SCHOOL ROUTES ANALYSIS

LOCKMAR ELEMENTARY SCHOOL

ASSESSMENT & IMPLEMENTATION REPORT

JULY 2020

SPACE COAST TPO

KITTELSON & ASSOCIATES

School Routes Analysis

Lockmar Elementary School

Palm Bay, FL

Assessment & Implementation Report

July 2020

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The preparation of this report has been financed in part through grant(s) from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation, under the State Planning and Research Program, Section 505 [or Metropolitan Planning Program, Section 104(f)] of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

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Executive Summary

Space Coast Transportation Planning Organization (SCTPO) with assistance from Kittelson & Associates, Inc. (KAI) documented existing conditions and developed Safe Routes to School (SRTS) recommendations for nine schools as part of the School Routes Analysis (SRA) project. The nine study schools were selected by the cities of Melbourne and Palm Bay prior to this project. The analysis reviewed the 'study areas' that were identified based on walk zones and attendance boundaries around the nine study schools. This SRA project is intended to serve as a pilot to establish a study methodology that can be replicated at other schools within Brevard County. This report documents the assessment of the existing conditions and lists recommendations for Lockmar Elementary School located at 525 Pepper Street, Palm Bay, FL 32907.

Purpose

The purpose of this project is to create a safe environment for students to walk or bike to school. The goal for the assessment phase of the SRA is to provide the SCTPO with a comprehensive study that will document the observed pedestrian and bicycle circulation routes adjacent to the school site, identify issues associated with student pedestrians and bicyclists within the study area, and make recommendations for improvement. The goal for the implementation phase of this study is to develop recommendations from the assessment phase to create a safer environment for children who live within the walk zone and choose to walk or bicycle to and from the school.

Many local, state, and federal laws require transportation agencies to focus on pedestrian and bicyclist infrastructure as part of the overall transportation network. The Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA-LU) of 2005 established the Safe Routes to School program that explicitly focused on funding projects to enhance pedestrian and bicyclist infrastructure near schools. Fixing America's Surface Transportation Act (FAST) of 2015 reinforces the Safe Routes to School program. The analysis in the report is to identify projects that could be funded by the State of Florida's Safe Routes to School program or other transportation funding.

Study Process

A study area was identified for the school based on the respective school's walk zone and attendance boundary to determine where students walk and bike. As part of stakeholder engagement, a Technical Committee (TC) was established. The TC was comprised of representatives from the City of Melbourne, the City of Palm Bay, Brevard County Planning, Public Works, and Public Schools, and the Florida Department of Transportation (FDOT). The TC functioned as a sounding board for the Project Team and acted as liaisons for their respective agencies throughout the planning process.

As part of the Assessment Phase of the project, existing conditions, crash data, and survey data were analyzed and mapped prior to the school coordination meeting. The school coordination meeting, comprising of relevant TC members and school administration, was conducted a day prior to the field review at the school campus. A field review of the school's study area was conducted to observe current pedestrian and bicyclist behaviors.

As part of the Implementation Phase of the project, a list of draft issues and recommendations were developed. Recommendations were based on the input received at the school coordination meeting and field review observations. The draft list of recommendations was revised and finalized based on feedback received from TC members. Planning-level cost estimates were calculated for the final recommendations. **Figure 1** graphically shows the study process. Recommendations for Lockmar Elementary School are summarized in **Table 1**.

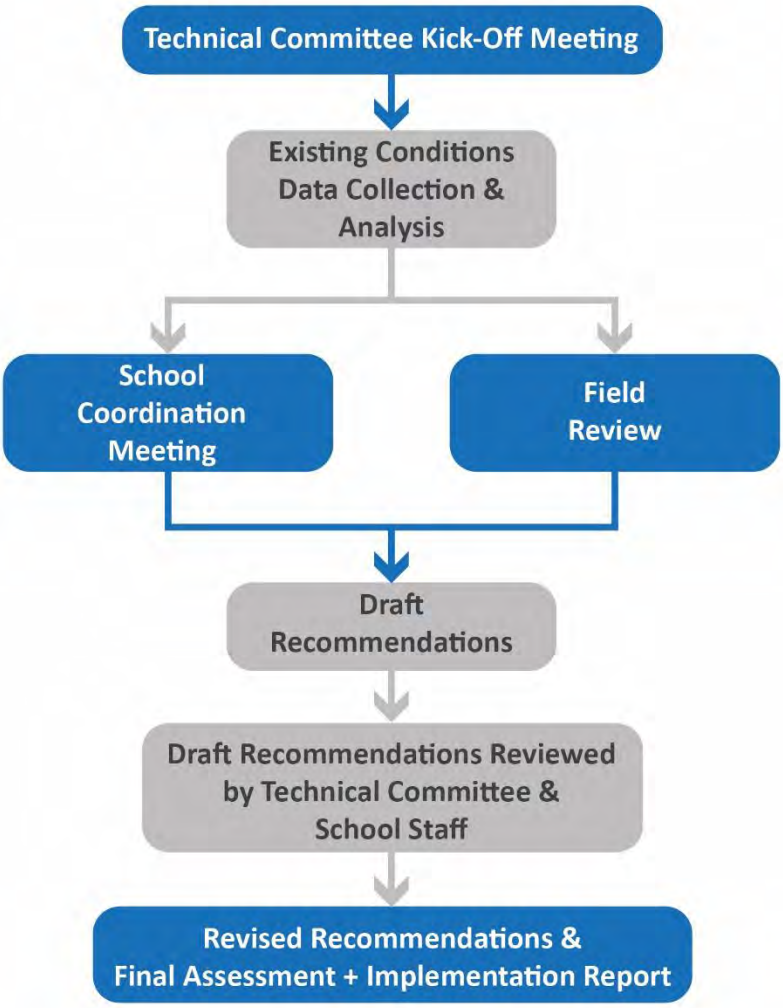

Figure 1: Study Process

Table 1: Recommendations Summary

School Campus Recommendations					
No.	**Location**	**Recommendation**	**Type**	**Time-Frame**	**Cost Estimate**
1	School Driveways	Install raised crosswalks or re-stripe high visibility crosswalk markings and upgrade pedestrian ramps to make them ADA compliant.	Crossing	Near-Term	$10,000 to $15,000
2	North School Driveway on Narragansett Street	Open the existing northern entrance gate for pedestrians and bicyclists to use. Add a bicycle rack at the gate entrance and staffing during AM and PM peak periods.	School Circulation	Near-Term	<$10,000
3	Crosswalk on southwest corner of the school building connecting school building to western parking lot	Move the crosswalk to align with the school building entrance sidewalk and add ADA compliant pedestrian ramps.	Crossing	Near-Term	<$10,000
Study Area Recommendations					
4	Emerson Drive, from Narragansett Street to Forest Street	Build an 8 to 10 foot wide sidewalk/shared use path on the east/north side.	Sidewalk	Long-Term	$1,150,000 to $1,350,000
5	Canals	Conduct a feasibility study to add paved trails along the canal ROWs.	Feasibility Study (Trail)	Near-Term	Further study is required

No.	Location	Recommendation	Type	Time-Frame	Cost Estimate
6	Pembroke Avenue and Narragansett Street and Grogan Avenue	Build a pedestrian and bicycle bridge across the canal.	Sidewalk	Long-Term	Further study is required
7	Pelican Drive and Narragansett Street; and Melody Avenue and Jade Lane	Build a pedestrian and bicycle bridge across the canal.	Sidewalk	Long-Term	Further study is required
8	Emerson Drive and Pepper Street Intersection	Install blank out signage for all intersection approaches. These signs would show no right-turn-on-red when the conflicting crosswalk pedestrian push button is activated, but otherwise will stay blank.	Sign/Signal	Near-Term	$30,000 to $40,000
9	Emerson Drive and Pepper Street Intersection	Re-stripe crosswalks as high visibility crosswalks and upgrade pedestrian ramps to make them ADA compliant.	Crossing	Near-Term	$15,000 to $20,000
10	Emerson Drive and Narragansett Street Intersection	Install high visibility crosswalks and upgrade pedestrian ramps across Narragansett Street to make them ADA compliant.	Crossing	Near-Term	$10,000 to $15,000

No.	Location	Recommendation	Type	Time-Frame	Cost Estimate
11	Armory Drive and Harwood Street and Culver Drive	Build an 8 to 10 foot wide sidewalk to connect Armory Drive and Harwood Drive intersection to Culver Drive.	Sidewalk	Near-Term	$15,000 to $20,000
12	Narragansett Street from School Bus Egress Driveway to Pembroke Avenue and Nevada Drive from Pembroke Avenue to Emerson Drive	Build a 5 to 6 foot wide sidewalk on the south and west side.	Sidewalk	Near-Term	$420,000 to $500,000
13	Narragansett Street from Pelican Drive to Emerson Drive	Build a 5 to 6 foot wide sidewalk on the south side.	Sidewalk	Near-Term	$170,000 to $200,000
14	Pelican Drive/Hyder Street from Narragansett Street to Emerson Drive	Build a 5 to 6 foot wide sidewalk on the east/north side.	Sidewalk	Long-Term	$250,000 to $290,000
15	Pepper Street from Pembroke Avenue to Nevada Drive	Build a 5 to 6 foot wide sidewalk on north side.	Sidewalk	Near-Term	$100,000 to $120,000
16	Pebble Avenue from Nemo Circle to Nesbitt Street	Build a 5 to 6 foot wide sidewalk on east side.	Sidewalk	Long-Term	$110,000 to $125,000

No.	Location	Recommendation	Type	Time-Frame	Cost Estimate
17	Nemo Circle from Pebble Avenue to Pelican Drive	Build a 5 to 6 foot wide sidewalk on south side.	Sidewalk	Long-Term	$60,000 to $70,000
18	Nesbitt Street from Pineda Avenue to Neptune Drive	Build a 5 to 6 foot wide sidewalk on north side.	Sidewalk	Long-Term	$200,000 to $225,000
19	Emerson Drive and Pembroke Avenue Intersection	Install RRFB for the pedestrian crossing.	Crossing	Near-Term	$25,000 to $30,000
20	Emerson Drive, from Minton Road to Narragansett Street	Widen existing 6 foot sidewalk to an 8 to 10 foot shared use path.	Sidewalk	Long-Term	$470,000 to $550,000

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Assessment

This section of the report documents the existing conditions within the Lockmar Elementary School study area and summarizes the student and parent survey data, crash analysis, school coordination meeting, and observations from the field review.

A study area was developed for each school. The study area is the walk zone defined as the two mile walking radius within the school's attendance boundary around the school where no school bus service is provided. The study area excludes pedestrian hazardous areas within the two mile walking radius. Pedestrian hazardous areas are generally identified as areas that are separated from the school by major physical barriers such as highways or rivers.

Existing Conditions Mapping & Analysis

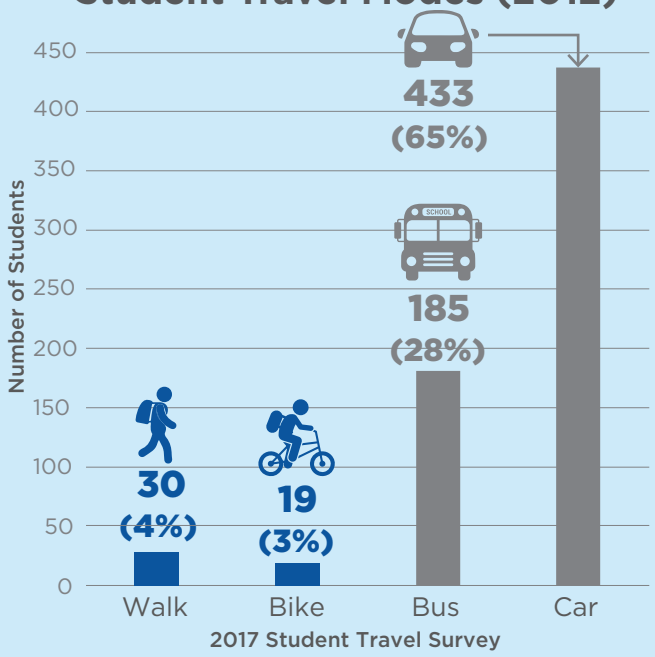
A series of maps were prepared to show the existing conditions within the Lockmar Elementary School study area including existing and proposed pedestrian and bicycle infrastructure, traffic data, crash data, and school circulation patterns. These maps were developed through GIS data collection, review of previous studies and plans, aerial satellite imagery, input from the TC, and observations from the field visit.

Previous and Ongoing Studies

Culver Drive from Emerson Drive to Palm Bay Road was widened in 2019 by the City of Palm Bay. This project included the widening of the roadway from two lanes to four lanes, improving drainage, and updating the sidewalks to be ADA compliant.

Figure 2 is an info-graphic summarizing the main background information collected as part of the existing conditions analysis.

Student Travel Modes (2012)



2017 Student Travel Survey

Total Bicycle & Pedestrian Crashes within Study Area

7 Pedestrian

8 Bicycle

School Aged Bicycle & Pedestrian Crashes within Study Area

0 Pedestrian

1 Bicycle

1 Injury

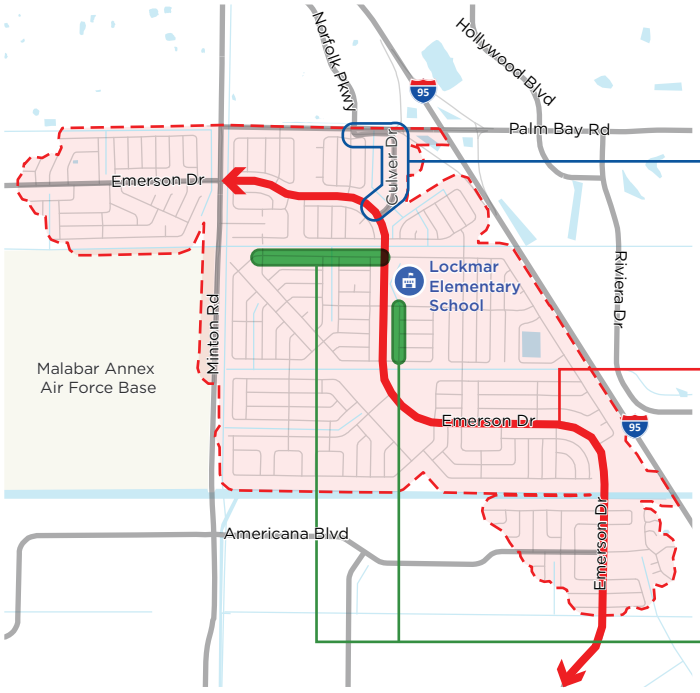
2014 to 2018 Crashes from University of Florida's Signal Four Analytics Database

Signals and Crossings within Study Area

9 Signalized Intersections

1 Unsignalized Marked Crosswalk Across Major Streets

2 Crossing Guards at Emerson Dr. & Pepper St. Peach Ave. & Pepper St.



Previous & Ongoing Plans

Culver Drive Widening Project (Recently Completed)

- Widening the roadway from two lanes to four lanes.
- Add ADA compliant sidewalks.
- Improve drainage in the area.

Bicycle & Pedestrian Master Plan (Ongoing)

- Bicycle facilities prioritized along Emerson Drive.

City of Palm Bay Comprehensive Plan

- Add new sidewalks on Narragansett Street from Pelican Drive to Emerson Drive.
- Add new sidewalks on Peach Avenue from Hyder Street to Pepper Street.

Figure 2: Background Information

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School Routes Analysis

Lockmar Elementary School

Existing and Planned Bicycle and Pedestrian Facilities

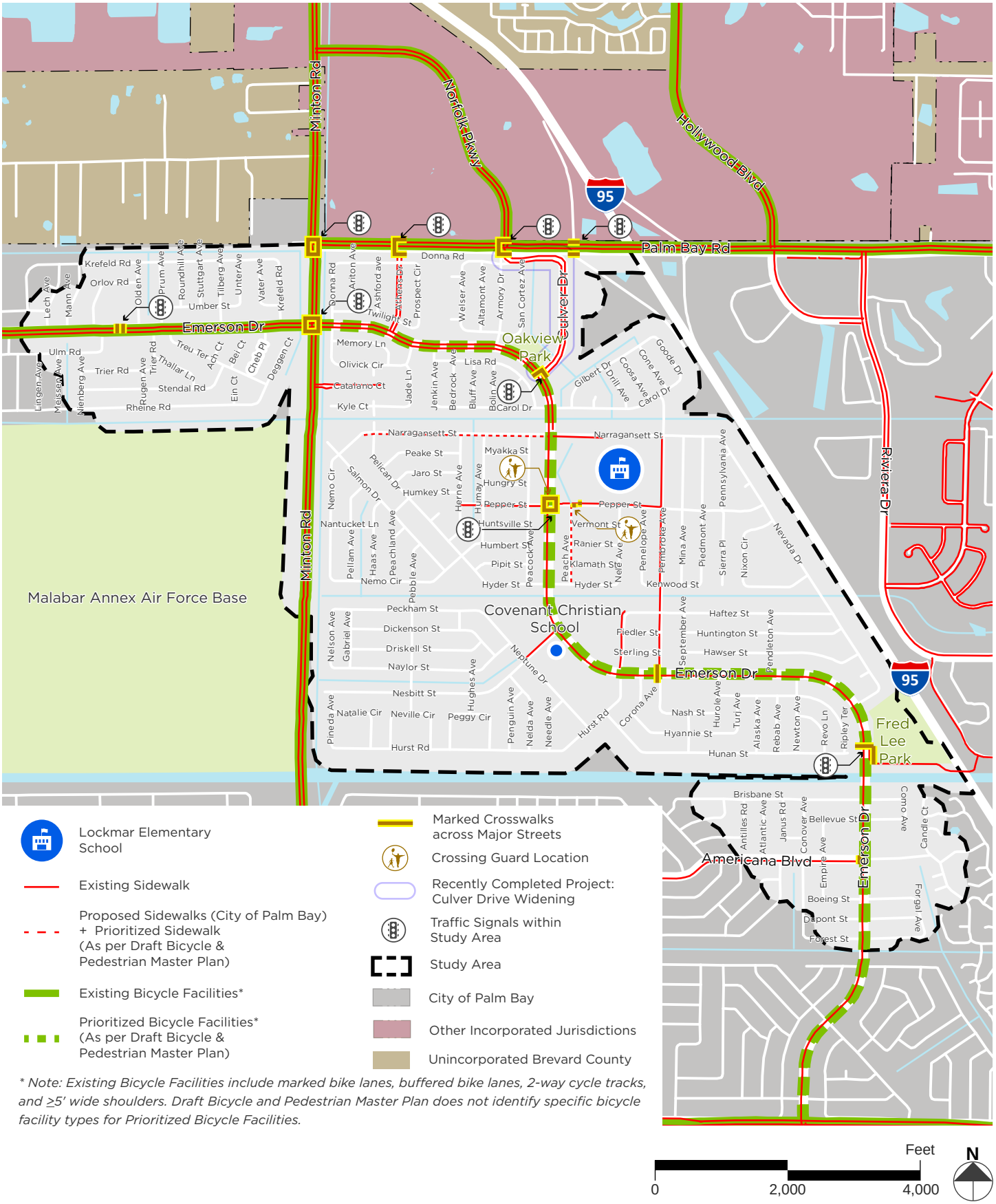
Existing and planned pedestrian and bicycle facilities including sidewalks, bike lanes, trails, crosswalks, signals, and crossing guard locations were mapped and analyzed. The datasets were mapped using GIS data provided by the City of Palm Bay and SCTPO as well as utilizing aerial satellite imagery and field review observations.

Emerson Drive has sidewalks along the east side of the roadway throughout the study area. Culver Drive has sidewalks on both sides of the roadway. There is a sidewalk along the north side of Pepper Street leading into the main school entrance. Most of the neighborhood streets throughout the study area do not have sidewalks along either side. The City of Palm Bay Comprehensive Plan includes the addition of sidewalks along Narragansett Street from Pelican Drive to Emerson Drive and along Peach Avenue from Heeder Street to Pepper Street.

Bicycle facilities are located within the study area along Palm Bay Road, Minton Road, and Emerson Drive. Bicycle facilities recommended by the SCTPO Bicycle and Pedestrian Master Plan (BPMP) were mapped. The BPMP recommended bicycle facilities along Emerson Drive from Minton Road to the southern boundary of the study area.

Signalized intersections and marked crosswalks across major streets were mapped using data from aerial satellite imagery. Crossing guard information was provided by the City of Palm Bay. There are nine signalized intersections within the study area. The only unsignalized marked crosswalk is located on the east leg of the Emerson Drive and Pembroke Avenue intersection. A crossing guard is present at the intersection of Emerson Drive and Pepper Street and Peach Avenue and Pepper Street.

Figure 3 shows the existing and planned bicycle and pedestrian facilities within and around the study area. **Figure 4** shows the existing planned bicycle and pedestrian facilities within the immediate context surrounding the school campus.



** Note: Existing Bicycle Facilities include marked bike lanes, buffered bike lanes, 2-way cycle tracks, and ≥5' wide shoulders. Draft Bicycle and Pedestrian Master Plan does not identify specific bicycle facility types for Prioritized Bicycle Facilities.*

Figure 3: Existing and Planned Bicycle and Pedestrian Facilities

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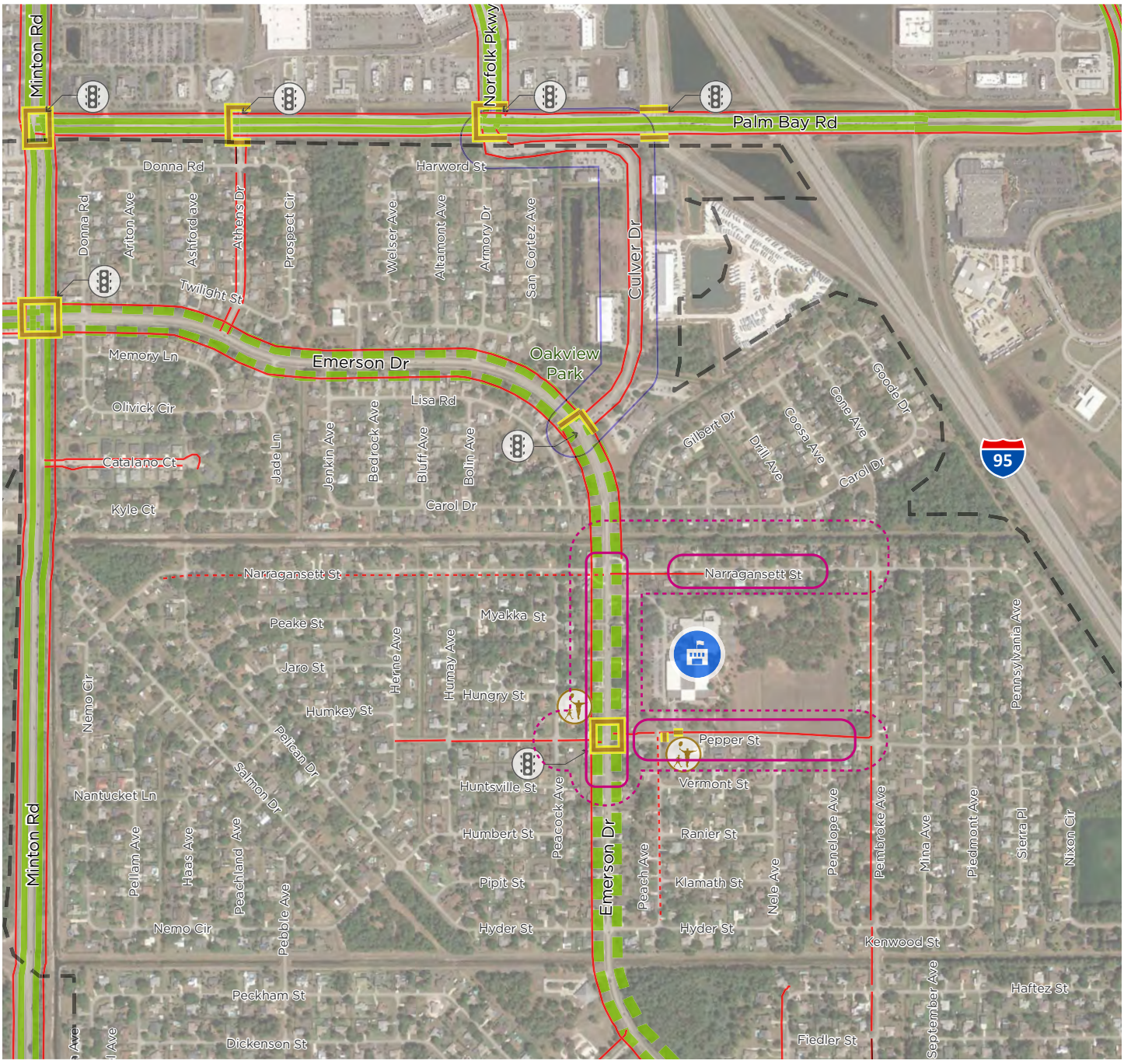
Lockmar Elementary School



Lockmar Elementary School

Existing Sidewalk

Proposed Sidewalks (City of Palm Bay) + Prioritized Sidewalk (As per Draft Bicycle & Pedestrian Master Plan)

Marked Crosswalks across Major Streets

Traffic Signals within Study Area

Existing Bicycle Facilities*

Prioritized Bicycle Facilities* (As per Draft Bicycle & Pedestrian Master Plan)

** Note: Existing Bicycle Facilities include marked bike lanes, buffered bike lanes, 2-way cycle tracks, and ≥5' wide shoulders. Draft Bicycle and Pedestrian Master Plan does not identify specific bicycle facility types for Prioritized Bicycle Facilities.*

Crossing Guard Location

Recently Completed Project: Culver Drive Widening

School Advance Warning Area

School Zone

Study Area

Feet
0
1,000
2,000
N

Figure 4: Existing Conditions School Context Aerial Map

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School Routes Analysis

Lockmar Elementary School

Existing Conditions Traffic Data

Posted speeds, annual average daily traffic (AADT), and school zones were mapped as part of existing conditions traffic data analysis. Speed limit information was mapped using data from FDOT and Open Streets Map. The speed limit along Pepper Street directly in front of the school entrance is 30 miles per hour (MPH) and the speed limit along Emerson Drive near the school campus is 40 MPH. AADT information was mapped using data from the SCTPO's 2018 State of the System (SOS) and FDOT. Traffic volumes along Emerson Drive near the school campus are less than 10,000 vehicles per day.

School zone and school zone advance warning areas were mapped using data from aerial satellite imagery and field review observations. There are three school zones located within the study area.

- Along Emerson Drive from Narragansett Street to 300 feet south of Pepper Street;
- Along Pepper Street from Penelope Avenue to Peach Avenue; and
- Along Narragansett Street at the bus exit to the school.

Figure 5 shows the existing conditions of traffic data.

School Campus Circulation

Circulation patterns were gathered during the school coordination meeting and field review. There are three entrances to the school campus located along Pepper Street. The eastern most entrance is used by pedestrians and bicyclists and has a bike rack near the entrance to the school. The middle entrance is used for the drop-off/pick-up of kindergarten to Grade 1 students. There is parking located along the northern part of this loop. The western most entrance is used primarily for the drop-off/pick-up Grade 2 to Grade 6 students. There is parking located along this loop. This entrance is also used for the school bus entry. Buses and parents exit onto Emerson Drive. Buses with Exceptional Student Education (ESE) students drop-off/pick-up students along the northern side of the school and exit onto Narragansett Street.

Figure 6 shows various circulation patterns within the school campus.

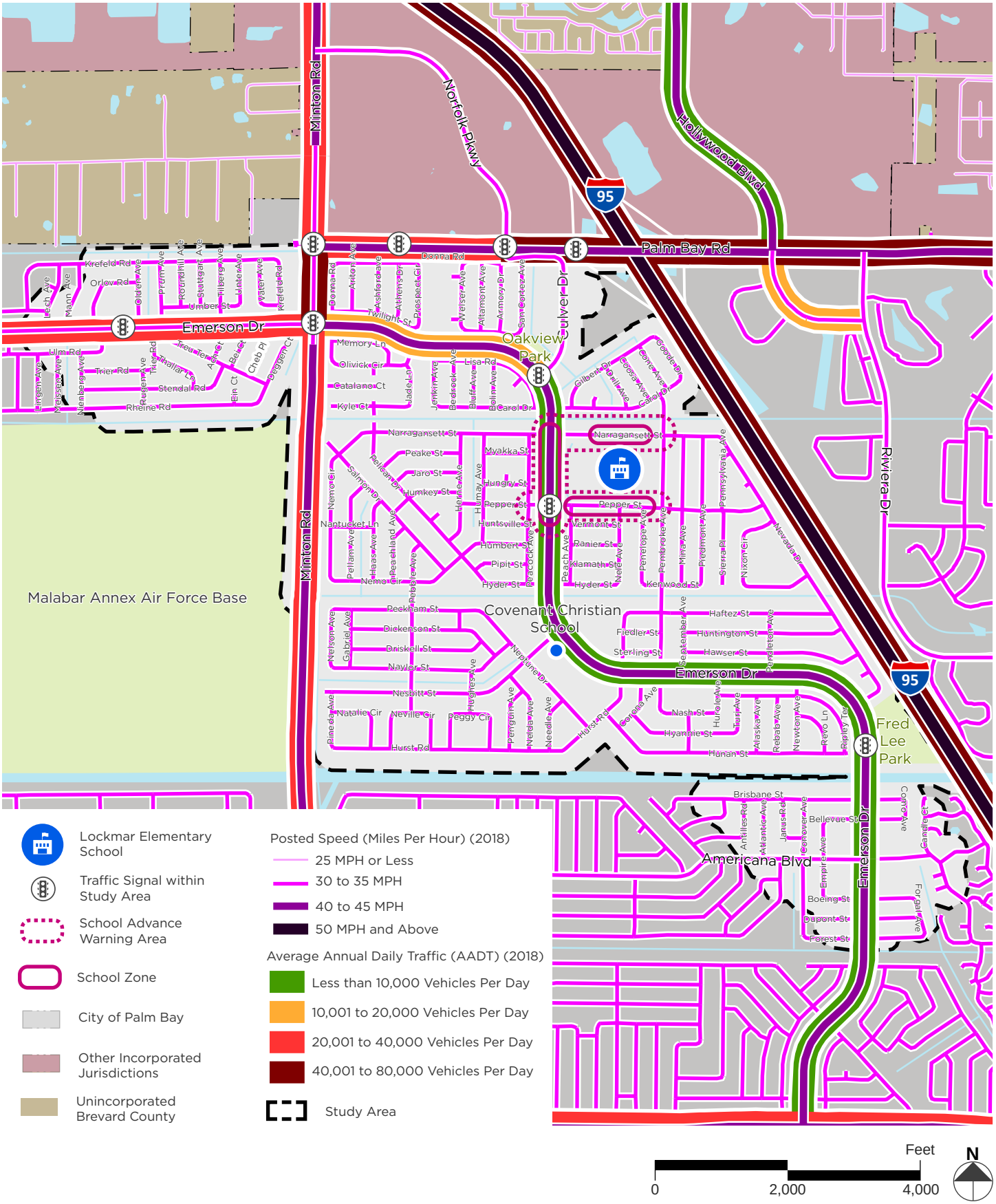

Figure 5: Existing Conditions Traffic Data

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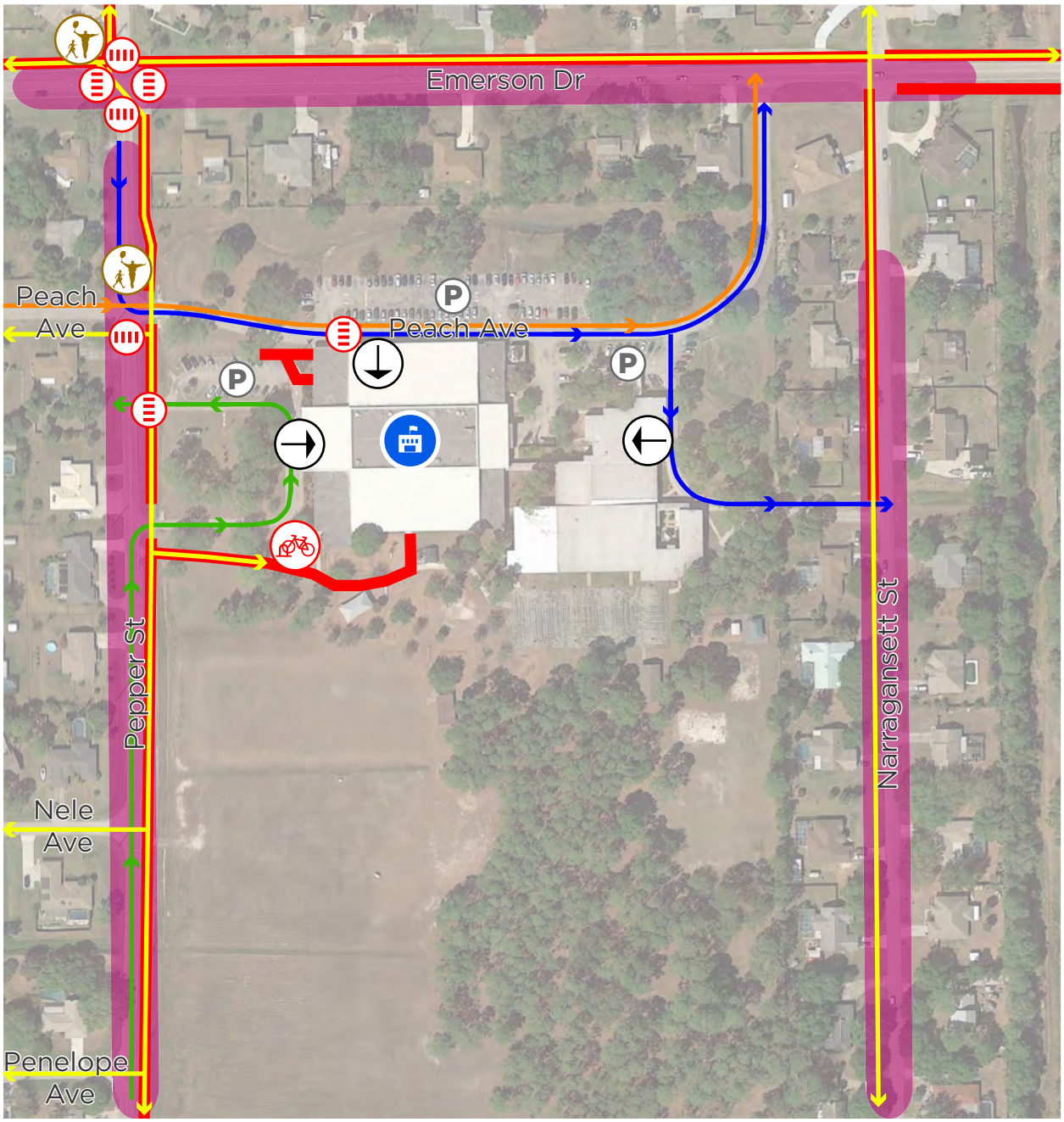
Lockmar Elementary School



Lockmar Elementary School

Marked Crosswalks

School Building Entrance

Crossing Guard Location

Bike Parking

Car Parking

School Zone

Existing Sidewalk

Circulation Patterns

Walkers/Bikers

School Bus Loop

Parent Drop-Off/Pick-Up Loop (Grade 2 to Grade 6)

Parent Drop-Off/Pick-Up Loop (Kindergarten to Grade 1)

Feet

0 200 400

N

Figure 6: Existing School Circulation Map

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School Routes Analysis

Lockmar Elementary School

School Student & Parent Survey Summary

The SCTPO conducts student and parent surveys alternating every other year to assess how students get to school and what factors affect parent's decisions to allow or not allow their child to walk or bike to school. The latest Student Travel Mode Survey was conducted in 2017 and the latest Parent Survey was conducted in 2018. This section summarizes the results of these surveys for Lockmar Elementary School. These surveys are conducted once every two years and provide a snapshot of conditions when the respondents fill out the survey. The survey results may not truly represent the daily average. Variables such as weather, day of week, time of year when the survey is taken, all play into the results of these surveys.

Student Travel Mode Survey

Students at Lockmar Elementary School were surveyed asking how they traveled to and from school. The latest survey data available for Lockmar Elementary School was from a survey conducted in 2012.

Figure 7 shows the percentage of students walking or biking to school from 2000 to 2012. **Figure 8** shows the total number of students walking or biking to school from 2000 to 2012.

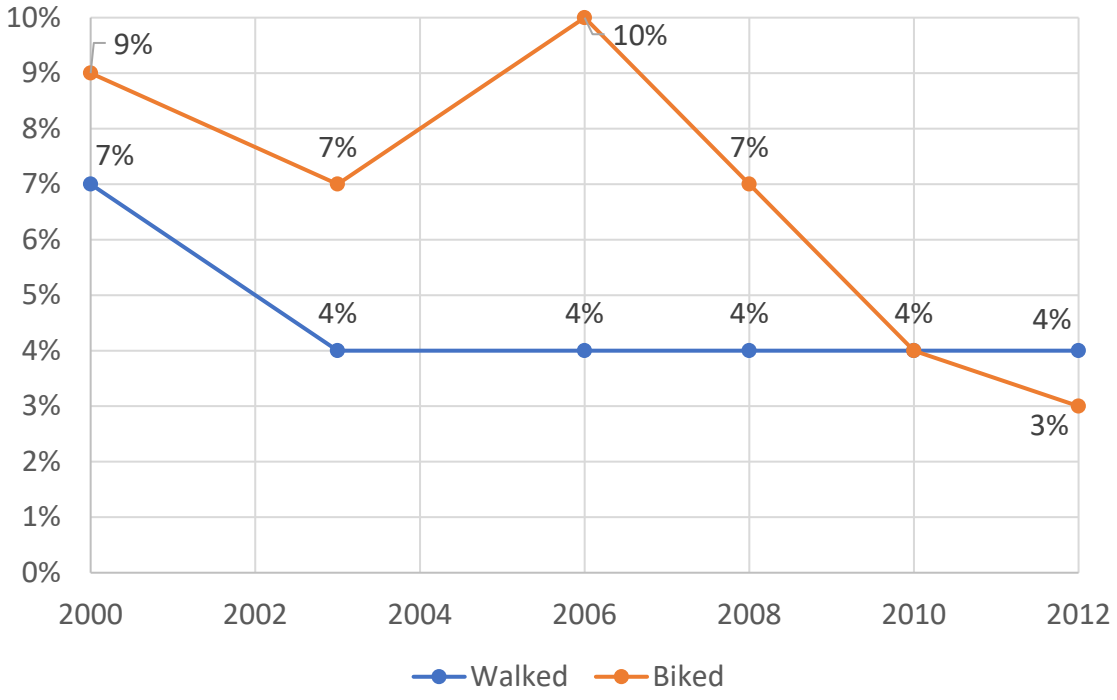

Figure 7: Percentage of Students Walking or Biking to School from 2000 to 2012

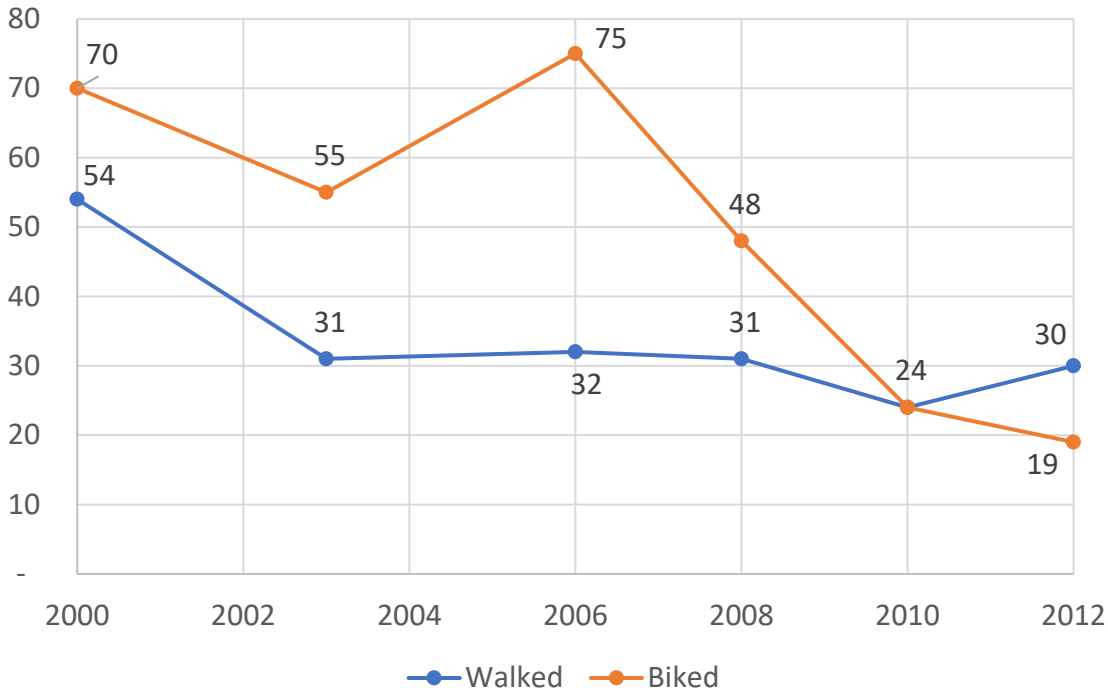

Figure 8: Total Number of Students Walking or Biking to School from 2000 to 2012

Main takeaways from the Student Travel Mode Survey:

- Based on the survey data from year 2000 to 2012, on average about 12 percent of total students travel by walking (five percent) or biking (seven percent).
- The total number of students seen walking or biking to school has decreased from 2000 to 2012.
- Most students either travel by car (65 percent) or bus (28 percent) to school as shown in **Figure 2**.

Parent Survey

The following data shows the results from surveys taken from parents with students attending 86 different schools in the area. Data was used from the schools that responded to the survey because there was not enough data from each individual school to draw reasonable conclusions.

Figure 9 shows issues reported to affect the decision to allow a child to walk or bike to/from school by parents.

Figure 10 shows the parent's opinions about how healthy walking and biking to/from school is for their child.

Figure 11 parent's opinions about how much their child's school encourages or discourages walking and biking to/from school.

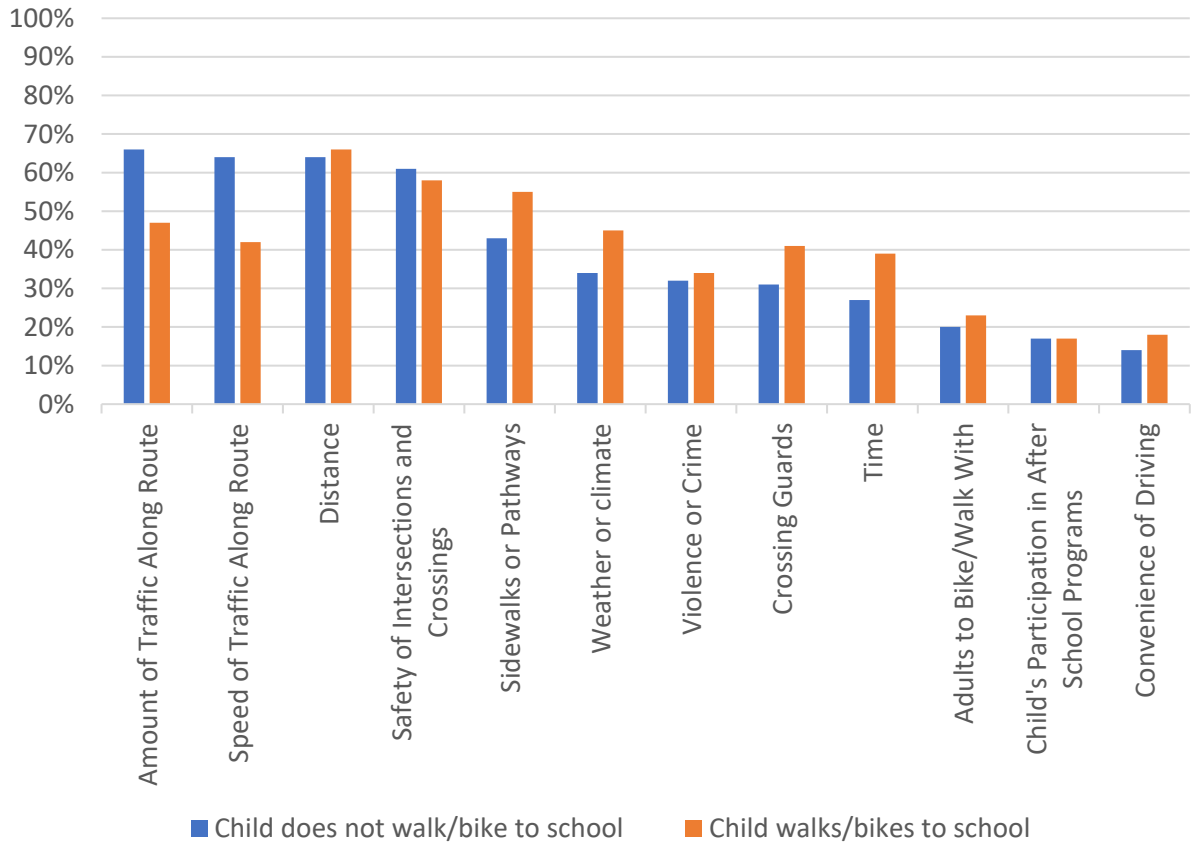

Figure 9: Issues Reported to Affect the Decision to Allow a Child to Walk or Bike to/from School by Parents (Based on 2018 Survey)

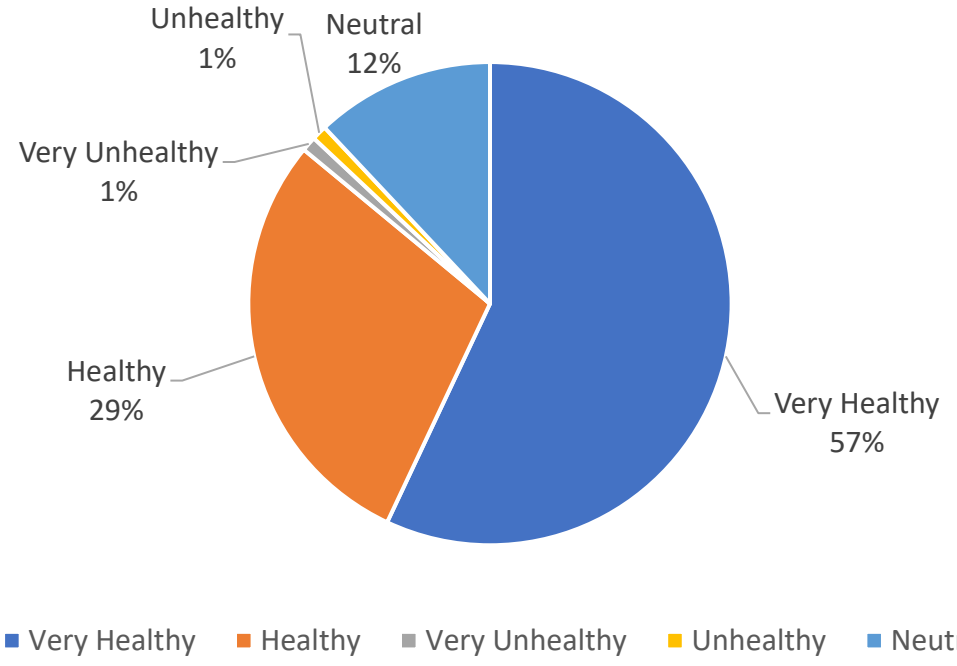

Figure 10: Parent's Opinions about How Healthy Walking and Biking to/from School is for Their Child (Based on 2018 Survey)

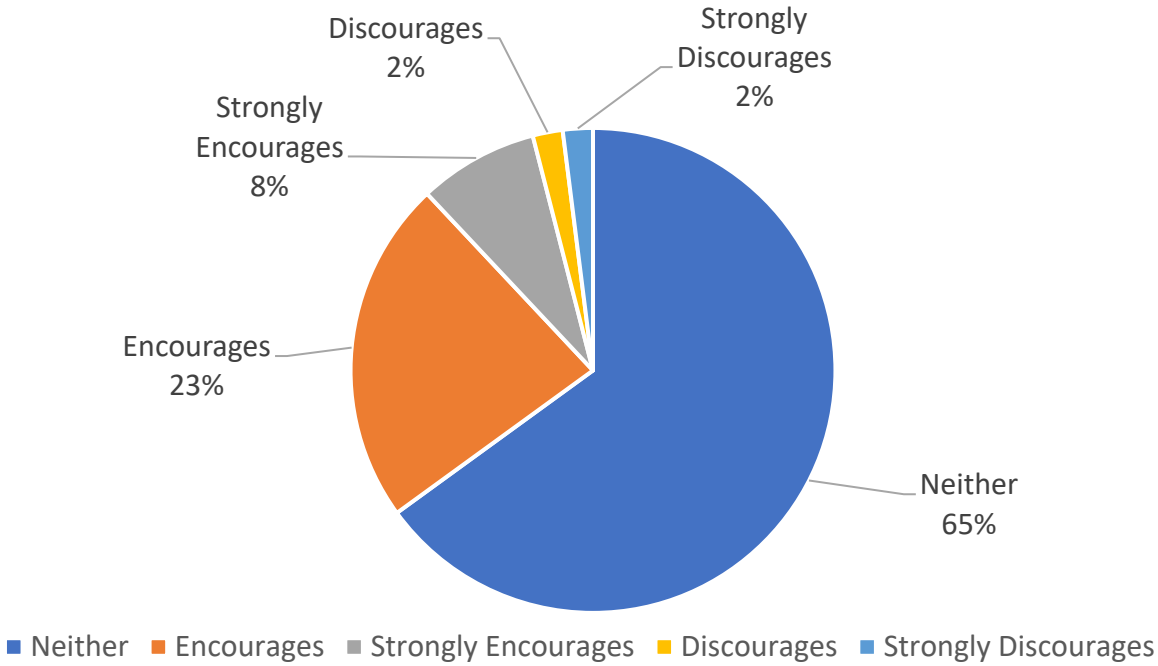

Figure 11: Parent's Opinions about How Much their Child's School Encourages or Discourages Walking and Biking to/from School (Based on 2018 Survey)

Main takeaways from the Parent Survey:

- The most common issues that affect both parents of children who already bike or walk to school and parents' of children that do not currently walk or bike to school decision to allow their child to walk or bike to school are:
    - The amount of traffic along the route
    - The speed of traffic along the route
    - Distance
    - The safety of intersections and crossings
    - Sidewalks or pathways
- Most parents think that walking or biking to school is very healthy for their child but think their child's school neither encourages nor discourages children to walk or bike to school.

For full or updated student or parent surveys please contact SCTPO.

Crash Data Analysis

Crash records were obtained for the Lockmar Elementary School study area for the most recent five-year period on record (2014 through 2018) from the University of Florida's Signal Four Analytics Database. This section summarizes both the school aged and non-school aged pedestrian/bicycle crashes in the Lockmar Elementary School study area.

Pedestrian/Bicycle Crash Statistics

There were 15 total pedestrian and bicycle crashes within the study area (seven pedestrian and eight bicycle). Three of the crashes were property damage only, nine of the crashes resulted in injury, and three crashes resulted in a fatality. Fifty-three percent of crashes occurred during the day and 93 percent of crashes occurred under dry conditions. Alcohol and/or drug involved crashes accounted for 27 percent of reported crashes. The reported crashes are displayed by different measures of time (year, month, day, and hour) in **Figure 12**, **Figure 13**, **Figure 14**, and **Figure 15**.

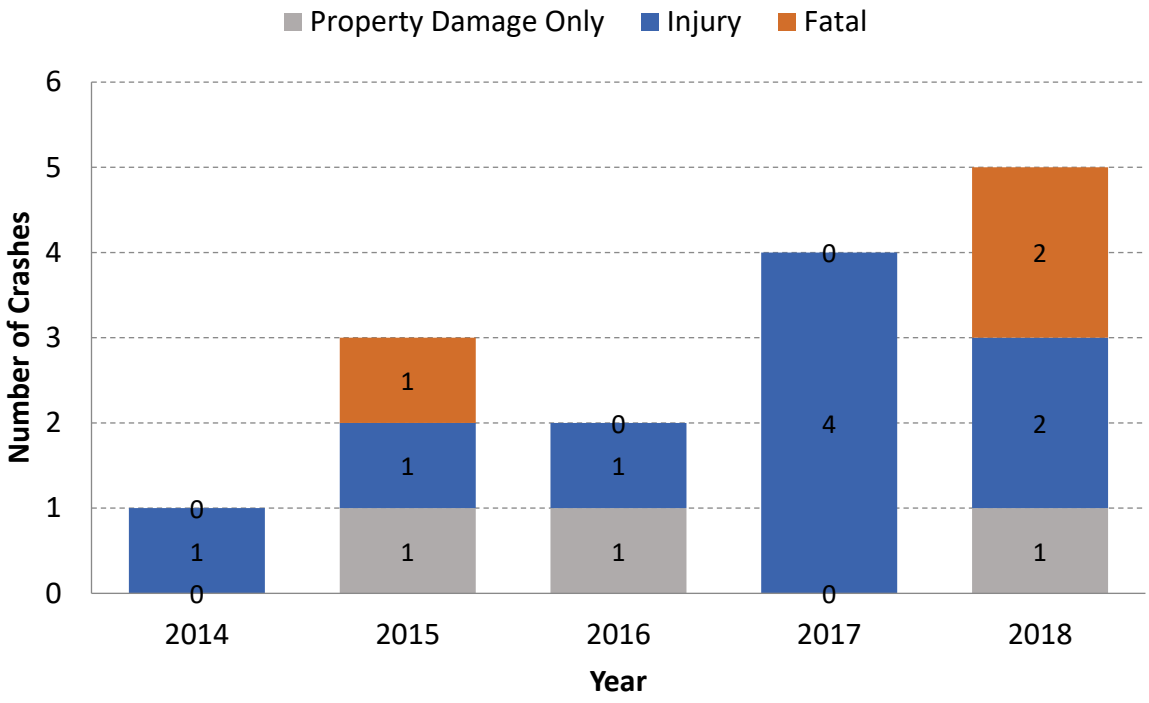

Figure 12: Crashes by Year and Severity

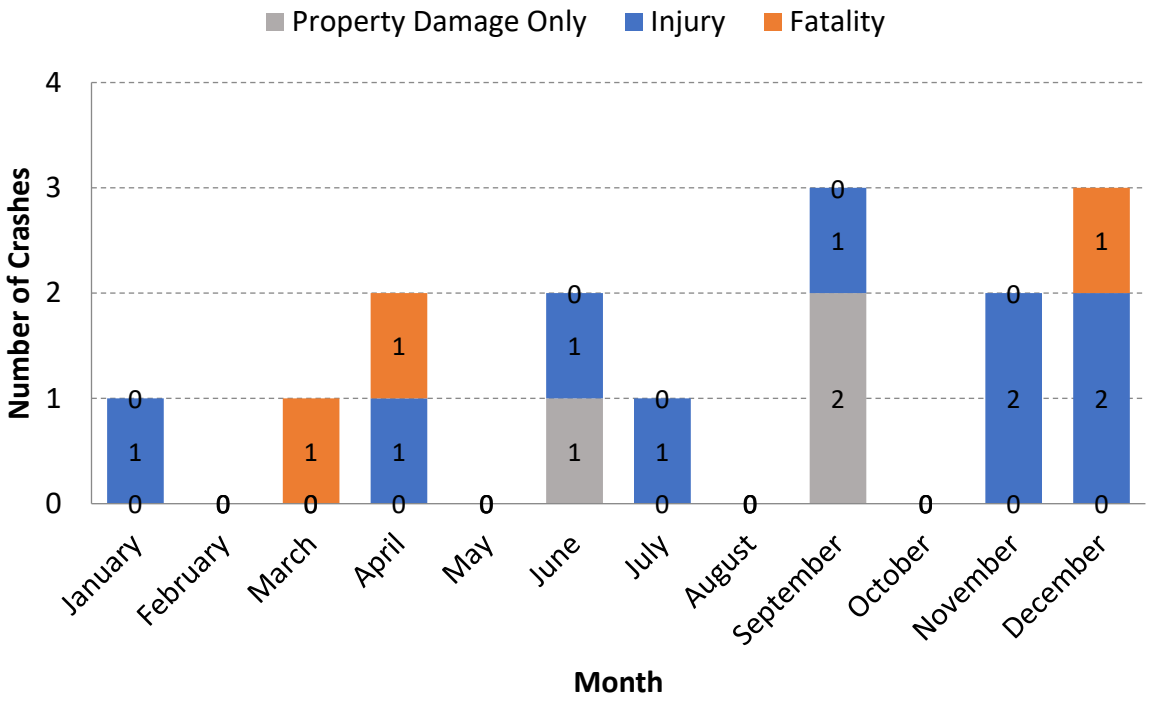

Figure 13: Crashes by Month and Severity

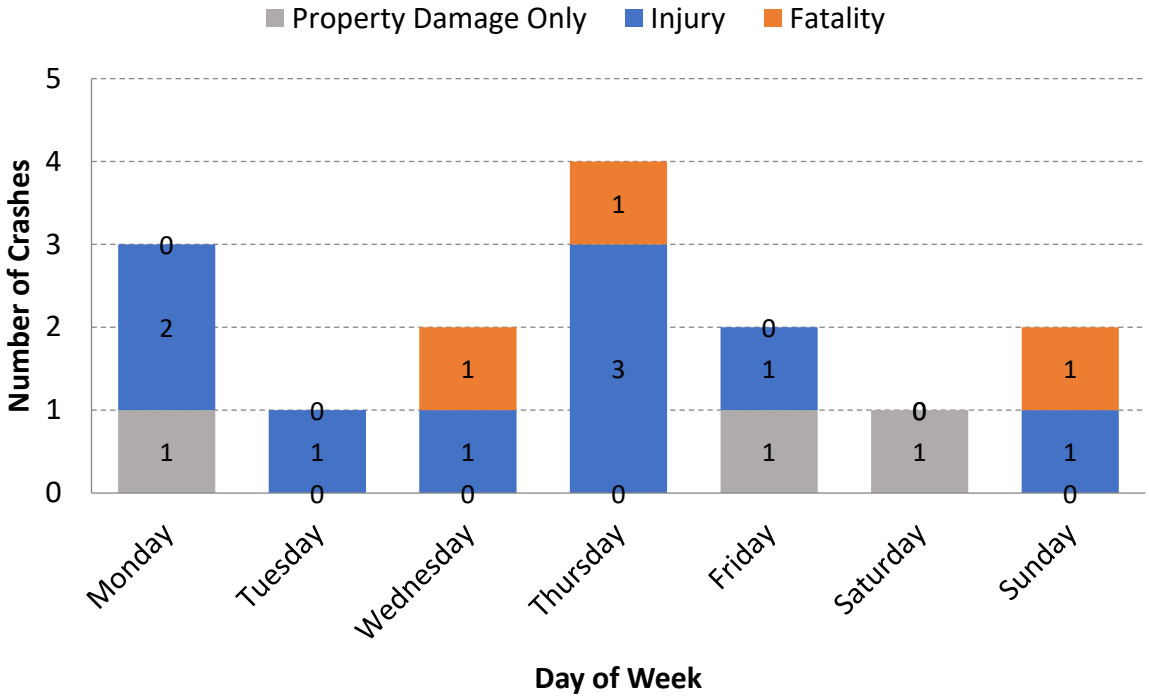

Figure 14: Crashes by Day of Week and Severity

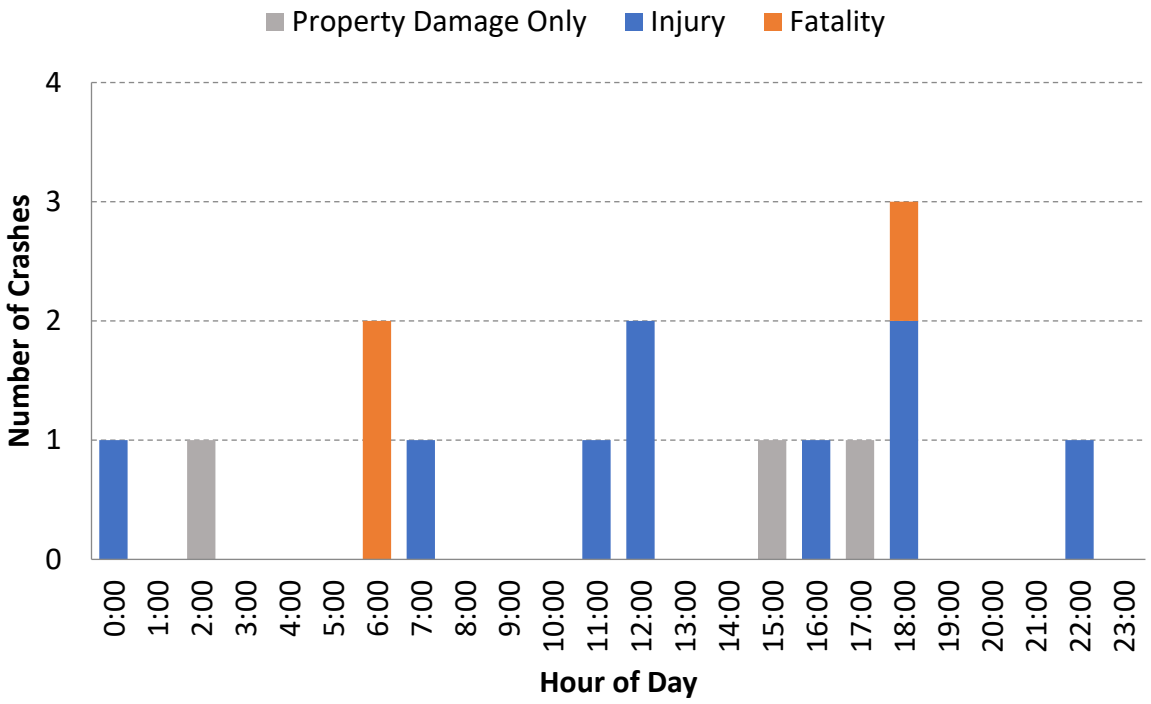

Figure 15: Crashes by Hour of Day and Severity

The number of crashes per year increased by four crashes per year from 2014 to 2018. The most crashes occurred in the months of September and December (three each) and Thursday was the most common day when crashes occurred (four). By time of day, the highest crash hour was from 6 PM to 7 PM (three).

School Aged Pedestrian/Bicycle Crash Statistics

There was one school aged bicycle crash and no school aged pedestrian crashes within the study area. **Figure 16** maps the location of the crash and a summary is discussed below:

1. Crash Number: 87368267
    - On September 27, 2017 at 7:23 AM, a crash involving a bicyclist occurred at the intersection of Narragansett Street and Emerson Drive. The bicyclist was traveling along the east leg of the intersection when a vehicle traveling east on Narragansett Street struck the bicyclist. The crash resulted in a non-incapacitating injury. The crash occurred under wet conditions during the day.

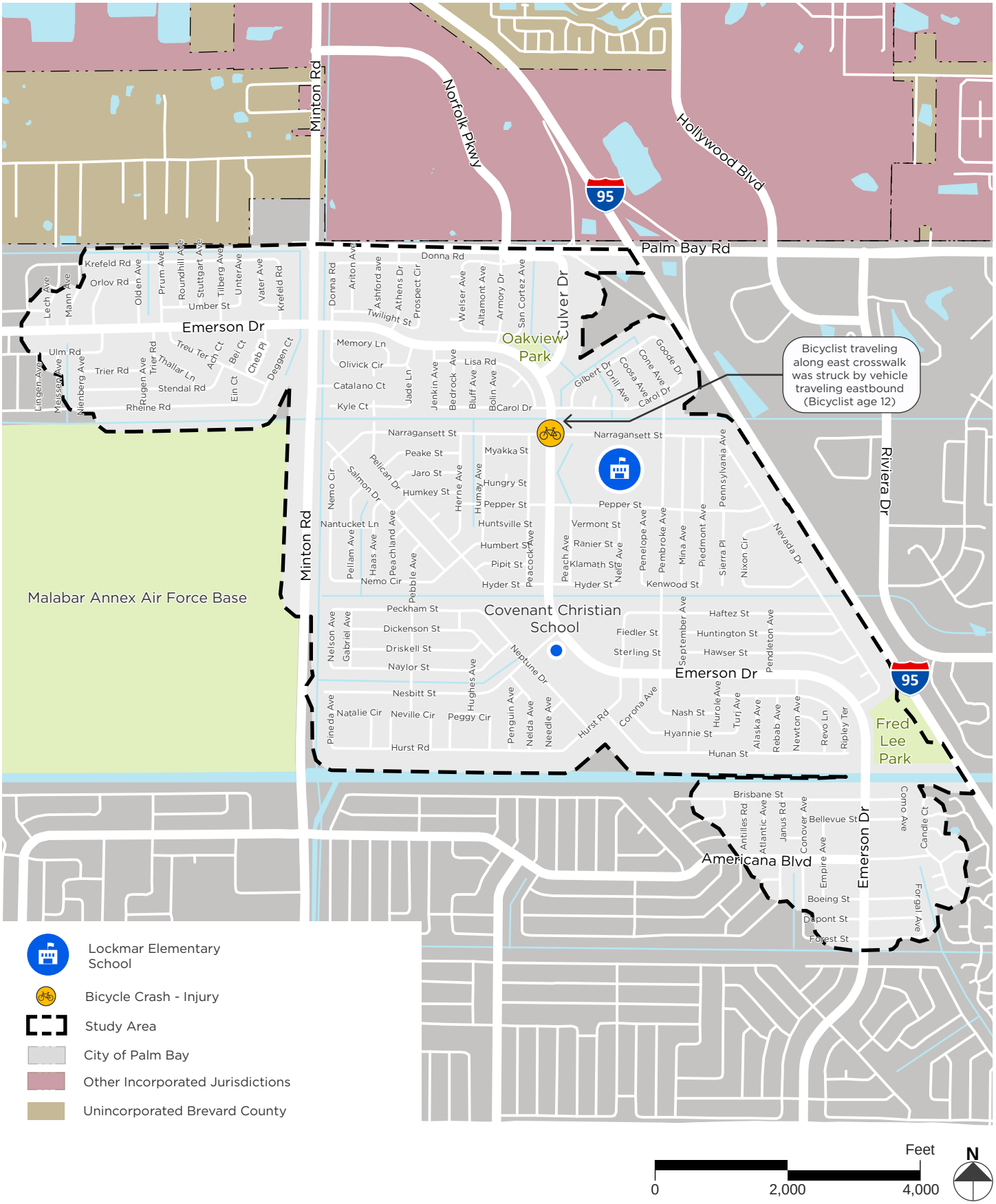

Figure 16: Bicycle and Pedestrian Crashes (2014 - 2018)

School Routes Analysis

Lockmar Elementary School

Non-School Aged Pedestrian/Bicycle Crash Statistics

There were 14 total non-school aged pedestrian and bicycle crashes within the study area (seven pedestrian and seven bicycle). Three of the crashes were property damage only, eight of the crashes resulted in injury, and three crashes resulted in a fatality. Fifty percent of the crashes occurred in daylight conditions, and all reported crashes occurred with dry roadway conditions. The reported crashes are displayed by different measures of time (year, month, day, and hour) in **Figure 17**, **Figure 18**, **Figure 19,** and **Figure 20**.

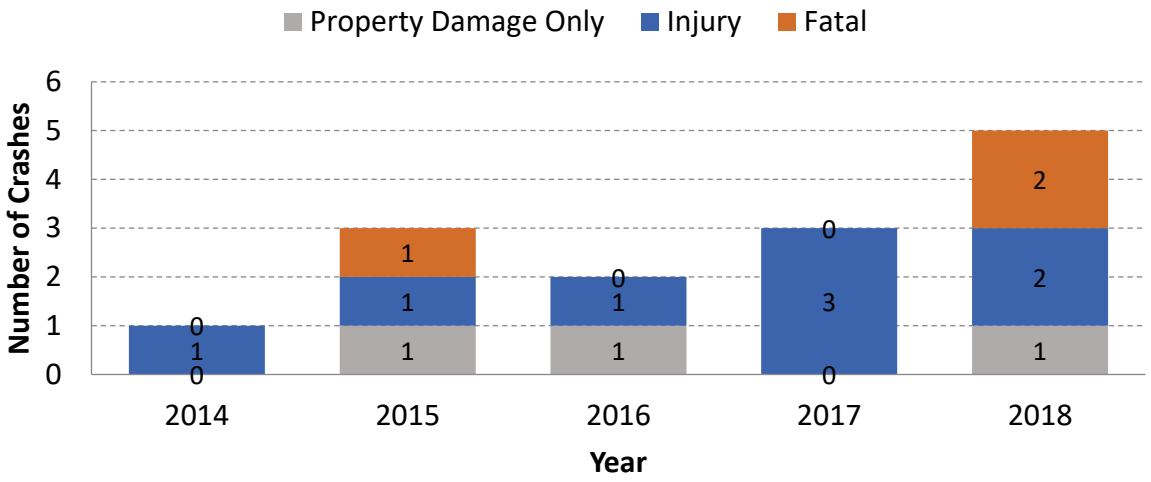

Figure 17: Non-School Aged Crashes by Year and Severity

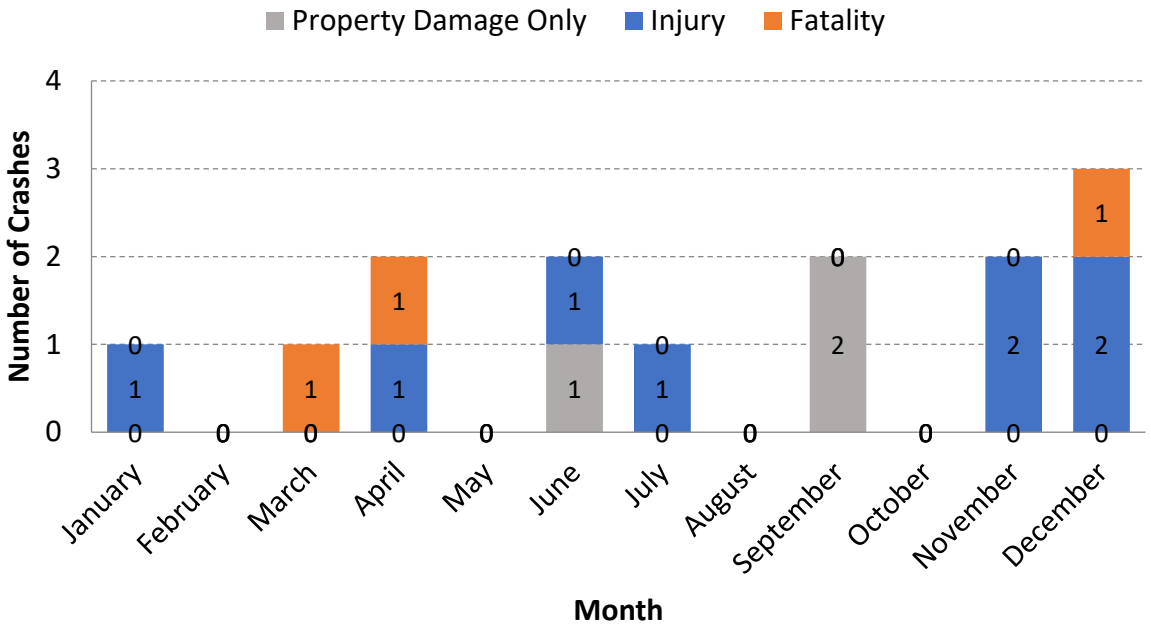

Figure 18: Non-School Aged Crashes by Month and Severity

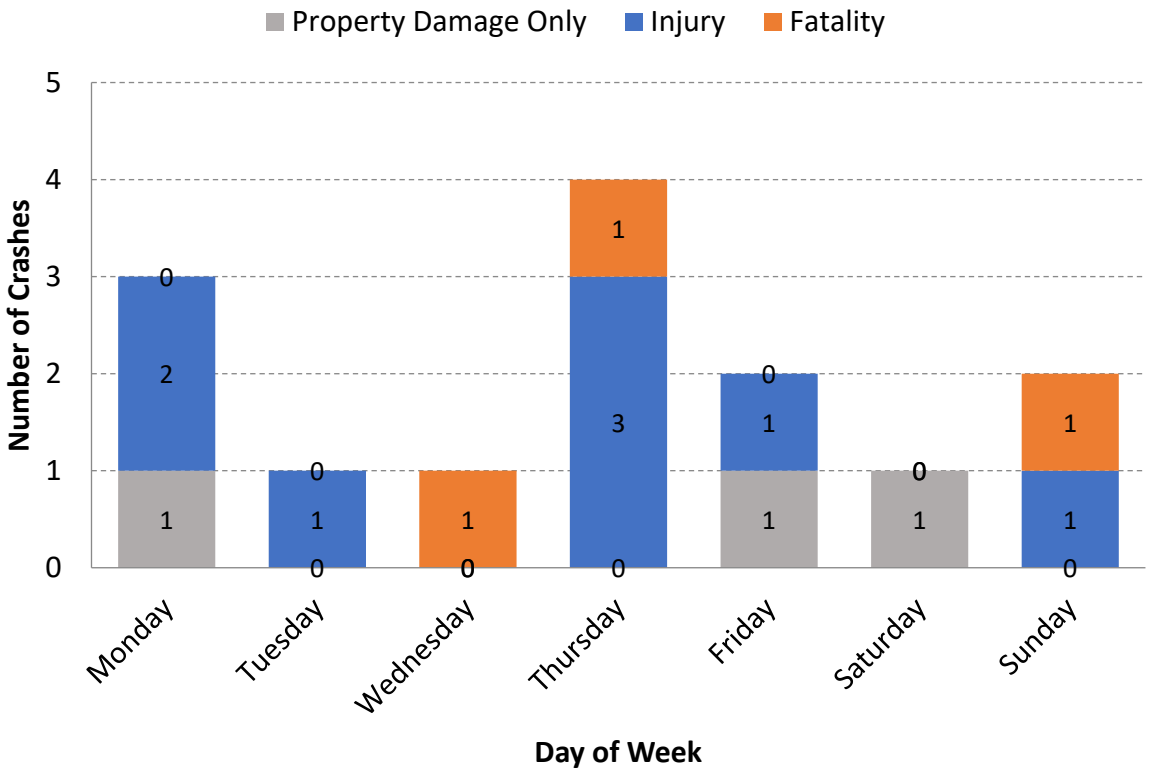

Figure 19: Non-School Aged Crashes by Day of Week and Severity

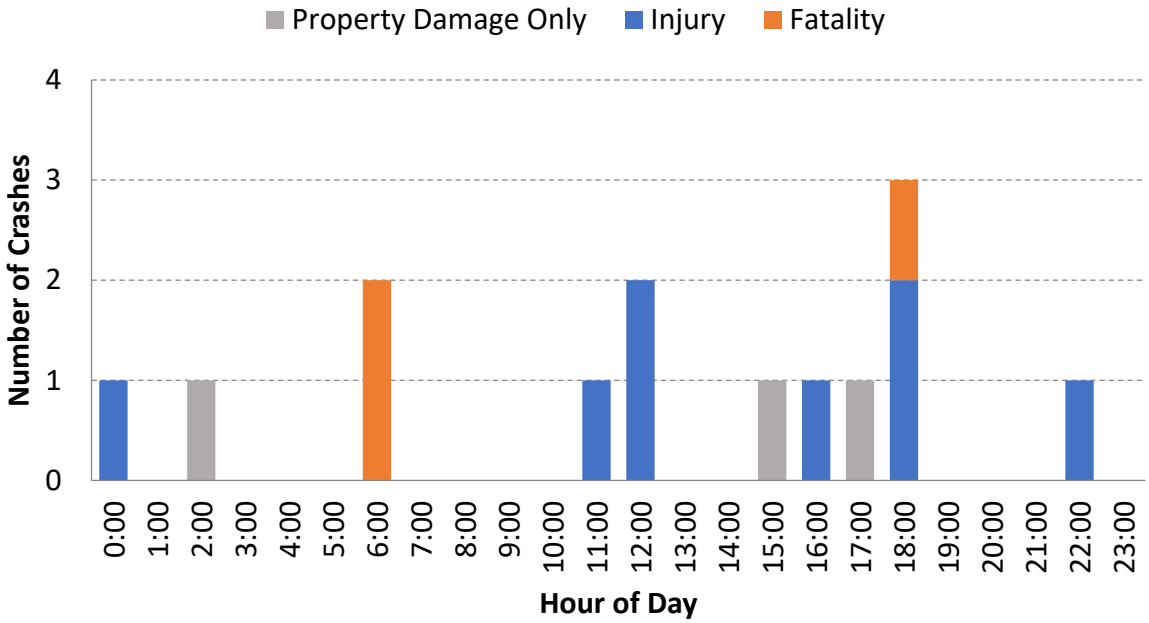

Figure 20: Non-School Aged Crashes by Hour of Day and Severity

The number of crashes per year increased by four crashes per year from 2014 to 2018. The most crashes occurred during the month of December (three) and Thursday was the most common day when crashes occurred (four). By time of day, the highest crash hour was from 6 PM to 7 PM (three). Alcohol and/or drug involved crashes accounted for 29 percent of the reported crashes.

Non School-Aged Fatal Crash Report Summaries

1. Crash Number: 85881669
    - On December 31, 2015 at 6:09 PM, a crash involving a pedestrian occurred at the intersection of Emerson Drive and Krefeld Road. The pedestrian was traveling south across Emerson Drive when a vehicle traveling westbound struck the pedestrian. The crash resulted in a fatality. The crash occurred under dry conditions during the day.
2. Crash Number: 87790225
    - On March 25, 2018 at 6:33 AM, a crash involving a bicyclist occurred at the intersection of Minton Road and Emerson Drive. The bicyclist was traveling along the north crosswalk when a vehicle traveling northbound on Minton Road struck the bicyclist. The crash resulted in a fatality. The crash occurred under dry and dark conditions.
3. Crash Number: 87790407
    - On April 18, 2018 at 6:22 AM, a crash involving a bicyclist occurred at the intersection of Palm Bay Road and Culver Drive. The bicyclist was traveling along the west crosswalk when a vehicle traveling eastbound along Palm Bay Road struck the bicyclist. The crash resulted in a fatality. The crash occurred under dry and dark conditions.

Comparison between School Aged and Non-School Aged Pedestrian/Bicycle Crash Statistics

Figure 21, **Figure 22**, **Figure 23**, and **Figure 24** show a comparison of the number of school aged and non-school aged pedestrian and bicycle crashes by different measures (year, month, day, and hour).

There were more non-school aged crashes than school aged crashes from 2014 to 2018. The only reported school aged crash occurred in September while non-school aged crashes occurred throughout the year. The only reported school aged crash occurred on a Wednesday while most non-school aged crashes occurred on a Thursday (four). The only reported school aged crash occurred from 7 AM to 8 AM while most non-school aged crashes occurred form 6 PM to 7 PM (three).

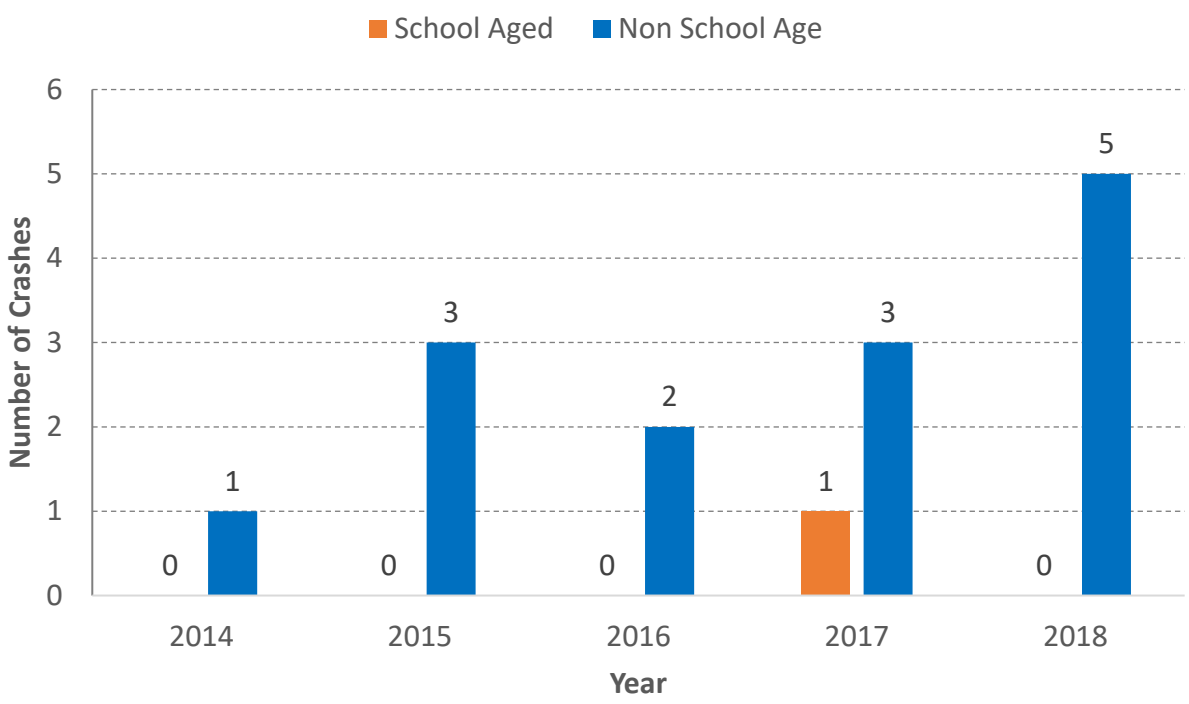

Figure 21: Comparison of School Aged and Non-School Aged Crashes by Year

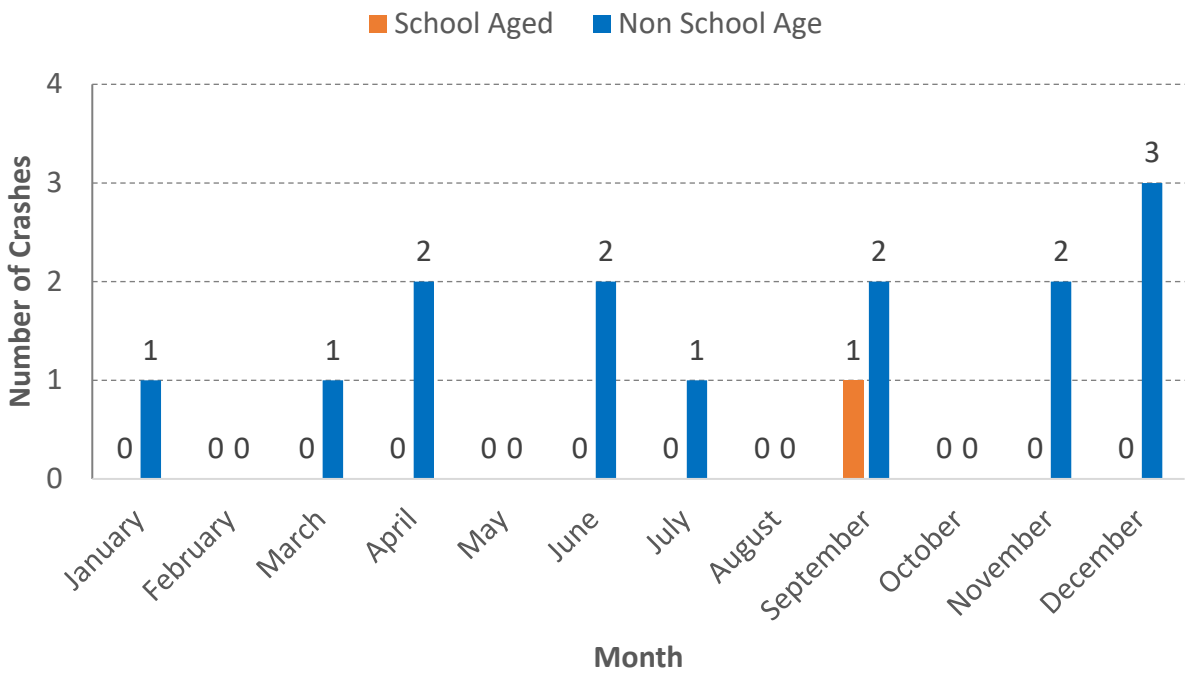

Figure 22: Comparison of School Aged and Non-School Aged Crashes by Month

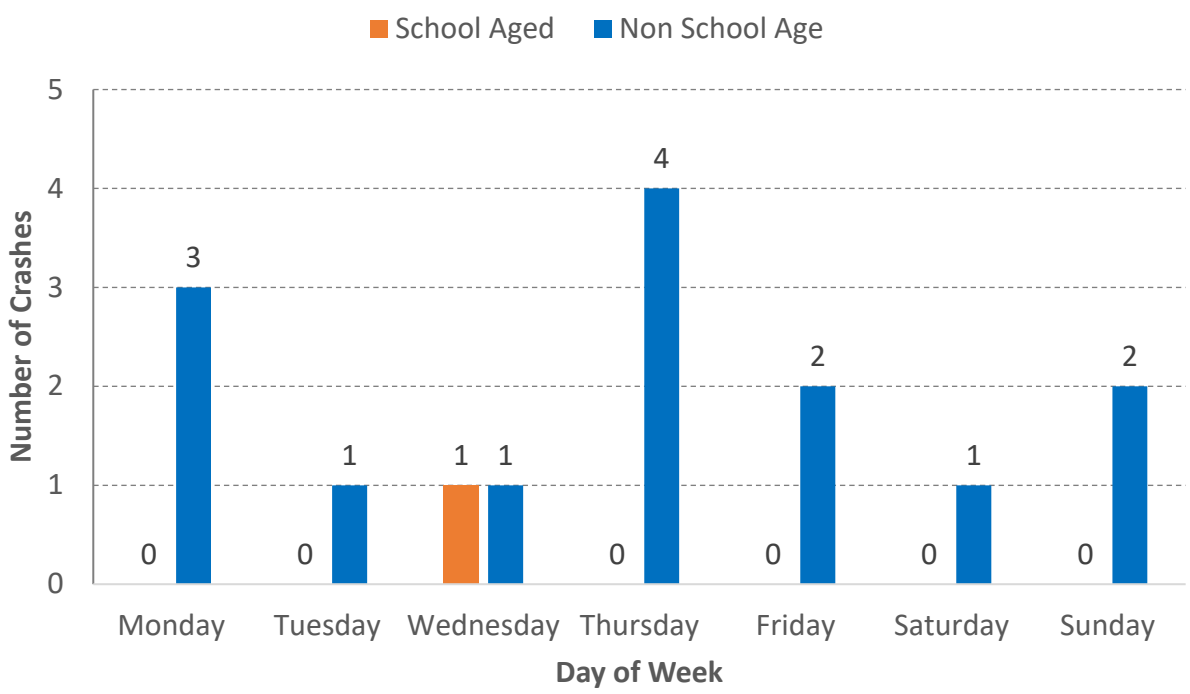

Figure 23: Comparison of School Aged and Non-School Aged Crashes by Day of Week

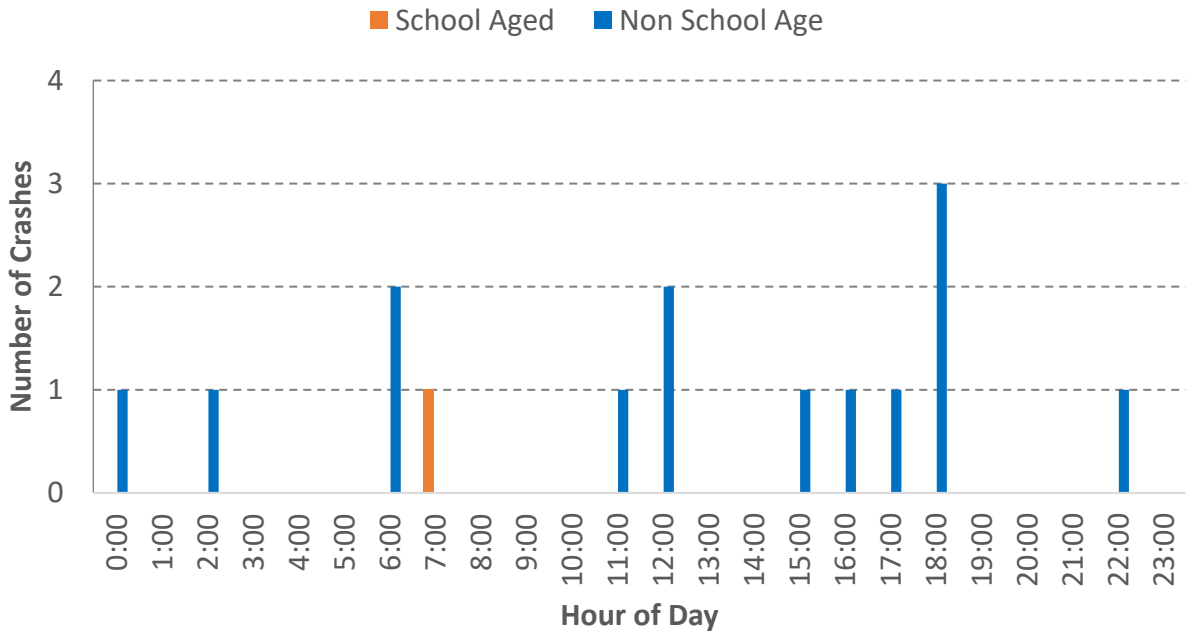

Figure 24: Comparison of School Aged and Non-School Aged Crashes by Hour of Day

School Coordination Meeting

A coordination meeting was held on October 22, 2019 to bring stakeholders together and discuss issues and opportunities related to students walking and biking to the school. Members from Brevard County Schools, Lockmar Elementary School, SCTPO, and KAI were present at this meeting. Notes from this meeting are summarized below.

General Notes

Sarah Kraum began the meeting with a short background about the project and initiated introductions. After brief introductions by the attendees, Aditya Inamdar began the discussion with an overview of the project as well as work conducted to date. He briefly introduced the meeting materials included in the attendee handout package. The materials shared with attendees includes the following documents:

- Summary Infographic that included:
    - Student travel mode split based on the Student Travel Survey
    - Pedestrian and bicycle crash summary
    - Information regarding signals and crossings with the study area
    - Summary of previous and ongoing plans within the study area
- Map showing existing and planned bicycle and pedestrian facilities
- Map showing existing conditions traffic data
- Map showing school-aged bicycle and pedestrian crashes (2014 - 2018)

The following sections summarizes the discussions during and after the group discussion.

School Timings

- The school hours are as follows:
    - 8:00 AM to 2:30 PM - Monday through Thursday.
    - 8:00 AM to 1:15 PM – Friday.
- The peak period of students arriving in the morning is 7:45 to 8:00 AM.
- The peak period of students departing is 2:30 to 3:00 PM.
- School buses leave at 2:30 PM.
- Parent's cars are let in around 2:35 to 2:40 PM, and Walkers/Bikers are dismissed at 2:35 PM.

School Entrances and Circulation

- There are three one-way school driveways along Pepper Street.
- One of the driveways serves as a two-lane entrance for buses and cars dropping-off/picking-up Grade 2 to Grade 6 students and a 68-space staff parking lot.

- Two driveways (one entrance and one egress) serve as the drop-off/pick-up loop for kindergarten to Grade 1 students and a pick-up loop for daycare buses along with a 24-space staff parking lot.
- There is a one one-way driveway along Emerson Drive, which serves as an egress for buses and cars dropping-off/picking-up Grade 2 to Grade 6 students.
- There is a one one-way driveway along Narragansett Street, which serves as an egress for buses with Exceptional Student Education (ESE) students.
- Students walking or biking to school enter through a separate pedestrian entrance along Pepper Street.

Main Walking and Biking Routes

- Students walk or bike along Pepper Street to enter the school.
- Most of the students use the north side of Pepper Street, and the west side of Emerson Drive, Pembroke Avenue, Narragansett Street, and Hyder Street to walk/bike from/into the surrounding residential neighborhoods.
- There is a bike parking rack located on the southeast corner of the school building along the pathway that connects the walker and biker entrance gate and the southeast school building entrance.
- Students walking or biking west from the walker and biker entrance gate have to cross three school driveways. Melissa Long (Assistant Principal, Lockmar Elementary – Brevard County Schools) raised safety concerns about these three potential conflict points between students walking or biking and cars, vans, and buses turning into the driveways.
- Very few students walk or bike along Emerson Drive north of Narragansett Street.
- There is one crossing guard at the Pepper Street and Peach Avenue intersection and another one at the Emerson Drive and Pepper Street intersection.
- Pepper Street has a sidewalk on one side. The sidewalk is present on the south side, west of Emerson Drive and on the north side, east of Emerson Drive. The signal at the Emerson Drive and Pepper Street intersection has a full pedestrian phase that allows pedestrians and bikers to cross diagonally from the south side sidewalk to the north side sidewalk along Pepper Street.
- The crossing guard at the Emerson Drive and Pepper Street intersection stands at the southwest corner in AM and northeast corner in PM.
- Safety concerns were raised about some students crossing Emerson Drive at Narragansett Street. Emerson Drive and Narragansett Street have sidewalks on only one side of the street. There are no marked crosswalks or a crossing guard at this location. This location needs to be assessed during field review.
- Some parents walk and bike with their children.

- There are 15 student safety patrol officers who assist in student dismissal and afternoon pick-up activity. These student safety patrol officers are dismissed at 2:50 PM.

Drop-Off/Pick Up

- The school is served by six regular school buses and three ESE buses in the morning and afternoon.
- Lockmar is a hub for regional school buses. Instructional Assistants (IAs) are picked up from Lockmar Elementary School in six additional school buses to be dropped off at different schools.
- The buses drop-off students or pick-up IAs from 7:30 AM to 7:35 AM using the drop-off loop on the west side of the school. Students unload along the western side of the school building. Four to five buses will continue to the north side of the property and unload ESE students.
- Melissa Long stated that buses pick-up students along the northern side on rainy days. There were no reported issues with the pick-up activity.
- Parents begin dropping-off students after 7:35 AM when the buses leave after dropping-off students. Buses and vehicles are not supposed to mix in the drop-off loop.
- Parents of Grade 2 to Grade 6 students line up along Peach Avenue during the morning and afternoon for drop-off and pick-up. Parents are allowed to enter the school property at 7:35 AM for drop-off, and 2:37 PM for pick-up after the buses leave the school property. There is a crossing guard at the intersection of Peach Avenue and Pepper Street who directs traffic across Pepper Street.
- Parents of Kindergarten to Grade 1 students line up along Pepper Street, east of Peach Avenue during the morning and afternoon for drop-off and pick-up. In the afternoon pick-up period, parents queue on the grass shoulder and are allowed to enter the school property after the 12 daycare vans leave.
- Melissa Long noted that parents who wish to drop-off their students for morning music classes at 7 AM need to park and sign-in their students at the front office. They cannot drop them off along the southern or western drop-off loop.

Recent and Planned Projects

- Emerson Drive may be resurfaced soon. Feasibility of adding bicycle and pedestrian facilities along Emerson Drive as part of the resurfacing project should be studied.
- The Culver Drive project was recently completed. This project widened Culver Drive to four lanes with a median/center left-turn lane and installed sidewalks on both sides of the road.

Other Issues

- Melissa Long noted there are a large number of ESE and medically fragile students at Lockmar Elementary School (approximately 40 to 50 students).
- Melissa Long stated concern for emergency vehicles' ability to provide emergency services during drop-off and pick-up times. She shared a past experience when the congestion during the pick-up activity caused a delay in emergency response time for a student having a seizure.
- There is an access point to the school property located on Pembroke Avenue, just south of Narragansett Street. It is currently a permanently locked gate.
- There are no reported issues with the faculty parking lot.
- Melissa Long observed that it is dark in the morning when students are coming to the school, and some street lighting improvements should be considered.
- Melissa Long recommended adding sidewalks on the east side of Emerson Drive.
- There is potential to add trails along drainage canals.

Field Review

A field review was conducted on October 23, 2019 to review the existing conditions and to observe student drop-off activity from 7:00 AM to 8:15 AM and student pick-up activity from 1:30 PM to 3:00 PM. Members from SCTPO and KAI were present at this field review. On the date of the field review, there was an awards ceremony for Grade 3 students from 1:15 to 2:15 PM. The award ceremony may have affected some of the travel patterns and observations. The field review also included interacting with the crossing guard and observing and documenting conditions within the school's study area. Notes from this field review are summarized below.

Crossing Guards

- There is one crossing guard at the intersection of Emerson Drive and Pepper Street and another one at the intersection of Pepper Street and Peach Avenue.
- The crossing guard at the intersection of Emerson Drive and Pepper Street noted that when it is raining, the sidewalk along Pepper Street floods, and students try to walk in the roadway.
- The crossing guard at the intersection of Emerson Drive and Pepper Street mentioned that drivers making a right turn on red at this intersection often do not pay attention to students crossing the street. He suggested installing 'No right turn on red during school hours' signage for each of the intersection approaches. He also noted that he does not see a need for a sidewalk along the east side of Emerson Drive as students can cross safely at this intersection.
- There is no crossing guard at the intersection of Narragansett Street and Emerson Drive.

School Campus

- Students walking/biking to the school enter through a separate entrance gate on Pepper Street located on the east side of the school driveways.
- Students walking or biking west from the walker and biker entrance gate have to cross three school driveways. These are three potential conflict points between students walking or biking and cars, vans, and buses turning into the driveways.
- There were 38 bicycles and four scooters in the bicycle rack.
- The teacher parking lot was not full.
- From 7:00 to 8:00 AM, and 2:00 to 3:00 PM, eastbound vehicles on Pepper Street cannot turn left into the school.
- The easternmost and westernmost school driveways along Pepper Street do not have marked crosswalks.
- Crosswalk across the Grade 2 to Grade 6 drop-off/pick-up loop between the west side faculty parking lot and the school building does not connect to any pedestrian walkway or entrance on either side of the crosswalk.

- A school safety person directs traffic just south of this crosswalk.

Study Area

- The intersection of Emerson Drive and Pepper Street may not be ADA compliant (no detectable warning surfaces).
- Sidewalks along Pepper Street and Emerson Drive are not well maintained. There are many cracks along the sidewalks.
- There is significant sign clutter with too many road signs near the school entrances that may confuse drivers.
- The school driveway along Emerson Drive has poor pavement conditions as well as drainage issues.

Morning Observations

- The surrounding school area is dark at 7:00 AM. This is likely because the field review occurred before daylight savings time ended.
- The peak period for students walking or biking to school is 7:15 AM to 7:30 AM.
- Approximately 60 to 70 students walked or biked to the school. Around 35 to 40 students were on a bike.
- Many bicyclists were not wearing helmets. Some had helmets but hung them on their handlebars.
- Emerson Drive and Pepper Street intersection:
    - Approximately 35 to 40 students were observed walking or biking and crossed the Emerson Drive and Pepper Street intersection.
    - Students crossing the Emerson Drive and Pepper Street intersection primarily traveled along Pepper Street, west of Emerson Drive, and along Emerson Drive, south of Pepper Street.
    - There is northbound vehicle queuing on Emerson Drive from 7:00 AM to 7:30 AM. About 11 cars per signal cycle are allowed northbound through this intersection.
    - The vehicle queue length for the southbound left-turn lane is sufficient for the vehicle queue volume.
    - Vehicles were observed running the red light going northbound on Emerson Drive.
    - Students come from multiple directions to the east side of Emerson Drive and cross the intersection with the assistance of the crossing guard.
    - The crossing guard estimated that approximately 30 to 40 students walk or bike through this intersection to get to school, with there being more bikers than walkers.
    - The sidewalk is present on the south side, west of Emerson Drive and on the north side, east of Emerson Drive. The signal at Emerson Drive and Pepper Street has a

full pedestrian phase that allows pedestrians and bikers to cross diagonally from the south side sidewalk to the north side sidewalk along Pepper Street.

- A total of 12 buses were seen entering the Grade 2 to Grade 6 drop-off loop. Buses exit the school campus along Emerson Drive and typically turn northbound. The last bus was seen entering the school campus at 7:43 AM and was dropping off while vehicles were dropping students off.
- Some buses will pick up IAs at Lockmar Elementary and drop them off at other schools.
- Some parents park along the northern grass shoulder of Pepper Street and walk their children to the school.
- Two daycare vans were observed dropping students off.
- Student Safety Patrol Officers were stationed at the entrance and exit to the southern car loop.

Afternoon Observations

- Out of 60 to 70 students who walked or biked to the school, approximately 35 to 45 students traveled west to the Emerson Drive and Pepper Street intersection, around 15 to 25 students traveled east along Pepper Street, and ten to 15 students traveled south along Peach Avenue.
- Approximately 19 pedestrians, 17 bicyclists, and six students using scooters traveled west on Pepper Street to the intersection of Pepper Street and Emerson Drive.
- Cars start queuing for Grade 2 to Grade 6 student pick-up along Peach Avenue at the intersection of Peach Avenue and Pepper Street as early as 1:30 PM.
- The Grade 2 to Grade 6 student drop-off/pick-up loop follows Peach Avenue, Vermont Street, Nele Avenue, and Hyder Street.
- Approximately 30 to 40 cars were in the Grade 2 to Grade 6 queue and backed up to the Vermont Street and Nele Avenue intersection around 2:00 PM.
- Overall, approximately 92 vehicles entered the Grade 2 to Grade 6 student drop-off/pick-up loop.
- Cars start queuing for Kindergarten to Grade 1 student pick-up along the north side of Pepper Street along the grass shoulder.
- Approximately 50 to 60 cars were in the Kindergarten to Grade 1 queue along Pepper Street at 2:30 PM.
- Around 12 daycare vans were queued in the Kindergarten to Grade 1 drop-off/pick-up loop.
- One student crossed Pepper Street diagonally to get on Peach Avenue.
- Student Safety Patrol Officers were observed at the school driveways.
- Vehicles were parked along the northern grass shoulder of Pepper Street directly in front of the school entrance between Peach Avenue and Nele Avenue. The crossing guard at

the intersection of Pepper Street and Peach Avenue noted that these vehicles are not parked here during regular school days and were likely there for the awards ceremony for Grade 3 students.

- Buses began to line up along the western side of the school at 2:15 PM and left by 2:35 PM.
- At 2:50 PM, the pick-up loops cleared with the occasional parent entering the school campus. The crossing guard at the intersection of Pepper Street and Peach Avenue noted that the drop-off/pick-up loop does not clear until 3:05 PM on some days, but likely cleared early on the day of the field review due to the awards ceremony for Grade 3 students.
- Some parents are parking at the southwest corner of Emerson Drive and Pepper Street intersection to pick up students.
- A parent noted that the northeast corner of Emerson Drive and Pepper Street floods when it rains.

Opportunities

- Consider moving the crosswalk along the western side of the school that connects the school to the western faculty parking lot to where the school safety officer is currently directing traffic. Moving the crosswalk south would align the parking lot to the school building entrance.
- Install ADA compliant sidewalks, pedestrian ramps, and high visibility crosswalks along Emerson Drive, Pepper Street, Pembroke Avenue, Narragansett Street.
- Consider adding signs at the entrances and egresses to the school along Pepper Street, stating - “Caution Students Crossing.”
- Consider adding ‘No turn on red during school hours’ signage for each of the intersection approaches at the Emerson Drive and Pepper Street intersection.
- Extend sidewalk on the eastern side of Emerson Drive from the Fred Lee Park entrance to Narragansett Street.
- Install sidewalk on Narragansett Street, between Pelican Drive and Emerson Drive, and Peach Avenue from Hyder Street to Pepper Street.
- Conduct a feasibility study to build trails along canals.

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SPEED
LIMIT

Implementation

This section of the report will build on the analysis and observations documented in the Assessment Section to make recommendations. The purpose of this section is to list and describe the issues and recommendations identified for the Lockmar Elementary School study area. Planning level cost estimates, implementation time-frames, and responsible agencies were also listed for the recommendations.

List & Maps of Recommendations

A list of issues and recommendations was developed based on the input received at the school coordination meeting and field review observations. Planning level cost estimates, implementation time-frame and responsible agency were identified for the recommendations.

Recommendations on the school campus are listed in **Table 2**. Recommendations in the larger study area are listed in **Table 3**. Maps showing the locations of these recommendations are shown in **Figure 25**, **Figure 26**, and **Figure 27**.

Table 2: School Campus Recommendations

No.	Location	Recommendation	Type	Time-Frame	Cost Estimate
1	School Driveways	Install raised crosswalks or re-stripe high visibility crosswalk markings and upgrade pedestrian ramps to make them ADA compliant.	Crossing	Near-Term	$10,000 to $15,000
2	North School Driveway on Narragansett Street	Open the existing northern entrance gate for pedestrians and bicyclists to use. Add a bicycle rack at the gate entrance and staffing during AM and PM peak periods.	School Circulation	Near-Term	<$10,000

No.	Location	Recommendation	Type	Time-Frame	Cost Estimate
3	Crosswalk on southwest corner of the school building connecting school building to western parking lot	Move the crosswalk to align with the school building entrance sidewalk and add ADA compliant pedestrian ramps.	Crossing	Near-Term	<$10,000

Table 3: Study Area Recommendations

No.	Location	Recommendation	Type	Time-Frame	Cost Estimate
4	Emerson Drive, from Narragansett Street to Forest Street	Build an 8 to 10 foot wide sidewalk/shared use path on the east/north side.	Sidewalk	Long-Term	$1,150,000 to $1,350,000
5	Canals	Conduct a feasibility study to add paved trails along the canal ROWs.	Feasibility Study (Trail)	Near-Term	Further study is required
6	Pembroke Avenue and Narragansett Street and Grogan Avenue	Build a pedestrian and bicycle bridge across the canal.	Sidewalk	Long-Term	Further study is required
7	Pelican Drive and Narragansett Street; and Melody Avenue and Jade Lane	Build a pedestrian and bicycle bridge across the canal.	Sidewalk	Long-Term	Further study is required

No.	Location	Recommendation	Type	Time-Frame	Cost Estimate
8	Emerson Drive and Pepper Street Intersection	Install blank out signage for all intersection approaches. These signs would show no right-turn-on-red when the conflicting crosswalk pedestrian push button is activated, but otherwise will stay blank.	Sign/Signal	Near-Term	$30,000 to $40,000
9	Emerson Drive and Pepper Street Intersection	Re-stripe crosswalks as high visibility crosswalks and upgrade pedestrian ramps to make them ADA compliant.	Crossing	Near-Term	$15,000 to $20,000
10	Emerson Drive and Narragansett Street Intersection	Install high visibility crosswalks and upgrade pedestrian ramps across Narragansett Street to make them ADA compliant.	Crossing	Near-Term	$10,000 to $15,000
11	Armory Drive and Harwood Street and Culver Drive	Build an 8 to 10 foot wide sidewalk to connect Armory Drive and Harwood Drive intersection to Culver Drive.	Sidewalk	Near-Term	$15,000 to $20,000

No.	Location	Recommendation	Type	Time-Frame	Cost Estimate
12	Narragansett Street from School Bus Egress Driveway to Pembroke Avenue and Nevada Drive from Pembroke Avenue to Emerson Drive	Build a 5 to 6 foot wide sidewalk on the south and west side.	Sidewalk	Near-Term	$420,000 to $500,000
13	Narragansett Street from Pelican Drive to Emerson Drive	Build a 5 to 6 foot wide sidewalk on the south side.	Sidewalk	Near-Term	$170,000 to $200,000
14	Pelican Drive/Hyder Street from Narragansett Street to Emerson Drive	Build a 5 to 6 foot wide sidewalk on the east/north side.	Sidewalk	Long-Term	$250,000 to $290,000
15	Pepper Street from Pembroke Avenue to Nevada Drive	Build a 5 to 6 foot wide sidewalk on north side.	Sidewalk	Near-Term	$100,000 to $120,000
16	Pebble Avenue from Nemo Circle to Nesbitt Street	Build a 5 to 6 foot wide sidewalk on east side.	Sidewalk	Long-Term	$110,000 to $125,000
17	Nemo Circle from Pebble Avenue to Pelican Drive	Build a 5 to 6 foot wide sidewalk on south side.	Sidewalk	Long-Term	$60,000 to $70,000
18	Nesbitt Street from Pineda Avenue to Neptune Drive	Build a 5 to 6 foot wide sidewalk on north side.	Sidewalk	Long-Term	$200,000 to $225,000

No.	Location	Recommendation	Type	Time-Frame	Cost Estimate
19	Emerson Drive and Pembroke Avenue Intersection	Install RRFB for the pedestrian crossing.	Crossing	Near-Term	$25,000 to $30,000
20	Emerson Drive, from Minton Road to Narragansett Street	Widen existing 6 foot sidewalk to an 8 to 10 foot shared use path.	Sidewalk	Long-Term	$470,000 to $550,000

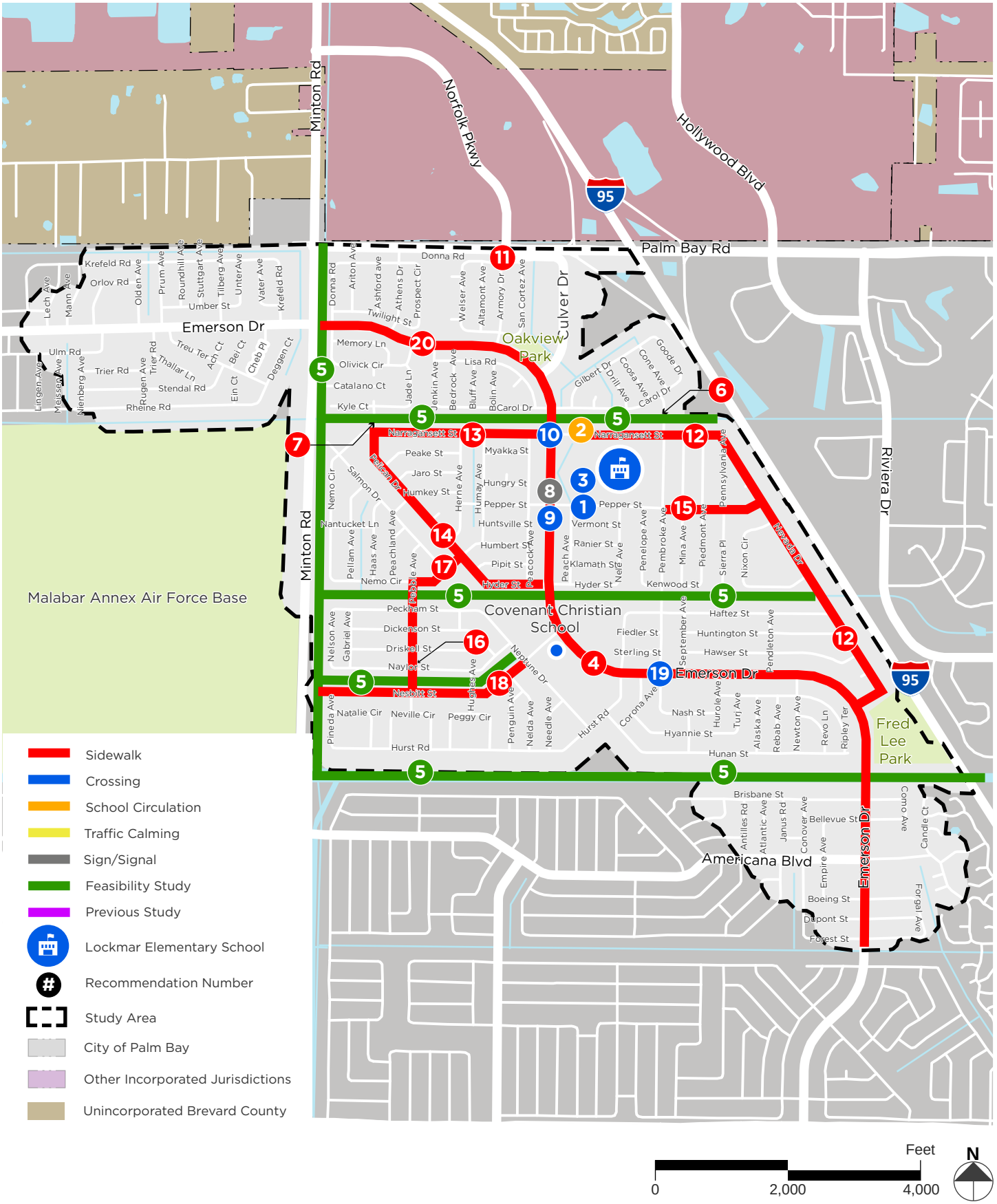


Figure 25: Recommendations

School Routes Analysis

Lockmar Elementary School

Figure 26: Recommendations: School Context Aerial Map

School Routes Analysis

Lockmar Elementary School

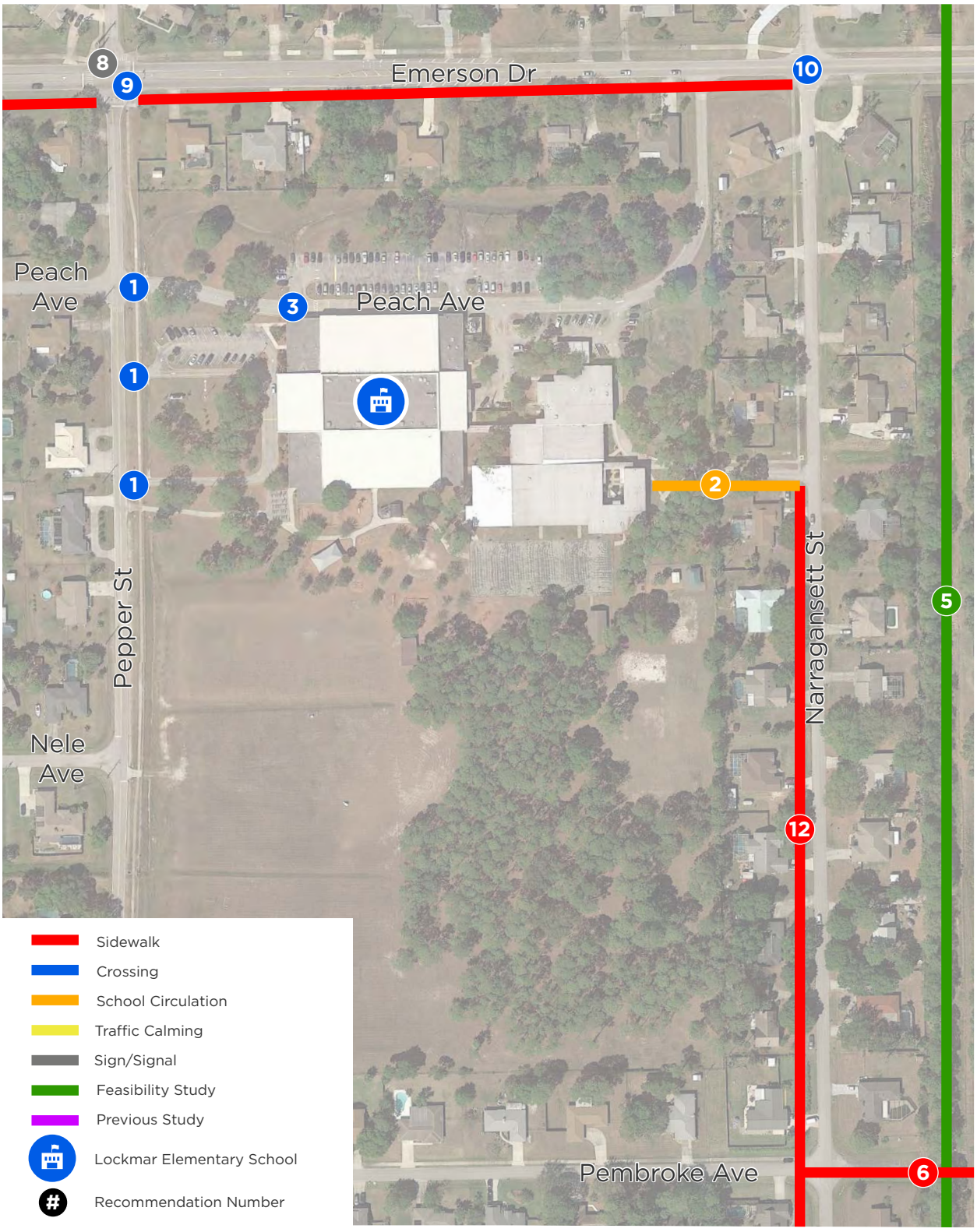


Figure 27: Recommendations: School Campus Aerial Map

Detailed Recommendations

This section lists details for each recommendation including its location, type, issue, implementation time-frame, estimated project cost, if right-of-way is needed, if there is anticipated drainage or utility impact, and the responsible agency. The implementation time-frame is listed as "Maintenance", "Near-Term", or "Long-Term" and describes the amount of time it may take for a project to be completed. The responsible agency is the public agency that will be responsible for the implementation of the recommendation.

Methodology to Calculate Cost Estimates

Cost estimates were calculated for the recommended projects in this section, unless otherwise noted. Cost estimates were not prepared for projects where more information was needed, or further follow up study should be undertaken. The bullets below describe the assumptions made for the cost estimating of the recommended projects:

- Pay items and pay item unit costs were obtained from the FDOT Historical Cost website: *https://www.fdot.gov/programmanagement/estimates/historicalcostinformation/historicalcost.shtm*
    - The most current 12 month (12/01/18 – 11/30/19) moving Statewide and Area 8 (which includes Brevard County) pay item average unit costs were utilized
- Maintenance of traffic was assumed to be 10 percent to 15 percent of the construction cost, depending on the level of impact the recommendation has on adjacent roadway traffic. Maintenance of traffic was assumed to be 0 percent for recommendations on the school campus.
- The mobilization of construction equipment to the work site was assumed to be 15 percent of the construction + maintenance of traffic cost.
- Concepts were not prepared for these recommendations so there is a high degree of unknowns that may affect the project cost once it is designed. To account for these unknowns, a 20 percent and 40 percent "contingency/unknowns" cost was calculated for each project to provide a cost estimate "range" for each project. These contingency/unknown calculations were based on the construction + maintenance of traffic + mobilization cost.
- Design and construction engineering inspection (CEI) were assumed to be 15 percent each. These costs were calculated based on the construction + maintenance of traffic + mobilization + contingency/unknowns (20%) cost and the construction + maintenance of traffic + mobilization + contingency/unknowns (40%) cost.
- The total lower range cost estimate for each recommendation was calculated as construction + maintenance of traffic + mobilization + contingency/unknowns (20%) + design (based on 20% contingency/unknowns) + CEI (based on 20%

contingency/unknowns). The total upper range cost estimate for each recommendation was calculated as construction + maintenance of traffic + mobilization + contingency/unknowns (40%) + design (based on 40% contingency/unknowns) + CEI (based on 40% contingency/unknowns).

- The final lower and upper range were rounded up to the nearest $5K or $10K to provide a conservative estimate of the total project cost.

Figure 28 below shows an example of the cost estimate process described above.

Item No.	Description	Unit	Total Quantity	Weighted Average Unit Price	Total Amount
Roadway Items					
110-1-1	CLEARING & GRUBBING	AC	0.27	$9,219.13	$2,516.82
522-1	SIDEWALK CONCRETE, 4" THICK	SY	570.00	$44.53	$25,382.10
Subtotal					$27,898.92
102-1	MAINTENANCE OF TRAFFIC	LS	15%		$4,184.84
Subtotal					$32,083.76
101-1	MOBILIZATION	LS	15%		$4,812.56
Subtotal					$36,896.32
	CONTINGENCY	LS	20%		$7,379.26
	CONTINGENCY	LS	40%		$14,758.53
Total Construction Cost (20%)					$44,275.58
Total Construction Cost (40%)					$51,654.85
	DESIGN (20%)	LS	15%		$6,641.00
	DESIGN (40%)	LS	15%		$7,748.00
	C.E.I (20%)	LS	15%		$6,641.00
	C.E.I (40%)	LS	15%		$7,748.00
Total Cost (20%)					$57,557.58
Total Cost (40%)					$67,150.85
Total Cost (20%) - Rounded					$60,000.00
Total Cost (40%) - Rounded					$70,000.00

Figure 28: Example Cost Estimate Process

Project 1: Install raised crosswalks or re-stripe high visibility crosswalk markings and upgrade pedestrian ramps to make them ADA compliant

Location	School Driveways
Type	Crossing
Issue	Pedestrian ramps and crosswalk pavement markings at school driveways have ADA deficiencies. There is often speeding through these areas.
Recommendation	Install raised crosswalks or re-stripe high visibility crosswalk markings and upgrade pedestrian ramps to make them ADA compliant.

School Driveways Along Pepper Street

	Implementation Time-Frame	Near-Term
	Estimated Project Cost	$10,000 to $15,000
	Right-of Way Needed?	No
	Drainage or Utility Impact?	No
	Responsible Agency	Brevard County Public Schools

Examples of ADA Compliant Pedestrian Curb Ramps

Perpendicular Pedestrian Ramp

Unflared Perpendicular Curb Ramps

Raised Crosswalk

Project 2: Open existing northern entrance gate

Location	North School Driveway on Narragansett Street
Type	School Circulation
Issue	Students walking and biking south along Emerson Drive must walk around the school on Pepper Street to enter the school campus where there is vehicle traffic due to parent drop-off/pick-up.
Recommendation	Open the existing northern entrance gate for pedestrians and bicyclists to use. Add a bicycle rack at the gate entrance and staffing during AM and PM peak periods.

Northern Entrance Gate Along Narragansett Street

	Implementation Time-Frame	Near-Term
	Estimated Project Cost	Less than $10,000
	Right-of Way Needed?	No
	Drainage or Utility Impact?	No
	Responsible Agency	Brevard County Public Schools

Project 3: Move crosswalk and add ADA compliant pedestrian ramps

Location	Crosswalk on southwest corner of the school building connecting school building to western parking lot
Type	Crossing
Issue	The crosswalk along the southwest corner of the school building does not connect to the entrance to the school or the parking lot. Pedestrian ramps are not ADA compliant.
Recommendation	Move the crosswalk to align with the school building entrance sidewalk and add ADA compliant pedestrian ramps.

Crosswalk Across Drop-Off/Pick-Up Loop

	Implementation Time-Frame	Near-Term
	Estimated Project Cost	Less than $10,000
	Right-of Way Needed?	No
	Drainage or Utility Impact?	No
	Responsible Agency	Brevard County Public Schools

Existing Crosswalk Across Drop-Off/Pick-Up Loop

Proposed Crosswalk Across Drop-Off/Pick-Up Loop

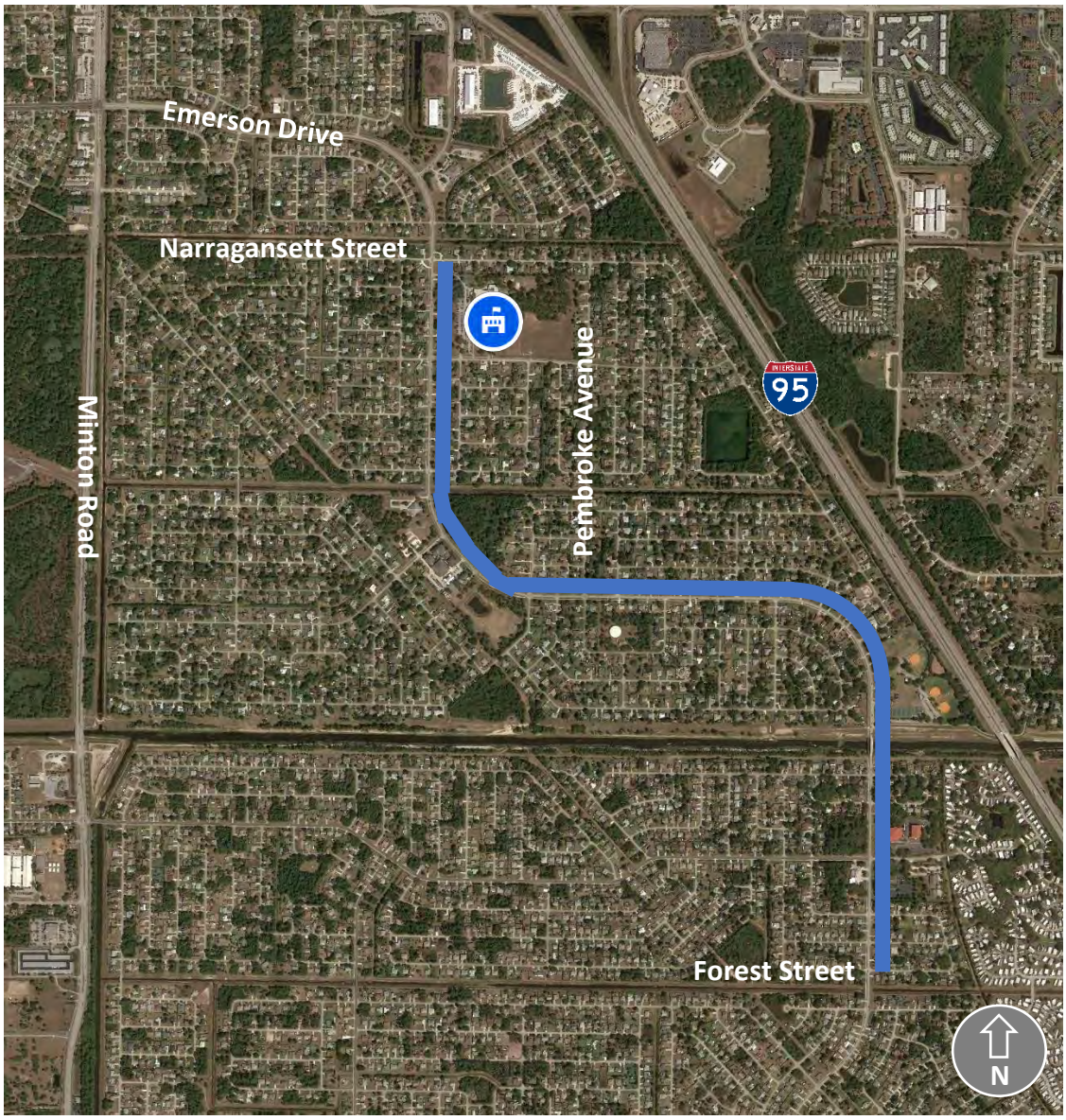
Project 4: Construct a sidewalk or shared use path on Emerson Drive

Location	Emerson Drive, from Narragansett Street to Forest Street
Type	Sidewalk
Issue	There is no sidewalk along the east/north side of Emerson Drive, from Narragansett Street to Forest Street within the study area.
Recommendation	Build an 8 to 10 foot wide sidewalk/shared use path on the east/north side.

Shared Use Path

Sidewalk Gap At Narragansett Street

	Implementation Time-Frame	Long-Term
	Estimated Project Cost	$1,150,000 to $1,350,000
	Right-of Way Needed?	Unknown
	Drainage or Utility Impact?	Potential Drainage and Utility impact
	Responsible Agency	City of Palm Bay



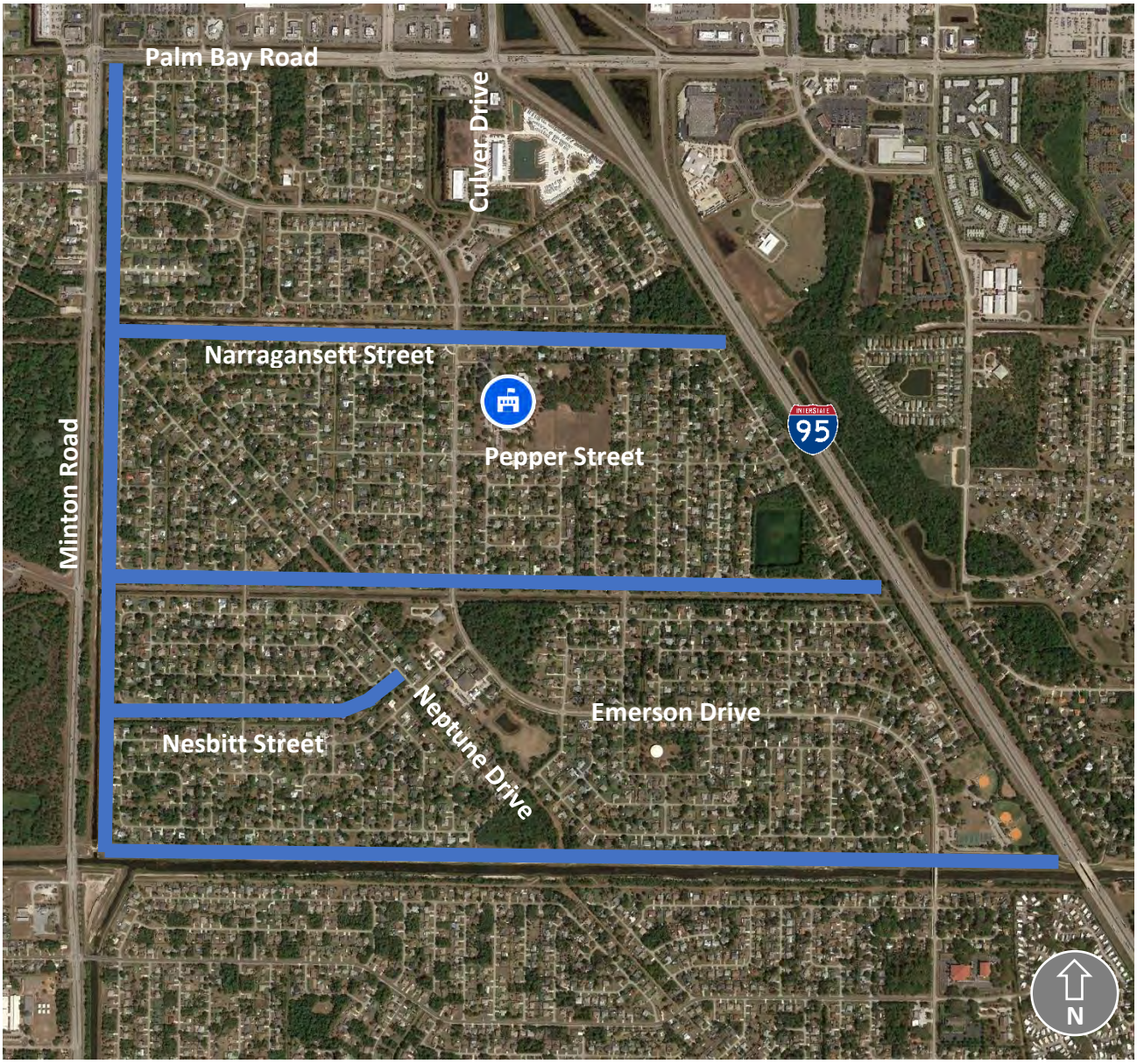
Add Sidewalk Along East/North Side of Emerson Drive

Project 5: Feasibility study to add trails along canal right-of-way

Location	Canals
Type	Feasibility Study (Trail)
Issue	The neighborhoods within the study area lack sidewalk connectivity.
Recommendation	Conduct a feasibility study to add paved trails along the canal ROWs.

Potential Trail Connection

	Implementation Time-Frame	Near-Term
	Estimated Project Cost	Further Study Required
	Right-of Way Needed?	Unknown
	Drainage or Utility Impact?	Potential Drainage Impact
	Responsible Agency	City of Palm Bay



Add Trails Along Canal Right-Of-Ways

Project 6: Construct a pedestrian and bicycle bridge across the canal

Location	Pembroke Avenue and Narragansett Street and Grogan Avenue
Type	Sidewalk
Issue	The neighborhoods within the study area lack sidewalk connectivity.
Recommendation	Build a pedestrian and bicycle bridge across the canal.

Potential Pedestrian and Bicycle Bridge Across Canal

	Implementation Time-Frame	Long-Term
	Estimated Project Cost	Further Study Required
	Right-of Way Needed?	Unknown
	Drainage or Utility Impact?	Potential Drainage and Utility Impact
	Responsible Agency	City of Palm Bay

Project 7: Construct a pedestrian and bicycle bridge across the canal

Location	Pelican Drive and Narragansett Street; and Melody Avenue and Jade Lane
Type	Sidewalk
Issue	The neighborhoods within the study area lack sidewalk connectivity.
Recommendation	Build a pedestrian and bicycle bridge across the canal.

Potential Pedestrian and Bicycle Bridge Across Canal

	Implementation Time-Frame	Long-Term
	Estimated Project Cost	Further Study Required
	Right-of Way Needed?	Unknown
	Drainage or Utility Impact?	Potential Drainage and Utility Impact
	Responsible Agency	City of Palm Bay

Project 8: Install blank out “No Right Turn on Red” signage

Location	Emerson Drive and Pepper Street Intersection
Type	Sign/Signal
Issue	Vehicles fail to yield to pedestrians crossing when making a right turn at the intersection of Emerson Drive and Pepper Street.
Recommendation	Install blank out signage for all intersection approaches. These signs would show no right-turn-on-red when the conflicting crosswalk pedestrian push button is activated, but otherwise will stay blank.

Emerson Drive and Pepper Street Intersection

Recommended Blank Out “No Turn On Red” Sign

	Implementation Time-Frame	Near-Term
	Estimated Project Cost	$30,000 to $40,000
	Right-of Way Needed?	No
	Drainage or Utility Impact?	No
	Responsible Agency	City of Palm Bay

Project 9: Upgrade pedestrian ramps to be ADA compliant and re-stripe crosswalk

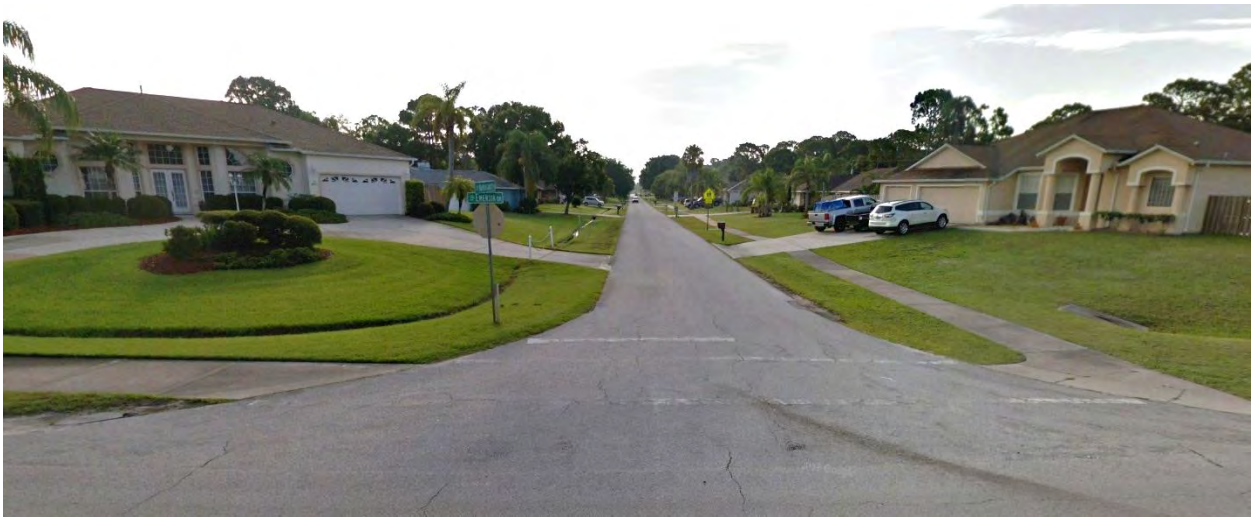
Location	Emerson Drive and Pepper Street Intersection
Type	Crossing
Issue	Pedestrian ramps and crosswalk pavement markings at the intersection of have ADA deficiencies.
Recommendation	Re-stripe crosswalks as high visibility crosswalks and upgrade pedestrian ramps to make them ADA compliant.

Emerson Drive and Pepper Street Intersection

	Implementation Time-Frame	Near-Term
	Estimated Project Cost	$15,000 to $20,000
	Right-of Way Needed?	No
	Drainage or Utility Impact?	Unknown
	Responsible Agency	City of Palm Bay

Project 10: Upgrade pedestrian ramps to be ADA compliant and re-stripe crosswalk

Location	**Emerson Drive and Narragansett Street Intersection**
Type	**Crossing**
Issue	Pedestrian ramps and crosswalk pavement markings at the intersection of have ADA deficiencies.
Recommendation	Install high visibility crosswalks and upgrade pedestrian ramps across Narragansett Street to make them ADA compliant.



Emerson Drive and Narragansett Street Intersection

	Implementation Time-Frame	**Near-Term**
	Estimated Project Cost	**$10,000 to $15,000**
	Right-of Way Needed?	**No**
	Drainage or Utility Impact?	**Unknown**
	Responsible Agency	**City of Palm Bay**

Project 11: Construct an eight to ten foot wide sidewalk on Armory Drive, Harwood Street, and Culver Drive

Location	**Armory Drive and Harwood Street and Culver Drive**
Type	**Sidewalk**
Issue	There is no sidewalk to connect Culver Drive to the intersection of Harwood Street and Armory Drive
Recommendation	Build an 8 to 10 foot wide sidewalk to connect Armory Drive and Harwood Drive intersection to Culver Drive.

Armory Drive and Harwood Street Intersection

	Implementation Time-Frame	**Near-Term**
	Estimated Project Cost	**$15,000 to $20,000**
	Right-of Way Needed?	**Unknown**
	Drainage or Utility Impact?	**Unknown**
	Responsible Agency	**City of Palm Bay**

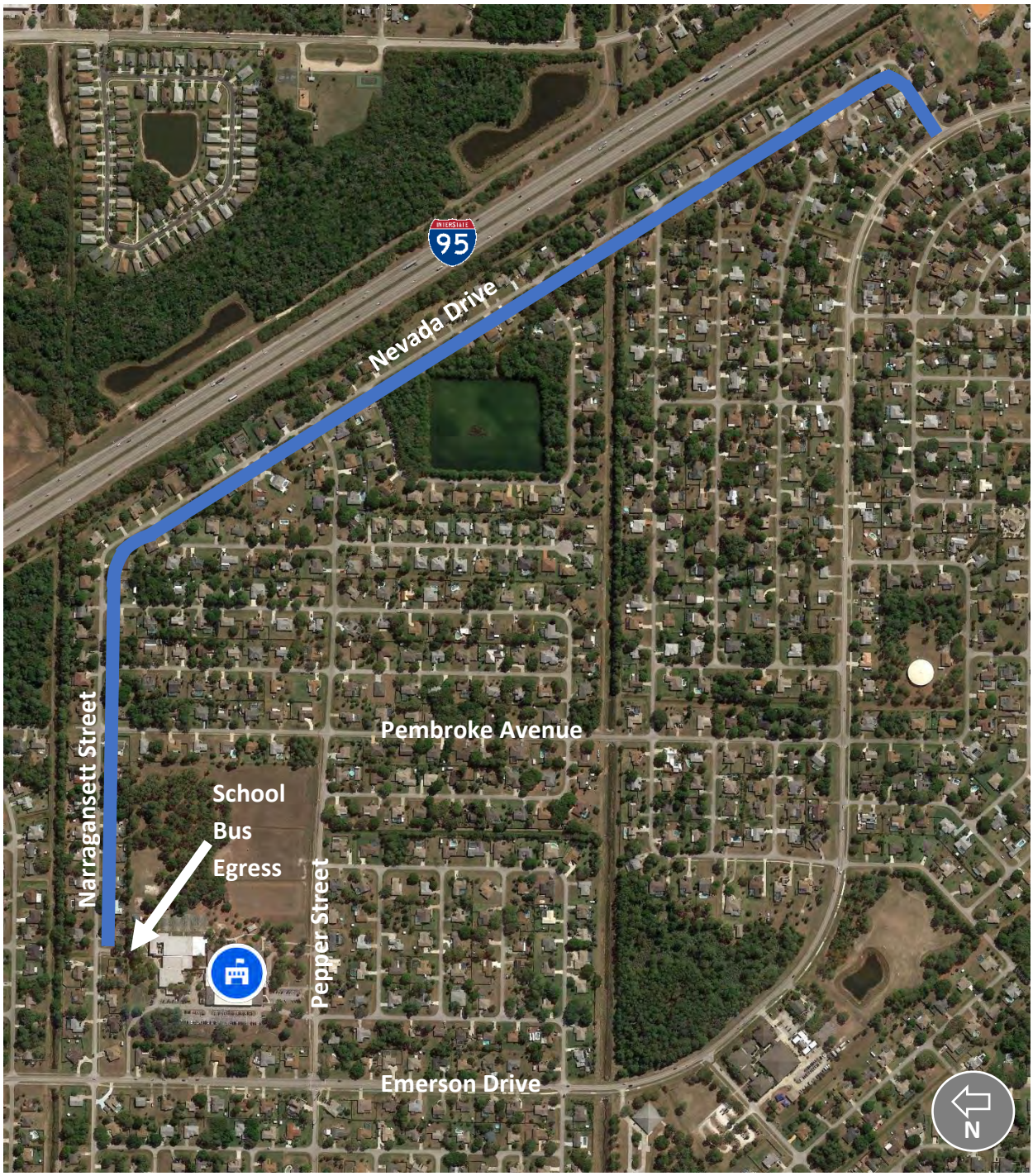
Add Sidewalk Along Armory Drive and Harwood Street and Culver Drive

Project 12: Construct a five to six foot sidewalk on Narragansett Street and Nevada Drive

Location	Narragansett Street from School Bus Egress Driveway to Pembroke Avenue and Nevada Drive from Pembroke Avenue to Emerson Drive
Type	Sidewalk
Issue	There are no sidewalks along Narragansett Street from School Bus Egress Driveway to Pembroke Avenue and Nevada Drive from Pembroke Avenue to Emerson Drive.
Recommendation	Build a 5 to 6 foot wide sidewalk on the south and west side.

Sidewalk Gap Along Narragansett Street

	Implementation Time-Frame	Near-Term
	Estimated Project Cost	$420,000 to $500,000
	Right-of Way Needed?	Unknown
	Drainage or Utility Impact?	Drainage Impact
	Responsible Agency	City of Palm Bay



Add Sidewalk Along South and West Side of Narragansett Street and Nevada Drive

Project 13: Construct a five to six foot sidewalk on Narragansett Street

Location	**Narragansett Street from Pelican Drive to Emerson Drive**
Type	**Sidewalk**
Issue	There are no sidewalks along Narragansett Street from Pelican Drive to Emerson Drive.
Recommendation	Build a 5 to 6 foot wide sidewalk on the south side.

Sidewalk Gap Along Narragansett Street

	Implementation Time-Frame	**Near-Term**
	Estimated Project Cost	**$170,000 to $200,000**
	Right-of Way Needed?	**Unknown**
	Drainage or Utility Impact?	**Drainage Impact**
	Responsible Agency	**City of Palm Bay**

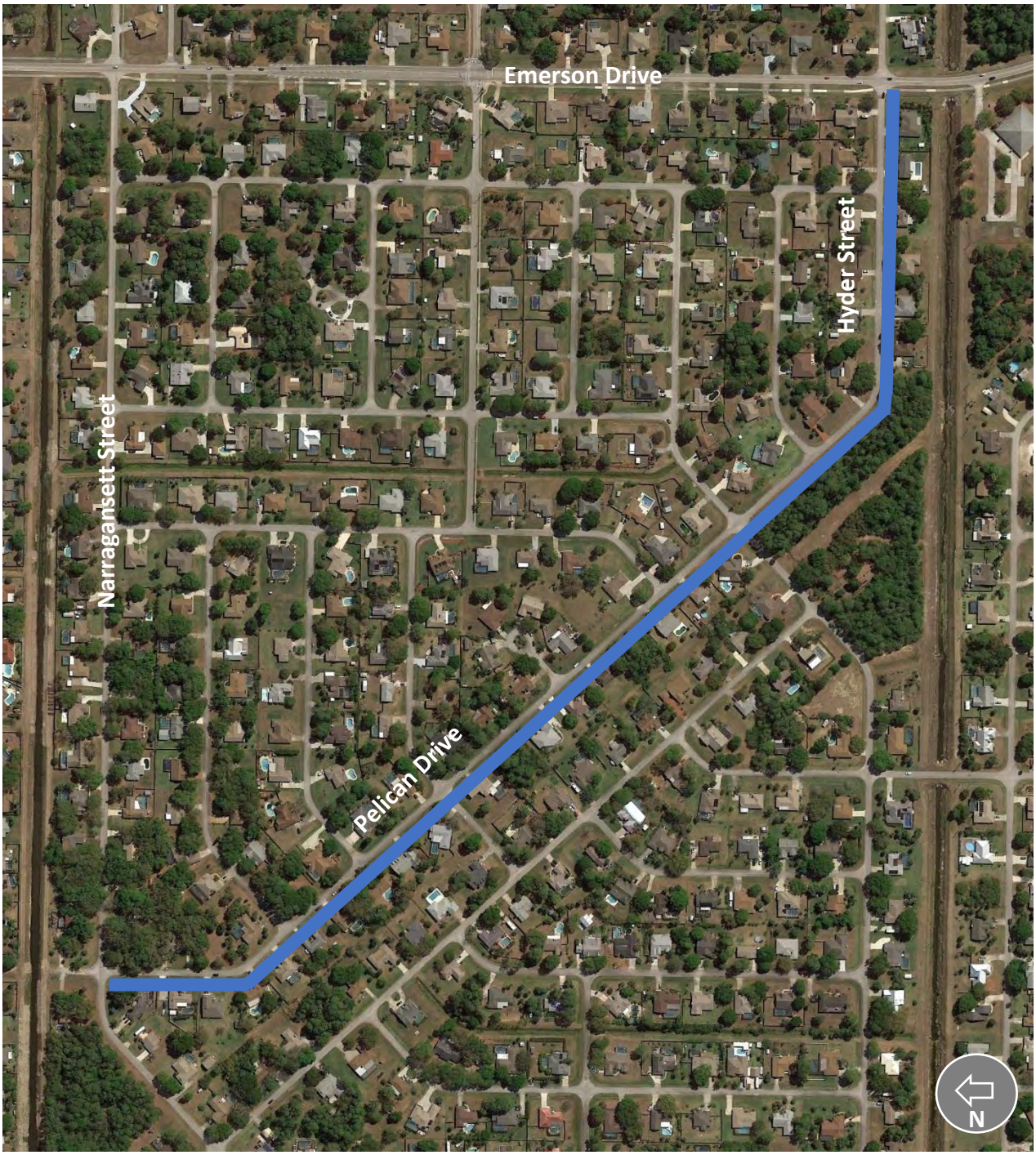
Add Sidewalk Along South Side of Narragansett Street

Project 14: Construct a five to six foot sidewalk on Pelican Drive

Location	Pelican Drive/Hyder Street from Narragansett Street to Emerson Drive
Type	Sidewalk
Issue	There are no sidewalks along Narragansett Street from Pelican Drive to Emerson Drive.
Recommendation	Build a 5 to 6 foot wide sidewalk on the south side.

Sidewalk Gap Along Pelican Drive/Hyder Street

	Implementation Time-Frame	Long-Term
	Estimated Project Cost	$250,000 to $290,000
	Right-of Way Needed?	Unknown
	Drainage or Utility Impact?	Drainage Impact
	Responsible Agency	City of Palm Bay



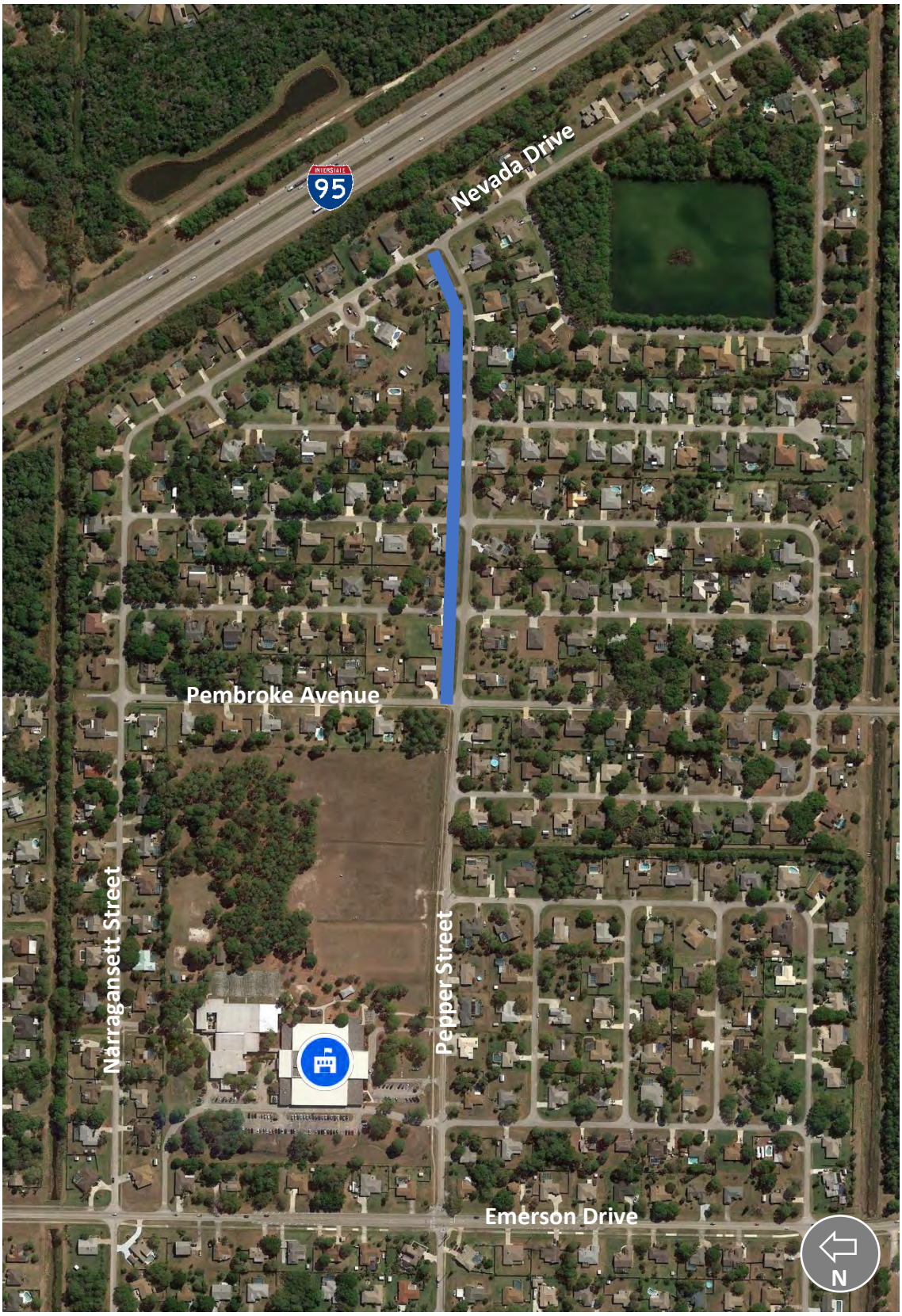
Add Sidewalk Along South Side of Pelican Drive/Hyder Street

Project 15: Construct a five to six foot sidewalk on Pepper Street

Location	**Pepper Street from Pembroke Avenue to Nevada Drive**
Type	**Sidewalk**
Issue	There are no sidewalks along Pepper Street from Pembroke Avenue to Nevada Drive.
Recommendation	Build a 5 to 6 foot wide sidewalk on the north side.

Sidewalk Gap Along Pepper Street

	Implementation Time-Frame	**Near-Term**
	Estimated Project Cost	**$100,000 to $120,000**
	Right-of Way Needed?	**Unknown**
	Drainage or Utility Impact?	**Drainage Impact**
	Responsible Agency	**City of Palm Bay**



Add Sidewalk Along North Side of Pepper Street

Project 16: Construct a five to six foot sidewalk on Pebble Avenue

Location	**Pebble Avenue from Nemo Circle to Nesbitt Street**
Type	**Sidewalk**
Issue	There are no sidewalks along Pebble Avenue from Nemo Circle to Nesbitt Street.
Recommendation	Build a 5 to 6 foot wide sidewalk on east side.

Sidewalk Gap Along Pebble Avenue

	Implementation Time-Frame	**Long-Term**
	Estimated Project Cost	**$110,000 to $125,000**
	Right-of Way Needed?	**Unknown**
	Drainage or Utility Impact?	**Drainage Impact**
	Responsible Agency	**City of Palm Bay**

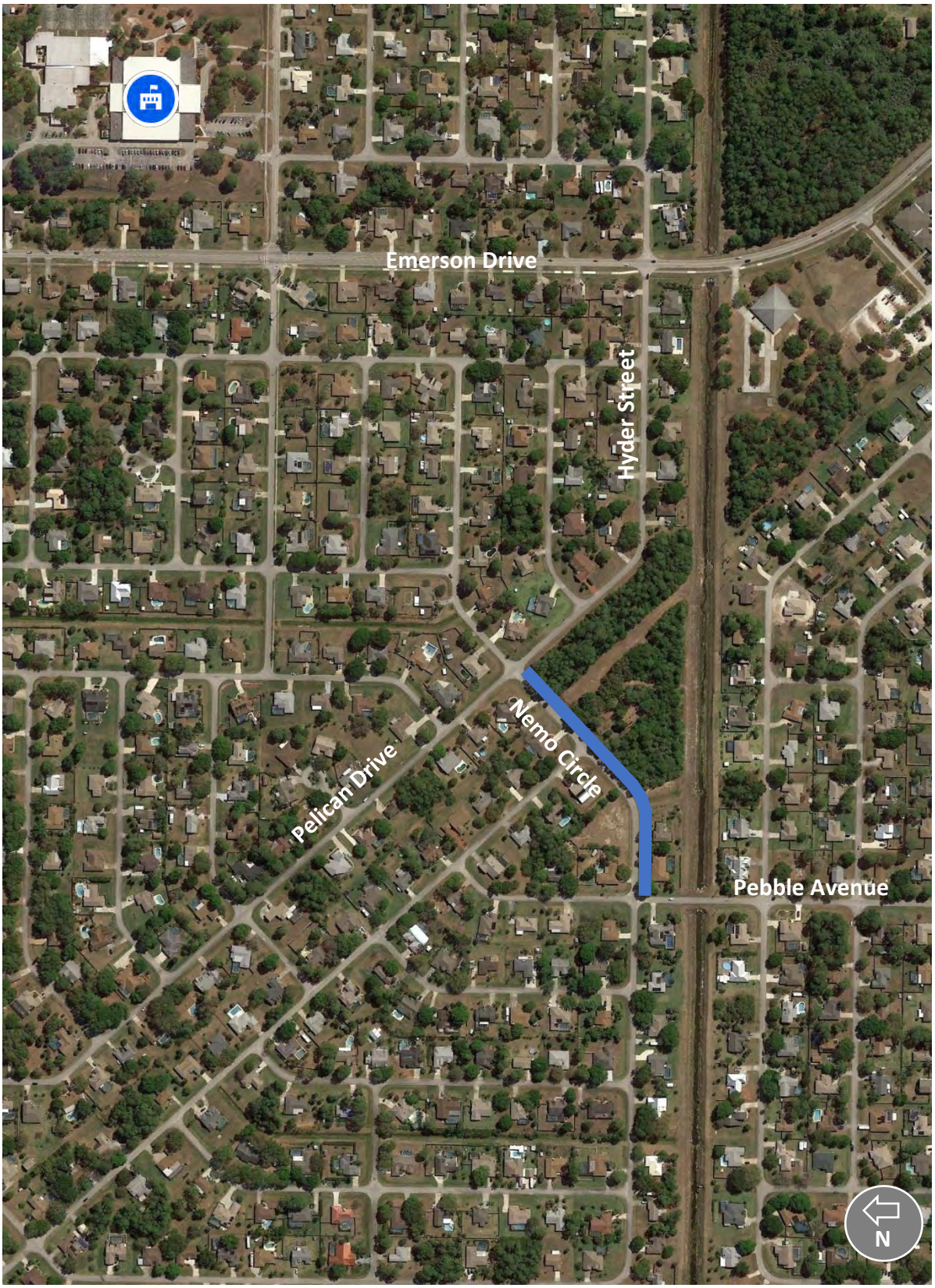
Add Sidewalk Along East Side of Pebble Avenue

Project 17: Construct a five to six foot sidewalk on Nemo Circle

Location	**Nemo Circle from Pebble Avenue to Pelican Drive**
Type	**Sidewalk**
Issue	There are no sidewalks along Nemo Circle from Pebble Avenue to Pelican Drive.
Recommendation	Build a 5 to 6 foot wide sidewalk on south side.

Sidewalk Gap Along Nemo Circle

	Implementation Time-Frame	**Long-Term**
	Estimated Project Cost	**$60,000 to $70,000**
	Right-of Way Needed?	**Unknown**
	Drainage or Utility Impact?	**Drainage Impact**
	Responsible Agency	**City of Palm Bay**



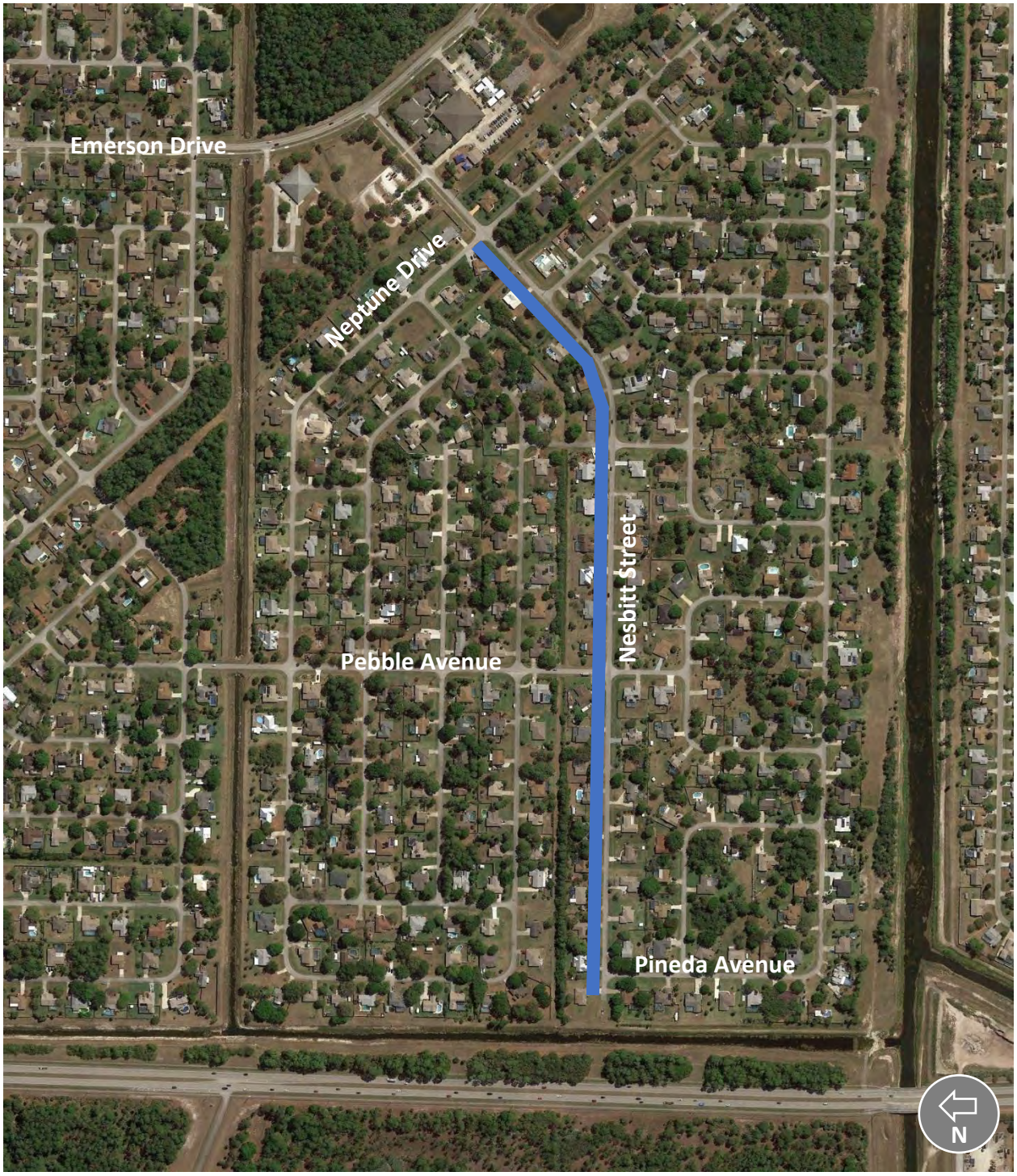
Add Sidewalk Along South Side of Nemo Circle

Project 18: Construct a five to six foot sidewalk on Nesbitt Street

Location	**Nesbitt Street from Pineda Avenue to Neptune Drive**
Type	**Sidewalk**
Issue	There are no sidewalks along Nesbitt Street from Pineda Avenue to Neptune Drive.
Recommendation	Build a 5 to 6 foot wide sidewalk on north side.

Sidewalk Gap Along Nesbitt Street

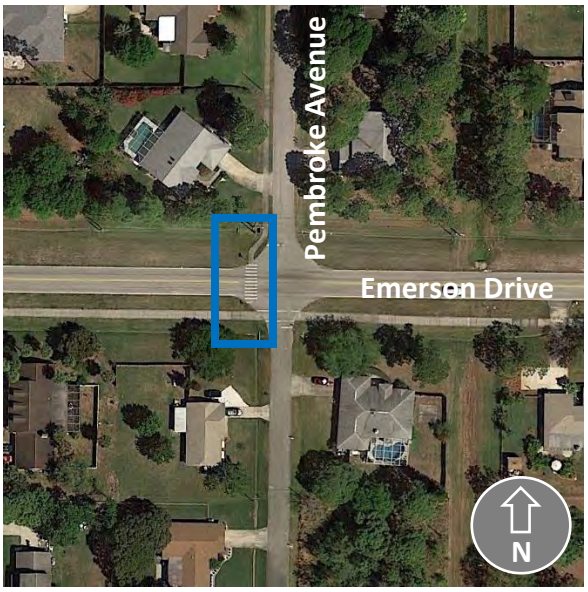
	Implementation Time-Frame	**Long-Term**
	Estimated Project Cost	**$200,000 to $225,000**
	Right-of Way Needed?	**Unknown**
	Drainage or Utility Impact?	**Drainage Impact**
	Responsible Agency	**City of Palm Bay**



Add Sidewalk Along North Side of Nesbitt Street

Project 19: Add Rectangular Rapid Flashing Beacon (RRFB) at Emerson Drive and Pembroke Avenue Intersection

Location	Emerson Drive and Pembroke Avenue Intersection
Type	Crossing
Issue	The intersection of Emerson Drive and Pembroke Avenue is an unsignalized intersection. Pedestrians and bicyclists must cross Emerson Avenue with no assistance.
Recommendation	Install RRFB for the pedestrian crossing.



Existing Crossing at Emerson Drive and Pembroke Avenue Intersection

	Implementation Time-Frame	Near-Term
	Estimated Project Cost	$25,000 to $30,000
	Right-of Way Needed?	No
	Drainage or Utility Impact?	No
	Responsible Agency	City of Palm Bay

RRFB at an Intersection

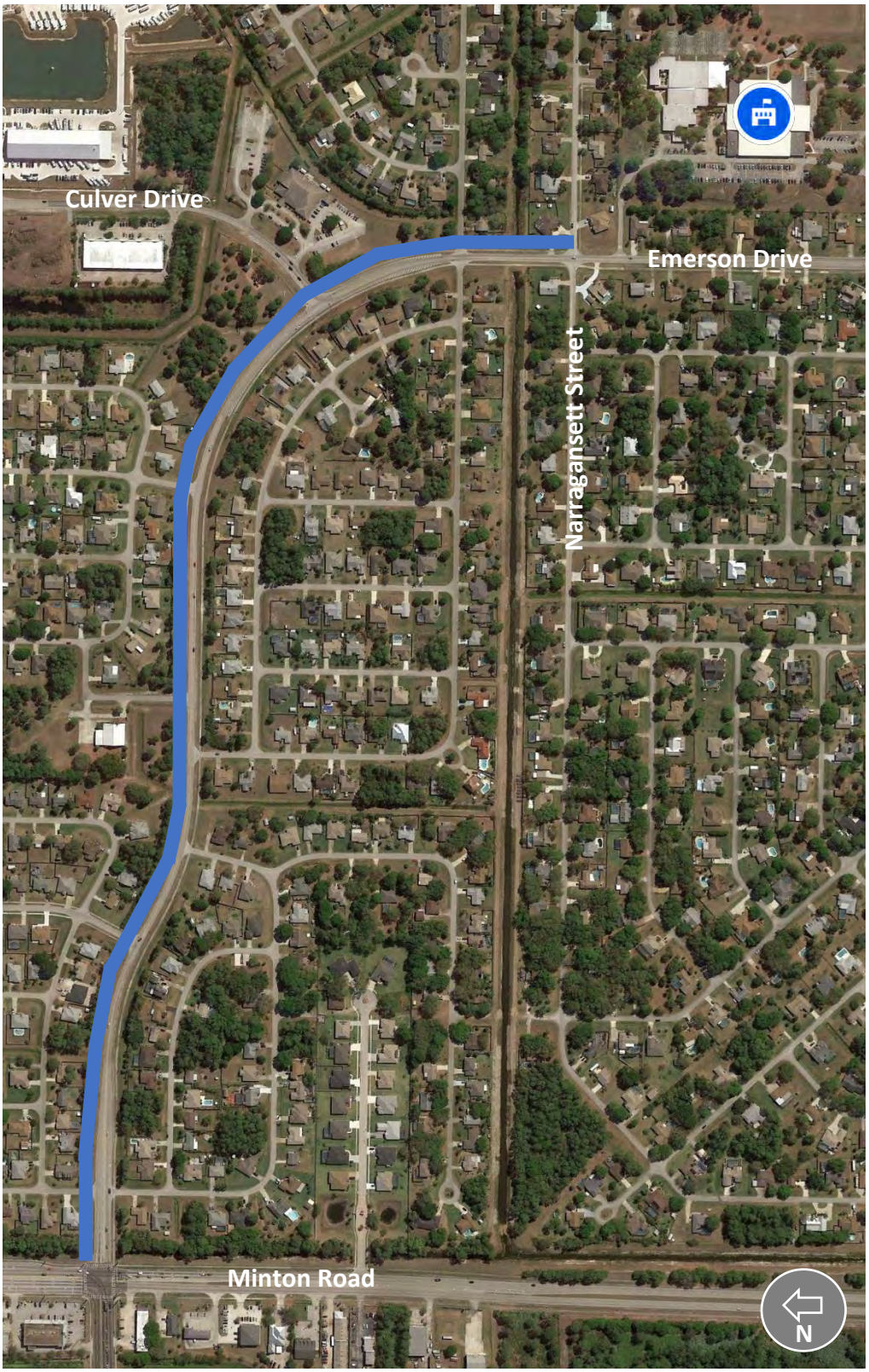
Typical RRFB Sign

Project 20: Widen sidewalk along Emerson Drive to an eight to ten foot shared use path

Location	Emerson Drive, from Minton Road to Narragansett Street
Type	Sidewalk
Issue	There are no bicycle facilities along Emerson Drive, from Minton Road to Narragansett Street.
Recommendation	Widen existing 6 foot sidewalk to an 8 to 10 foot shared use path.

Existing Sidewalk Along Emerson Drive

	Implementation Time-Frame	Long-Term
	Estimated Project Cost	$470,000 to $550,000
	Right-of Way Needed?	Unknown
	Drainage or Utility Impact?	Unknown
	Responsible Agency	City of Palm Bay



Widen Existing Sidewalk to an Eight to Ten Foot Wide Shared Use Path

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