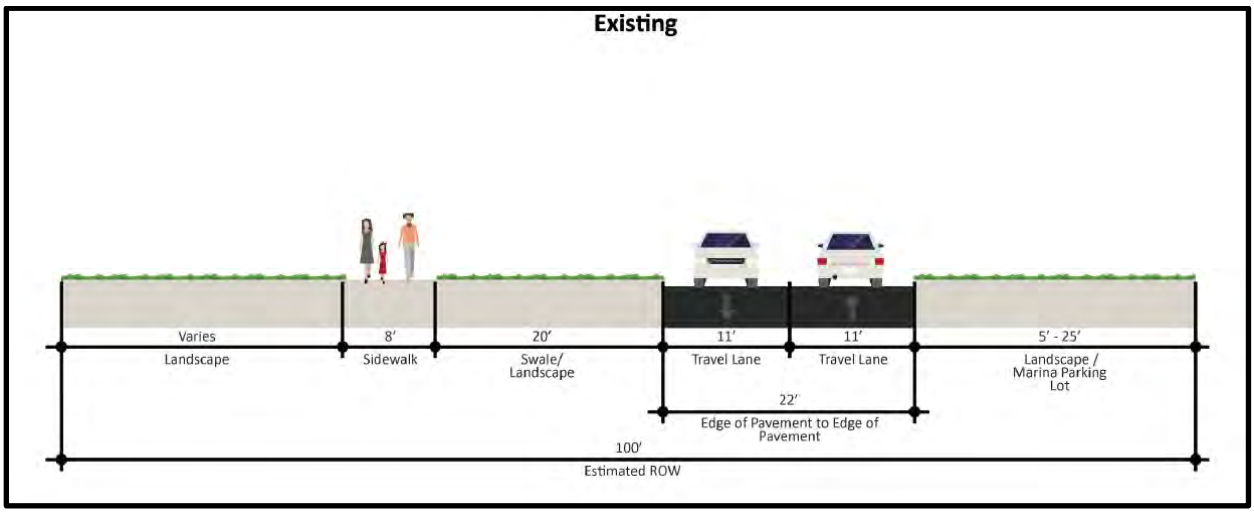


Figure 10: Segment 1 Existing Typical Section

- Alternative 1 (**Figure 11**)
  - One lane eastbound and westbound – lanes are 11' wide
  - Sharrows added to roadway
  - North side sidewalk increased from 8' to a 12' shared use path

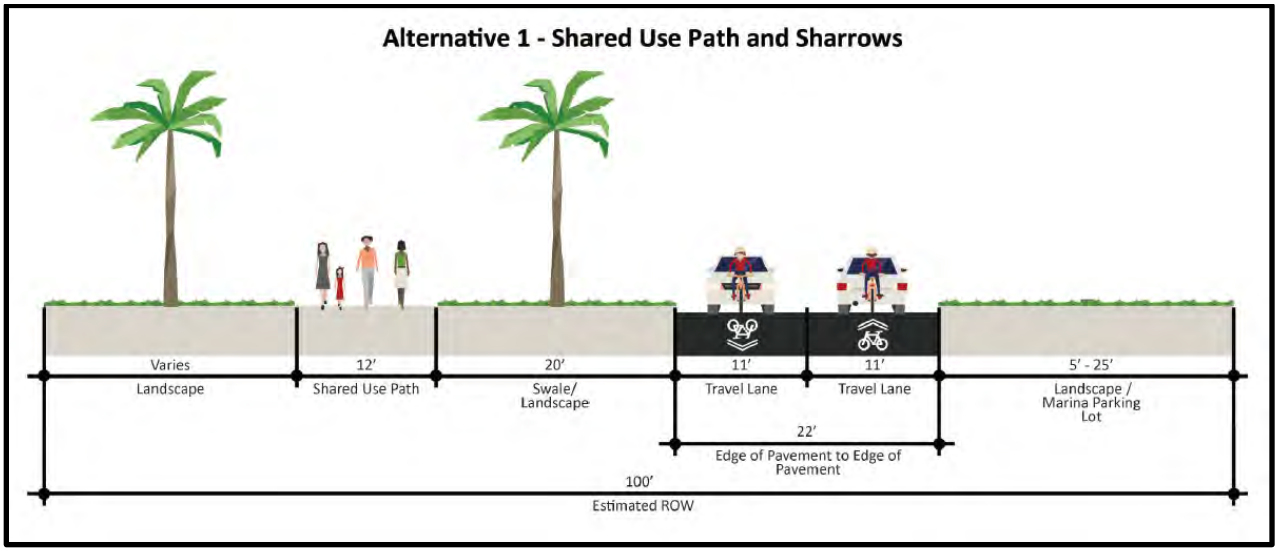


Figure 11: Segment 1 Alternative 1 Typical Section

- Alternative 2 (**Figure 12**)
  - One lane eastbound and westbound – lanes are 11’ wide
  - Add 7’ wide buffered bike lanes adjacent to travel lanes
  - Shift center of roadway 7’ to the north
  - Maintain 8’ sidewalk on north side

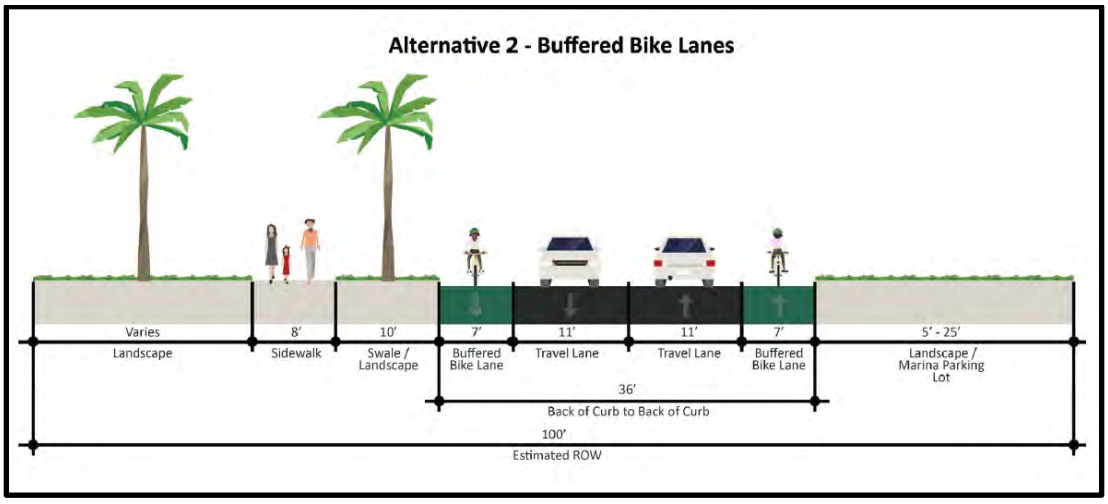


Figure 12: Segment 1 Alternative 2 Typical Section

- Alternative 3 (**Figure 13**)
  - One lane eastbound and westbound – lanes are 11’ wide
  - Sharrows added to roadway
  - Add 6’ sidewalk and 4’ landscape strip to the south side from the Mathers Bridge to Oars and Paddles Park
  - North side sidewalk increased from 8’ to a 12’ shared use path
  - Shift center of roadway 10’ north

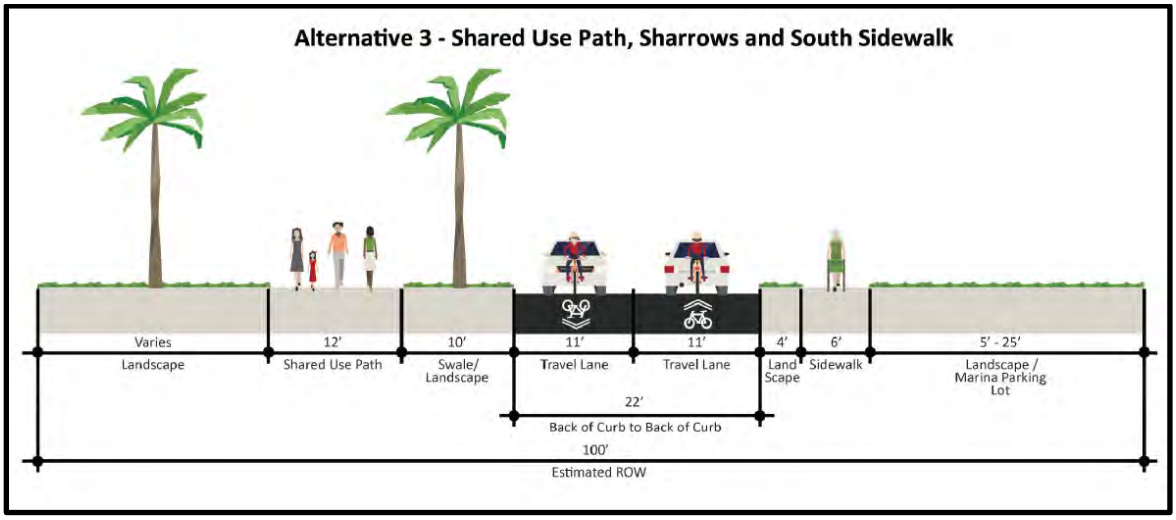


Figure 13: Segment 1 Alternative 3 Typical Section

- Alternative 4 (**Figure 14**)
  - One lane eastbound and westbound – lanes are 11’ wide
  - Add 7’ wide buffered bike lanes adjacent to travel lanes
  - Add 6’ sidewalk and 4’ landscape strip to the south side from the Mathers Bridge to Oars and Paddles Park
  - Shift center of roadway 17’ north
  - Maintain 8’ sidewalk on north side

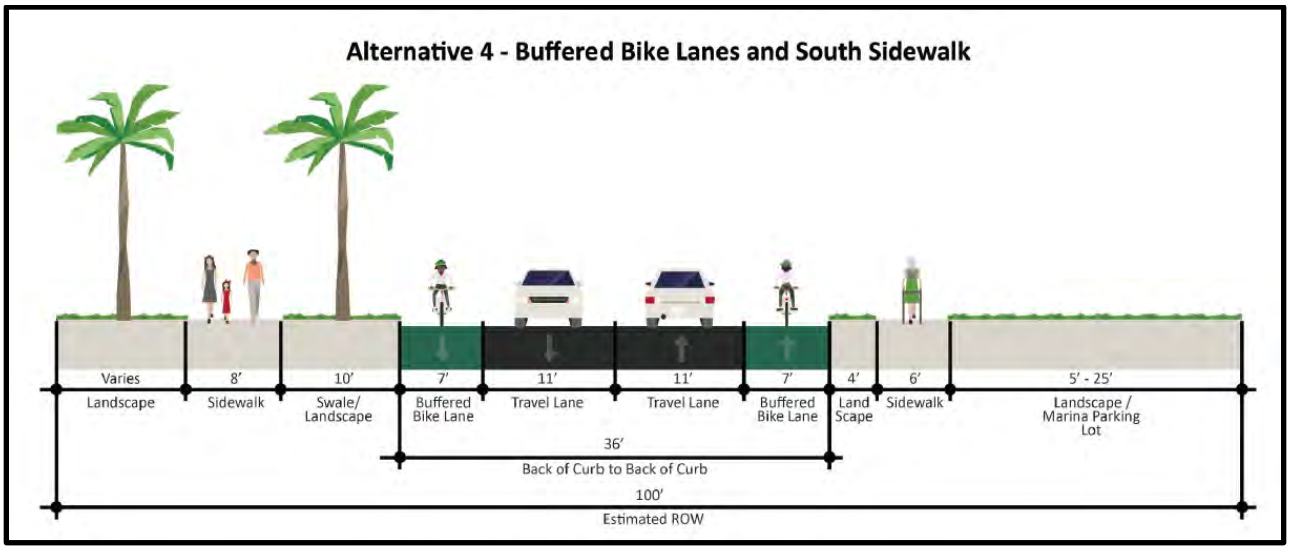


Figure 14: Segment 1 Alternative 4 Typical Section

SEGMENT 2: S. PATRICK DRIVE TO PALM SPRINGS BOULEVARD

- Existing (**Figure 15**)
  - One lane eastbound and westbound – lanes are 13’ wide
  - Sidewalks are 4-5’ wide along length of segment
  - 2’ curb and gutter and 6’ landscaping between travel lanes and sidewalk
  - Estimated 80’ right of way

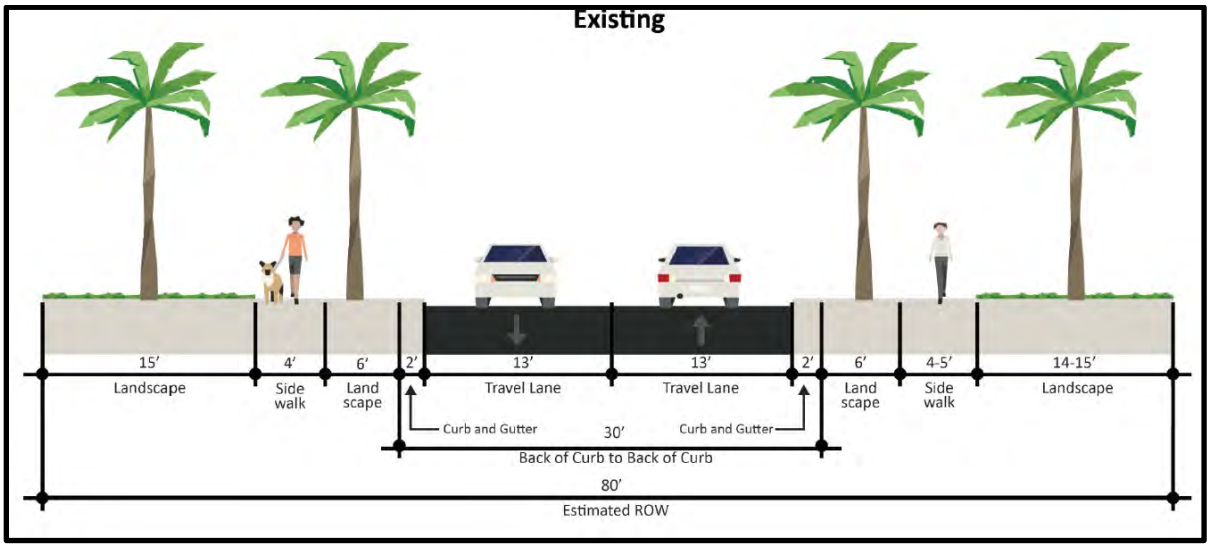


Figure 15: Segment 2 Existing Typical Section

- Alternative 1 (**Figure 16**)
  - One lane eastbound and westbound – lanes are 13’ wide
  - Sharrows added to roadway
  - Both north and south side sidewalks widened from 4’ to 10’
  - 2’ curb and gutter and 6’ landscaping between travel lanes and sidewalk is maintained

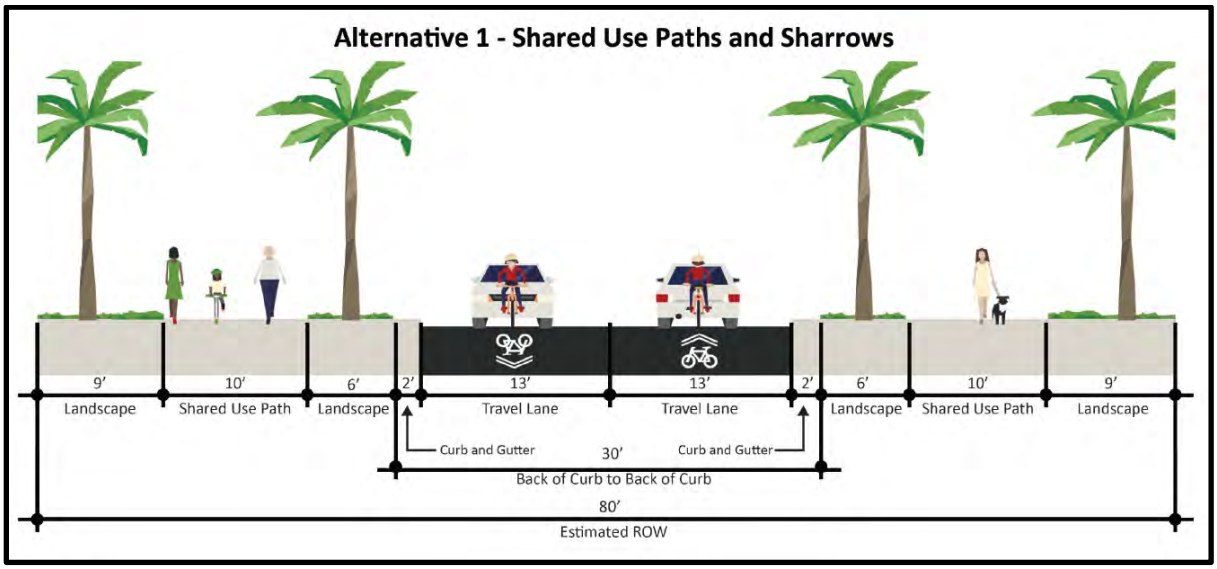


Figure 16: Segment 2 Alternative 1 Typical Section

- Alternative 2 (**Figure 17**)
  - One lane eastbound and westbound – lanes are 11’ wide
  - Add 7’ wide buffered bike lanes adjacent to travel lanes
  - Reconstruct 2’ curb and gutter and 6’ landscaping area between buffered bike lane and sidewalk
  - Both north and south side sidewalks widened from 4’ to 8’

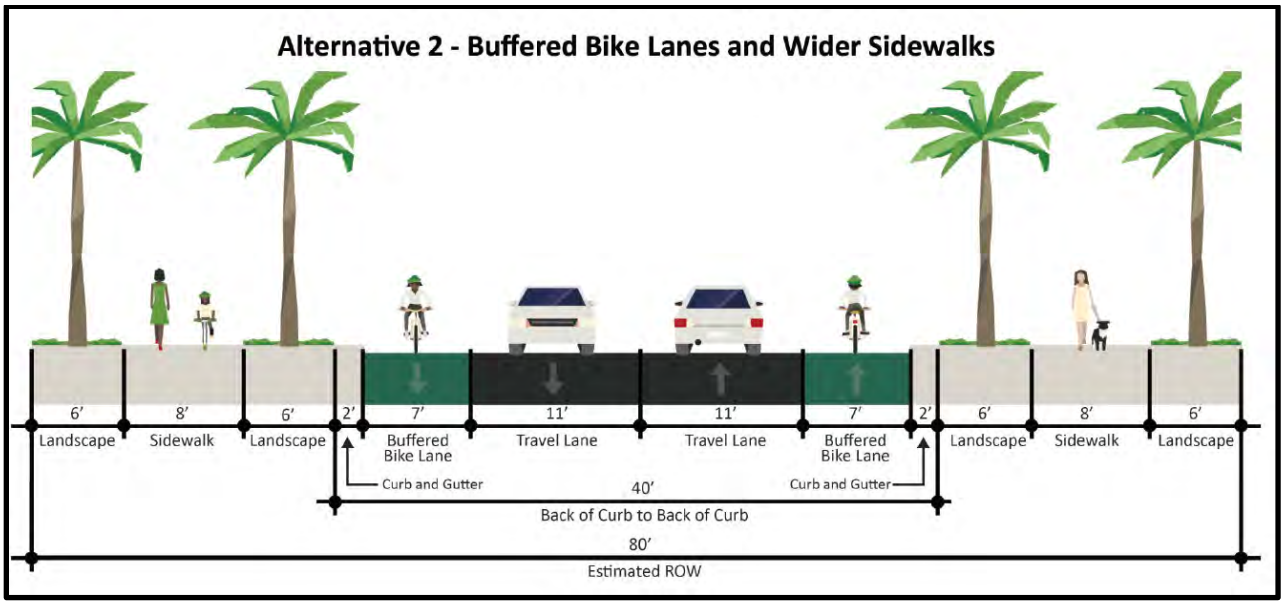


Figure 17: Segment 2 Alternative 2 Typical Section

SEGMENT 3: PALM SPRINGS BOULEVARD TO SR A1A

- Existing (**Figure 18)**
    - Two lanes eastbound and westbound – lanes are 13’ wide
    - Sidewalks are 5’ wide along length of segment
    - 2’ curb and gutter and varying width landscaping between travel lanes and sidewalk
    - Estimated 100’ right of way

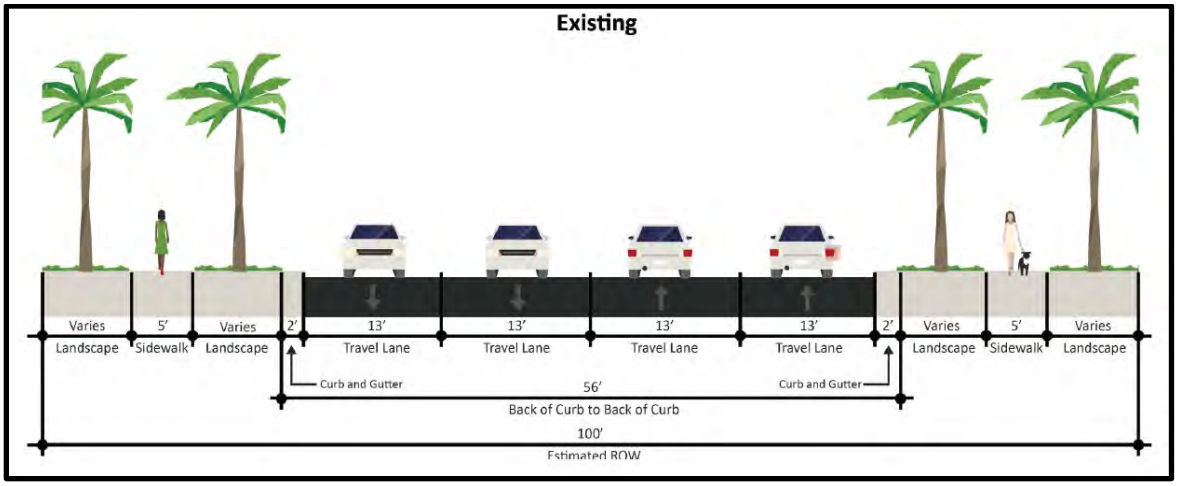


Figure 18: Segment 3 Existing Typical Section

- Alternative 1 (**Figure 19**)
    - Two lanes eastbound and westbound – lanes are 13’ wide
    - Sharrows added to roadway
    - Both north and south side sidewalks widened from 5’ to 10’
    - 2’ curb and gutter is maintained; 5’ landscaping area created between curb and sidewalk

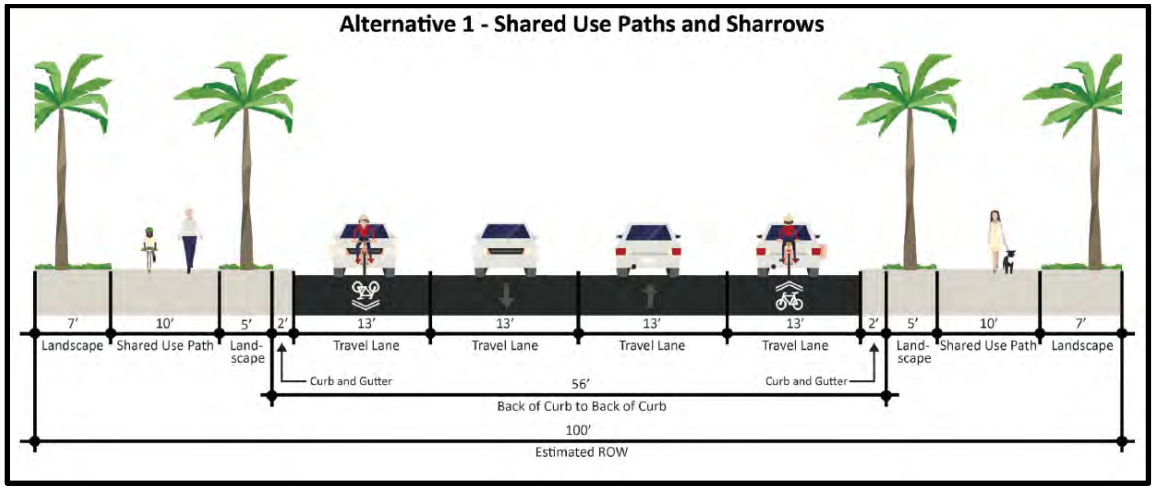


Figure 19: Segment 3 Alternative 1 Typical Section

- Alternative 2 (**Figure 20**)
  - Reduce to one lane eastbound and westbound – lanes are 11’ wide
  - Add 7’ wide buffered bike lanes adjacent to travel lanes
  - Reconstruct 2’ curb and gutter; 10’ landscaping area created between curb and sidewalk
  - Both north and south side sidewalks widened from 5’ to 10’

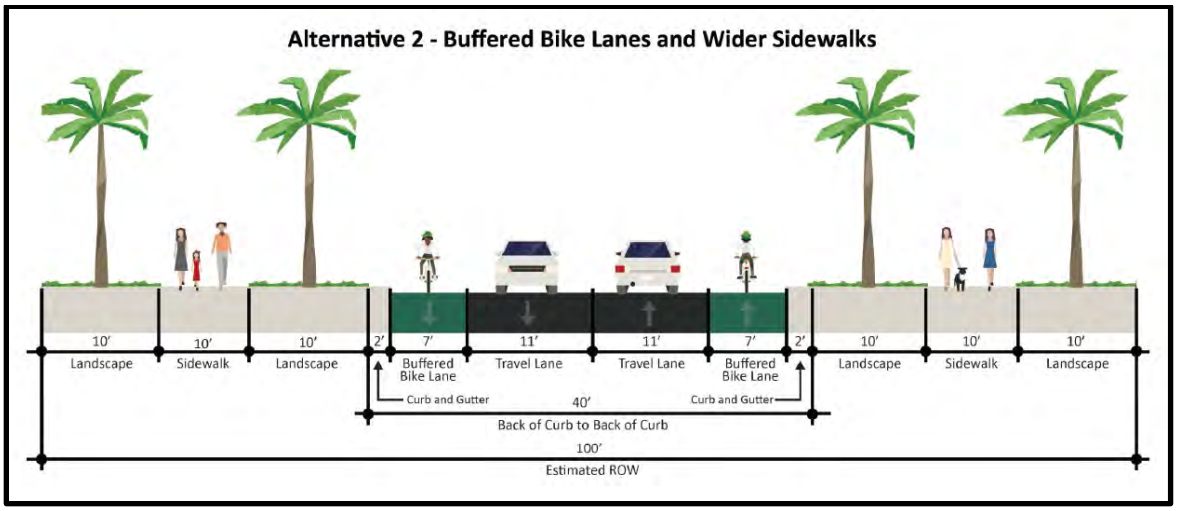


Figure 20: Segment 3 Alternative 2 Typical Section

- Alternative 3 (**Figure 21**)
  - Reduce to one lane eastbound and westbound, add a center two-way left-turn lane – lanes are 11’ wide
  - Both north and south side sidewalks widened from 5’ to 12’ shared use paths
  - Reconstruct 2’ curb and gutter; 10’ landscaping area created between curb and sidewalk

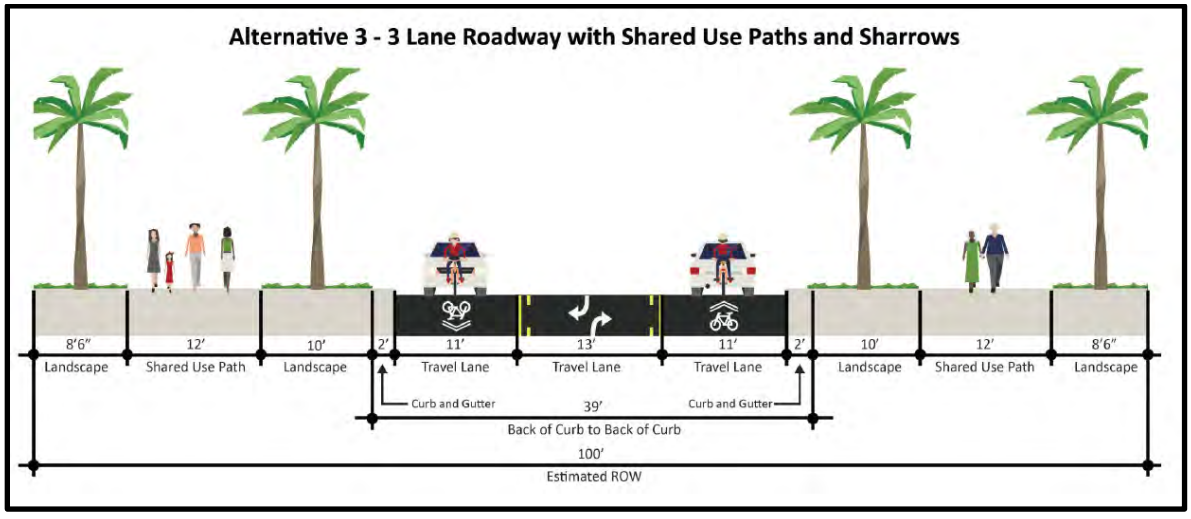


Figure 21: Segment 3 Alternative 3 Typical Section

TYPICAL SECTION ALTERNATIVES COMPARISON MATRIX

The nine typical section alternatives for Banana River/Pine Tree Drive are compared in **Table 1** based on Measures of Effectiveness (MOEs) such as pedestrian/bicycle mobility, vehicular mobility/safety, ROW impacts, closer to residential properties, drainage impacts, utility impacts, and cost. These impacts are qualitative in nature.

- **Improve Pedestrian Mobility/Safety** – Each of the alternatives provide either wider sidewalks or shared-use paths when compared to the existing condition, thus the reason for the moderate to high ratings. The only exception is Segment 1 Alternative 2, which is maintaining the existing sidewalk width on the north side of the road.
- **Improve Bicycle Mobility/Safety** – Each of the typical section alternatives are providing some type of bicycle facility where it is not currently present today, either in the form of sharrows, shared-use paths, or buffered bicycle lanes. Sharrows in traffic do not provide as much separation of bicyclist comfort as a shared use path or buffered bicycle lanes, thus the reason for the moderate rating for alternatives including sharrows.
- **Improve Vehicular Mobility** – Overall there will be limited to no impacts/changes to vehicular mobility along the corridor, except for Segment 3 Alternatives 2 and 3 due to the lane reduction from four travel lanes to two travel lanes.
- **Improve Vehicular Safety** – For Segments 1 and 2, there will be limited to no impacts/changes to vehicular safety based on the typical section alternatives. Segment 3 Alternatives 2 and 3 would have a positive safety impact due to the lane reduction from four travel lanes to two travel lanes.
- **ROW Impacts** –There are no anticipated ROW impacts.
- **Closer to Residential Properties** – While there will not be ROW impacts, some of the alternatives will push the existing sidewalk closer to residential properties.
- **Drainage Impacts** – The drainage impacts are anticipated to be high for alternatives moving curb and gutter in Segments 2 and 3. Segment 1 Alternatives 2, 3, and 4 would result in high drainage impacts due to the shifting/reconstruction of the roadway and may also result in needing an offsite pond for water treatment.
- **Utility Impacts** – There are no anticipated utility impacts.
- **Cost Comparison** – The lower cost alternatives mainly include resurfacing/restriping the existing roadway and widening sidewalks. The moderate to higher cost alternatives would include some type of partial or full reconstruction of the roadway to add buffered bike lanes and move curb and gutter.

Typical section alternatives as well as the comparative analysis based on MOEs were presented to the public at the Existing Conditions/Future Alternatives Open House held on February 13, 2019. Issues important to the public were safety and comfort for pedestrians and bicyclists, as well as impacts to adjacent residential properties.

The preference of the public based on typical section voting was as follows:

- Segment 1 Alternative 4
- Segment 2 Alternative 2
- Segment 3 Alternative 2

The next section will review feasibility of these sections for long-term implementation, and also review short-term improvement strategies that can be implemented in the interim.

Table 1: Typical Section Measures of Effectiveness

Measure of Effectiveness (MOE)	Segment 1				Segment 2		Segment 3		
	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 1	Alternative 2	Alternative 1	Alternative 2	Alternative 3
Improve Pedestrian Mobility/Safety	Moderate	No Change	High	High	High	High	High	High	High
Improve Bicycle Mobility/Safety	Moderate	High	Moderate	High	Moderate	High	Moderate	High	Moderate
Improve Vehicular Mobility	No Change	No Change	No Change	No Change	No Change	No Change	No Change	Low	High
Improve Vehicular Safety	No Change	No Change	No Change	No Change	No Change	No Change	No Change	Moderate	High
ROW Impacts	None Anticipated	None Anticipated	None Anticipated	None Anticipated	None Anticipated	None Anticipated	None Anticipated	None Anticipated	None Anticipated
Closer to Residential Property?	No Change	No Change	No Change	Yes	Yes	Yes	No Change	No Change	No Change
Drainage Impacts	None Anticipated	High	High	High	None Anticipated	High	None Anticipated	High	High
Utility Impacts	None Anticipated	None Anticipated	None Anticipated	None Anticipated	None Anticipated	None Anticipated	None Anticipated	None Anticipated	None Anticipated
Cost Comparison	Least Cost	Moderate Cost	Moderate Cost	High Cost	Least Cost	High Cost	Least Cost	Moderate Cost	Moderate Cost

Potential Improvement Alternatives

The following sections detail the potential improvement alternatives and the preferred alternative for the Banana River/Pine Tree Drive study corridor. The improvements were broken down into short-term improvements and the long-term vision. The short-term improvements could potentially be implemented in the next 3-5 years. The long-term vision may take up to 15-20 years to implement as the project goes through the project development process and adequate funding is secured.

SHORT-TERM IMPROVEMENTS

To address some of the issues and opportunities identified for Banana River/Pine Tree Drive, short-term improvements were identified, including pavement resurfacing, wider sidewalks/shared use paths, raised intersections, special emphasis crosswalk markings, rectangular rapid flashing beacons (RRFB), advanced intersection warning signage, and retroreflective signal head backplates. Each of these short-term improvements are discussed in more detail in the following sections.

Resurfacing

The City of Indian Harbour Beach is planning a resurfacing project from S. Patrick Drive to SR A1A. This resurfacing project can be an opportunity to make improvements benefiting pedestrians and bicyclists in the short-term, as opposed to waiting 10+ years for a long-term, more costly alternative. In addition to the pedestrian/bicycle improvements, the striping of the corridor would be refreshed which is an upgrade over the faded pavement markings, especially between Palm Springs Boulevard and SR A1A. **Figure 22** displays an example of a recent resurfacing project.

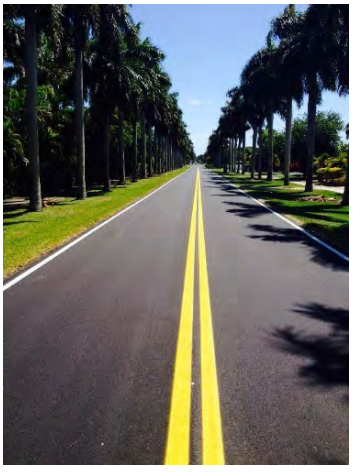


Figure 22: Roadway Resurfacing

In preparation for the upcoming resurfacing project, typical sections were created based on input from the PAT for Segment 2 (S. Patrick Drive to Palm Springs Boulevard) and Segment 3 (Palm Springs Boulevard to SR A1A). Improvement strategies for Segment 1 are discussed in the **Long-Term Vision** section. For both Segments 2 and 3, the existing roadway will be resurfaced and sharrows will be added. In both segments the sidewalk will be widened to 10’.

- Segment 2 Resurfacing Typical Section (**Figure 23**)
  - One lane eastbound and westbound – lanes are 13’ wide
  - Sharrows added to roadway
  - Both north and south side sidewalks widened from 4’ to 10’
  - 2’ curb and gutter and 6’ landscaping between travel lanes and sidewalk is maintained

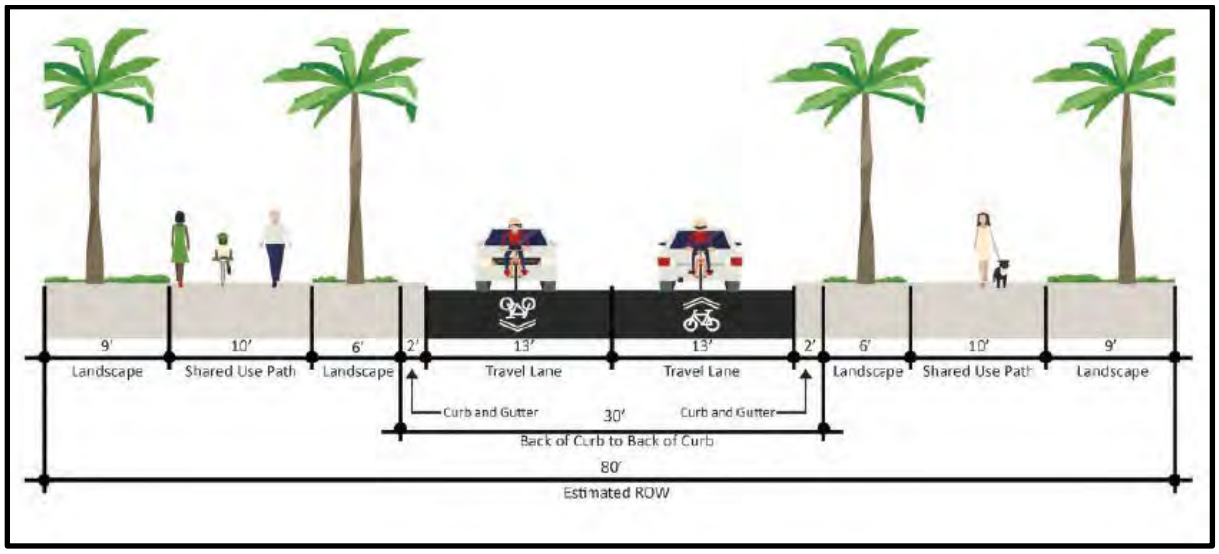


Figure 23: Segment 2 Resurfacing Typical Section

- Segment 3 Resurfacing Typical Section (**Figure 24**)
  - One lane eastbound and westbound – lanes are 13’ wide
  - Sharrows added to roadway
  - Both north and south side sidewalks widened from 5’ to 10’
  - 2’ curb and gutter is maintained, 5’ landscaping area created between curb and sidewalk

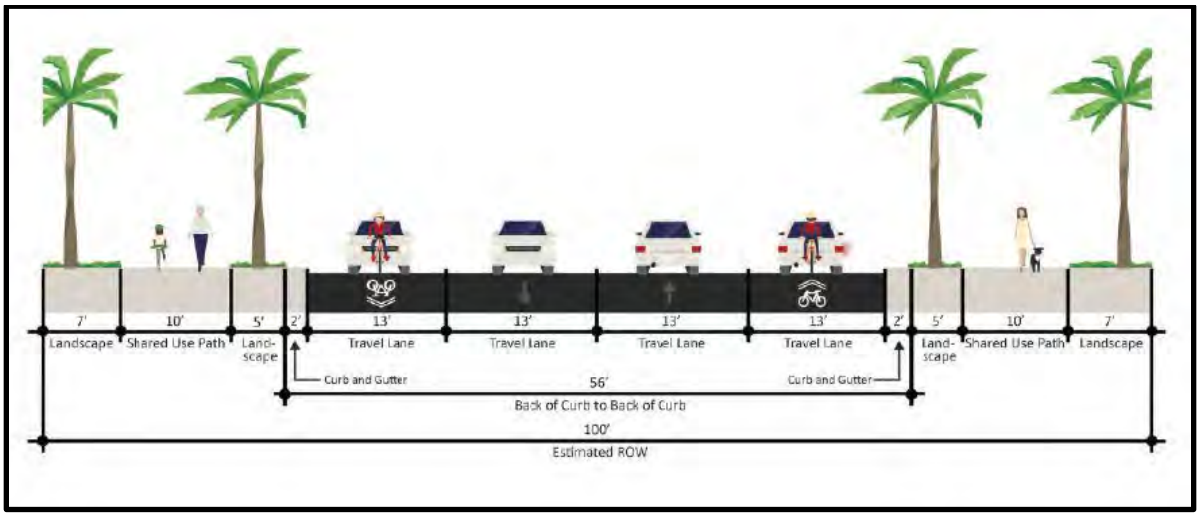


Figure 24: Segment 3 Resurfacing Typical Section

Wider Sidewalks/Shared Use Paths

Wider sidewalks/shared use paths increase pedestrian mobility and safety while promoting a heathier and more active community. Wider sidewalks/shared use paths also provide an off-road facility for inexperienced/younger bicyclists. Wider sidewalks/shared use paths are proposed as part of the resurfacing project. **Figure 25** displays an example of a wider sidewalk with additional landscaping improvements between the vehicles and the pedestrians.

Figure 25: Wider Sidewalk

Raised Intersections

Installing raised intersections at the intersections of Osceola Drive, School Road, and Palm Springs Boulevard will reinforce slower speeds along the corridor, while encouraging motorists to yield to pedestrians. These three intersections are the most traveled for school children walking north/south across Banana River/Pine Tree Drive and the raised intersections should help create a safer environment for children going to and from school. Raised intersections are proposed as part the resurfacing project. **Figure 26** displays examples of raised intersections.

Figure 26: Raised Intersections

Special Emphasis Crosswalk Markings

By installing special emphasis crosswalk markings at intersections, drivers are alerted to enhanced pedestrian activity. Special emphasis crosswalks should be installed on the north and south approaches at the two-way stop-controlled intersections along the corridor. These crosswalks should also be installed on all four legs at S. Patrick Drive, Osceola Drive, School Road, and Palm Springs Boulevard, with the latter three intersections being proposed for the raised intersection treatment. Special emphasis crosswalk markings are proposed as part the resurfacing project. **Figure 27** displays an example of special emphasis crosswalk markings.

Figure 27: Special Emphasis Crosswalk Markings

Rectangular Rapid Flashing Beacons (RRFBs)

RRFBs are an innovative crossing treatment typically installed at uncontrolled marked crosswalks. Pedestrians/bicyclists using the crosswalk will press a button that initiates flashing strobe lights which will alert drivers of pedestrian/bicycle activity at the crosswalk. RRFBs are proposed at the School Road and Palm Springs Boulevard raised intersections to help facilitate north/south crossings. **Figure 28** displays an example RRFB assembly.

Figure 28: Retroreflective Rectangular Flashing Beacons

Advanced Intersection Warning Signage/Flashers

Advanced intersection warning signage/flashers provide early warning of an upcoming stop or signalized intersection in reduced visibility conditions. The S. Patrick Drive intersection has a history of southbound rear end crashes due to queuing around a curve along S. Patrick Drive. The advanced warning signage/flashers could be installed to alert drivers of a red light or stopped vehicles around the curve, which may help reduce the number of crashes. The advanced warning flashers could be installed as part of the resurfacing project or as a standalone project. **Figure 29** displays examples of advanced warning signage/flashers.

Figure 29: Advanced Warning Signage and Flashers

Retroreflective Signal Head Backplates

Retroreflective signal heads improve visibility of signals both at nighttime and during the day, while helping to reduce rear end crashes. Installing retroreflective signal heads would be helpful at the S. Patrick Drive intersection which experienced the highest number of rear end crashes along the corridor.

The retroreflective signal heads could be installed as part of the resurfacing project or as a standalone project. **Figure 30** displays examples of retroreflective signal heads.

Figure 30: Retroreflective Signal Head Backplates

Short-Term Improvement Cost Estimates

Cost estimates were generated for Segments 2 and 3 based on the following. **Table 2** through **Table 4** display the short-term cost estimates for Segments 2 and 3.

- **Resurfacing** – The resurfacing cost includes the milling and resurfacing of each segment. This cost also includes new striping for the length of the segments and special emphasis crosswalks at the intersections previously discussed.
- **Raised Intersections** – The raised intersection cost includes additional asphalt and patterned pavement to create the raised intersection.
- **Sidewalk and Signing** – The sidewalk and signing cost includes the wider sidewalks on both sides of Banana River/Pine Tree Drive for each segment. The addition of new signage and RRFBs (where previously noted) is also included.
- **Engineering/Construction Engineering Inspection (CEI)** – This cost is calculated as 30 percent (20 percent for engineering, 10 percent for CEI) of the combined resurfacing/raised intersection/sidewalk/signing cost for each segment.
- **Utility Relocations** – The Short-Term Improvement has no anticipated utility impacts.
- **Drainage** – The Short-Term Improvement has no anticipated drainage impacts.
- **Roadway ROW** – The Short-Term Improvement has no anticipated ROW impact.

Table 2: Short-Term Cost Estimate – S. Patrick Drive to Palm Springs Boulevard

Element	Cost
Resurfacing	$430,000
Raised Intersections (3)	$170,000
Sidewalk & Signing	$580,000
Engineering/CEI	$360,000
Total	**$1,540,000**

Table 3: Short-Term Cost Estimate – Palm Springs Boulevard to SR A1A

Element	Cost
Resurfacing	$150,000
Sidewalk & Signing	$110,000
Engineering/CEI	$80,000
Total	**$340,000**

Table 4: Total Short-Term Cost Estimate – S. Patrick Drive to SR A1A

Element	Cost
Construction	$1,440,000
Engineering/CEI	$440,000
Total Cost	**$1,880,000**

LONG-TERM VISION – TYPICAL SECTIONS

This section describes the long-term vision for the Banana River/Pine Tree Drive study corridor. It is anticipated the long-term vision will potentially take 10+ years to implement due to the lack of readily available funding sources.

Segment 1: Mathers Bridge to S. Patrick Drive

- Existing (**Figure 31**)
  - One lane eastbound and westbound – lanes are 11' wide
  - North side 8' sidewalk present, with south sidewalk existing in front of Oars and Paddles Park to S. Patrick Drive
  - Estimated 100' right of way

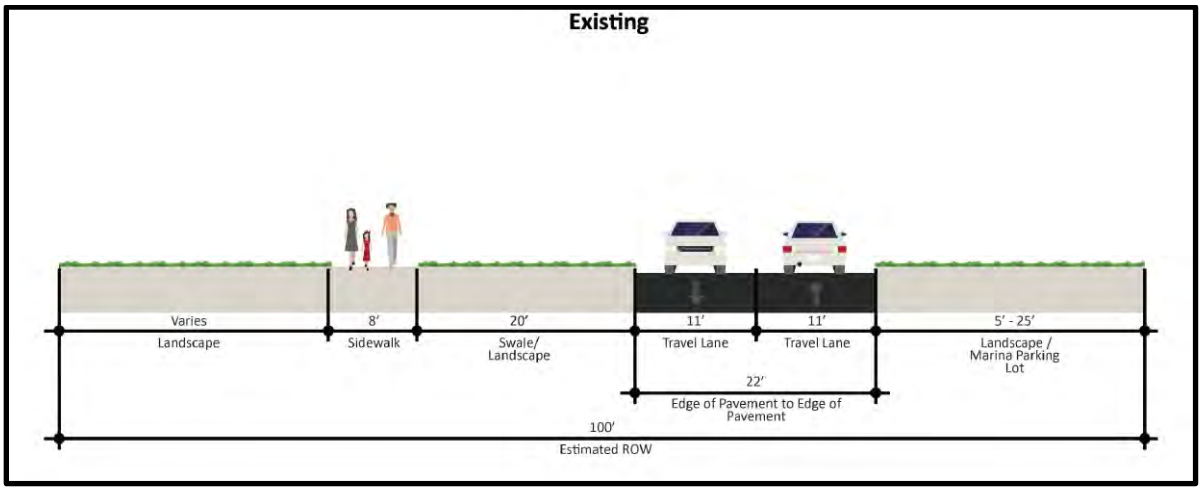


Figure 31: Segment 1 Existing Typical Section

Based on feedback from the Existing Conditions/Future Alternatives Open House, the public voted for Alternative 4 as the preferred alternative:

- Alternative 4 (**Figure 32**)
  - One lane eastbound and westbound – lanes are 11' wide
  - Add 7' wide buffered bike lanes adjacent to travel lanes
  - Add 6' sidewalk and 4' landscape strip to the south side from the Mathers Bridge to Oars and Paddles Park
  - Shift center of roadway 17' north
  - Maintain 8' sidewalk on north side

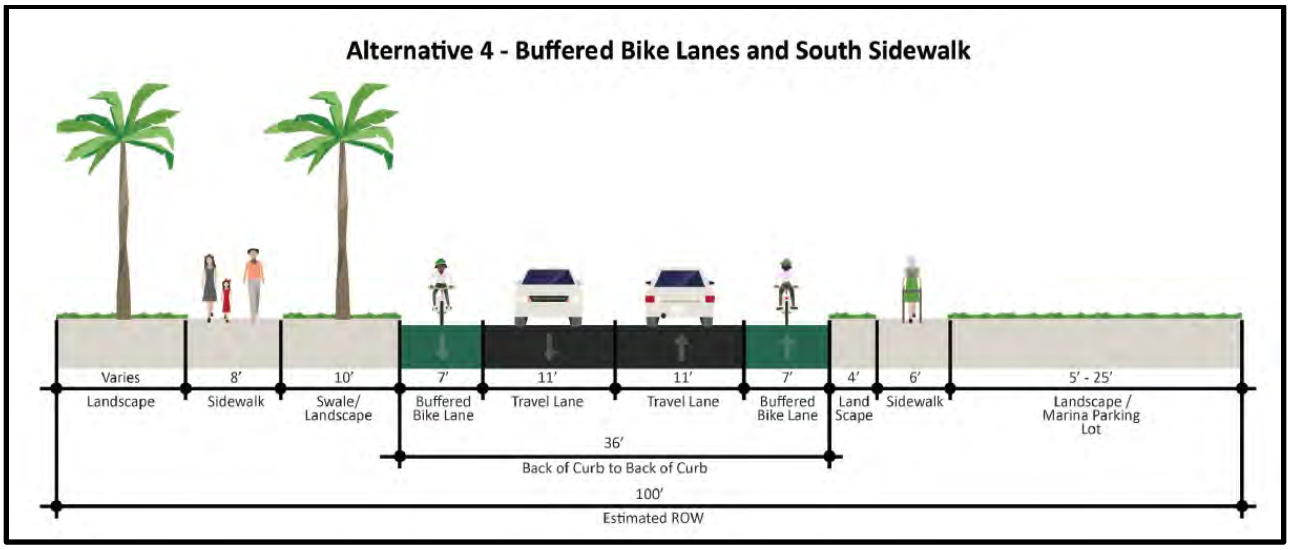


Figure 32: Segment 1 Alternative 4 Typical Section

A cost estimate for Alternative 4 was generated and is displayed in **Table 5**. Due to the high construction cost of $2 million and the pond/associated ROW that would be needed for water quality treatment, the PAT deemed that this alternative was not feasible.

Table 5: Alternative 4 Cost Estimate – Mathers Bridge to S. Patrick Drive

Element	Cost
New Roadway Construction	$460,000
Drainage	$890,000
Sidewalk & Signing	$220,000
Engineering/CEI	$470,000
Total Construction + Eng/CEI	**$2,040,000**
Pond ROW	$5,445,000
Total	**$7,485,000**

Instead of the higher cost Alternative 4, the PAT discussed a lower cost resurfacing alternative:

- Long-Term Vision (**Figure 33**)
    - One lane eastbound and westbound – lanes are 11' wide
    - Sharrows added to roadway
    - North side sidewalk increased from 8' to a 12' shared use path

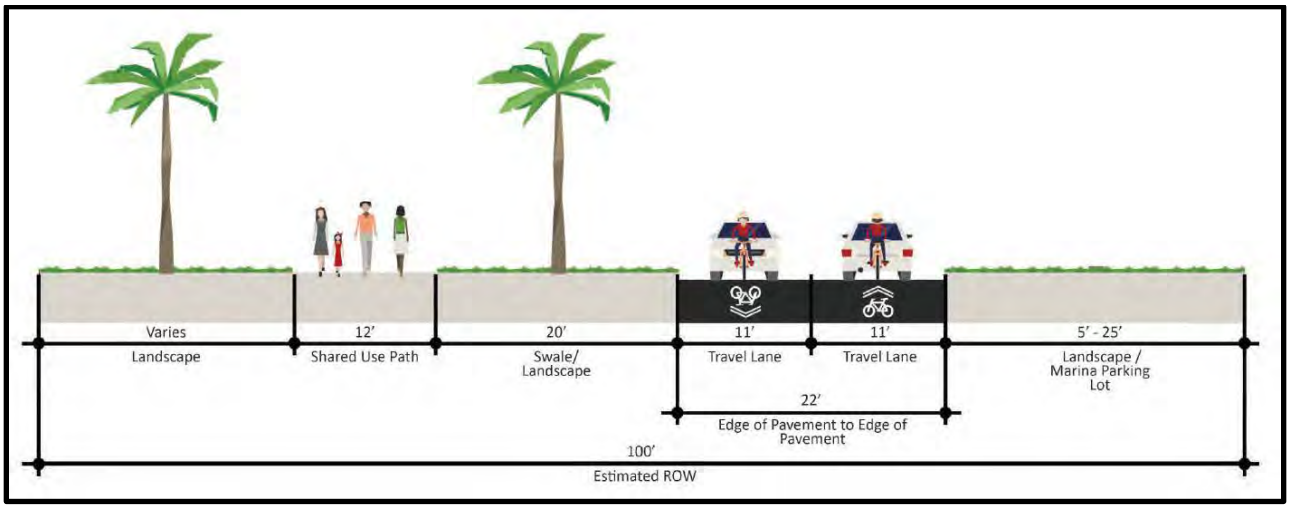


Figure 33: Segment 1 Long-Term Vision Typical Section

Segment 1 from the Mathers Bridge to S. Patrick Drive is the Brevard County maintained portion of Banana River Drive. Through discussions with Brevard County PAT members, this section of Banana River Drive is not scheduled for resurfacing within the next 3-5 years thus the reason this section is included in the long-term vision for the corridor. The cost estimate for the long-term vision is in the next section.

Segment 2: S. Patrick Drive to Palm Springs Boulevard

- Existing (**Figure 34**)
    - One lane eastbound and westbound – lanes are 13' wide
    - Sidewalks are 4-5' wide along length of segment
    - 2' curb and gutter and 6' landscaping between travel lanes and sidewalk
    - Estimated 80' right of way

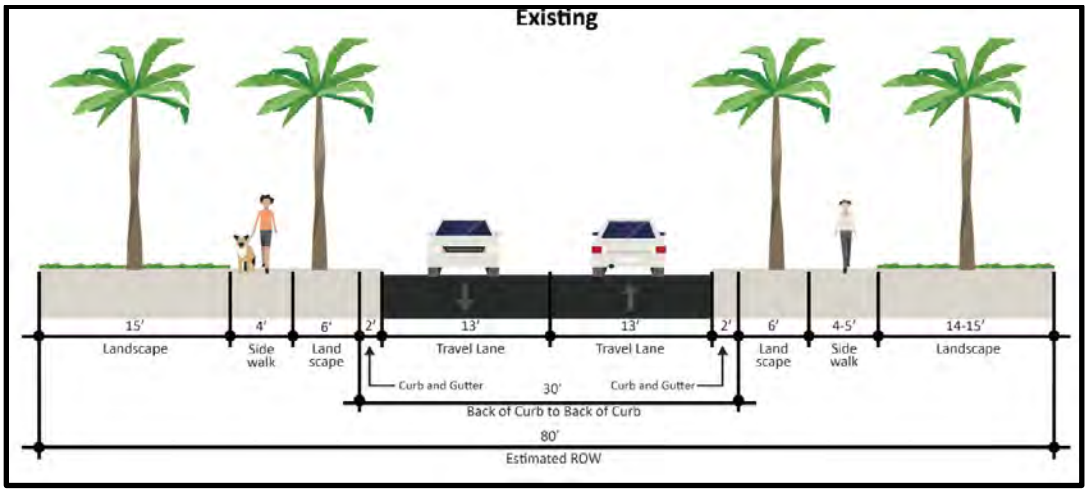


Figure 34: Segment 2 Existing Typical Section

- Long-Term Vision (**Figure 35**)
  - One lane eastbound and westbound – lanes are 11' wide
  - Add 7' wide buffered bike lanes adjacent to travel lanes
  - Reconstruct 2' curb and gutter and include 2' utility/lighting strip between buffered bike lane and sidewalk
  - Both north and south side sidewalks widened from 4' to 8'
  - 10' landscaping area outside of sidewalk

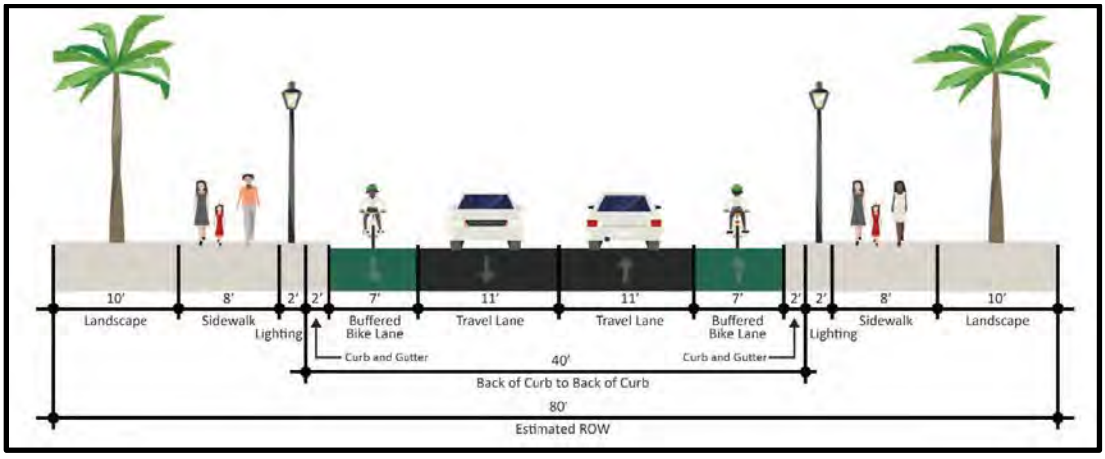


Figure 35: Segment 2 Long-Term Vision Typical Section

Segment 3: Palm Springs Boulevard to SR A1A

- Existing (**Figure 36**)
  - Two lanes eastbound and westbound – lanes are 13' wide
  - Sidewalks are 5' wide along length of segment
  - 2' curb and gutter and varying width landscaping between travel lanes and sidewalk
  - Estimated 100' right of way

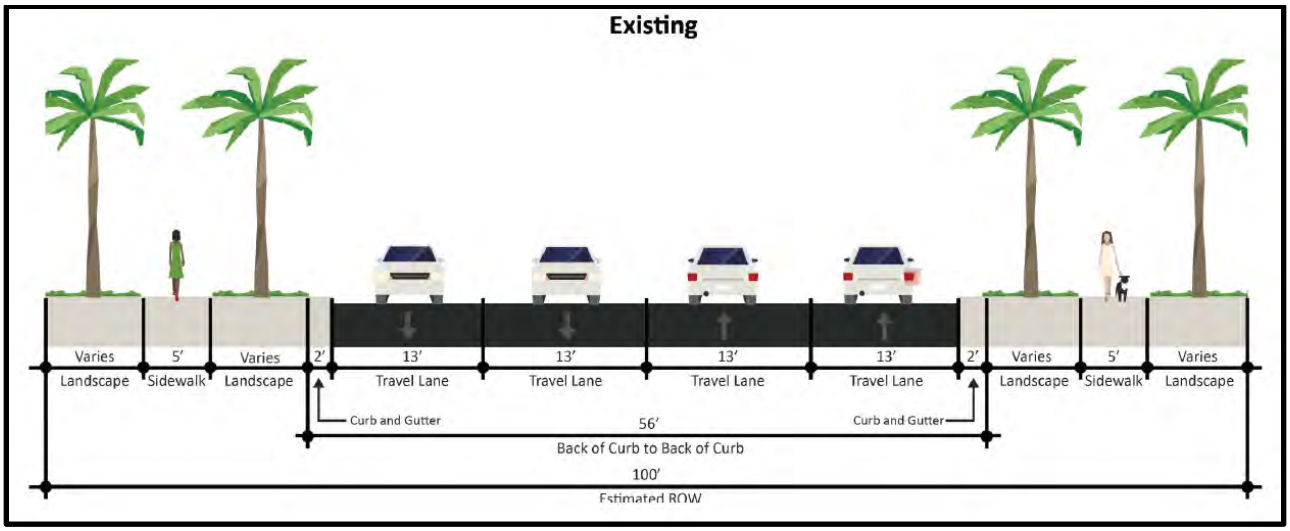


Figure 36: Segment 3 Existing Typical Section

- Long-Term Vision (**Figure 37**)
  - Reduce to one lane eastbound and westbound – lanes are 11' wide
  - Add 7' wide buffered bike lanes adjacent to travel lanes
  - Reconstruct 2' curb and gutter; 10' landscaping area created between curb and sidewalk
  - Both north and south side sidewalks widened from 5' to 10'

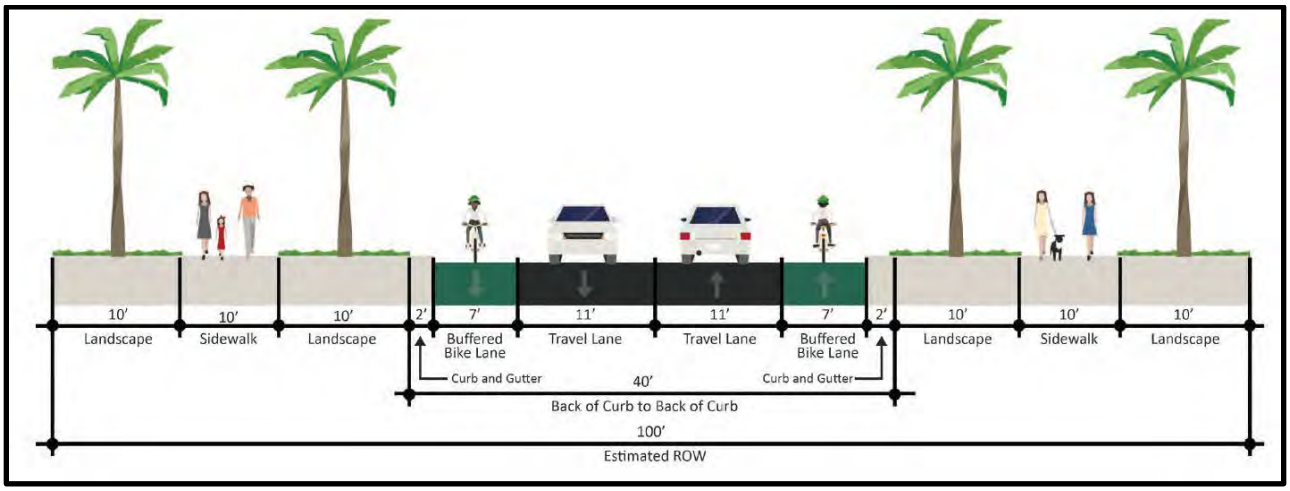


Figure 37: Segment 3 Long-Term Vision Typical Section

LONG-TERM VISION – ROADWAY CONCEPT DETAILS

Based on the long-term vision typical sections discussed in the previous section, a roadway concept was developed for the Banana River/Pine Tree Drive study corridor. The concept was developed from the Mathers Bridge on the west end to SR A1A on the east. In addition to typical section improvements, intersection safety treatments and additional pedestrian crossings were developed along the corridor. The remainder of this section describes the details of the concept developed.

Segment 1: Mathers Bridge to S. Patrick Drive

As shown in the long-term vision typical section, the width of the sidewalk on the north side was increased from 8' to 12' to provide a wider area for less experienced bicylists to ride. The new sidewalk width was added to the north, where feasible, to minimize impacts to the existing swale. In addition to the sidewalk width increase, sharrows were added in the roadway to indicate to experienced bicyclists and drivers that the roadway is intended to be a shared space.

In order to provide pedestrian access to Oars and Paddles Park from the north side of Banana River Drive, a mid-block crossing with RRFB's is proposed west of the intersection of Banana River Drive and Palmer Road. The new mid block crossing would provide a safer crossing environment and make the pedestrian movements within this section more predictable for motorists. This crossing is shown in **Figure 38**.

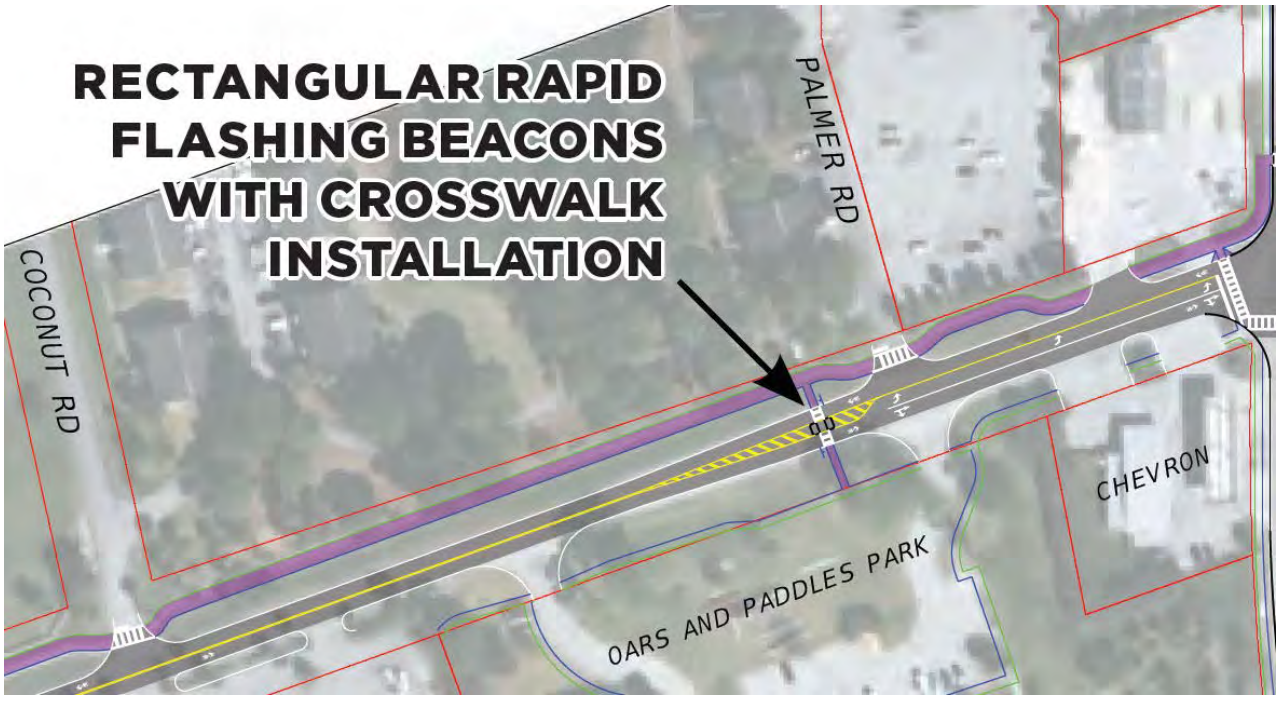


Figure 38: Mid-Block Crossing West of Palmer Road

Table 6 provides the cost estimate for the long-term vision for Segment 1.

Table 6: Long-Term Vision Cost Estimate – Mathers Bridge to S. Patrick Drive

Element	Cost
Resurfacing	$150,000
Sidewalk & Signing	$160,000
Engineering/CEI	$90,000
Total	**$400,000**

Segment 2: S. Patrick Drive to Palm Springs Boulevard

Along Segment 2, several improvements were made to improve safety and increase walkability/bikability. The significant improvement is the addition of buffered bicycle lanes on both the north and south sides of the roadway, which will result in the reconstruction of the curb and gutter. The buffered bicycle lanes will provide bicyclists a safe and separated space while traveling along the corridor. The sidewalks are also proposed to be increased from 4' to 8', to allow for inexperienced bicyclists to have additional space to share with pedestrians. The new sidewalks will include pedestrian level lighting along with landcaping treatments to the outside of the sidewalks. The lighting and landscaping features are discussed in the next section.

Other corridor and intersection treatments are also proposed:

- Special emphasis crosswalk markings on all four intersection legs at S. Patrick Drive.
- Add a west leg crosswalk at the all-way stop-controlled intersection of Wimico Drive. Stripe the west leg and north leg crosswalks with special emphasis crosswalk markings.
- Add a sidewalk on the south side from Wimico Drive through the park adjacent to the fire station. A marked crosswalk with RRFBs is also proposed across Pine Tree Drive to facilitate pedestrian movements. This is displayed in **Figure 39**.

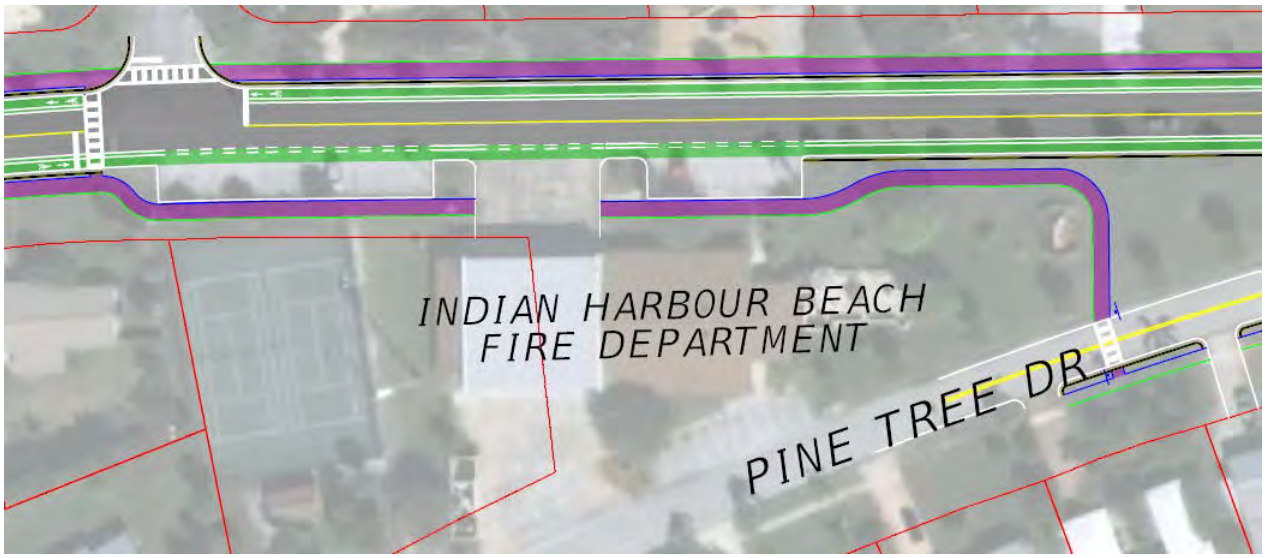


Figure 39: New Sidewalk through Park Adjacent to Fire Station

- Proposed making Pine Tree Drive a one-way road approaching the Osceola Drive intersection and formalizing the spur connection to Banana River Drive as a two-way stop-controlled intersection (**Figure 40**).

Figure 40: Pine Tree Drive One-Way Conversion

- Raised intersections at Osceola Drive, School Road, and Palm Springs Bouelvard that should provide safer pedestrian crossing opportunities and encourage lower vehicular speeds along the study corridor. Osceola Drive and School Road will have special emphasis crosswalk markings on all four intersection legs. Palm Springs Boulevard will have special emphasis crosswalk markings on the north, south, and west legs.
- The raised intersection at Osceola Drive will be all-way stop-controlled. The raised intersections at School Road and Palm Springs Boulevard will include RRFBs for the east and west leg crosswalks which will alert drivers of pedestrian crossings.
- The median for the south leg at Palm Springs Boulevard is proposed to be extended to the north, creating a refuge area for pedestrian crossings.

Table 7 provides the cost estimate for the long-term vision for Segment 2.

Table 7: Long-Term Vision Cost Estimate – S. Patrick Drive to Palm Springs Boulevard

Element	Cost
Resurfacing + New Pavement	$1,410,000
Raised Intersections (3)	$170,000
Drainage	$160,000
Sidewalk & Signing	$510,000
Engineering/CEI	$680,000
Total	**$2,930,000**

Segment 3: Palm Springs Boulevard to SR A1A

The long-term vision for Pine Tree Drive from Palm Springs Boulevard to SR A1A is proposed to reduce the travel lanes from four to two. The total roadway pavement width will decrease from 52' to 36' and include two 11' lanes and a 7' buffered bike lane in each direction. The sidewalks are proposed to be widened from 6' to 10' and additional landscaping areas will be provided between the roadway and sidewalk and to the outside of the sidewalk.

Table 8 provides the cost estimate for the long-term vision for Segment 3.

Table 8: Long-Term Vision Cost Estimate – Palm Springs Boulevard to SR A1A

Element	Cost
Resurfacing	$260,000
Drainage	$30,000
Sidewalk & Signing	$120,000
Engineering/CEI	$120,000
Total	**$530,000**

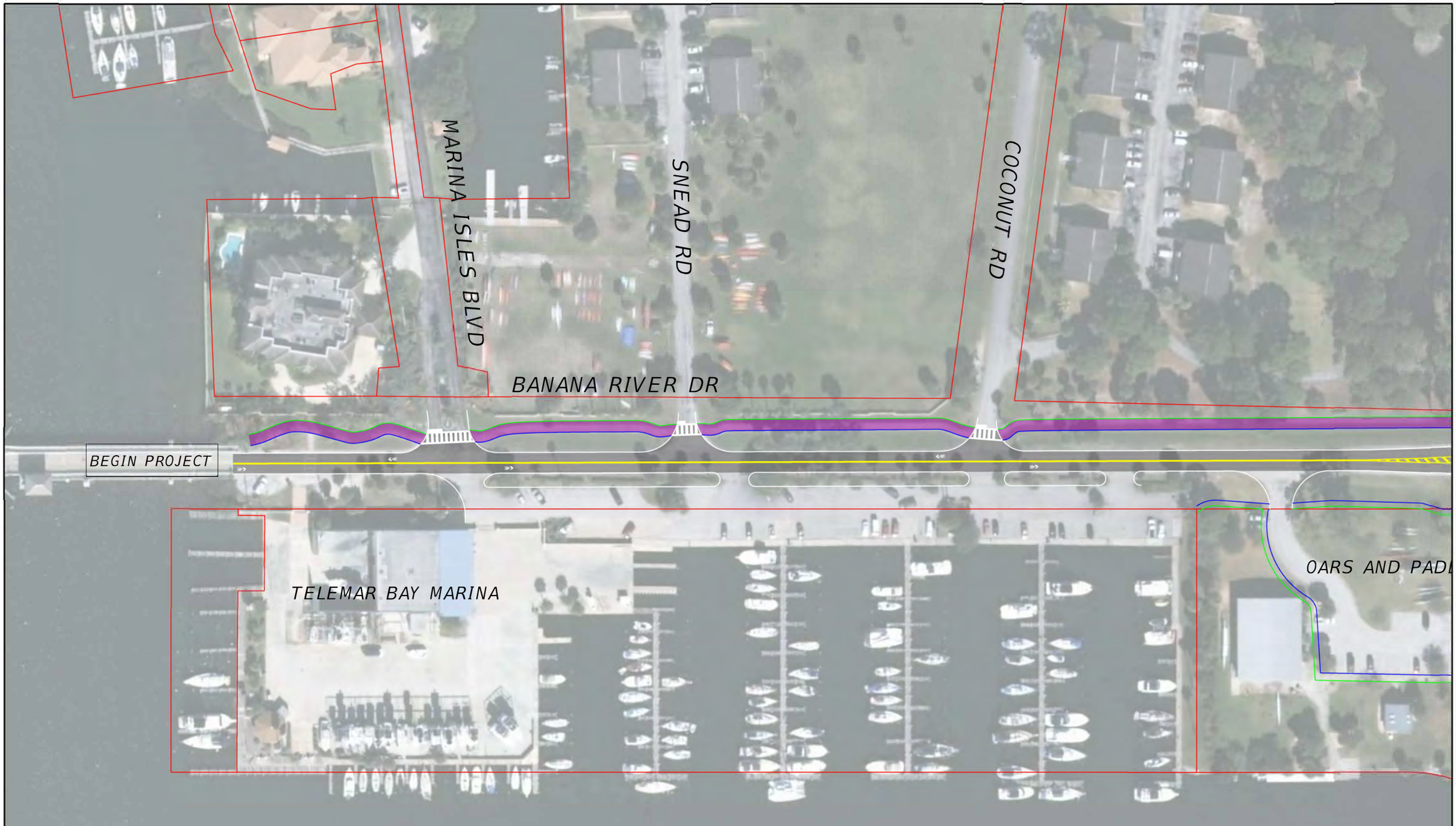
Corridor Summary

Table 9 provides the total cost estimate for the long-term vision from Mathers Bridge to SR A1A.

Table 9: Total Long-Term Vision Cost Estimate – Mathers Bridge to SR A1A

Element	Cost
Construction	$2,970,000
Engineering/CEI	$890,000
Total Cost	**$3,860,000**

Figure 41A-E provides the full concept for the long-term vision.



0 20 100
Feet

PARCEL LINES
SIDEWALK FRONT
SIDEWALK BACK
BACK OF CURB
NEW SIDEWALK
BIKE LANE
RAISED INTERSECTION
RESURFACED PAVEMENT

PRELIMINARY CONCEPT – FOR DISCUSSION ONLY

NOTES

-RIGHT-OF-WAY AND PROPERTY LINES ARE GEOGRAPHICAL REPRESENTATIONS ONLY AND DO NOT DEPICT ACCURATE BOUNDARIES. DO NOT USE TO DESCRIBE, ASSESS, OR OTHERWISE ESTABLISH THE LIMITS OF PROPERTIES OR LOCATIONS OF FEATURES IN RELATION TO PROPOERTY LINES SHOWN HEREIN.
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-ALL CURRENT DRIVEWAY ACCESSES WILL BE MAINTAINED UNLESS OTHERWISE NOTED.

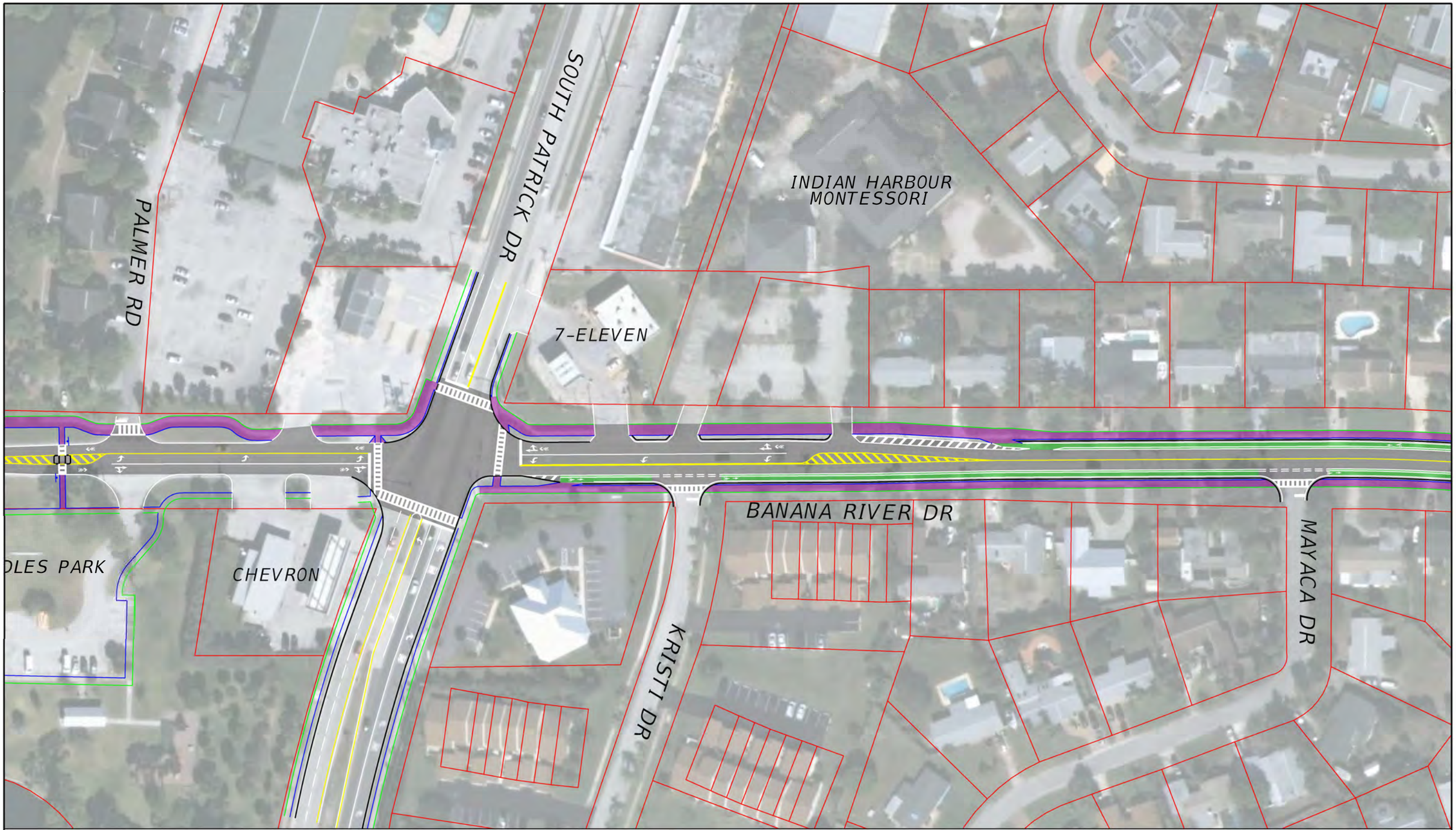
KITTELSON & ASSOCIATES

SPACE COAST TRANSPORTATION PLANNING ORGANIZATION

ROAD NO.	COUNTY	DATE
	BREVARD	MAY 2019

BANANA RIVER DRIVE/PINE TREE DRIVE COMPLETE STREETS STUDY

FIGURE NO.
41A



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Feet

N

PARCEL LINES
SIDEWALK FRONT
SIDEWALK BACK
BACK OF CURB
NEW SIDEWALK
BIKE LANE
RAISED INTERSECTION
RESURFACED PAVEMENT

PRELIMINARY CONCEPT – FOR DISCUSSION ONLY

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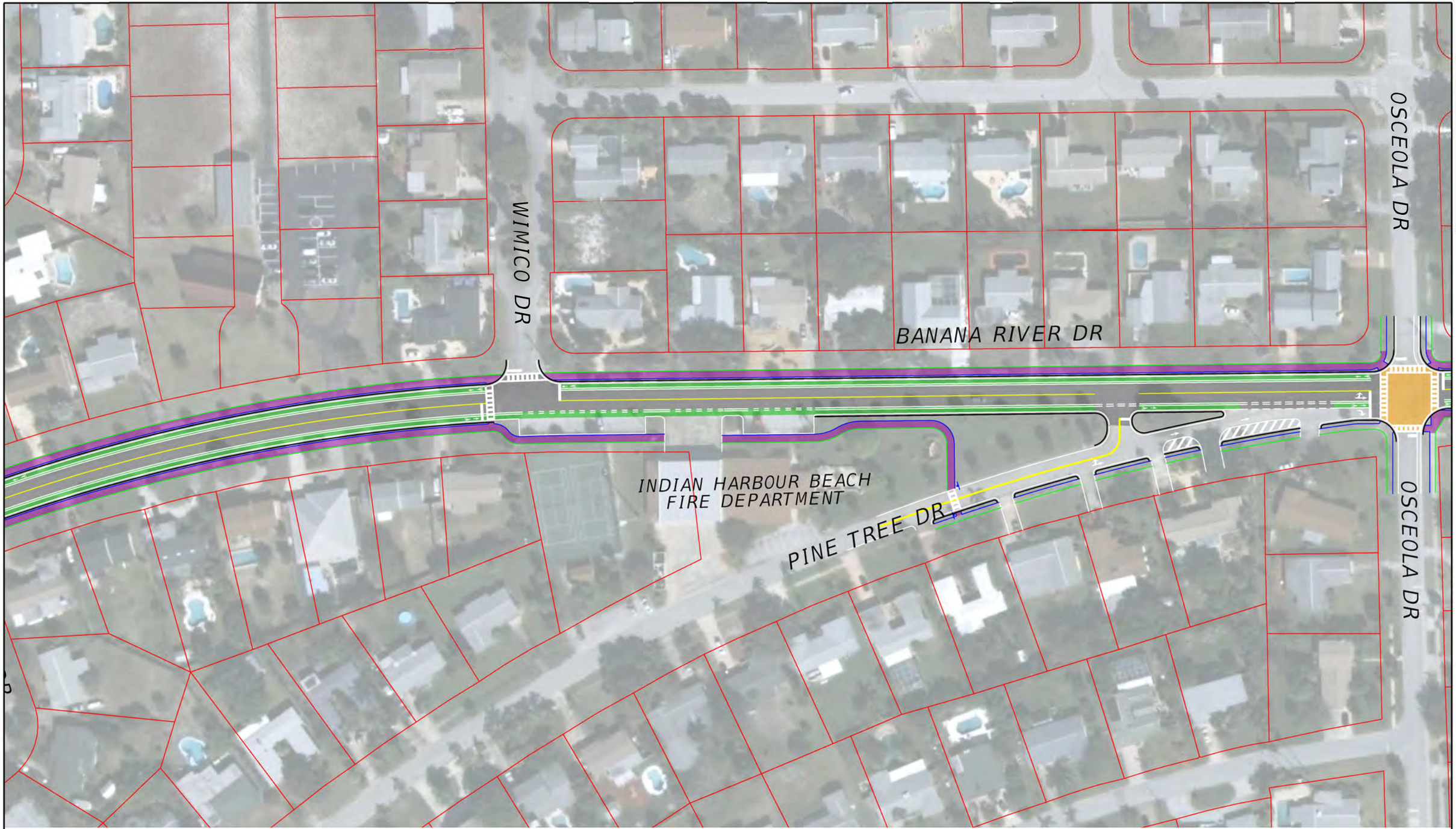
KITTELSON & ASSOCIATES

SPACE COAST TRANSPORTATION PLANNING ORGANIZATION

ROAD NO.	COUNTY	DATE
	BREVARD	MAY 2019

BANANA RIVER DRIVE/PINE TREE DRIVE COMPLETE STREETS STUDY

FIGURE NO.
41B



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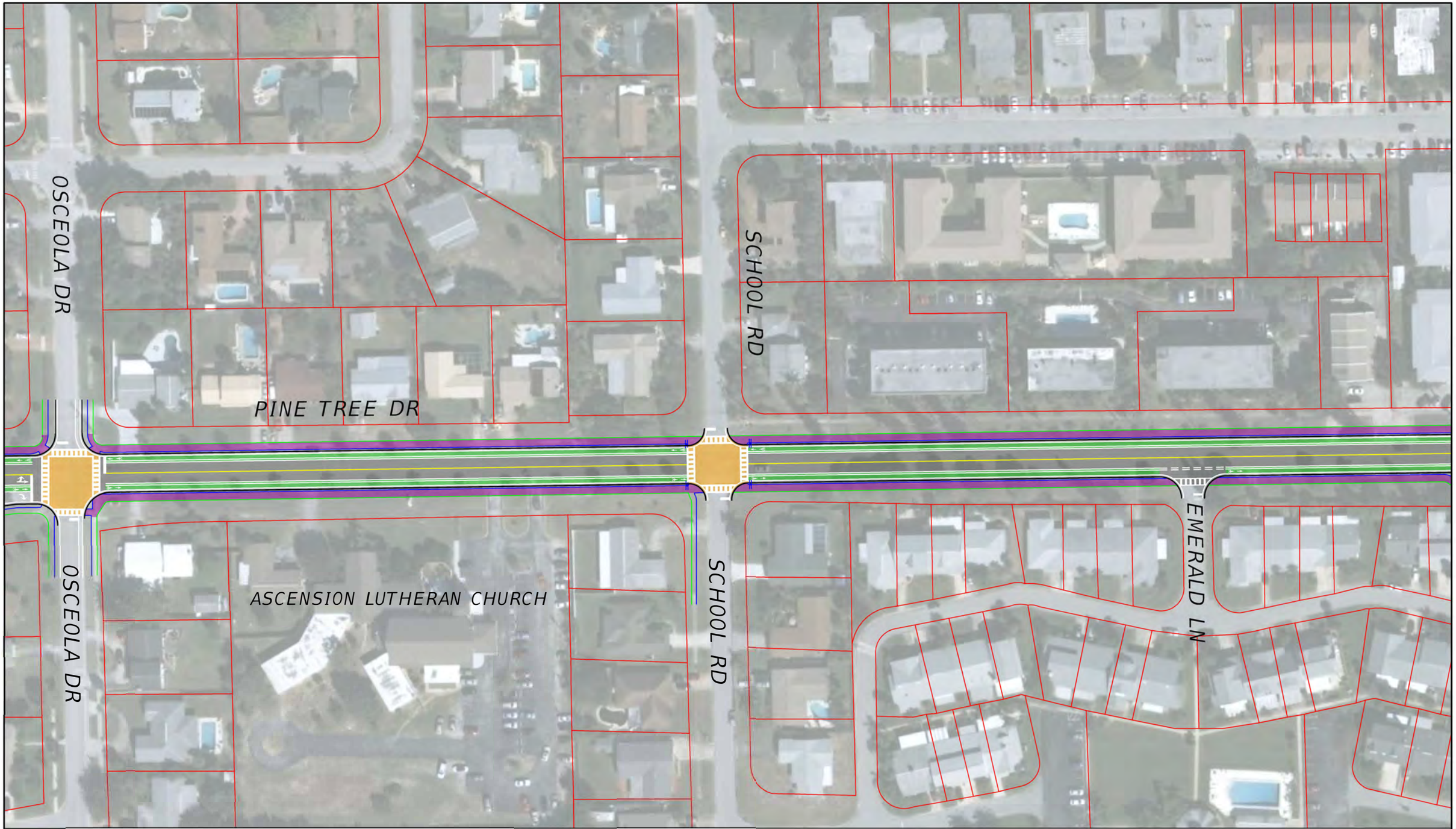
SPACE COAST TRANSPORTATION PLANNING ORGANIZATION

ROAD NO.	COUNTY	DATE
	BREVARD	MAY 2019

BANANA RIVER DRIVE/PINE TREE DRIVE COMPLETE STREETS STUDY

FIGURE NO. 41C



0 20 100
Feet

N

PARCEL LINES
SIDEWALK FRONT
SIDEWALK BACK
BACK OF CURB
NEW SIDEWALK
BIKE LANE
RAISED INTERSECTION
RESURFACED PAVEMENT

PRELIMINARY CONCEPT – FOR DISCUSSION ONLY

NOTES

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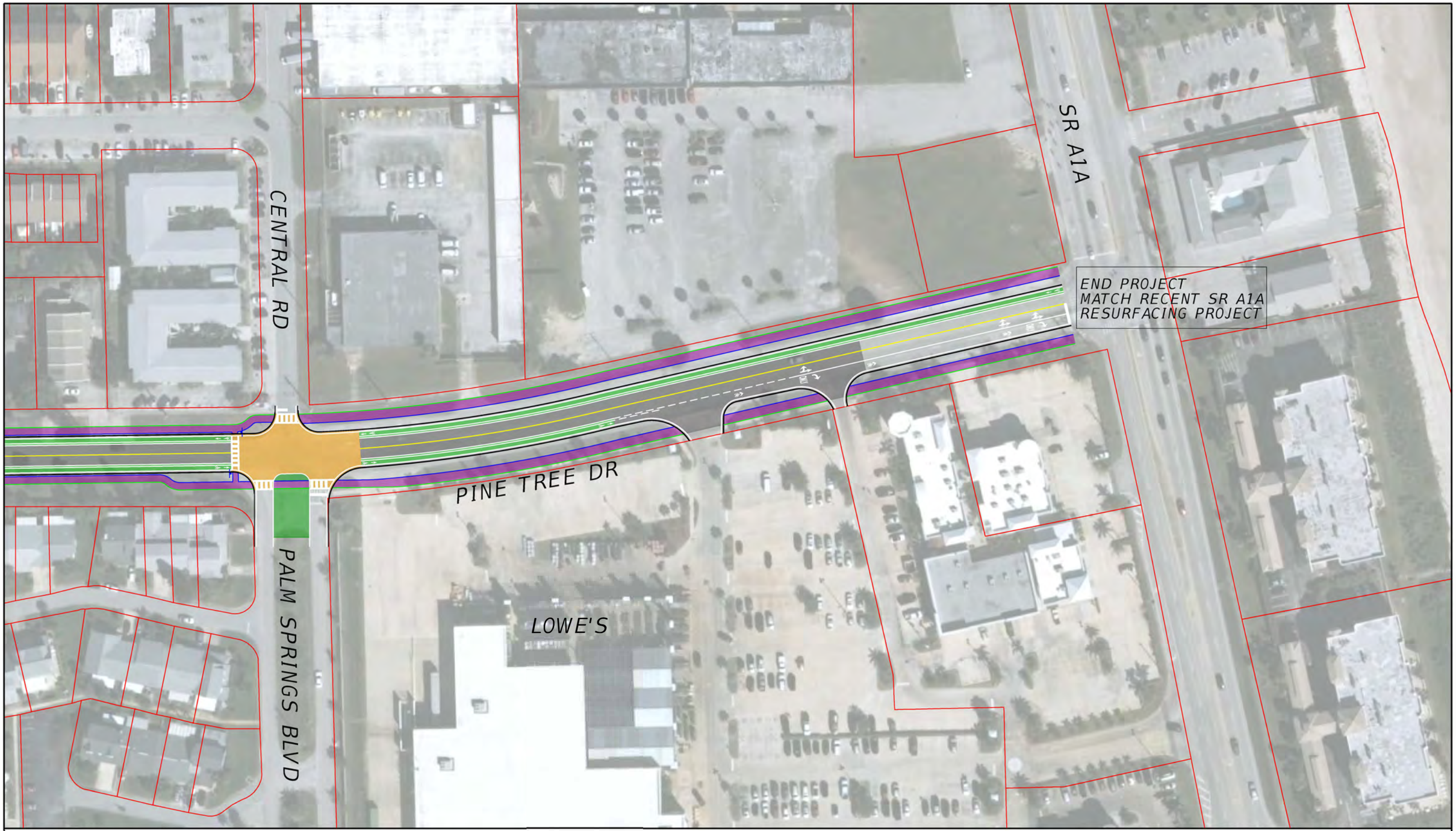
SPACE COAST TRANSPORTATION PLANNING ORGANIZATION

ROAD NO.	COUNTY	DATE
	BREVARD	MAY 2019

BANANA RIVER DRIVE/PINE TREE DRIVE COMPLETE STREETS STUDY

FIGURE NO.
41D



0 20 100
Feet

N

PARCEL LINES
SIDEWALK FRONT
SIDEWALK BACK
CURB
NEW SIDEWALK
BIKE LANE
RAISED INTERSECTION
RESURFACED PAVEMENT
NEW GRASS

PRELIMINARY CONCEPT – FOR DISCUSSION ONLY

NOTES

-RIGHT-OF-WAY AND PROPERTY LINES ARE GEOGRAPHICAL REPRESENTATIONS ONLY AND DO NOT DEPICT ACCURATE BOUNDARIES. DO NOT USE TO DESCRIBE, ASSESS, OR OTHERWISE ESTABLISH THE LIMITS OF PROPERTIES OR LOCATIONS OF FEATURES IN RELATION TO PROPOERTY LINES SHOWN HEREIN.
-AERIAL PHOTOGRAPHY COURTESY OF FLORIDA DEPARTMENT OF TRANSPORTATION. FLIGHT YEAR 2015.
-ALL CURRENT DRIVEWAY ACCESSES WILL BE MAINTAINED UNLESS OTHERWISE NOTED.

KITTELSON & ASSOCIATES

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LONG-TERM VISION 3-D REPRESENTATIONS

As part of the concept development, 3-D visualizations were produced to explain the concept at the second public meeting. **Figure 42** is the rendering for the long-term vision at the intersection of Banana River/Pine Tree Drive and Osceola Street looking west. **Figure 43** shows the vision at Banana River/Pine Tree Drive Osceola Drive looking East.

Figure 42: Proposed (Looking West) at Osceola Drive

Figure 43: Proposed (Looking East) at Osceola Drive

ADDITIONAL CONSIDERATIONS

After the Alternatives Open House was held on May 22, 2019 and through discussions with the PAT, the following additional considerations should be reviewed as this project moves forward in the project development process:

- For the proposed mid-block crosswalk at Oars and Paddles Park, members of the public and PAT recommended moving the crossing further to the west, to where the existing sidewalk ends at the Telemar Bay Marina. This could be beneficial as it is further away from the S. Patrick Drive intersection and a majority of people using the Park are coming from residences off Coconut Road, Snead Road, or Marina Isles Boulevard.
- There was concern from the general public about the proposed layout of the area just west of Osceola Drive (one-way Pine Tree Drive and formalizing the spur connection to Banana River Drive as a two-way stop-controlled intersection. The primary concern was there would not be enough spacing between the new formalized intersection and Osceola Drive, which would create new turning conflicts and queuing issues in the short segment between the two intersections. Through discussions with the public, an idea was proposed to create a new north-south roadway through the park adjacent to the fire station, approximately 550’ west of Osceola Drive, that would connect Pine Tree Drive and Banana River Drive. This would create more space between the two intersections, alleviating the potential turning conflicts and queuing issues. In addition to this new roadway, the existing spur roadway connecting the two streets would be removed.

Lighting and Landscaping Alternatives

The Banana River/Pine Tree Drive Complete Streets Study also identified potential improvements for lighting and landscaping along the corridor. Through the guidance and insight of the PAT and the public during the open houses, a strategy was formulated to develop recommendations for lighting and landscaping alternatives.

LIGHTING ALTERNATIVES

The PAT team developed lighting alternatives and presented the alternatives to the public for guidance and input on preferred types. Four types of lighting were Identified along the corridor: Solar Power Lighting; Bollard Lighting; Decorative Lighting; and Traditional LED Lighting.

Solar Power Lighting

Solar power lighting was identified as an opportunity to install a cost effective and green solution to lighting along the corridor. After the installation and maintenance costs, there is no additional electric bill associated for the life of the lighting. It also benefits from being easy to construct and maintain due to the lack of above ground or in-ground wiring needed. **Figure 44** displays examples of solar power lighting alternatives.

Figure 44: Solar Power Lighting Alternatives

Bollard Lighting

The PAT team identified bollard style lighting as a noninvasive lighting alternative due to the study corridor's location to the beaches, oceans, and wildlife. Bollard lighting's low mounting and shielding are ideal for residential settings and provides comfort and visibility along the sidewalk. Bollard lighting also has high impact resistance, giving them longer durability and allowing them to last longer in active environments. **Figure 45** displays an example of bollard lighting.

Figure 45: Bollard Lighting Alternative

Decorative Lighting

Decorative lighting was the third alternative reviewed due to its aesthetic appeal and ability to give the corridor a unique and modern feel. It also has the benefit of being able to be retrofitted to the existing poles in the area, which provides a cost-effective option. **Figure 46** displays an example of decorative lighting.

Figure 46: Decorative Lighting Alternative

Traditional LED Lighting

Traditional LED lighting allows for ample coverage and lighting when applied and designed for areas that can light the sidewalks and the roadways. They too, like decorative lighting, can be retrofitted to existing poles to be more cost effective. Traditional LED lighting also improves nighttime visibility for all road users, and has the potential to reduce nighttime crashes. **Figure 47** displays traditional LED lighting alternatives.

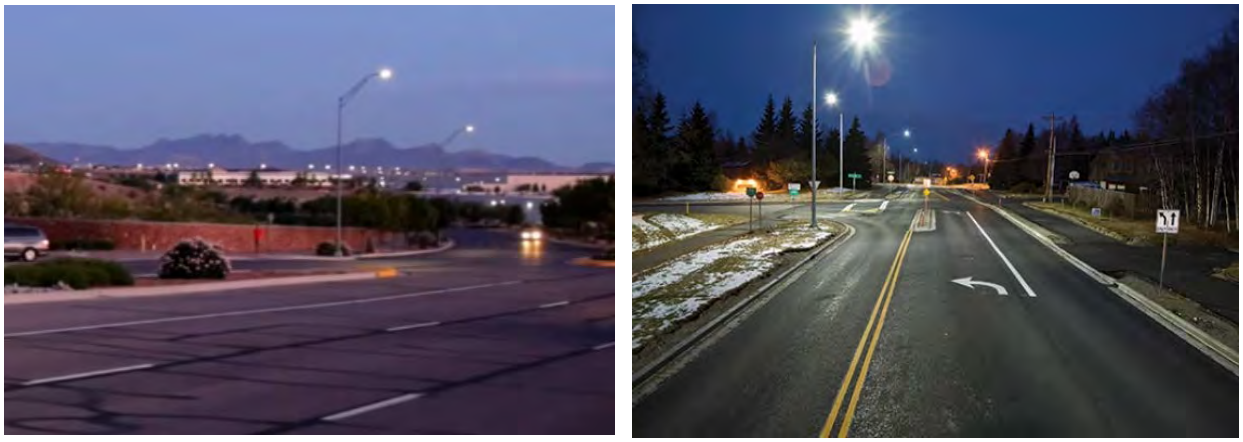


Figure 47: Traditional LED Lighting Alternatives

The public were given the opportunity at the final public open house to select lighting alternatives that they would wish to see and were encouraged to leave comments. Solar power lighting alone received 58 percent of votes; whereas many members of the community selected a combination of the solar powered and decorative lighting, as shown in **Figure 48**.

Figure 48: Combined Solar and Decorative Lighting Alternative

LANDSCAPING ALTERNATIVES

Landscaping alternatives were developed along the corridor in collaboration with the PAT team. One goal of the landscaping alternatives was to keep the tree canopy intact and that trees be attempted to be relocated or reused along the corridor. **Figure 49** and **Figure 50** display a potential landscaping alternative from Kristi Drive to Osceola Drive.

Cabbage Palm
Along the Street

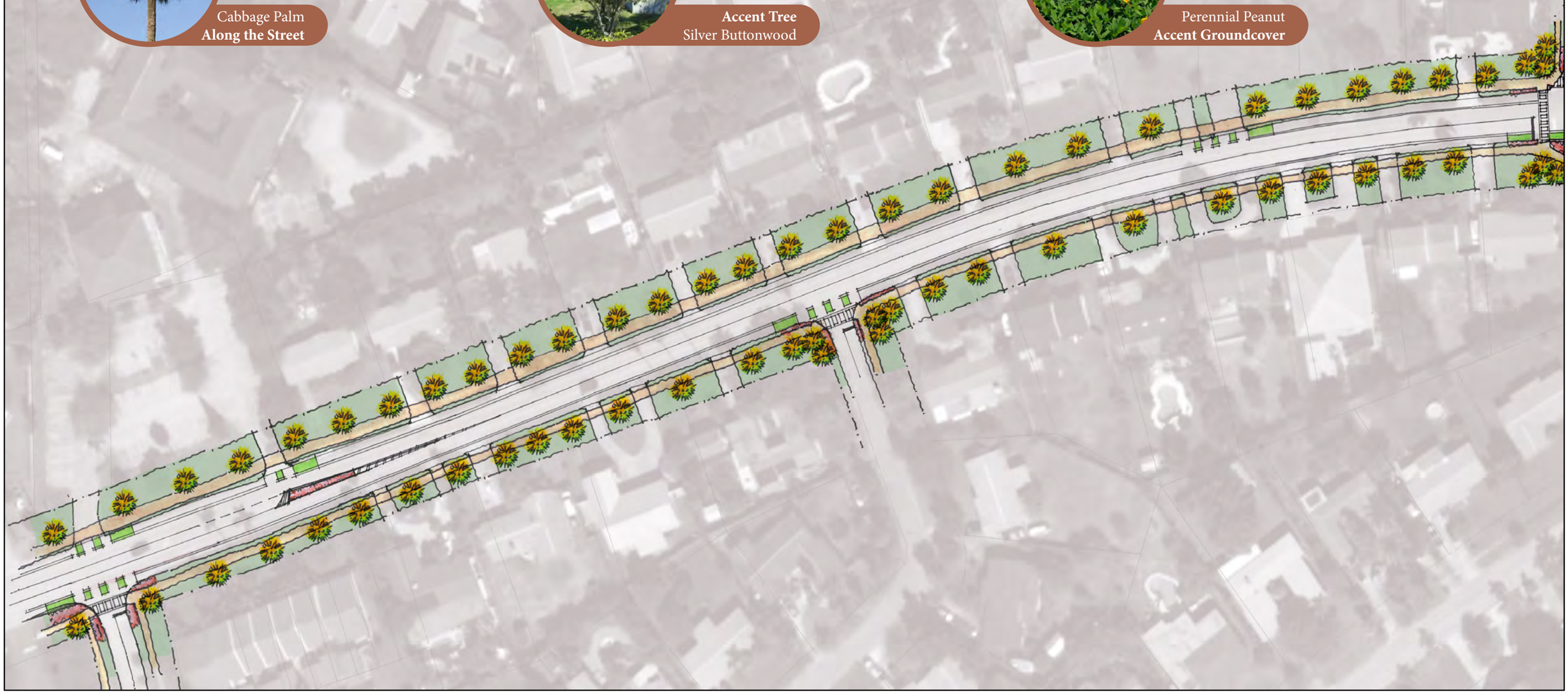
Shade in the Park
Sand Live Oak

Accent Tree
Silver Buttonwood

Pink Muhly Grass
Accent Shrub

Perennial Peanut
Accent Groundcover

Groundcover
Bahia Grass



INDIAN HARBOUR BEACH Florida

TPO SPACE COAST

KITTELSON & ASSOCIATES

CONSOR

Scale in Feet
0 600 North

FIGURE 49

Landscaping Alternative - Kristi Drive to Wimico Drive

INDIAN HARBOUR BEACH Florida

SPACE COAST TPO

KITTELSON & ASSOCIATES

CONSOR

Scale in Feet
0 600 North

FIGURE 50

Landscaping Alternative - Wimico Drive to Osceola Drive

The landscaping alternative highlights the major landscaping components proposed to beautify the corridor. All landscaping types selected can be found locally and are indigenous to the area. The landscaping types are described below:

Cabbage Palm

Cabbage palms are already located along the corridor, and the landscape alternative formalizes the palm locations and creates rows of shade off the sidewalk along the corridor. Cabbage palms grow as tall as 40-60 feet while providing ample shade. **Figure 51** displays an example of a cabbage palm.

Figure 51: Cabbage Palm

Sand Live Oak

Sand live oaks were selected in more open areas to add a diversity of tree types. They do especially well in sandy soils and will play as accent trees in the open areas along the corridor, such as near Oars and Paddles Park, and surrounding the fire station. **Figure 52** displays an example of a sand live oak.

Figure 52: Sand Live Oak

Silver Buttonwood

The native accent tree utilized in the landscape alternative is the silver buttonwood. Silver buttonwoods are highly salt-resistant and grow in tough coastal conditions. They add a colorful accent to the area and are intended to build beautification. **Figure 53** is an example of a silver buttonwood.

Figure 53: Silver Buttonwood

Pink Muhly Grass

As a perennial grass, pink muhly grass was selected because of its attractive vibrant summer look and added beautification for the corridor. They thrive in any soil condition, and are tolerant to heat and droughts. **Figure 54** shows an example of pink muhly grass.

Figure 54: Pink Muhly Grass

Perennial Peanut

Perennial peanut as groundcover is a low-cost alternative that adds beautification along the corridor and is already native to the Central Florida coastal area. They thrive in warm weather, high moisture, and sandy soils. **Figure 55** displays an example of the perennial peanut plant.

Figure 55: Perennial Peanut

Bahia Grass

Bahia grass is the native grass of choice in the south and for most of Florida, as it thrives in drought and heat. It prefers full sun and has little water or nutrient requirements. **Figure 56** shows an example of Bahia grass.

Figure 56: Bahia Grass

Conclusion and Next Steps

This Banana River/Pine Tree Drive Complete Streets Study identified various solutions for the key issues along the study corridor, which will be presented to the Indian Harbour Beach City Council in August 2019 and to the SCTPO Committees and Board in September 2019. Short-term improvements and long-term vision for the corridor are summarized below:

SHORT-TERM IMPROVEMENTS

The following improvements were identified as potentially having a shorter time frame for implementation (within the next 3-5 years). **Table 10** through **Table 12** display the short-term cost estimates for Segments 2 and 3.

- Corridor-Wide Improvements:
  - Resurfacing/restriping and wider sidewalks from S. Patrick Drive to SR A1A (City maintained section);
  - Potential landscaping alternatives that could be implemented outside of the long-term vision; and
  - Potential solar powered or other corridor lighting alternatives.
- Location Specific Improvements:
  - Raised Intersections at Osceola Drive, School Road, and Palm Springs Boulevard;
  - New special emphasis crosswalks on the north and south approaches at the two-way stop-controlled intersections and on all four legs at S. Patrick Drive, Osceola Drive, School Road, and Palm Springs Boulevard;
  - Rectangular rapid flashing beacons at School Road and Palm Springs Boulevard;
  - Retroreflective signal head backplates at S. Patrick Drive; and
  - Advanced intersection warning signage/flashers for the southbound approach at S. Patrick Drive.

Table 10: Short-Term Cost Estimate – S. Patrick Drive to Palm Springs Boulevard

Element	Cost
Resurfacing	$430,000
Raised Intersections (3)	$170,000
Sidewalk & Signing	$580,000
Engineering/CEI	$360,000
Total	**$1,540,000**

Table 11: Short-Term Cost Estimate – Palm Springs Boulevard to SR A1A

Element	Cost
Resurfacing	$150,000
Sidewalk & Signing	$110,000
Engineering/CEI	$80,000
Total	**$340,000**

Table 12: Total Short-Term Cost Estimate – S. Patrick Drive to SR A1A

Element	Cost
Construction	$1,440,000
Engineering/CEI	$440,000
Total Cost	**$1,880,000**

LONG-TERM VISION

Based on feedback received in the final public meeting and through PAT discussions, the long-term vision for the corridor includes wider sidewalks from the Mathers Bridge to SR A1A and buffered bike lanes from S. Patrick Drive to SR A1A. The following provides additional details on the long-term vision for the Banana River/Pine Tree Drive study corridor. **Table 13** through **Table 16** displays the long-term vision cost estimates.

- Segment 1 – Mathers Bridge to S. Patrick Drive
  - One lane eastbound and westbound – lanes are 11’ wide
  - Sharrows added to roadway
  - North side sidewalk increased from 8’ to a 12’ shared use path
- Segment 2 – S. Patrick Drive to Palm Springs Boulevard
  - One lane eastbound and westbound – lanes are 11’ wide
  - Add 7’ wide buffered bike lanes adjacent to travel lanes
  - Reconstruct 2’ curb and gutter and include 2’ utility/lighting strip between buffered bike lane and sidewalk
  - Both north and south side sidewalks widened from 4’ to 8’
  - 10’ landscaping area outside of sidewalk
- Segment 3 – Palm Springs Boulevard to SR A1A
  - Reduce to one lane eastbound and westbound – lanes are 11’ wide
  - Add 7’ wide buffered bike lanes adjacent to travel lanes
  - Reconstruct 2’ curb and gutter; 10’ landscaping area created between curb and sidewalk
  - Both north and south side sidewalks widened from 5’ to 10’
- Add pedestrian level lighting and landscaping along the corridor

- Solar power lighting alone received 58 percent of votes; whereas many members of the public selected a combination of the solar powered and decorative lighting
- Add landscaping developed from the landscaping plan to increase beautification along the corridor

Table 13: Long-Term Vision Cost Estimate – Mathers Bridge to S. Patrick Drive

Element	Cost
Resurfacing	$150,000
Sidewalk & Signing	$160,000
Engineering/CEI	$90,000
Total	**$400,000**

Table 14: Long-Term Vision Cost Estimate – S. Patrick Drive to Palm Springs Boulevard

Element	Cost
Resurfacing + New Pavement	$1,410,000
Raised Intersections (3)	$170,000
Drainage	$160,000
Sidewalk & Signing	$510,000
Engineering/CEI	$680,000
Total	**$2,930,000**

Table 15: Long-Term Vision Cost Estimate – Palm Springs Boulevard to SR A1A

Element	Cost
Resurfacing	$260,000
Drainage	$30,000
Sidewalk & Signing	$120,000
Engineering/CEI	$120,000
Total	**$530,000**

Table 16: Total Long-Term Vision Cost Estimate – Mathers Bridge to SR A1A

Element	Cost
Construction	$2,970,000
Engineering/CEI	$890,000
Total Cost	**$3,860,000**