



SR 524 | Corridor Alternatives and Strategies Summary

FM #437983-1



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1.0 Introduction

In February 2016, the Florida Department of Transportation (FDOT) initiated a Corridor Planning Study (“the Study”) to evaluate the need for potential multimodal transportation improvements along State Road (S.R.) 524 in Brevard County, Florida. As shown in Figure 1.1, the limits of the S.R. 524 Study Area extend from S. Friday Road to Industry Road, a distance of approximately 3.150 miles.

This project was requested by the Space Coast Transportation Planning Organization (SCTPO) to coordinate the development of a future vision for the S.R. 524 corridor, which establishes a multimodal approach to providing for future transportation needs. This study involved a community-based evaluation to determine how best to meet the needs of current and future users, and to establish a long-term plan to guide evolution of the corridor, appropriately correlating the balance between land use and transportation planning.

The S.R. 524 Corridor Study engaged local agencies, community leaders, and other stakeholders to provide the study team with a comprehensive understanding of the groundwork for determining the needs of current and future users, and establishing a long-term plan that appropriately balances land use and transportation planning. The collaboration between the FDOT Study Team and key stakeholders included establishing a Project Visioning Team, comprised of agency staff from the City of Cocoa, Brevard County, the Space Coast TPO, Space Coast Area Transit, Port Canaveral, as well as residents, businesses, and property owners. The Study Team engaged this group throughout the evaluation to seek input into the planning process and to promote a heightened awareness of context-sensitive design issues as part of the concept development process.

The corridor is a two-lane, urban minor arterial with four foot paved shoulders and open swale drainage within right-of-way that varies from 200’ – approximately 253’. Annual average daily traffic (AADT) ranges from approximately 10,000 to 14,000 and truck traffic percentages range from approximately 7 to 9 percent. The posted speed limit varies from 55 miles-per-hour (mph) in the western portion to 45 mph in the eastern portion of the corridor.

Limited bicycle and pedestrian features are present within the study limits; however, a sidewalk is located on the north side of the roadway from Cox Road to Industry Road. Existing land uses in the area are primarily residential and commercial with numerous vacant, large acre parcels located on the south side of the roadway. There are also several industrial parcels on the west side of Cox Road, just south of S.R. 524. Future land uses are generally the same as existing land uses in the developed sections of the corridor; however, future land uses in the area south and east of S.R. 524 range from mixed use, industrial, commercial, neighborhood commercial, and medium density residential. Several large-scale developments are initiating the improvements to the existing roadway.

1.1 Guiding Principles

Building upon the data collected through the Existing Conditions Report and lessons learned from the stakeholder interviews and the first Public Meeting, a series of guiding principles were developed. These guiding principles speak to what the Cocoa community views as important, as

it relates to the multi-modal transportation vision and associated land use goals of the S.R. 524 Study Area. These guiding principles are listed in Table 1.1 below.

1.2 Goals, Objectives and Evaluation Measures

The Goals and Objectives were designed to support the Guiding Principles and are also identified in Table 1.1. The conceptual roadway alternatives were developed and analyzed based on the Guiding Principles and Goals and Objectives. The measures to evaluate the alternatives were developed to be consistent with the Guiding Principles, Goals and Objectives for the S.R. 524 Corridor.

Table 1.1: Guiding Principles for S.R. 524

Guiding Principle	Goal	Evaluation Measure
Safety and Security	To provide a safe and secure Corridor	Improvement in Estimated Crash Rate
		Improved Pedestrian Safety: Sidewalks or Pathways
		Improved Bicyclist Safety: Bicycle Lanes
Mobility, Connectivity, and Accessibility	To facilitate the easy movement of people and goods, improve interconnectivity between activity centers, I-95, S.R. 520, and S.R. 528, and provide access to different modes of transportation	Provision of Sufficient Travel Lanes
		Overall Access Management Strategy
		Improved Mobility: Sidewalk Connectivity
Environmental Stewardship	To protect the environment and the Cocoa Conservation Area	Impacts to Existing ROW Tied to Existing Stormwater and Drainage
		Impacts to Existing Drainage
Economic Vitality	To promote economic development, freight movement, and the development of a specialized economic hub along the Corridor	Promote Safe and Easy Access to Economic and Freight Activity Centers
		Promote Ancillary Development Adjacent to Freight Activity Centers, Supporting Retail, And Local Job Creation
Land Use Coordination	To promote livable communities and mixed use development along the Corridor	Promote Mixed-Use Adjacent to Existing Development to Promote Multi-Modal Access
		Promote Freight or Industrial Land Uses Adjacent to Freight Activity Centers

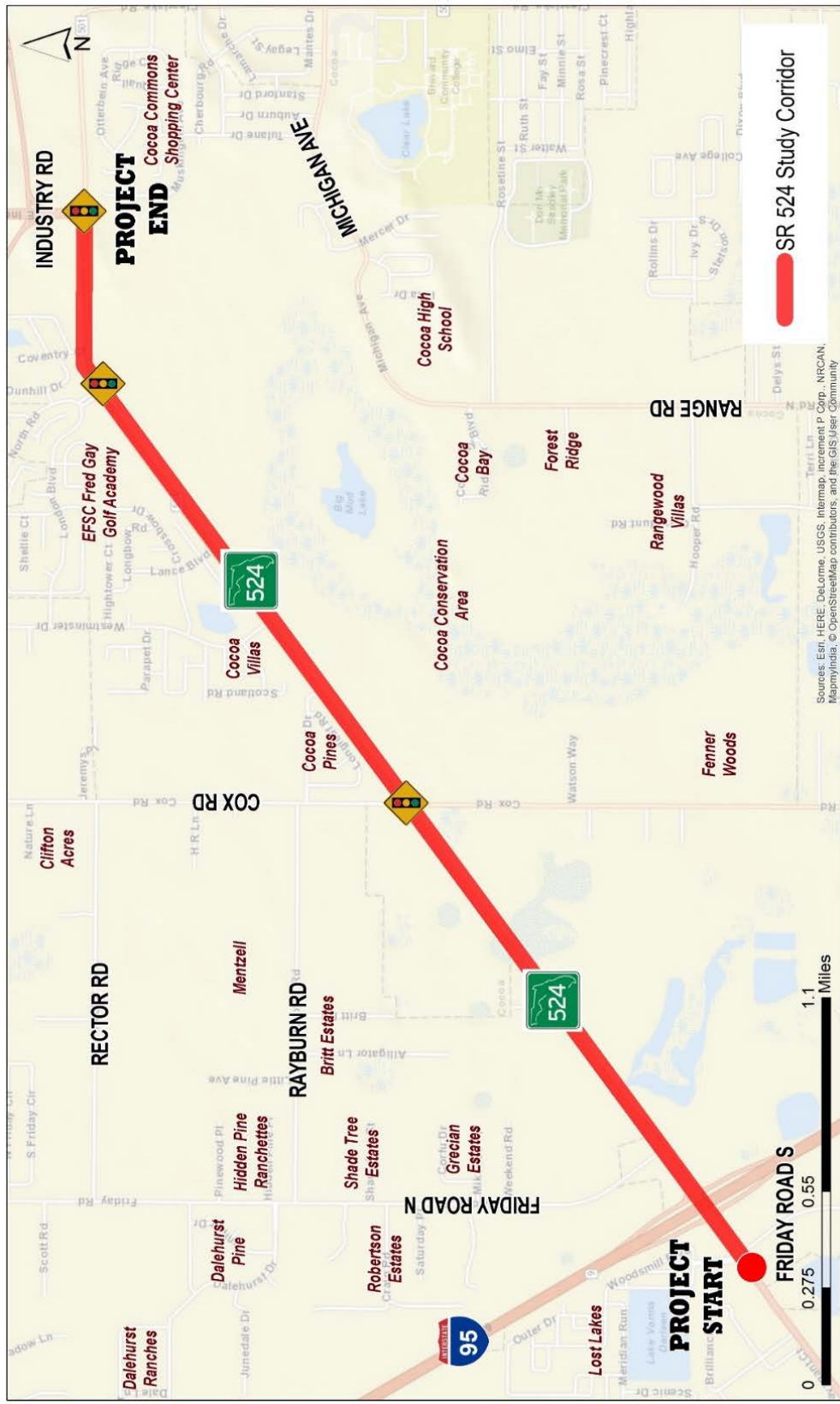
Once the issues, guiding principles and goals and objectives were identified, the resulting improvement strategies were developed to improve the function and multi-modal character of the corridor.

- Widen the entire corridor from 2 to 4 through lanes
- Reduce lane width to 11' east of Cox Road
- Provide a raised, landscaped median along corridor from S. Friday Road to Industry Road, with median breaks at identified locations
- Provide a 12' wide multi-use path along the northern portion of the corridor

- Provide a 6' wide sidewalk along the southern portion of the corridor
- Add buffered bike lanes on both sides of the corridor
- Modify the abutment at I-95 to allow for sidewalks behind the bridge piers
- Provide enhanced crosswalks and pedestrian signals at all intersections
- Provide double left turn lanes from S.R. 524 onto the southbound I-95 ramps (one of the turn lanes will also serve as a through lane); widen southbound on-ramp to accommodate two turning lanes
- Eliminate the directional right turn lanes off the I-95 southbound and northbound off-ramps, bringing these lanes into the proposed ramp signal locations
- Add traffic signals at S.R. 524 and the northbound and southbound I-95 ramps, and at S.R. 524 and N. Friday Road
- Confirm viability of traffic signal at S.R. 524 and S. Friday Road
- Provide enhanced roadway lighting in the corridor

The following chapters provide an overview of the process followed and the resulting recommendations for the S.R. 524 Corridor Planning Study.

Figure 1.1: Study Area



2.0 Existing and Future Conditions

This section of the report provides a summary of the existing conditions of S.R. 524 and the surrounding area, which was used to develop the Purpose & Need and Goals & Objectives.

2.1 Transportation Characteristics

This Section evaluates existing traffic operations along roadway segments and at intersections within the Study Corridor. For detailed information on Existing Conditions, refer to the Existing Conditions Technical Memorandum which exists as a separate document.

Roadway Network

S.R. 524 bisects the City of Cocoa and unincorporated Brevard County, and is designated as an Urban Minor Arterial by FDOT. From S. Friday Road to N. Friday Road, S.R. 524 consists of two travel lanes in each direction, and from N. Friday Road east to Industry Road, S.R. 524 consists of one travel lane in each direction. S.R. 524 is intersected by several important roadways as listed below in Table 2.1:

Table 2.1: Roadways in Study Area by Type

Roadway	Designation	Jurisdiction	Design LOS
Interstate 95	Urban Principal Arterial	FDOT	E
S.R. 524	Urban Minor Arterial	FDOT	D
S.R. 528	Urban Principal Arterial	FDOT	D
S.R. 501	Urban Principal Arterial	FDOT	D
Industry Road	Urban Principal Arterial	Brevard County	E
Cox Road	Urban Collector	City of Cocoa	E
N. Friday Road	Urban Collector	Brevard County	E
S. Friday Road	Urban Collector	Brevard County	E

Source: Brevard County Property Appraiser, 2016; City of Cocoa Comprehensive Plan, 2010

Roadway Cross Section and Right-of-Way

The roadway cross-sections, displayed in Figures 2.1 through 2.4, illustrate the dimensions of the paved roadway, grass shoulders, and the unpaved right-of-way. Existing right-of-way width along S.R. 524 is approximately 200 feet from S. Friday Road to the I-95 Bridge, and approximately 105 feet under the I-95 Bridge. Existing right-of-way width along S.R. 524 is approximately 200 feet from the I-95 Bridge to London Boulevard, approximately 218 feet from London Boulevard to the Shopping Center intersection, and approximately 253 feet from the Shopping Center intersection to Industry Road.

Figure 2.1: Existing S.R. 524 Roadway Cross Section Locations: S. Friday Road to Cox Road

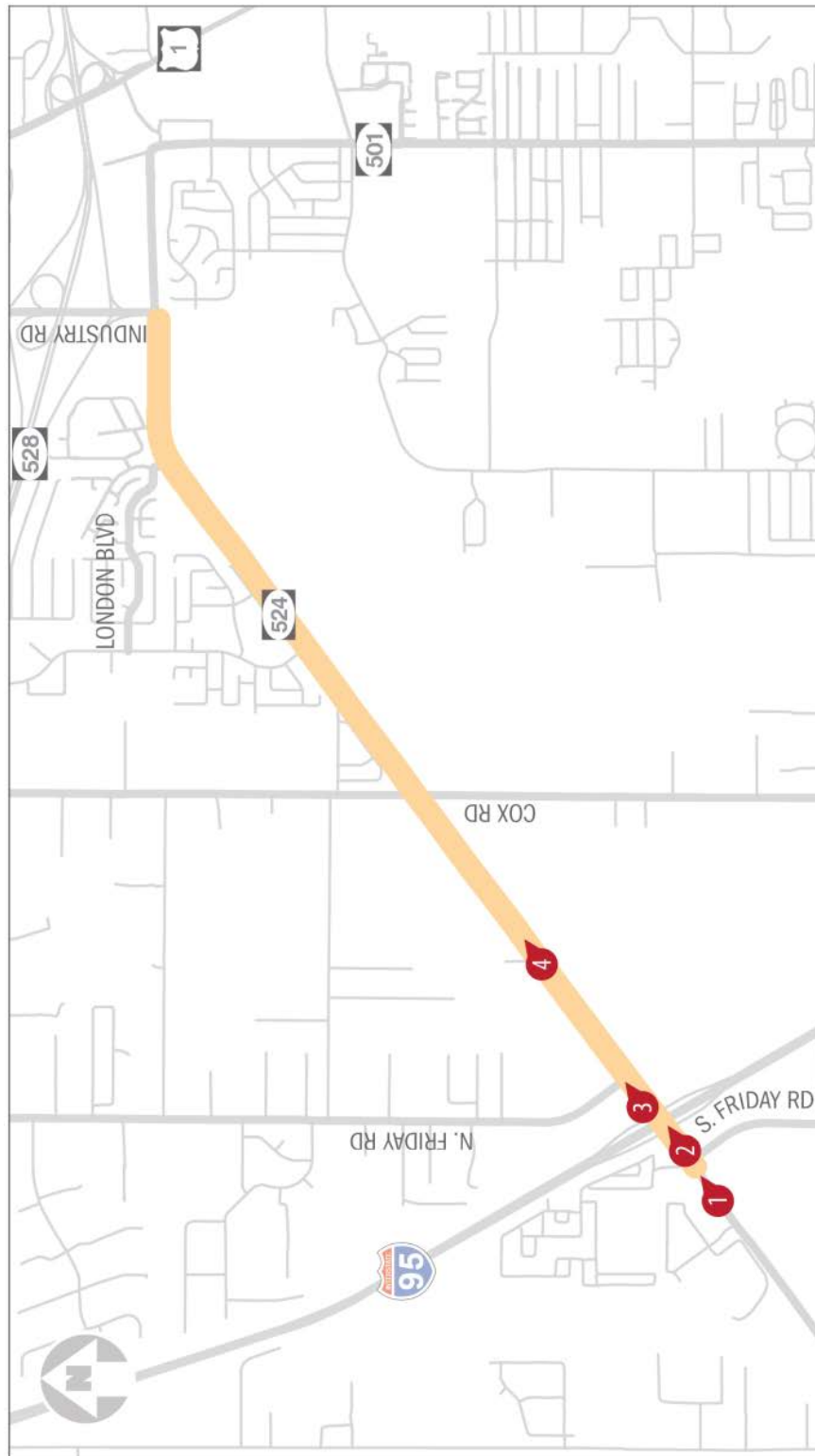


Figure 2.2: Existing S.R. 524 Roadway Cross Sections: S. Friday Road to Cox Rd.

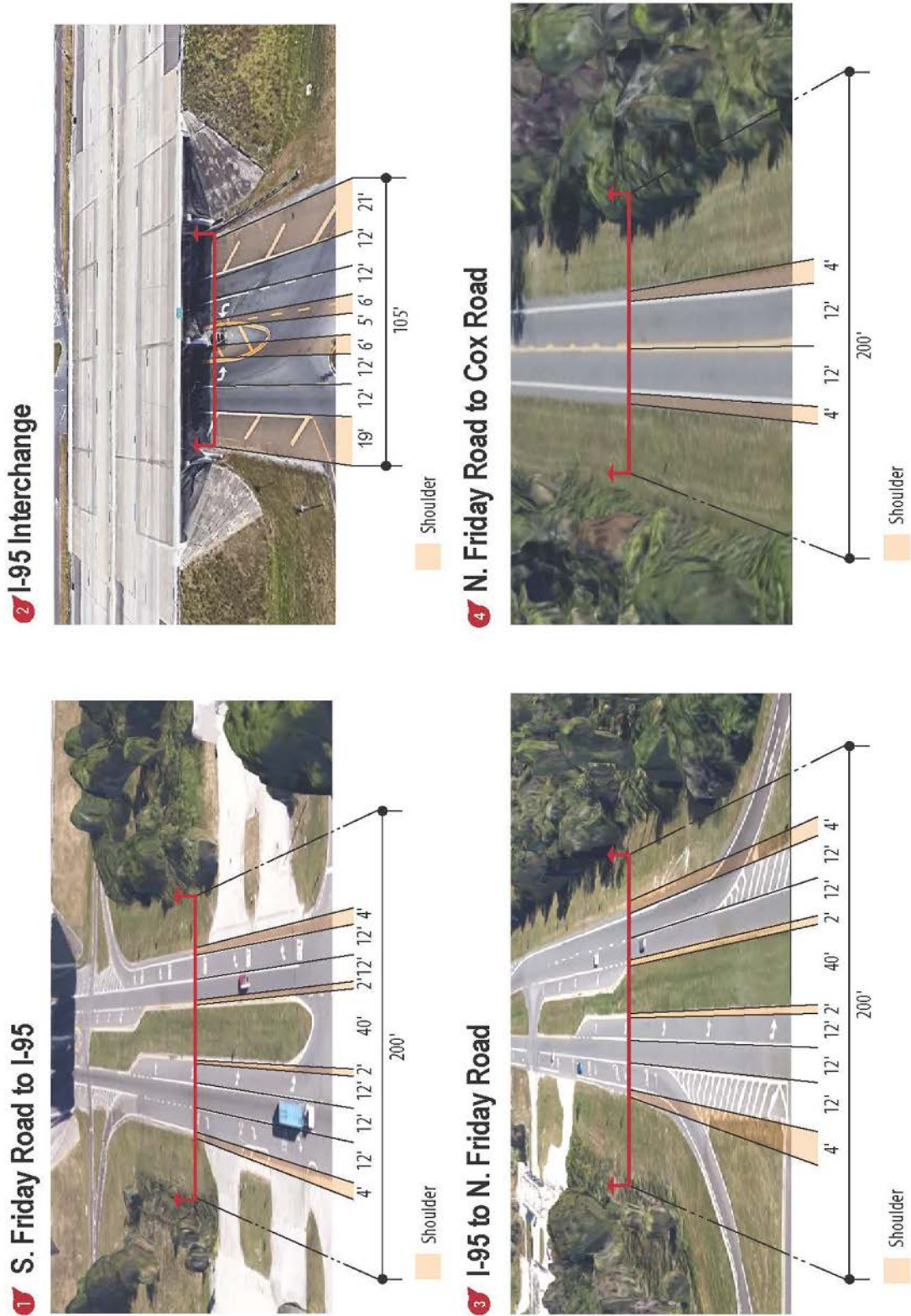


Figure 2.3: Existing S.R. 524 Roadway Cross Section Locations: Cox Rd. to Industry Rd.

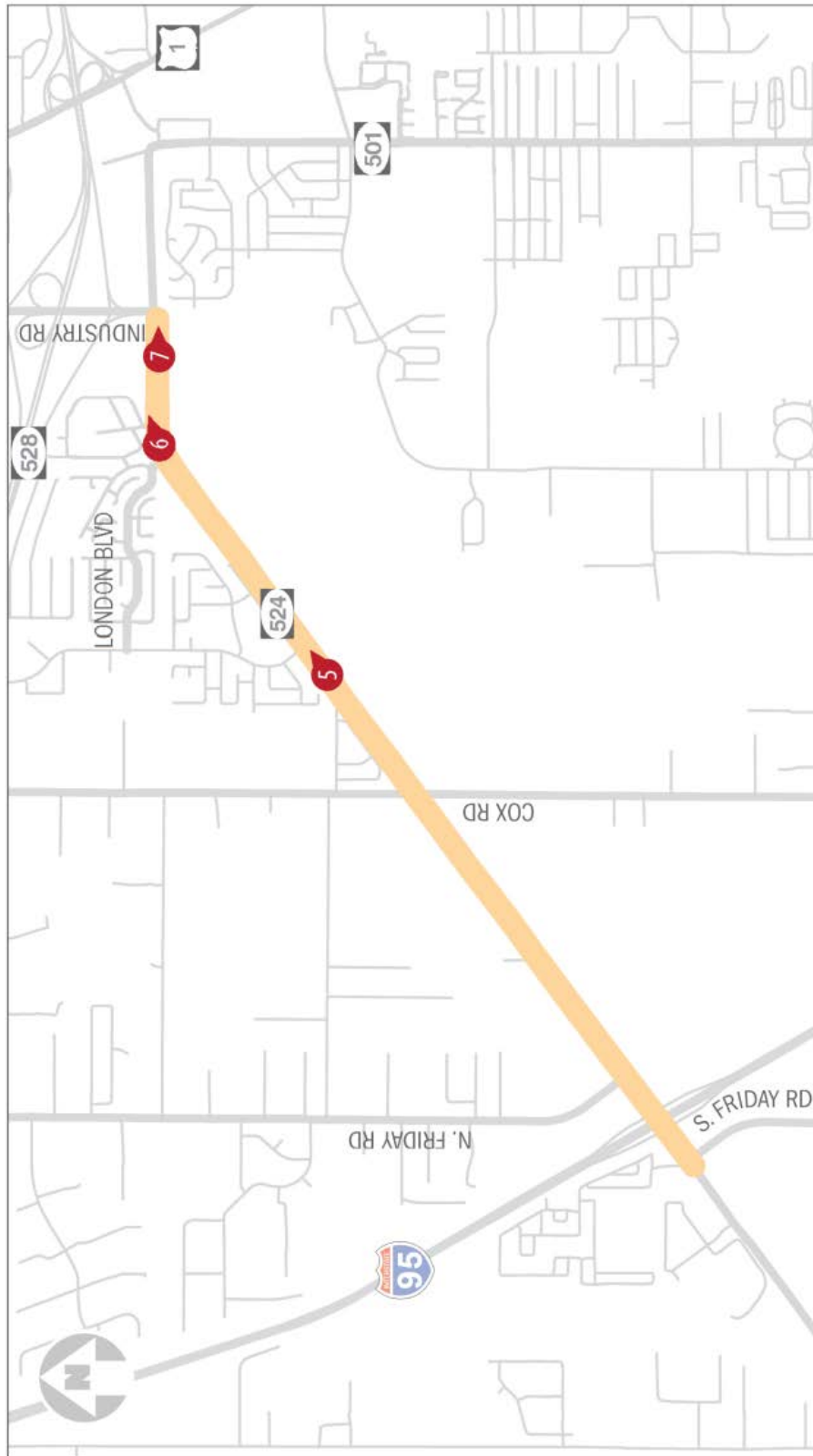
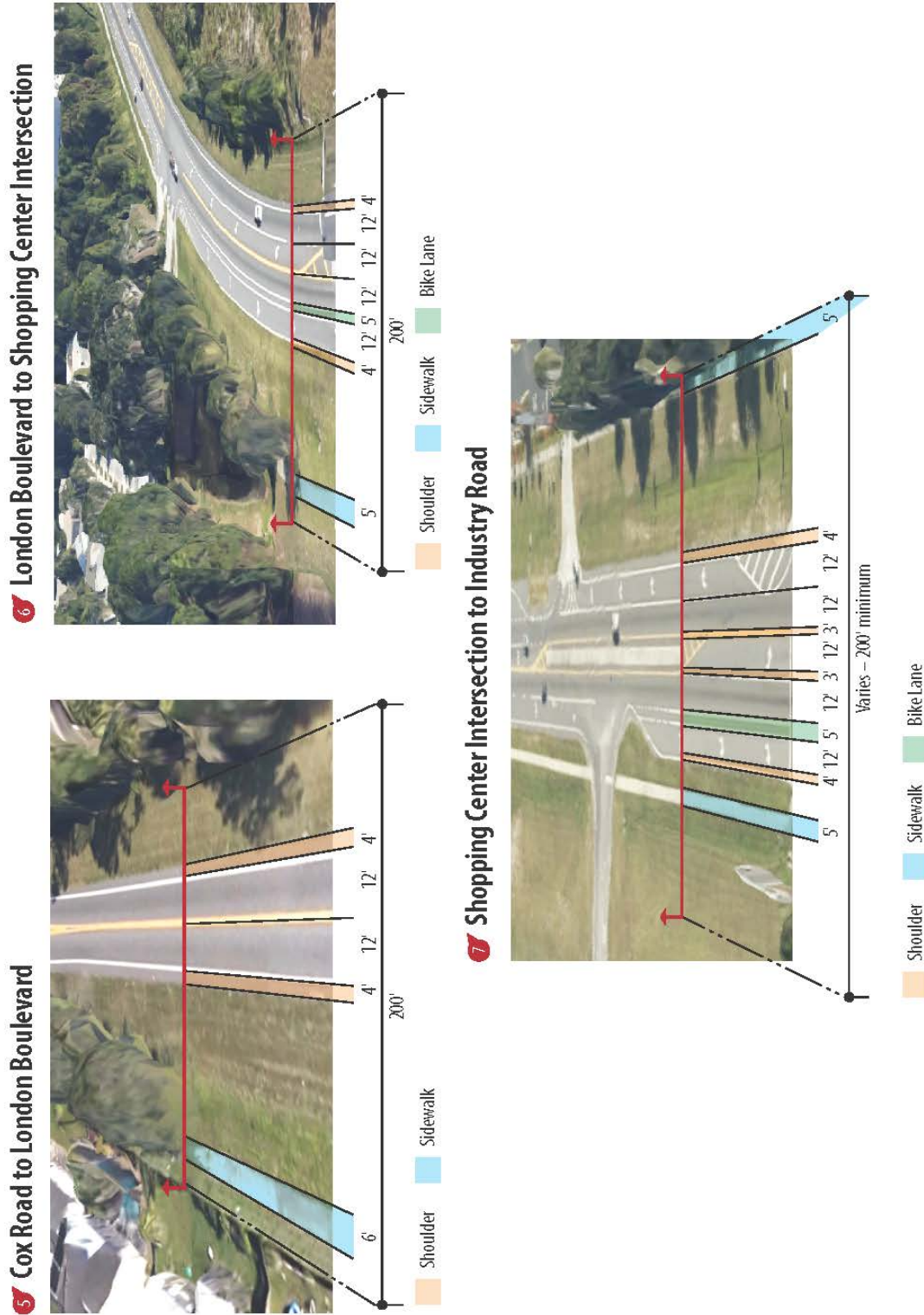


Figure 2.4: Existing S.R. 524 Roadway Cross Sections: Cox Rd. to Industry Rd



Source: FDOT, 2016

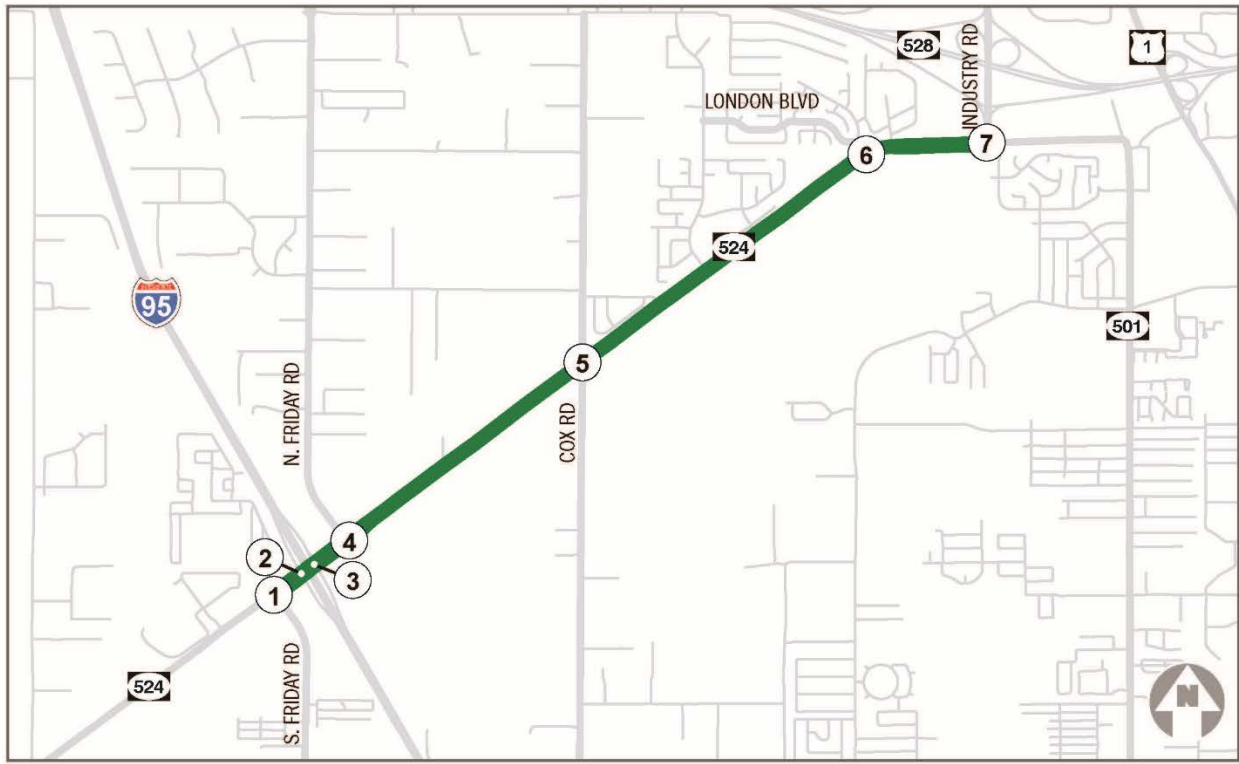
Intersection Configurations

Within the study area, there are four signalized intersections and nine unsignalized intersections, listed below. Figure 2.5 identifies the existing lane configurations and traffic control at the seven major intersections along S.R. 524.

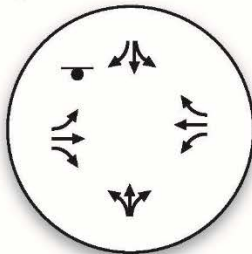
- S. Friday Road (unsignalized)
- I-95 Southbound Ramp (unsignalized)
- I-95 Northbound Ramp (unsignalized)
- N. Friday Road (unsignalized)
- Thien Thai Lane (unsignalized)
- **Cox Road (signalized)**
- Pinyon Drive (unsignalized)
- Westminster Drive (unsignalized)
- Lance Boulevard (unsignalized)
- **London Boulevard (signalized)**
- Coventry Court (unsignalized)
- **Cocoa Commons/Coventry at Cocoa Access (signalized)**
- **Industry Road (signalized)**

The existing Cox Road, London Boulevard, and Industry Road intersections are signalized. There is another signalized intersection between London Road and Industry Road, which serves the entrances of the Cocoa Commons and Coventry at Cocoa shopping centers. All other intersections in the corridor are un-signalized. The raised median on S.R. 524 on the west approach of Industry Road restricts access to driveways to right-in, right-out only movements between Industry Road and the signal serving both shopping centers. All intersections west of this raised median section have full movement access.

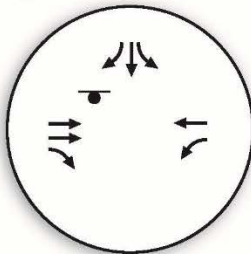
Figure 2.5: Existing Intersection Lane Configuration and Traffic Controls



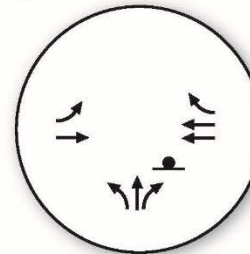
① SR 524 & S. Friday Rd.



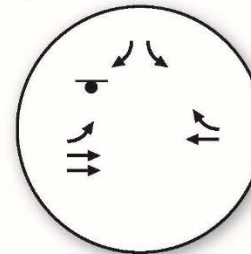
② SR 524 & I-95 SB Ramps



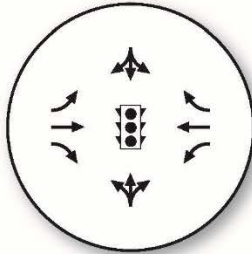
③ SR 524 & I-95 NB Ramps



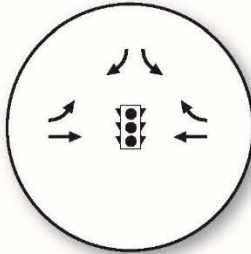
④ SR 524 & N. Friday Rd.



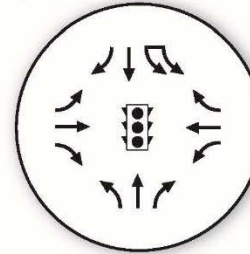
⑤ SR 524 & Cox Rd.



⑥ SR 524 & London Blvd.



⑦ SR 524 & Industry Rd.



Traffic Signal
 Stop Sign

2.2 Pedestrian and Bicycle Facilities

There are limited existing pedestrian and bicycle facilities currently within the S.R. 524 Study Area. Figure 2.6 illustrates existing and future pedestrian/bicycle facilities on S.R. 524 and the surrounding road network. These features are also summarized in Table 2.2.

Table 2.2: Existing Pedestrian & Bicycle Facilities

Segment	Length	Pedestrian Facilities	Bicycle Facilities	Other Notes
1. S. Friday Road to N. Friday Road	0.32 miles	None	None	Wide shoulder – could also be used as bicycle lane
2. N. Friday Road to Cox Road	1.08 miles	None	None	Wide shoulder – could also be used as bicycle lane
2: Cox Road to Westminster Drive	0.57 miles	Sidewalk, north side only	None	Wide shoulder – could also be used as bicycle lane
3: Westminster Drive to Lance Blvd	0.23 miles	Sidewalk, north side only	None	Wide shoulder – could also be used as bicycle lane
4: Lance Blvd to London Blvd	0.49 miles	Sidewalk, north side only	None	Wide shoulder – could also be used as bicycle lane
5. London Blvd to Industry Road	0.49 miles	Sidewalk, north side only	Bicycle Lane, north side only	

Source: FDOT, 2016.

S.R. 524 – S. Friday Road to N. Friday Road

This is a rather small segment (0.32 miles), but nonetheless very important to the corridor and to the surrounding community as it contains the on and off ramps for I-95 North and South. This segment of roadway does not currently include any facilities for pedestrians or bicyclists, and has a posted speed limit of 45 mph. However, project stakeholders shared their concerns about the limited sight distance and frequent accidents at the I-95 interchange, particularly left turns from the southbound off ramp. The FDOT recently completed an Interchange Operational Analysis Report (IOAR) at this location to evaluate the need for signaling the ramp terminal intersections. In addition, the Traffic Impact Analysis (TIA) conducted for the Walmart site also included a recommendation to signalize the I-95 ramp terminal intersections. The improvements to be implemented, will provide better protection for bicycle and pedestrian users.

S.R. 524 – N. Friday Road to Cox Road

This section of S.R. 524 is about 1.08 miles long, and the posted speed limit increases from 45 mph to 55 mph just prior to a Traffic Monitoring Station (#411) just past Friday Road North. While this stretch of the road currently lacks pedestrian and bicycle facilities, there is sufficient existing right-of-way on both sides of S.R. 524 to include both bicycle lanes and sidewalks in potential future improvements.

S.R. 524 – Cox Road to Industry Road

The north side of S.R. 524 within this segment is developed with numerous single-family residential subdivisions, a golfing facility owned by Eastern Florida State College, and other commercial land uses. There is a continuous sidewalk along the north side ranging from five to eight feet in width, which starts at Cox Road and goes through the entire segment. There are six locations where bicycle lanes are provided on the north side of S.R. 524 which correspond with the right turn lanes at each intersection, starting with the shopping center traffic signal and proceeding west to Cox Road.

The majority of the south side of S.R. 524 within this segment is currently undeveloped and has only a small segment of sidewalk (five feet wide), which starts right before the traffic signal at the Cocoa Commons Shopping Center and extends through the east end of the corridor at Industry Road. This segment also has a bicycle lane adjacent to the right turning lane into the shopping center.

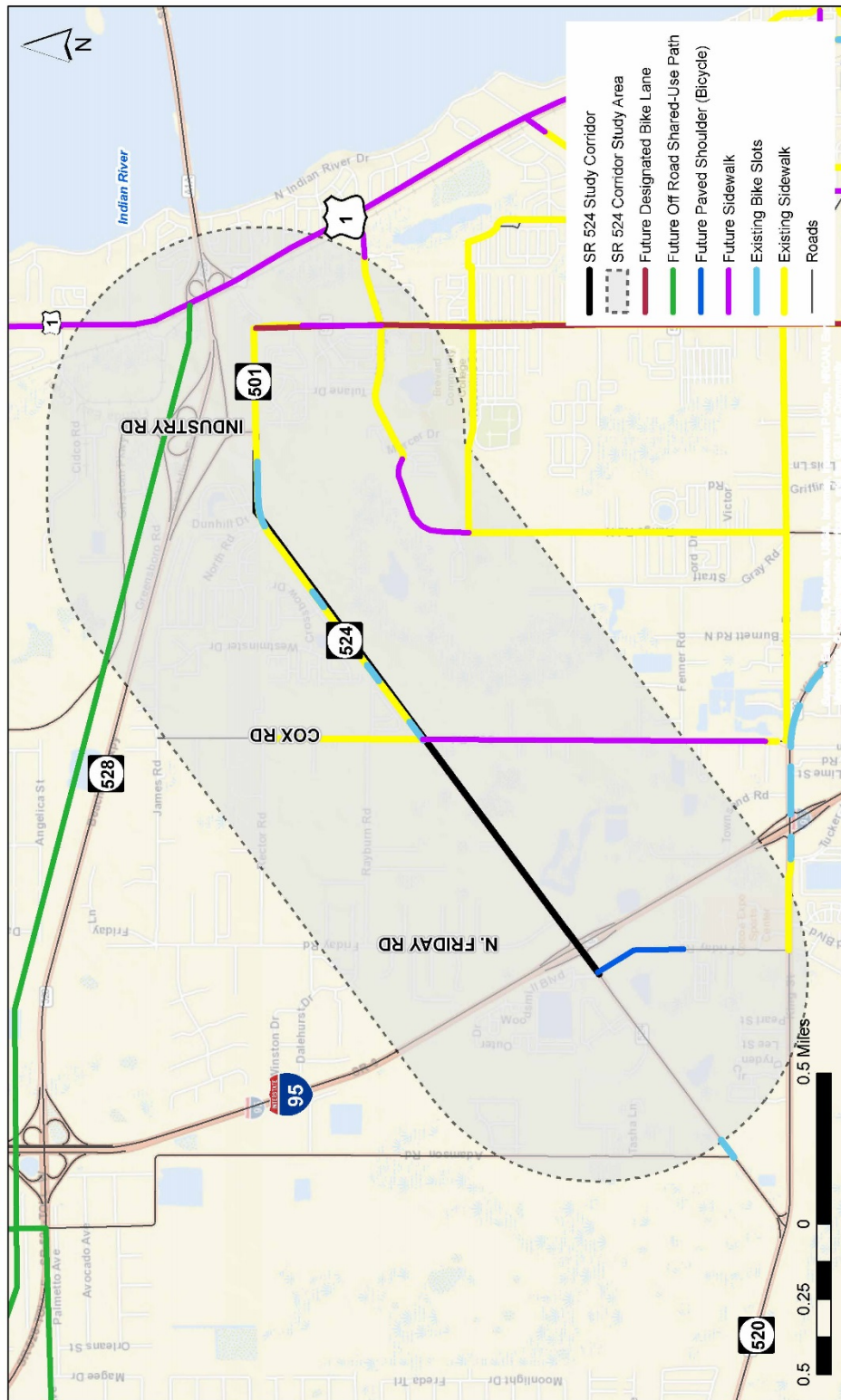
Intersecting Roadways – Bicycle and Pedestrian Facilities

N. Cox Road and S.R. 501 have existing sidewalks, but no bicycle lanes. North of S.R. 524 for around a mile, Cox Road has sidewalks on the east side of the roadway, but south of S.R. 524, Cox Road has no sidewalks. The remaining major intersecting roads which currently lack these facilities, such as S. Friday Road, N. Friday Road, and Cox Road. Most of the neighborhoods on the north side of the corridor (east of Cox Road) have an inner sidewalk network which is connected to the existing sidewalk facilities on S.R. 524. However, the sidewalks do not extend into the shopping center parking lots.

Pedestrian Crossings across S.R. 524

There is currently only one marked pedestrian connection between the north and south sides of S.R. 524 within the Study Area, which is located at the Cocoa Commons shopping center traffic signal on the east end. Since the south side of S.R. 524 is lightly developed, there are few existing connections between the south and north side. There are pedestrian refuge medians at select spots along S.R. 524 (e.g. the I-95 interchange area), but generally, the corridor has either painted medians or no medians at all. Most of the streets on the north side have marked crosswalks to ensure that drivers see pedestrians/bicyclists who are traveling east or west bound along these access points.

Figure 2.6: Pedestrian and Bicycle Facilities



Source: Space Coast Transportation Planning Organization, 2016

Transit Service

The S.R. 524 Study Area is currently served by two Space Coast Area Transit (SCAT) bus routes – Route 6 and Route 8 (see Figure 2.7). Route 6 (Cocoa/Rockledge) connects S.R. 524 with Central/South Cocoa and Rockledge, and serves the east end of the S.R. 524 Study Area, making a loop in the Cocoa Commons (Publix) shopping center. Route 8 (West Cocoa) connects Western and Central Cocoa along S.R. 520, serving S. Friday Road, just outside the S.R. 524 Study Area.

The frequency, span of service, and average daily ridership of Routes 6 and 8 are shown in Table 2.3. Route 6 has strong ridership compared to other routes in the region, but Route 8 displays very low ridership numbers. Surveys collected from riders indicated that they were not satisfied with the frequency of SCAT service.

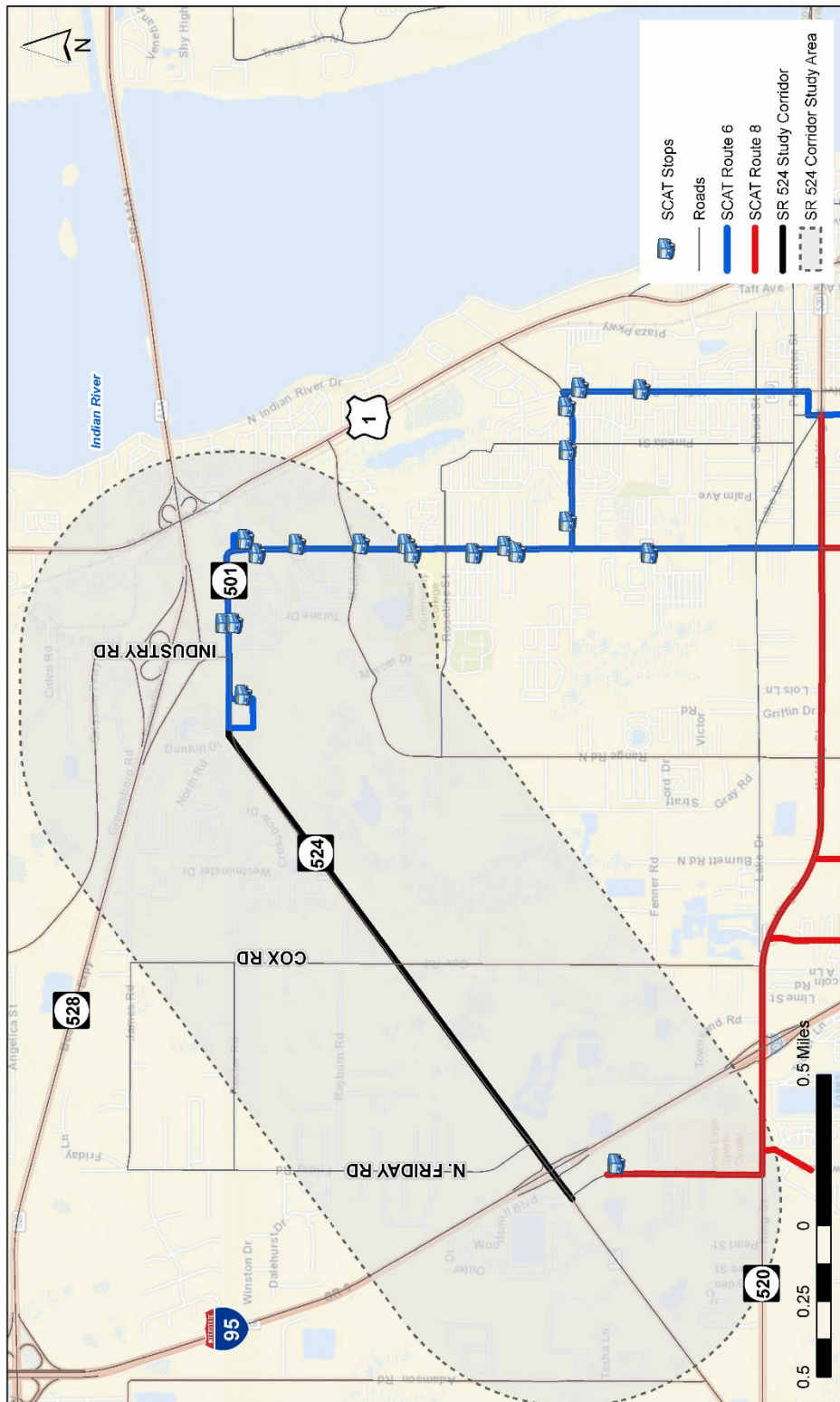
Table 2.3: Existing SCAT Transit Service in Study Area

Route	Weekday Frequency (min.)	Weekday Daily Ridership (2013)	Weekday Span of Service	Saturday Span of Service
6	30 – 60 (M-F) 60 (S)	725	5:45 am – 8:12 pm	7:15 am – 6:10 pm
8	90 – 240 (M-F)	26*	6:45 am – 5:44 pm	N/A

Source: Space Coast Area Transit TDP, 2012

*Based on 10 months of ridership data available.

Figure 2.7: Existing SCAT Transit Routes and Stops in Study Area



Source: Space Coast Transportation Planning Organization, 2016

2.3 Land Use Considerations

Existing and Future Land Use in the Corridor

This section of the report provides a summary of the land uses in the Study Area. The S.R. 524 Study Area covers 12.2 square miles and 4,688 parcels of land, listed in Table 2.4. Existing and future land uses for each parcel are illustrated in Figures 2.8 and 2.9, and are further described in the following sections. As Brevard County grows between today and 2040, the makeup of land uses in the S.R. 524 Study Area is expected to change as new development occurs. Though the major land uses in the Study Area are projected to remain the same, the proportions of the land uses will change with new industrial/commercial developments and new residential developments. Brevard County has zoned the majority of currently vacant sites as either low-density residential (5 units/acre maximum) or medium-density residential (12 units/acre maximum), with a larger share zoned low-density. The location of future commercial and industrial land uses remain clustered near existing commercial and industrial development, to the west/east ends of the Study Area.

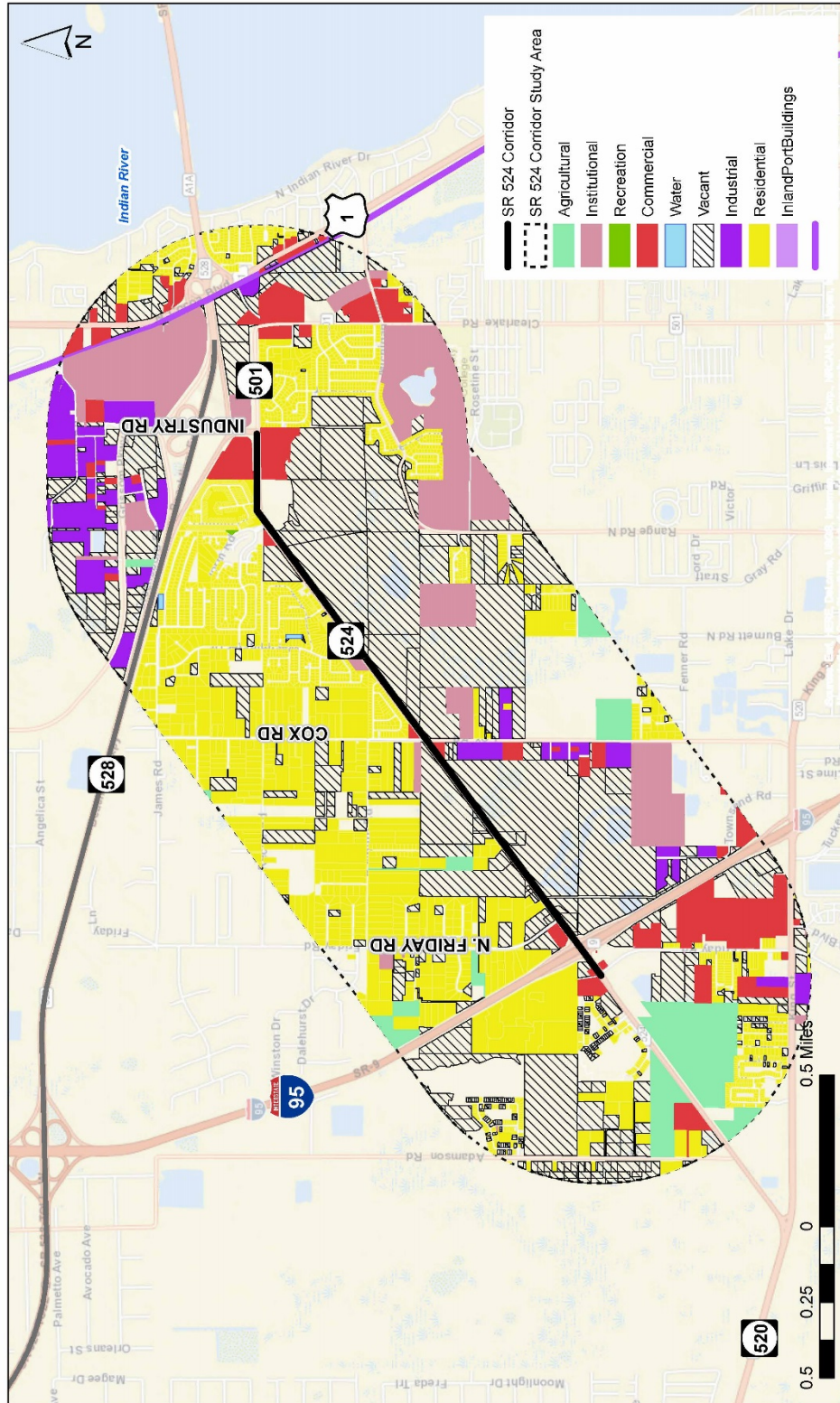
The largest factor affecting future land use in the Study Area is the proposed Walmart Distribution Center, proposed to take up the entirety of the vacant block of parcels south of S.R. 524, between N. Friday Road and Cox Road. Walmart’s plan is to construct 460,000 square feet of refrigerated warehouse/distribution space to service the Central Florida market. The current proposed site plan is depicted in Figure 2.10. Additionally, a Flying J Travel Center is currently under construction on the southwest corner of S.R. 524 and I-95, adjacent to Walmart. The site plan is shown in Figure 2.11.

Table 2.4: Existing Land Use by Type

Land Use Type	Total Parcels	Total Area (sq miles)	Percent of Study Area	Vacant Parcels
Single-Family Residential	3,979 (85%)	4.642	38%	315
Vacant	483 (10%)	0.239	2%	-
Industrial	134 (3%)	0.365	3%	66
Commercial	51 (1%)	3.135	26%	67
Multi-Family Residential	0 (0.0%)	0	0%	17
Institutional	30 (1%)	2.377	19%	2
Agricultural	11 (0.2%)	1.283	11%	0
Recreation	1 (0.0%)	0.159	1%	0
Other	0 (0.0%)	0	0%	16
Total	4,688	12.200		483

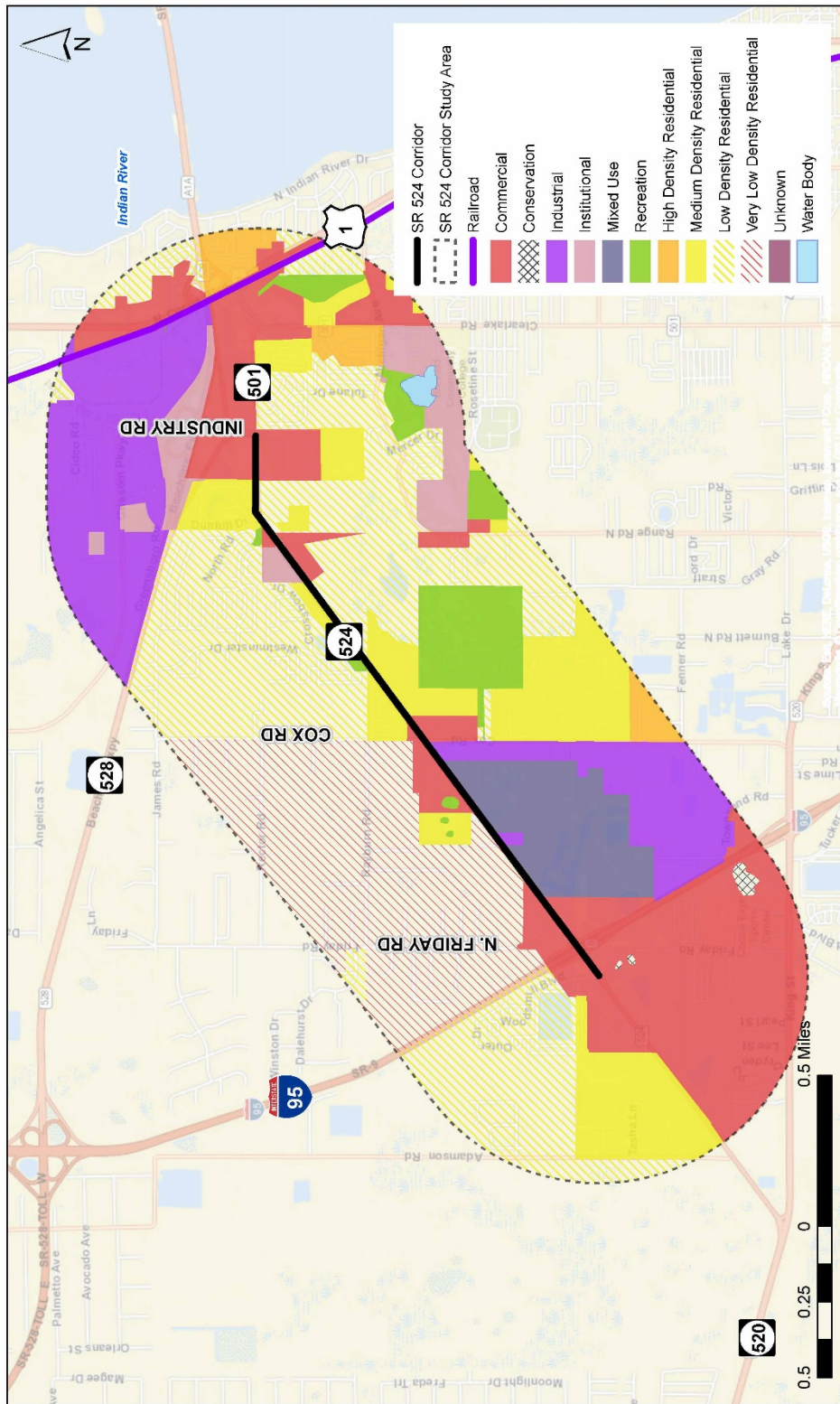
Source: Brevard County Property Appraiser, 2016

Figure 2.8: Existing Land Use



Source: Brevard County Property Appraiser, 2016

Figure 2.9: Future Land Use



Source: Brevard County (2016) and East Central Florida Regional Planning Council (2011)

Environmental Conditions

This Section provides an overview of the various cultural and environmentally sensitive resources within the S.R. 524 Study Area including:

- Cultural Resources
- Parks and Recreational Areas
- Waters of the US
- Water Quality
- 100-Year Floodplain
- Contaminated Sites
- Threatened and Endangered Species

Cultural Resources

A desktop evaluation of cultural resources was performed to identify cultural resource potential and previously recorded historic properties, which are listed, or may be eligible for listing, in the *National Register of Historic Places (NRHP)*. No archaeological sites or historic resources are determined eligible, or considered potentially eligible, for listing in the NRHP within the one mile buffer of the Study Area.

Parklands and Recreational Areas

The Florida Natural Areas Inventory (FNAI) GIS database depicts three local park and recreational lands within the study area (see Figure 2.12): Travis Park, Junny Rios Martinez Park, and the Cocoa Conservation. The Study Area does not contain any Florida Scenic Highways and Byways, planned greenway projects, state parks, Florida Forever Lands, or Areas of Critical Concern.

Waters of the US

Several large wetland communities were identified within the Study Area (Figure 2.13). These classifications are based on substrate material, vegetation, and flooding regime. Table 2.5 summarizes the waters of the US within the one mile buffer of the Study Area.

Table 2.5: Summary of Waters in the US

Waters of the US	Study Area
Wetlands	269 (1,462.32 acres)
Freshwater Ponds	102 (143.95 acres)
Freshwater Emergent	106 (570.73 acres)
Freshwater Forested	61 (747.64 acres)

Source: USFWS National Wetlands Inventory, 2014

Water Quality

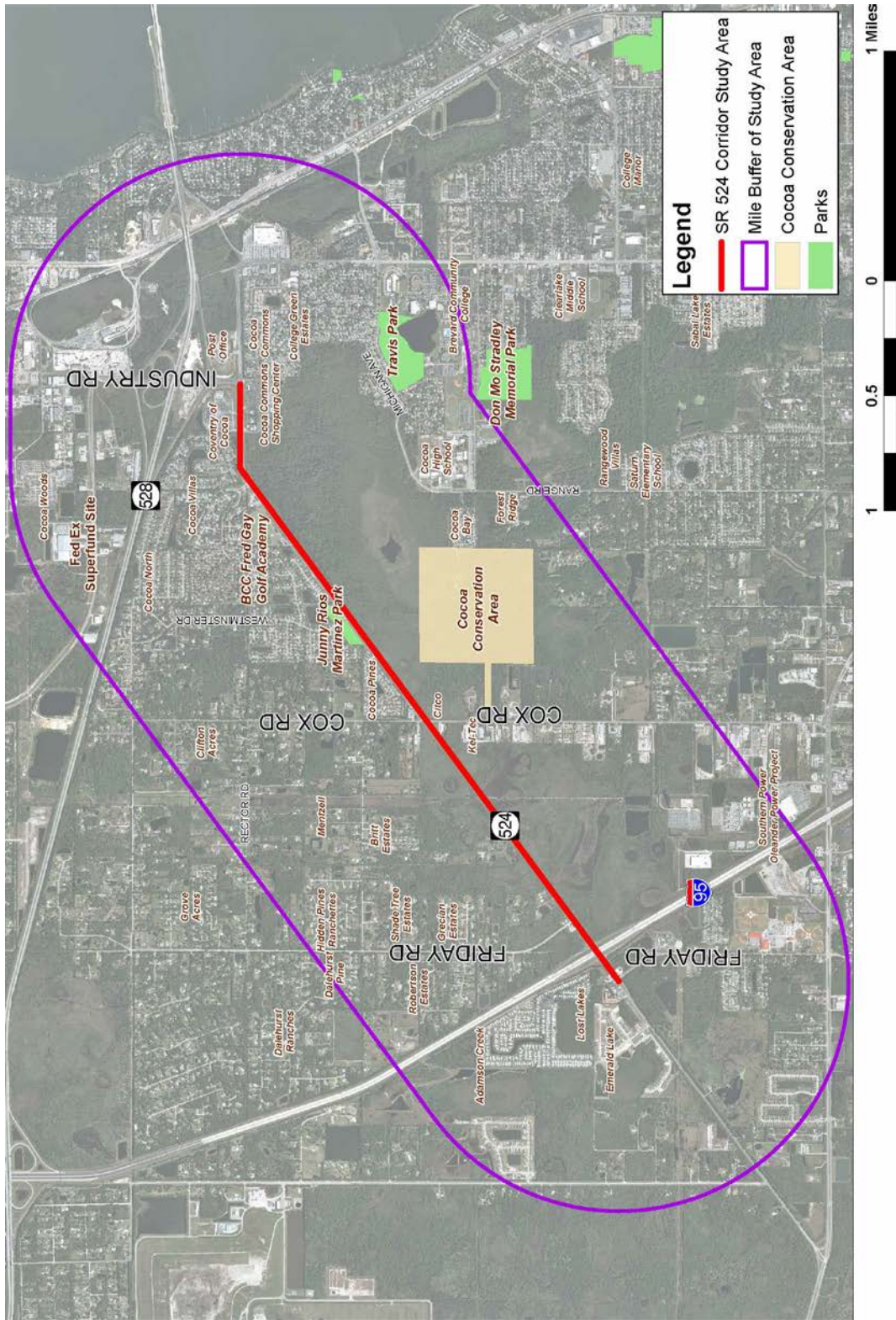
Table 2.6 summarizes the impaired wetlands within the one mile buffer of the Study Area. These wetlands, illustrated on Figure 2.13, are located within the Upper St. Johns River Basin verified by the FDEP in October 2014 for containing fecal coliform, dissolved oxygen, and mercury in fish tissue.

Table 2.6: Summary of Impaired and Outstanding Waters

Water Quality Designation	Within Study Area
Impaired Waters	546.51 acres
Outstanding Florida Waters	0 acres

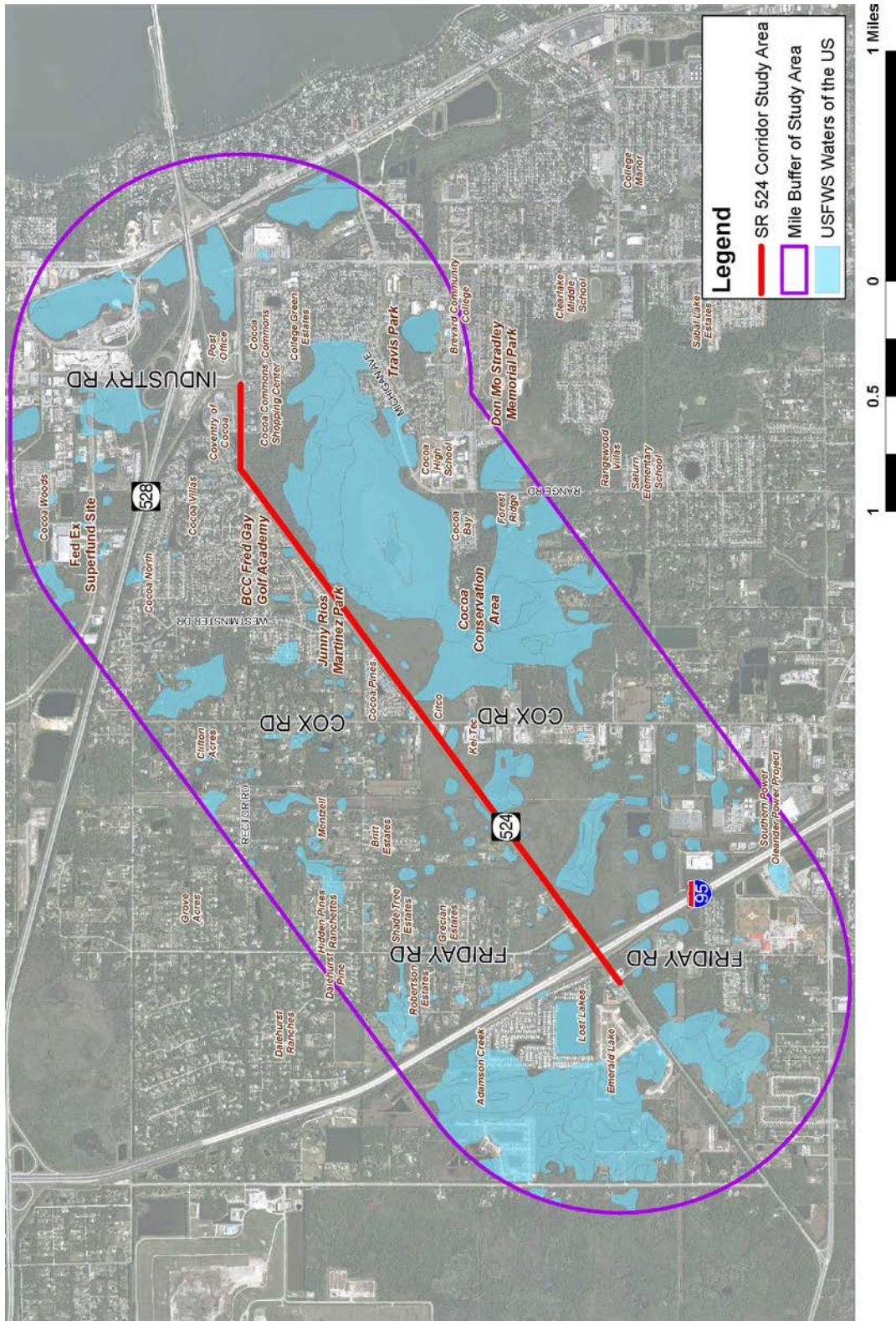
Source: Florida Department of Environmental Protection, 2012

Figure 2.12: Parks and Recreational Lands



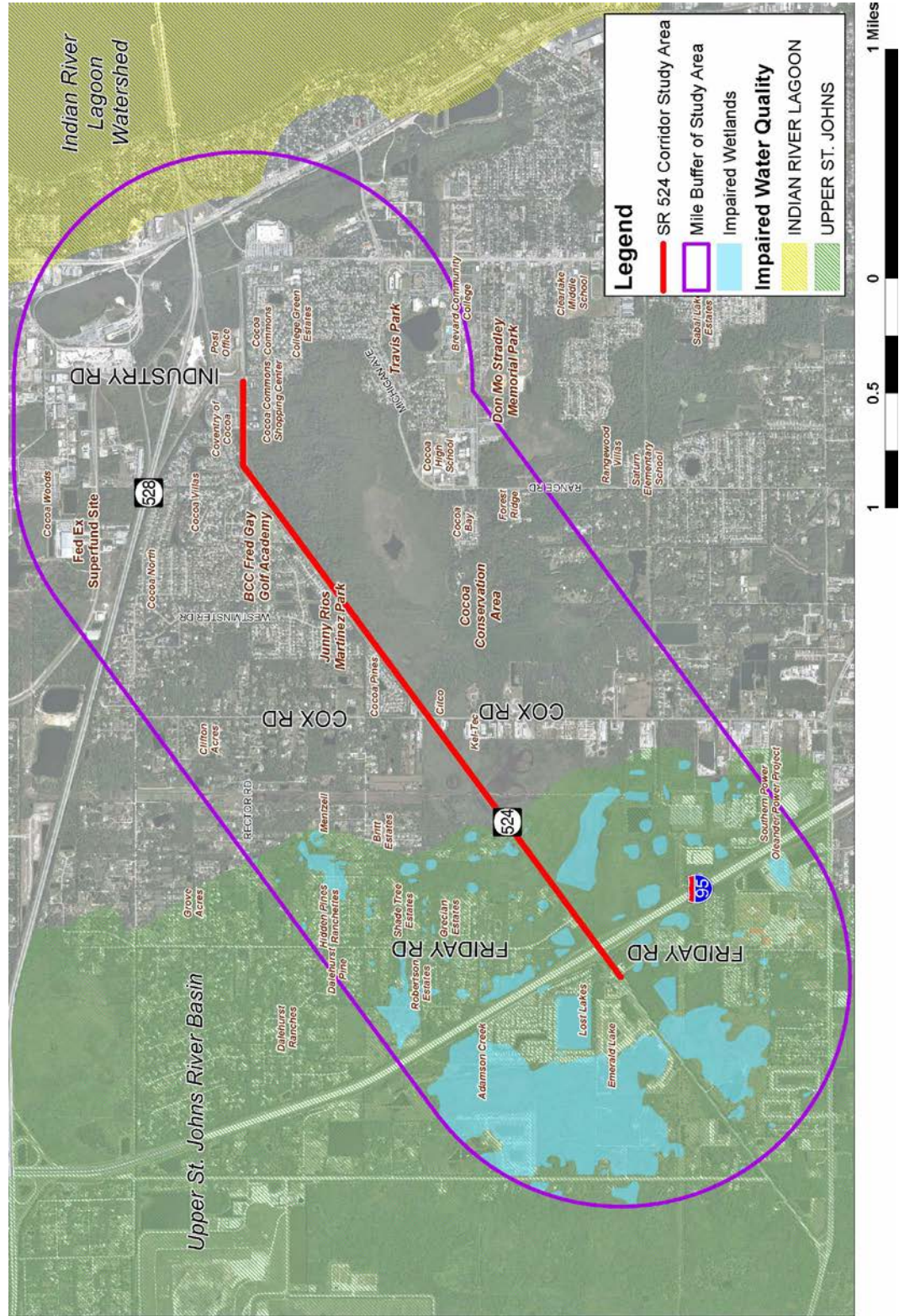
Source: FMSF Database, updated July 2016

Figure 2.13: Wetlands



Source: USFWS National Wetlands Inventory October 2014

Figure 2.14: Water Quality



Source: USFWS National Wetlands Inventory October 2014.

100-Year Floodplain

The flood zone designations depicting 100-year floodplain include flood zones A, AE, and AH. Zone A is an approximate method of analysis, Zone AE is determined by detailed methods of analysis using base flood elevations, and Zone AH is annual chance shallow flooding with a constant water-surface elevation where average depths are between one and three feet. According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), the Study Area has several encroachments on FEMA Flood Zone Type A and Type AE (Figure 2.15).

Drainage Characteristics

The Study Area includes seven drainage basins with Thien Thai Lane serving as a watershed boundary for two Water Body Identification Numbers (WBID). See Table 2.2 for the limits of the existing drainage basin boundaries. The portion of the Study Area located west of Thien Thai Lane is situated within WBID 28935 (St. Johns River above Puzzle Lake - South Segment) which has verified impairments for Dissolved Oxygen (Nutrients), Fecal Coliform and Mercury (in fish tissue). Drainage patterns for this area typically flow from south to north under S.R. 524 via existing cross drains before ultimately discharging to the west to the Upper St. Johns River. Soils are classified as Type A/D and B/D in this portion of the study area.

The eastern half of the Study Area is located within Mud Lake Outlet (WBID 3056) which has no verified impairments. Runoff flows from northwest to southeast under S.R. 524 to low-lying depressed areas south of the Study Area. In Basins 6 and 7 (easternmost portions of the project) the project lies primarily in Type A soils while the remainder of this WBID is comprised of Type A/D and B/D soils. See Figure 2.16.

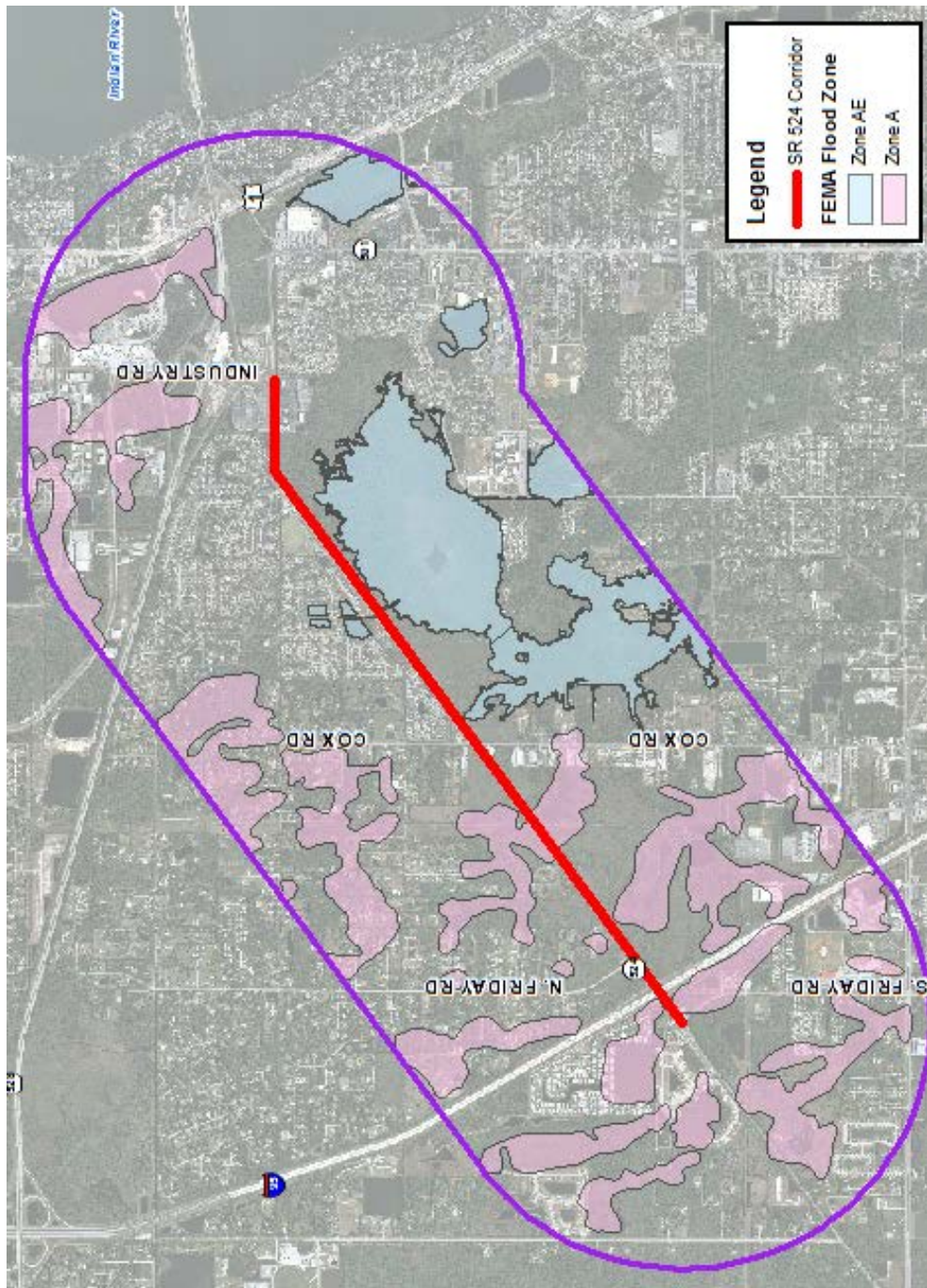
Contaminated Sites

The GIS review for the S.R. 524 Study Area identified facilities, sites, or places subject to environmental regulation or of environmental interest. No Florida Department of Environmental Protection (FDEP) SIS sites, hazardous waste, or Brownfield sites exist within the Study Area, however there are several sites adjacent to S.R. 524 within the Study Area (Figures 2.17 and 2.18).

Threatened and Endangered Species

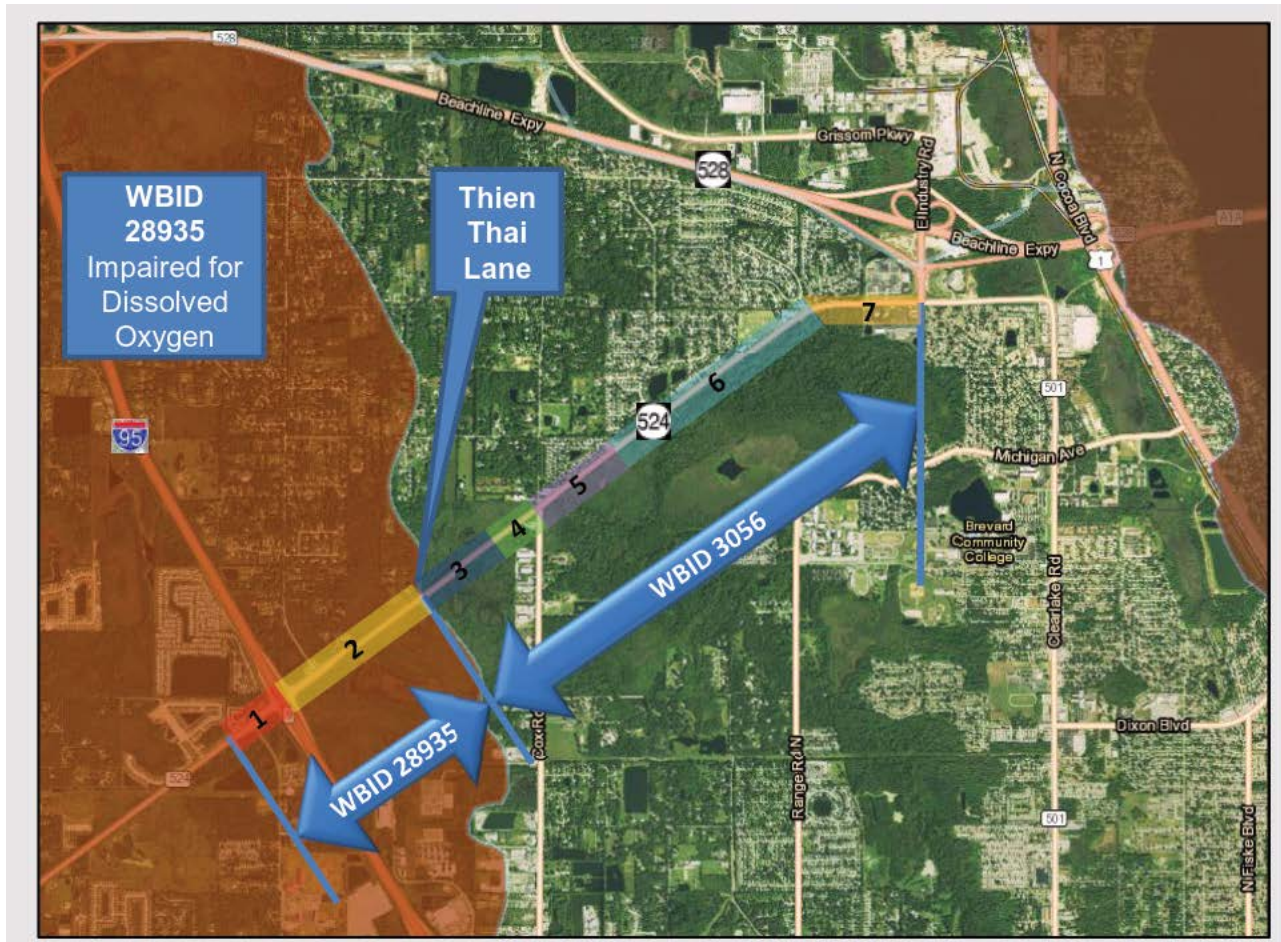
Several federally listed species were found to have the potential to occur within the study area. The entire study area is located within the Woodstork (*Mycteria americana*) Core Foraging Area and Snail Kite Consultation Area. Tracts of suitable or restorable habitat for the Florida scrub jay (*Aphelocoma coerulescens*) occur within the study area and the FWS lists the red-cockaded woodpecker (*Picoides borealis*), Audobon's Crested Caracara (*Polyborus plancus audubonii*), and the Eastern indigo snake (*Dymarchon corais couperi*) as having the potential to occur. The state listed gopher tortoise (*Gopherus polyphemus*) has been documented to occur within the study area. No eagle nests occur within the one mile buffer. The FWS lists Carter's mustard (*Warea carteri*) as having the potential to occur. The Cocoa Conservation Area is listed as a FWC Wildlife Management Area.

Figure 2.15: 100-Year Floodplain



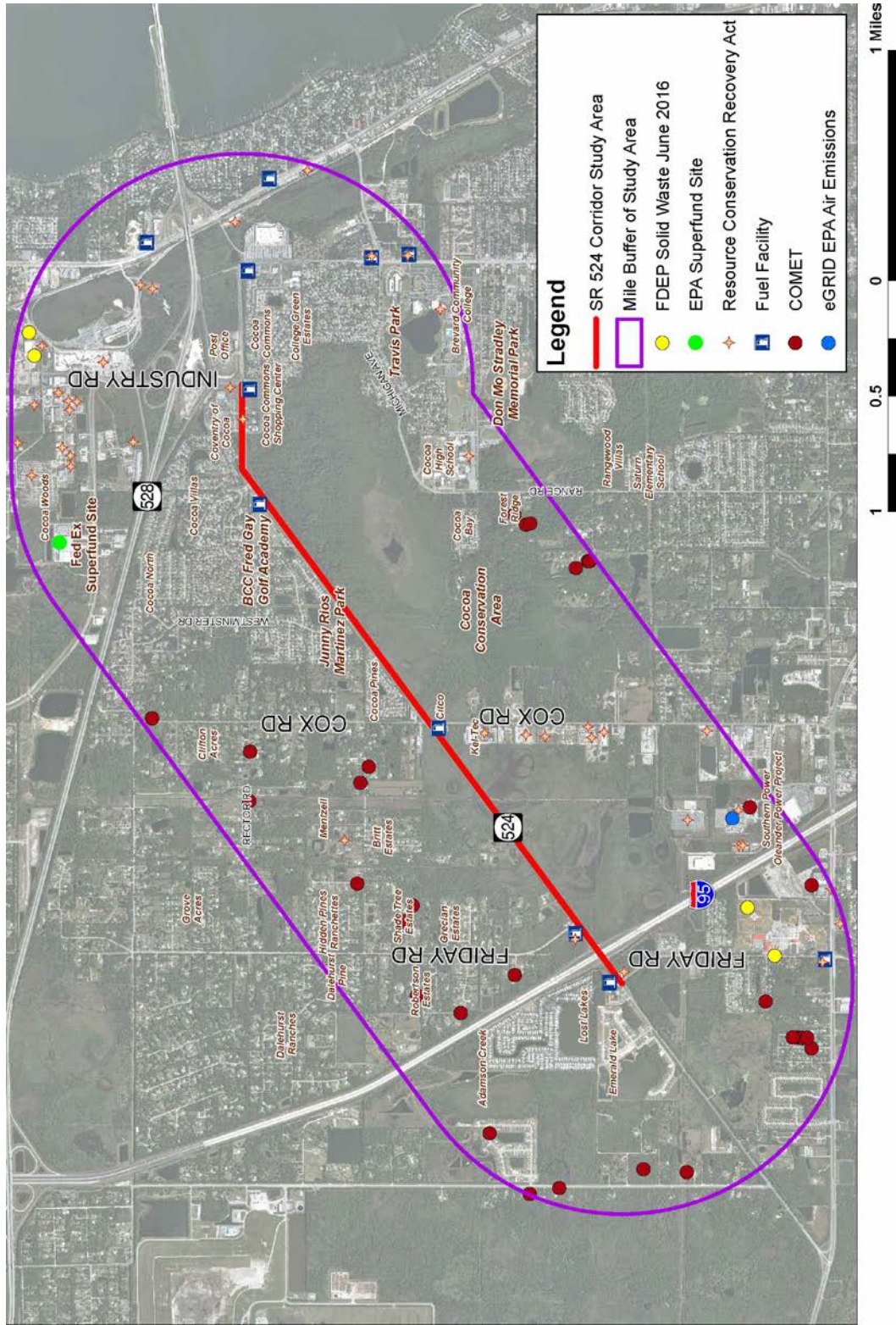
Source: FEMA FGDL Database, May 2016

Figure 2.16: Drainage Basins



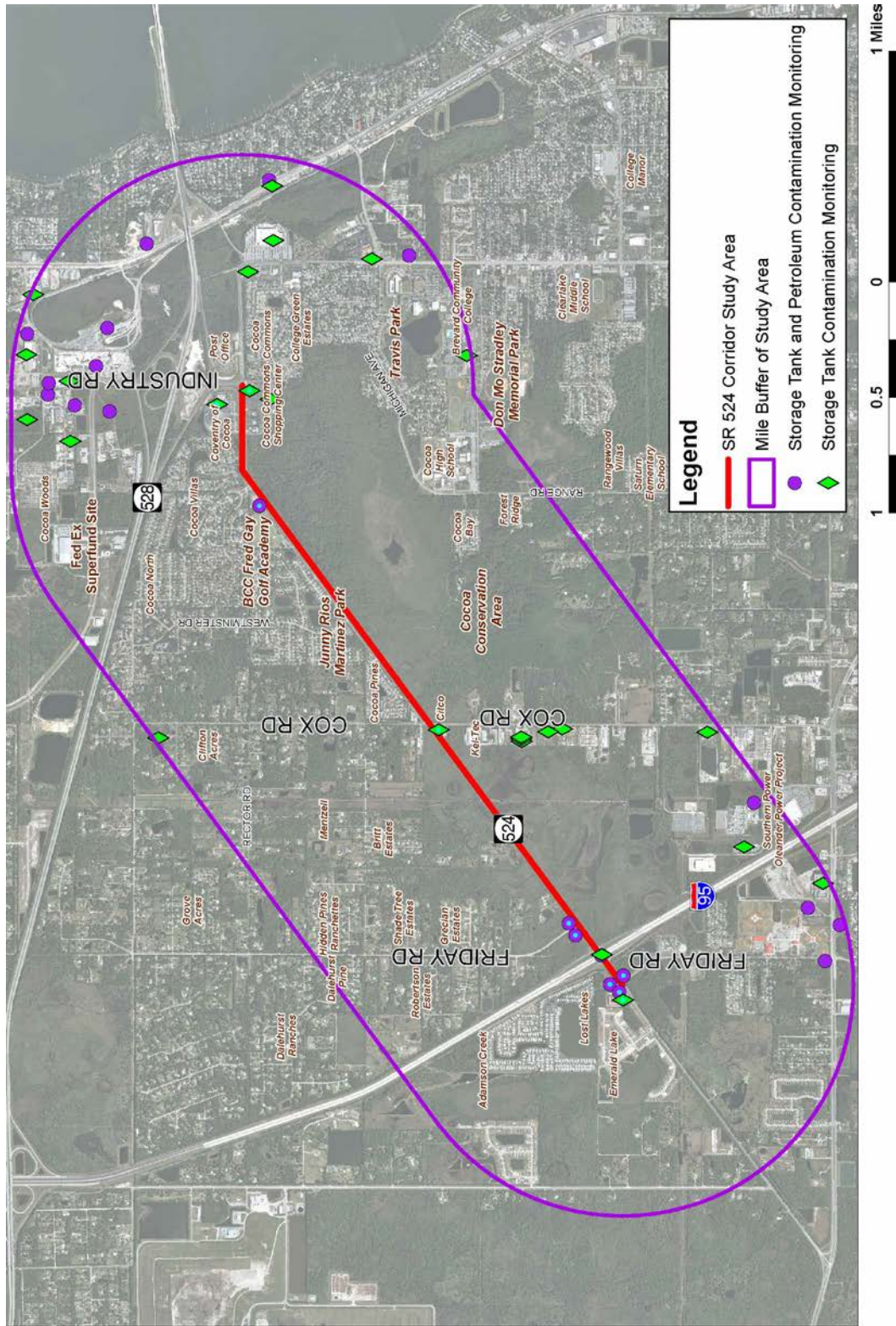
WBID	WBID Description	Impairments
WBID 28935	St. Johns River above Puzzle Lake (South Segment)	Dissolved Oxygen (Nutrients) Fecal Coliform Mercury (in fish tissue)
WBID 3056	Mud Lake Outlet	No Verified Impairments

Figure 2.17: Fuel and Potential Contaminated Sites



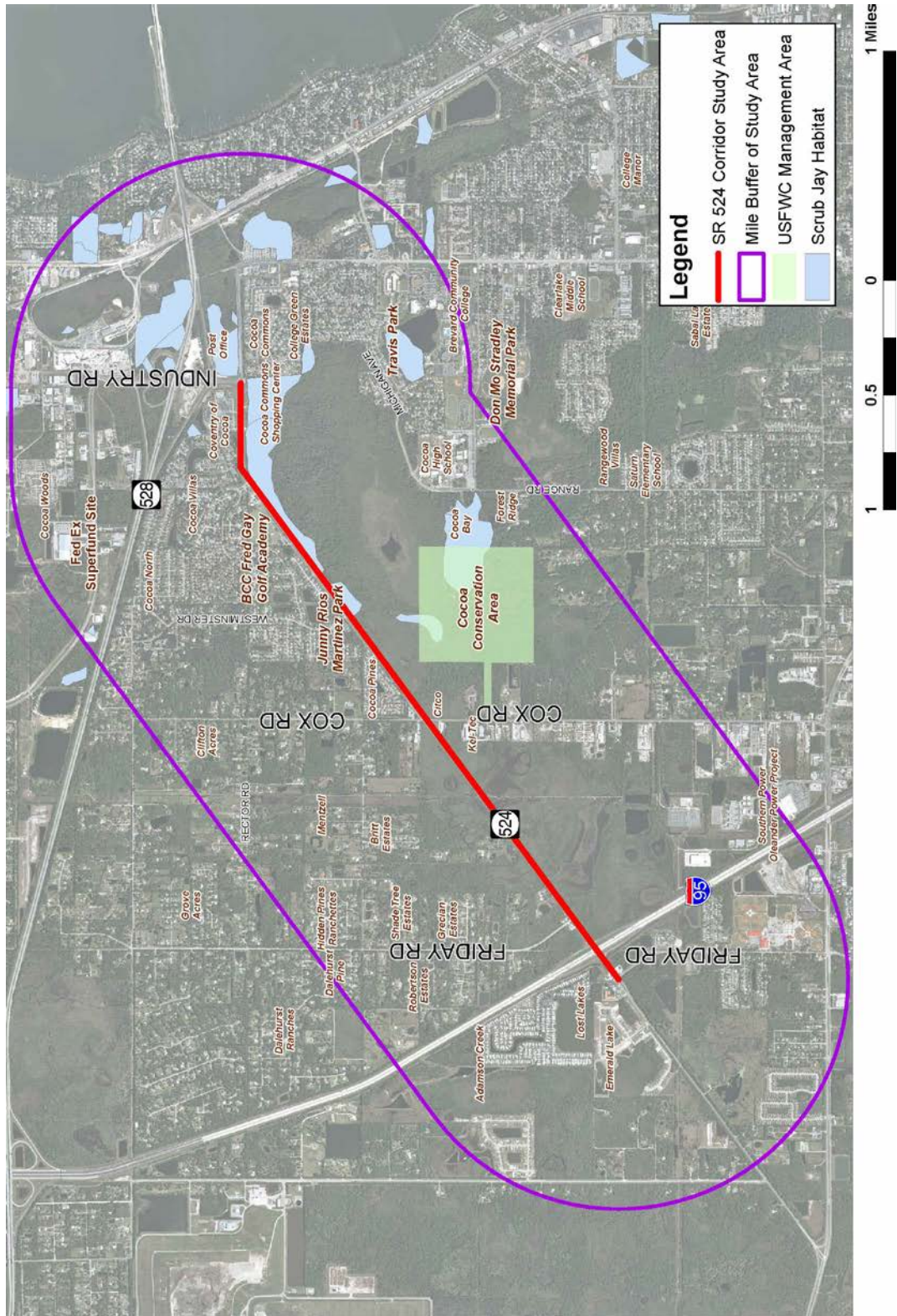
Source: FEMA FGDL Database, May 2016

Figure 2.18: Storage Tank & Petroleum Contamination/Cleanup Monitoring



Source: FEMA FGDL Database, May 2016

Figure 2.19: USFWS Management Area



Source: FEMA FGDL Database, May 2016.

2.4 Existing Traffic Conditions

Overview

The amount of existing (2015) daily traffic along S.R. 524 within the Study Area ranges from a low of 4,800 vehicles/day west of the I-95 interchanges to 15,300 vehicles/day approaching the Industry Road intersection, as seen in Table 2.7 and illustrated in Figure 2.18. FDOT GIS data indicates there are currently two portable traffic monitoring sites on S.R. 524 within the corridor, one east of N. Friday Road and the other near the Eastern State College Golf Academy. There are also traffic monitoring sites in close proximity to S.R. 524 including one on each of the I-95 ramps.

Table 2.7: S.R. 524 Study Corridor AADT (2015)

Segment	AADT	Truck AADT
S. Friday Road to I-95 Southbound Ramp	4,800	307 (6.4%)
I-95 Northbound Ramp to Cox Road	10,700	856 (8.0%)
Cox Road to Industry Road	15,300	979 (6.4%)

Source: FDOT Florida Traffic Online, 2015.

Existing Level of Service: S.R. 524 Segments

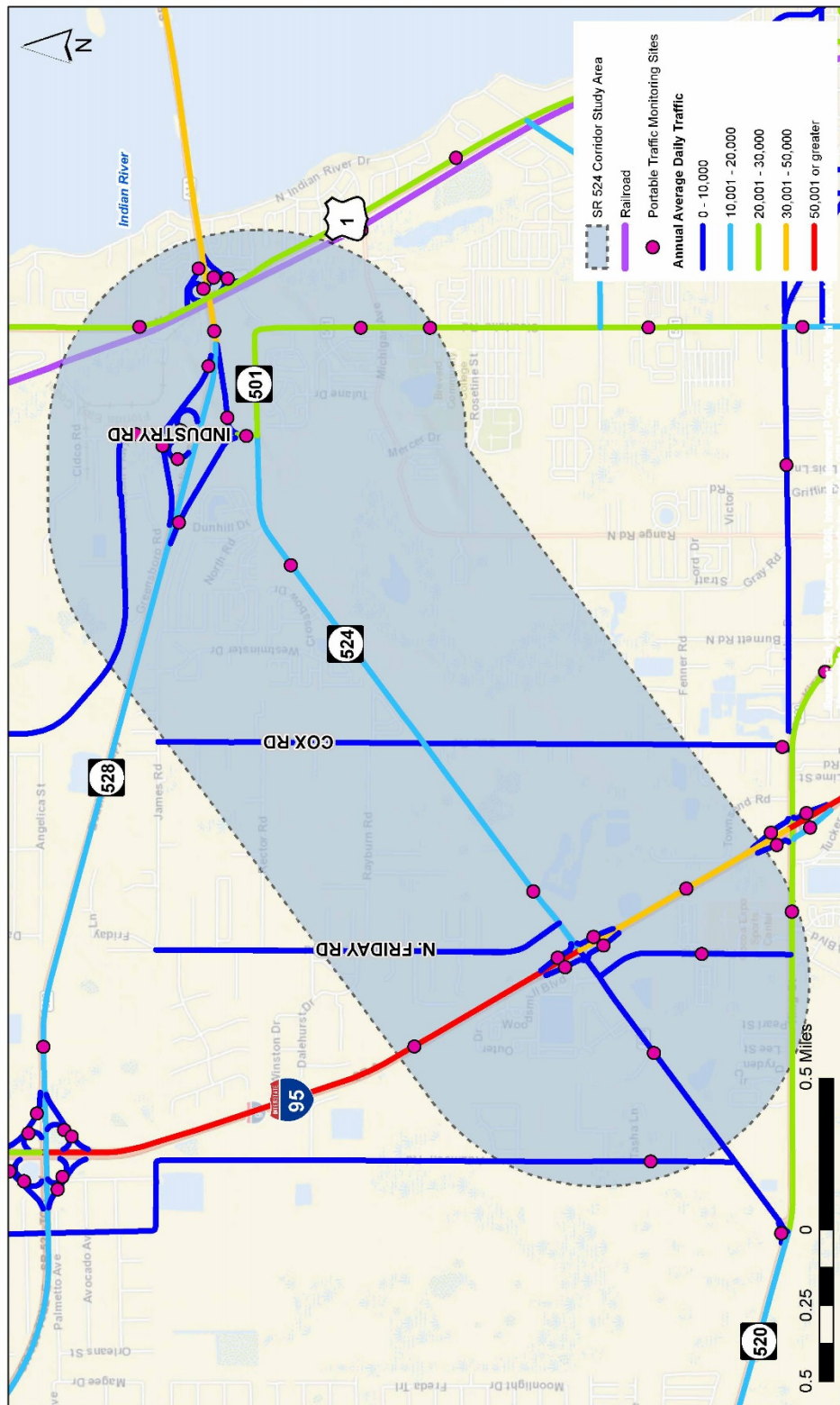
Existing roadway segment analysis was performed for nine segments along S.R. 524 using 2010 segment volume data from FDOT, listed in Table 2.8. The analysis indicated all of the Study Area segments are currently operating at LOS C or better in existing conditions.

Table 2.8: S.R. 524 Existing Segment LOS (2010)

Segment	AADT	LOS
S. Friday Road to I-95 S Ramp	8,622	LOS C
I-95 S Ramp to I-95 N Ramp	9,062	LOS C
I-95 N Ramp to N. Friday Road	9,917	LOS C
N. Friday Road to Cox Road	7,319	LOS C
Cox Road to Pinyon Drive	10,616	LOS C
Pinyon Drive to Westminster Drive	10,609	LOS C
Westminster Drive to London Blvd	9,277	LOS C
London Blvd to Shopping Center	14,248	LOS C
Shopping Center to Industry Road	14,420	LOS C

* LOS calculated through FDOT [Generalized LOS Planning Tables](#), Table 1

Figure 2.20: Existing AADT & Traffic Monitoring Sites

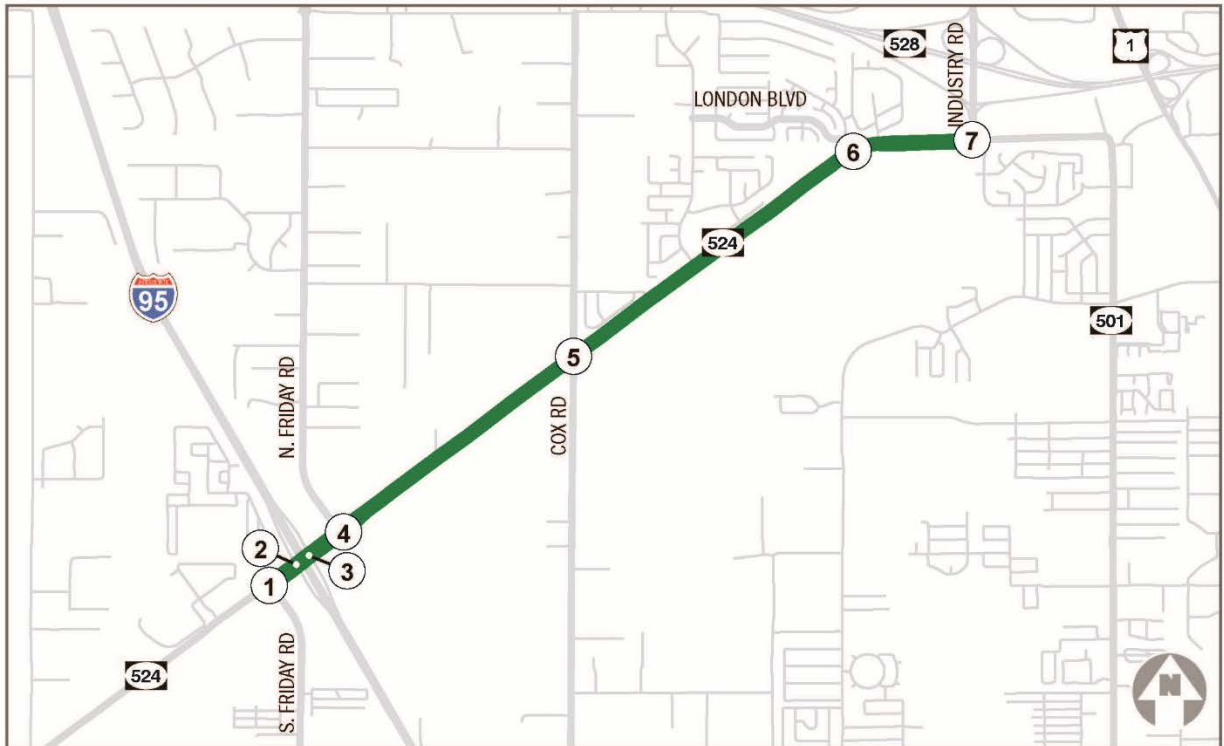


Source: FDOT, 2016

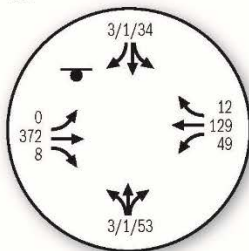
Existing Level of Service: S.R. 524 Intersections

In addition to corridor segments, intersection operations were analyzed. Figures 2.19 and 2.20 present the weekday AM/PM peak hour intersection turning movement volumes for 2017. The weekday AM peak hour generally occurs from 7 to 8 AM, with the weekday PM peak hour from 4:30 to 5:30 PM.

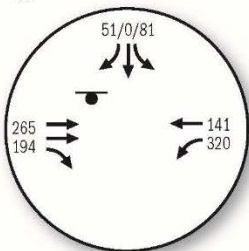
Figure 2.21: Weekday AM Peak Hour Intersection Turning Movement Volumes (2017)



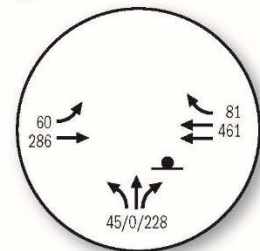
① SR 524 & S. Friday Rd.



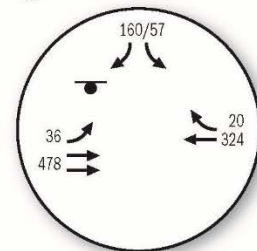
② SR 524 & I-95 SB Ramps



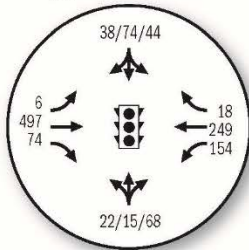
③ SR 524 & I-95 NB Ramps



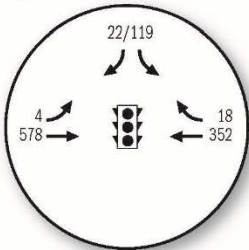
④ SR 524 & N. Friday Rd.



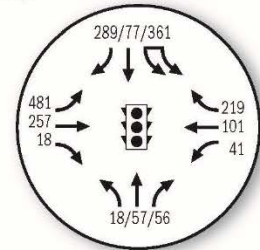
⑤ SR 524 & Cox Rd.



⑥ SR 524 & London Blvd.

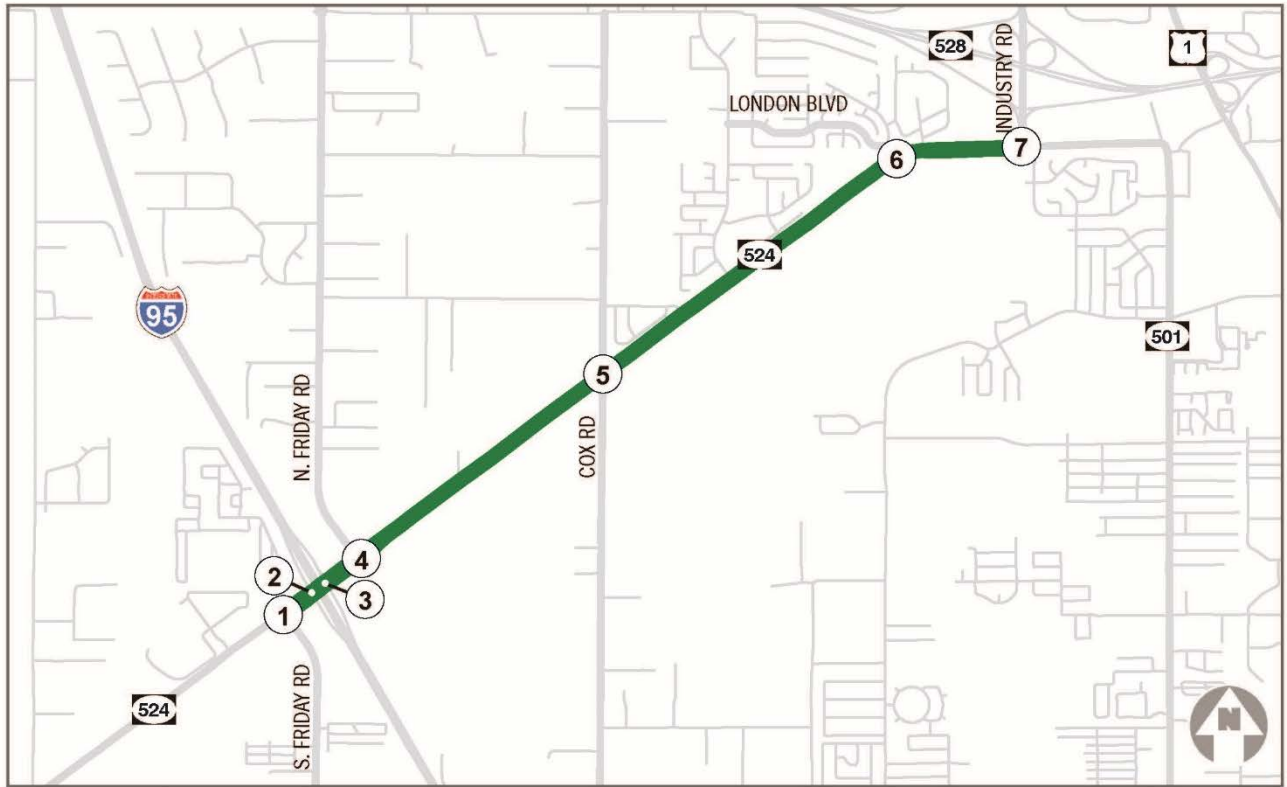


⑦ SR 524 & Industry Rd.

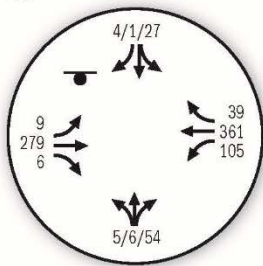


Traffic Signal
 Stop Sign

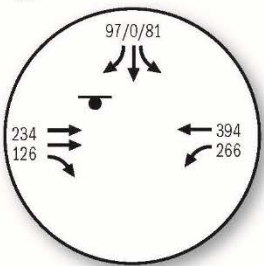
Figure 2.22: Weekday PM Peak Hour Intersection Turning Movement Volumes (2017)



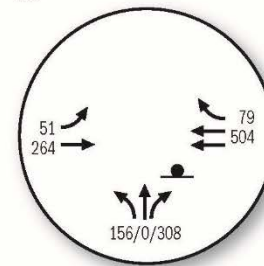
1 SR 524 & S. Friday Rd.



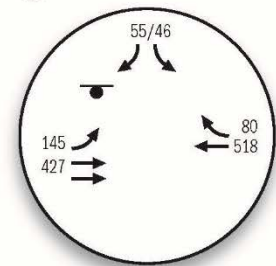
2 SR 524 & I-95 SB Ramps



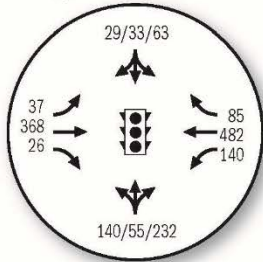
3 SR 524 & I-95 NB Ramps



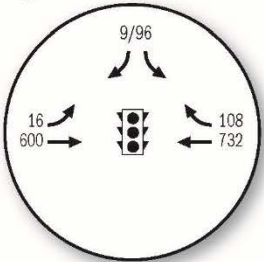
4 SR 524 & N. Friday Rd.



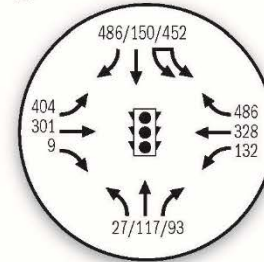
5 SR 524 & Cox Rd.



6 SR 524 & London Blvd.



7 SR 524 & Industry Rd.



Traffic Signal
 Stop Sign

Synchro Version 9.1908.56 was applied to assess intersection operations. The Synchro analysis indicated most of the Study Area intersections are currently operating at LOS C or better during weekday peak hours, with the exception of the I-95 Southbound ramp intersection, which is operating at a failing LOS during the PM Peak Hour.

Table 2.9: S.R. 524 Existing Intersection LOS (2017)

Intersection	Control	Peak Hour	LOS
S. Friday Road	TWSC	AM	C
		PM	D
I-95 SB Ramps	TWSC	AM	E
		PM	F
I-95 NB Ramps	TWSC	AM	C
		PM	C
N. Friday Road	TWSC	AM	C
		PM	C
Cox Road	Signalized	AM	B
		PM	B
London Boulevard	Signalized	AM	A
		PM	A
Industry Road	Signalized	AM	B
		PM	B

Source: Analyzed using Synchro's HCM 2000 Unsignalized Intersection Capacity Analysis & Synchro's Lanes, Volumes, Timings Methodology.

TWSC = Two-Way Stop Controlled.

LOS for unsignalized intersections based on worst LOS for side street or major street left turn movement.

Vehicle Classification Counts

Along S.R. 524, there is one portable traffic monitoring site used by FDOT since 2000, which also records vehicle classification counts. The site, Site 0411, is 0.2 miles east of the I-95 interchange along S.R. 524, and the vehicle classification data is listed below in Table 2.10. While overall AADT along the S.R. 524 corridor has generally increased in the last 5 years, the share of trucks has decreased since its record high value of 14.5 percent in 2013. Since then, the percentage of trucks on the corridor has averaged between 8.0 - 9.0 percent, with a small share of single-unit, combination, and multi-trailer trucks.

Table 2.10: Site 0411 Classification History Data

Year	AADT	Passenger Vehicles	Trucks	Single Unit Trucks	Combination Trailer Trucks	Multi Trailer Trucks
2015	10,700	92.0%	8.0%	4.0%	4.0%	0.0%
2014	10,200	91.2%	8.8%	4.0%	4.7%	0.0%
2013	10,100	85.5%	14.5%	6.0%	8.1%	0.4%
2012	9,700	90.5%	9.5%	6.3%	3.1%	0.1%
2011	9,900	90.8%	9.2%	6.8%	2.5%	0.0%
2010	10,400	90.5%	9.5%	7.1%	2.4%	0.0%

Source: FDOT, 2016.

Local Access Conditions

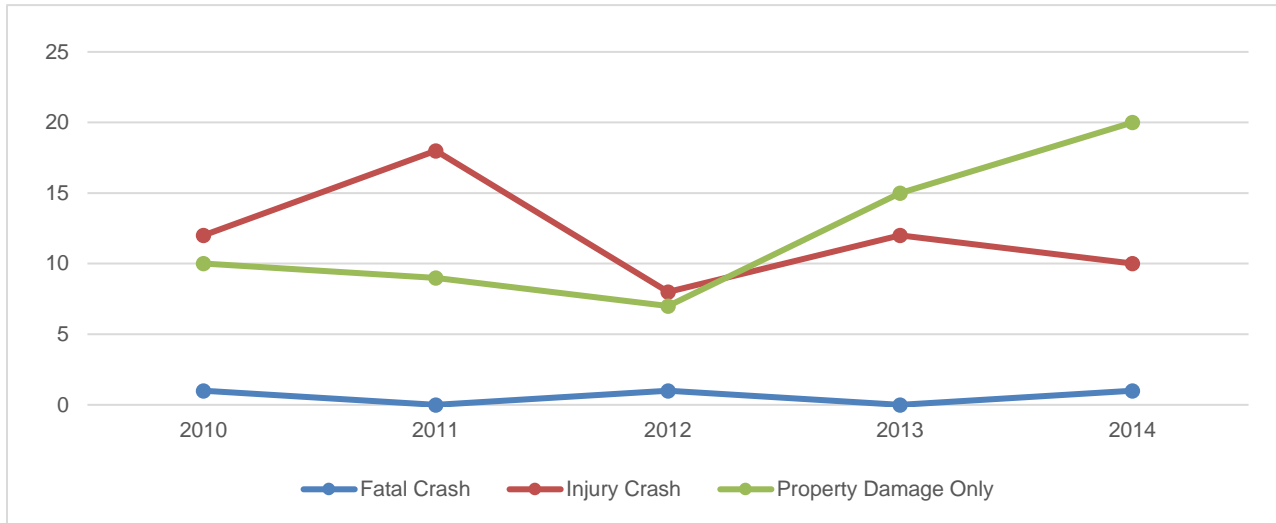
All intersections in the S.R. 524 study corridor have full movement access except the two unsignalized driveways serving the existing shopping centers on both sides of S.R. 524 west of Industry Road. In addition to these and the other seven major intersections, there are five added local street intersections under stop sign control along the corridor:

- Thien Thai Lane
- Pinyon Drive
- Westminster Drive
- Lance Boulevard
- Coventry Court

Safety and Crash Analysis

From 2010 to 2014, there were approximately 124 crashes along S.R. 524 within the Study Area. Of these crashes, three were fatal, 60 resulted in injuries and 61 only resulted in property damage. The overwhelming majority of crashes involved one or more vehicles, whereas pedestrian and bicycle involved crashes amounted to 3 percent of total crashes for this period. Figure 2.21 displays the trend of each crash type from 2010 to 2014, and Table 2.11 indicates the crash type (users involved in the crash), the severity of the crash, and the average crash rate for each segment in the corridor. Crashes resulting in property damage have doubled from 2010 to 2014.

Figure 2.23: Crash History in Corridor (2010-2014)



Source: FDOT CAR System, 2016.

Comparison to Statewide Average: The average crash rate on S.R. 524 within the Study Area (3.78) was typically greater than the average rates recorded on comparable roads statewide (2.09). Crash rates within the I-95 interchange area (5.81) were more than triple the statewide comparable rates (2.09). S. Friday Road to I-95 and London Blvd. to S.R. 501 were also segments with crash rates greatly exceeding statewide averages. Figure 2.24 illustrates where crash rates are the greatest on average in the Study Area.

Figure 2.24 depicts the locations of bicycle and pedestrian involved accidents from 2009 to 2013. There were three pedestrian crashes during this period, near the N. Friday Road intersection, between Westminster Drive and Lance Boulevard, and one at the Coventry Court intersection. A crash involving a bicycle was recorded in January 2013 in the CARS data just west of Westminster Drive at mile post 3.358; however, this data point was not present in the latest FDOT GIS file available (“Bicyclist-Involved Crash Clusters and Counts in Florida from 2009 through 2013”) and was added to Figure 2.25.

Table 2.11: Crash Experience by Type (2010-2014)

Crash Location	Crashes	Impact Type						Location					
		Side Swipe	Angle	Rear End	Head-On	Other	Unknown	On-Road	Median	Shoulder	Off-Road	Outside of ROW	Unknown
S. Friday Road to I-95	1	0	0	0	0	0	0	0	0	0	0	0	0
I-95 Interchange	23	1	6	2	1	8	1	10	2	3	0	0	4
I-95 to N. Friday Road	12	0	2	1	1	4	0	6	0	0	0	0	2
N. Friday Road to Cox Road	14	0	2	5	0	1	0	6	0	1	0	0	1
Cox Road to London Blvd	21	0	6	6	2	5	0	9	1	4	0	0	5
London Blvd. to S.R. 501	53	0	5	21	3	9	3	26	1	1	6	0	7
Total (2010-2014):	124	1	21	35	7	27	4	57	4	14	0	0	19

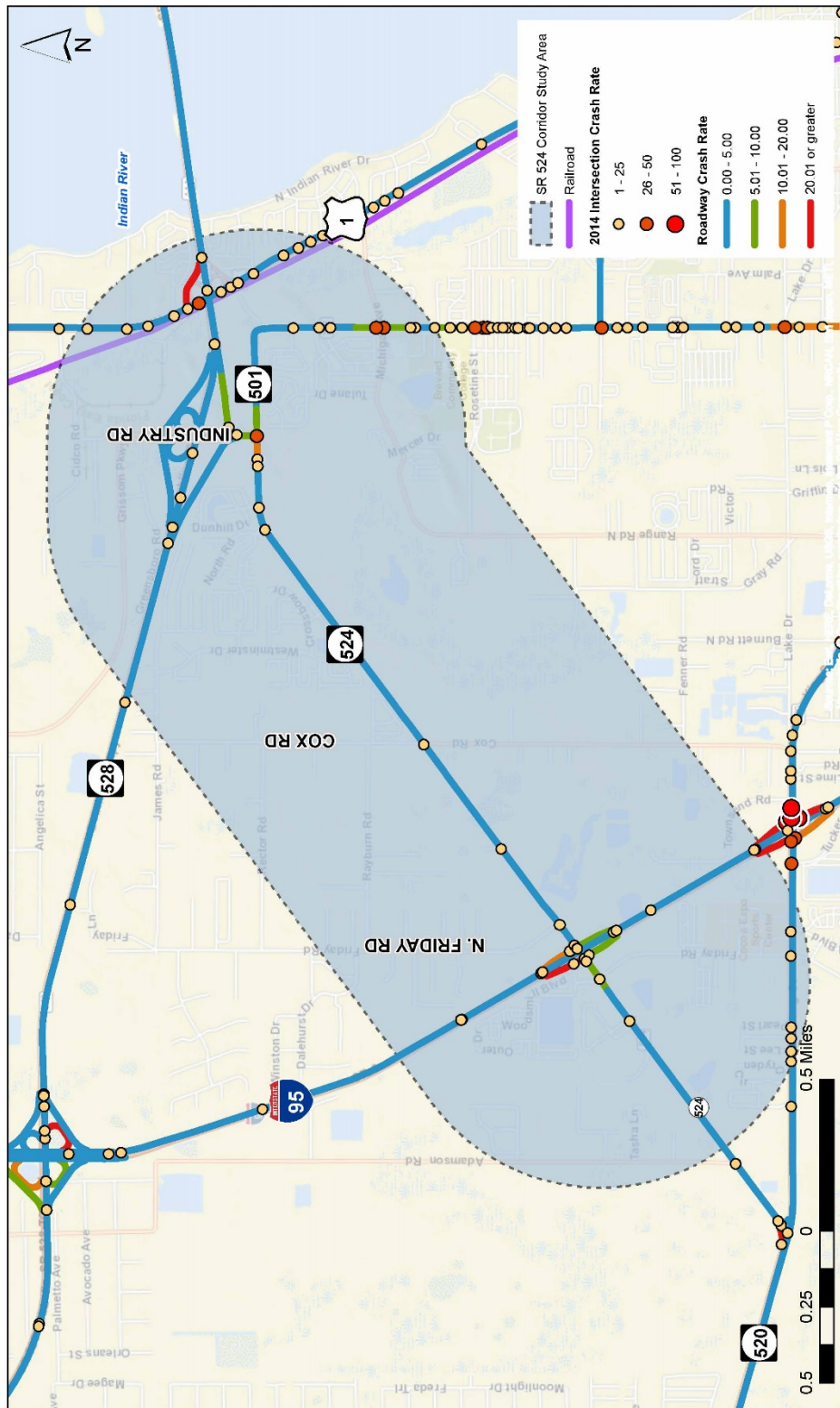
Source: FDOT CAR System, 2016.

Table 2.12: Crash Experience by Severity (2010-2014)

Crash Location	Crashes	Pedestrian Involved	Bicycle Involved	Crash Severity			*Average Crash Rate	
				Fatal	Injury	Property Damage Only	S.R. 524 Study Area	Statewide
S. Friday Road to I-95	1	0	0	0	1	0	6.15	2.63
I-95 Interchange	23	0	0	1	11	11	6.98	2.25
I-95 to N. Friday Road	12	1	0	0	6	6	4.30	2.63
N. Friday Road to Cox Road	14	0	0	0	6	8	0.28	0.93
Cox Road to London Blvd	21	1	1	2	9	10	0.32	1.72
London Blvd. to S.R. 501	53	1	0	0	27	26	4.65	2.38
Total (2010-2014):	124	3	1	3	60	61	3.78	2.09

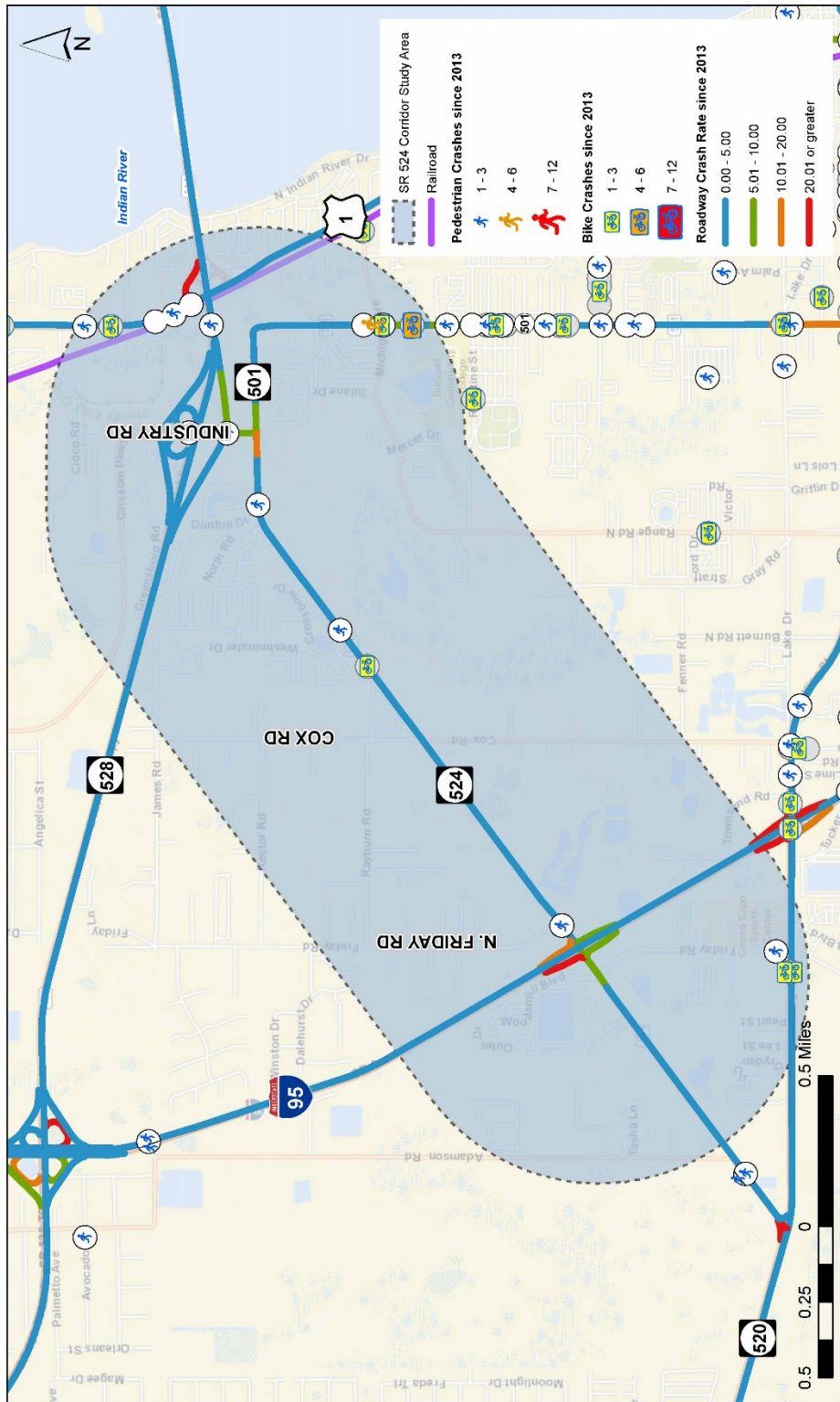
Source: FDOT CAR System, 2016.

Figure 2.24: Vehicle Crash Rate & Intersection History Map (2010-2014)



Source: FDOT, 2016

Figure 2.25: Pedestrian and Bicycle Crash History Map (2009-2013)



Source: FDOT, 2016

2.5 Future Traffic Conditions

Corridor Segment Analysis

The future year 2040 streets segment analysis was conducted using HCM 2010 methodology. The analysis was performed for the following ten segments along S.R. 524, using 2038 segment volumes from FDOT's S.R. 524/I-95 IOAR:

- S. Friday Road to I-95 SB
- I-95 SB to I-95 NB
- I-95 NB to N. Friday Road
- N. Friday Road to Walmart Distribution Center Access Road
- Walmart Distribution Center Access Road to Cox Road
- Cox Road to Pinyon Drive
- Pinyon Drive to Westminster Drive
- Westminster Drive to London Blvd
- London Blvd to Shopping Center
- Shopping Center to Industry Road

The results from the roadway segment analysis for 2040 are summarized under Table 2.13, which lists the 2040 AADT by segment. By 2040, the majority of the Corridor is projected to operate at LOS E with no geometric improvements to existing infrastructure (currently a 2-Lane Undivided Arterial), with two segments operating better than LOS E (Walmart to Cox Road; Westminster Drive to London Blvd).

However, if S.R. 524 were to be expanded from an Undivided 2-Lane Arterial to a Divided 4-Lane Arterial, the entire Corridor would operate at LOS C or better. This analysis revealed to provide an adequate LOS in the longer-term, four through lanes would be needed in the corridor.

Table 2.13: S.R. 524 Future Segment LOS (2040)

Segment	AADT	LOS* for Undivided 2-Lane Arterial	LOS* for Divided 4-Lane Arterial
S. Friday Road to I-95 SB	21,090	LOS E	LOS C
I-95 SB Ramps to I-95 NB Ramps	21,675	LOS E	LOS C
I-95 NB Ramps to N. Friday Road	22,260	LOS E	LOS C
N. Friday Road to Walmart Access Road	18,570	LOS E	LOS C
Walmart Access Road to Cox Road	16,490	LOS C	LOS C
Cox Road to Pinyon Drive	18,740	LOS E	LOS C
Pinyon Drive to Westminster Drive	18,820	LOS E	LOS C
Westminster Drive to London Blvd	17,590	LOS D	LOS C
London Blvd to Shopping Center	21,280	LOS E	LOS C
Shopping Center to Industry Road	23,280	LOS E	LOS C

* LOS calculated through FDOT [Generalized LOS Planning Tables](#), Page 195.

Intersection Analysis

Intersection operations were analyzed using Synchro Version 9.1.908.56, in both the weekday AM and PM peak hours for 2038. While Future Year 2040 data was available for segment volumes, Future Year 2038 data was available for intersection turning movement volumes from the I-95 Interchange Operational Analysis Report, and is illustrated in Figures 2.24 and 2.25.

At signalized intersections, Synchro's "Lanes, Volumes, Timings" module was used to report intersection signal delay (in seconds per vehicle), the intersection volume to capacity (v/c) ratio, and the corresponding intersection LOS. At unsignalized intersections, Synchro's "HCM Unsignalized" module was used to report the intersection's critical movement and corresponding delay, (v/c) ratio, and LOS.

The analysis was performed for the following eight intersections along S.R. 524.

- S. Friday Road
- I-95 SB Ramps
- I-95 NB Ramps
- N. Friday Road
- Walmart Distribution Center Access Road
- Cox Road
- London Blvd
- Industry Road

A summary of the intersection LOS analysis results for 2038 is provided in Table 2.14. The analysis indicates by 2038, the majority of the Corridor intersections (five out of eight) will be operating at a failing LOS with no geometric improvements to existing infrastructure, with particularly long delay at the I-95 Southbound and N. Friday Road intersections.

However, if S.R. 524 were to be expanded from an Undivided 2-Lane Arterial to a Divided 4-Lane Arterial, all intersections along the Corridor, except Industry Road, would operate at LOS C or better, without added auxiliary lane or signal improvements. This analysis revealed to provide an adequate intersection LOS in the longer-term, four through lanes would be needed in the corridor. To remedy operations at Industry Road, the 2014 *S.R. 501 PD&E Study* proposed the addition of a second eastbound left turn lane and westbound through lane at the Industry Road/S.R. 501 intersection to improve operations from a LOS F to LOS D.

Table 2.14: S.R. 524 Future Intersection LOS (2038)

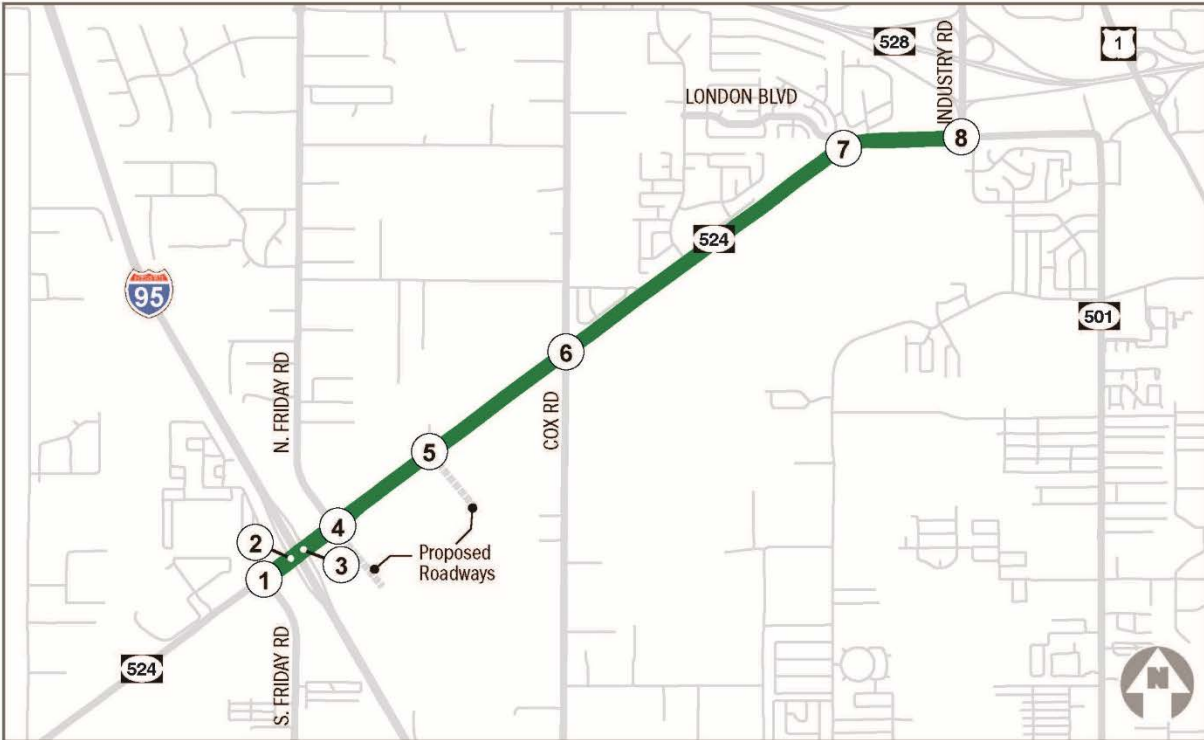
Intersection	Control	Peak Hour	Undivided 2-Lane Arterial	Divided 4-Lane Arterial
			LOS	LOS
S. Friday Road	TWSC*	AM	C	C
		PM	A	C
I-95 SB Ramps	TWSC*	AM	F	C
		PM	F	B
I-95 NB Ramps	TWSC*	AM	F	C
		PM	F	C
N. Friday Road	TWSC*	AM	F	C
		PM	F	C
Walmart Access Road	Signalized	AM	A	A
		PM	A	A
Cox Road	Signalized	AM	E	B
		PM	E	C
London Boulevard	Signalized	AM	A	A
		PM	A	A
Industry Road	Signalized	AM	F	F
		PM	F	F

Source: Analyzed using Synchro's HCM 2000 Unsignalized Intersection Capacity Analysis & Synchro's Lanes, Volumes, Timings Methodology.

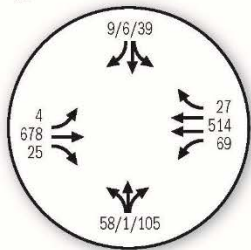
*TWSC = Two-Way Stop Controlled.

In the above scenario, the westbound left-turn queues along S.R. 524 at the I-95 SB Ramp Intersection were found to exceed available storage capacity in both the 2038 AM and PM peak hours. The conversion of a westbound through lane into a shared through-left lane at the I-95 SB Ramp Intersection, using split-phase signal operations, was found to improve operations of the S.R. 524/I-95 NB Ramp Intersection, improving from a LOS C to LOS B. The conversion also reduced queues for the westbound left-turning movement into the I-95 SB Ramp to within available storage capacity (extending to where the exclusive left turn lane begins, east of the I-95 NB Ramp Intersection). This conversion would require the widening of the I-95 SB Ramp to accommodate two left turning movements.

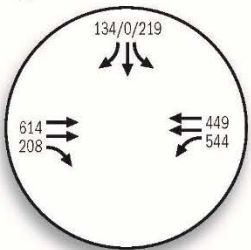
Figure 2.26: Weekday AM Peak Hour Intersection Traffic Volumes (2038)



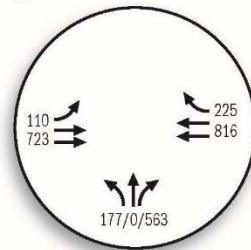
1 SR 524 & S. Friday Rd.



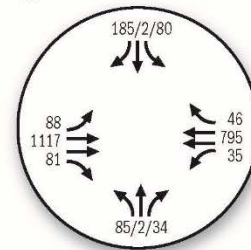
2 SR 524 & I-95 SB Ramps



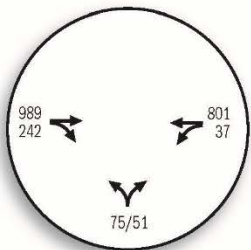
3 SR 524 & I-95 NB Ramps



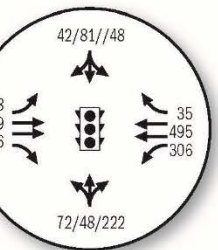
4 SR 524 & N. Friday Rd.



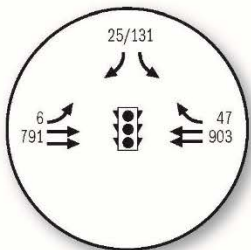
5 SR 524 & Wal-Mart Distribution Center Access Road



6 SR 524 & Cox Rd.



7 SR 524 & London Blvd.



8 SR 524 & Industry Rd.

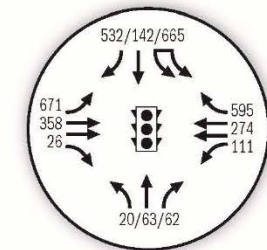
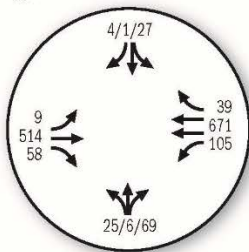


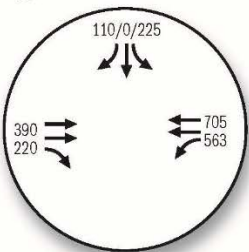
Figure 2.27: Weekday PM Peak Hour Intersection Traffic Volumes (2038)



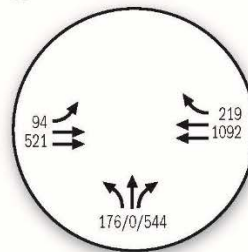
1 SR 524 & S. Friday Rd.



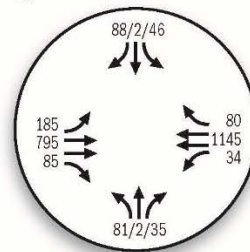
2 SR 524 & I-95 SB Ramps



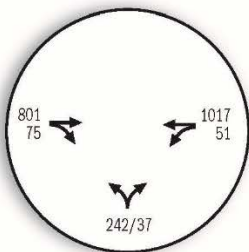
3 SR 524 & I-95 NB Ramps



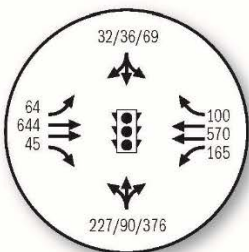
4 SR 524 & N. Friday Rd.



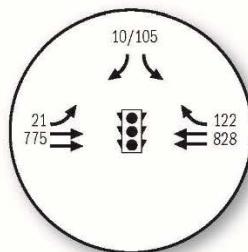
5 SR 524 & Wal-Mart Distribution Center Access Road



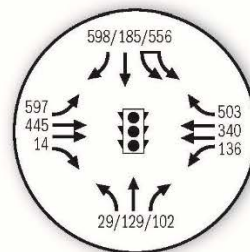
6 SR 524 & Cox Rd.



7 SR 524 & London Blvd.



8 SR 524 & Industry Rd.



3.0 Public Involvement

3.1 The Public Involvement Plan

A Public Involvement Plan was developed at the beginning of the study to set the foundation for continuous communication and feedback between the Study Team and corridor constituents. The public outreach activities were designed to share information as well as receive continuous input on evolving ideas related to the study. The following are the specific objectives of the public involvement and outreach process for the Study:

- **Early and continuous engagement:** Engage elected officials, agencies, stakeholders, and the public early and regularly throughout the project's key milestones —during the definition of the problem, the definition of the study's purpose and needs, and the definition and selection of alternatives.
- **Engagement through various channels and opportunities:** Implement various ways of community engagement, from traditional large-scale workshops to small-group stakeholder meetings. The Study Team also leveraged existing channels of communication with the FDOT and with partner agencies including the Cities of Cocoa and Port Canaveral, Brevard County, the TPO and Space Coast Area Transit to share project information and receiving community input.
- **Engage a diverse group of community members:** Provide opportunities for interacting with the Corridor's diverse stakeholders and users, including residents, businesses, and property owners.

3.2 The Project Visioning Team (PVT)

The collaboration between the FDOT and key stakeholders included establishing a PVT comprised of agency staff from the City of Cocoa, Brevard County, the Space Coast TPO, Space Coast Area Transit, Port Canaveral, St. John's Water Management District, and District 5.

This group of approximately 27 members met three times over the course of the study to act as a sounding board for preliminary findings and ideas, and vet potential alternatives before they are presented to the FDOT management and the larger community. The three PVT meetings were held on the following dates:

- June 29, 2016
- November 15, 2016
- May 31, 2017

3.3 Stakeholder Interviews and Small Group Meetings

To gain local perspective and insight on the S.R. 524 Corridor, stakeholder interviews were held in mid-August 2016 with five of our Project Visioning Team (PVT) member agencies. The questions asked of the stakeholders were designed to gauge their sense of the project's purpose and need,

modal travel patterns, recent or anticipated changes, corridor users, issues and challenges, and their vision for how S.R. 524 should look in the future. Specific representatives interviewed included:

- City of Cocoa
- Brevard County
- Space Coast Transportation Planning Organization
- Space Coast Area Transit
- Canaveral Port Authority

Each of the discussions provided a different perspective into the history, issues, and current conditions of the S.R. 524 Corridor, its existing travel patterns and challenges, and their personal or agency vision for the Corridor. Many of the interviews provided key insights into suggested goals and objectives for the Corridor. In summary, the following common themes were distilled from the interviews:

- The S.R. 524 Corridor is significant for both freight and local resident traffic, as well as multi-modal connections.
- The Corridor serves a mix of local, rural, residential traffic, some cut-through commuter traffic, and some freight traffic.
- The Corridor has not seen any development in the past few years, but several development plans are currently in process. However, there has been increased truck traffic and safety issues at the I-95 ramp intersections with S.R. 524.
- The Corridor is expected to experience significant changes as a result of Walmart, Flying J, The Preserve, and two potential large projects in the northeast quadrant of the Corridor - Home Depot and the Brightline rail station.
- There is a mix of local residents and through traffic using the Corridor; pedestrians using the shared pathway between Cox/Industry Road but not as many bicyclists; dangerous pedestrian conditions between S. Friday Road and Cox Road.
- The Corridor experiences the most traffic volume between the Cox and Industry Road intersections.
- The Corridor will see bicycle/pedestrian use as long as facilities are provided in development plans.
- The Corridor will likely be a four-lane divided highway with two segments, separated by Cox Road – industrial/freight access to the south, and residential/multi-modal to the north.
- The Corridor has several challenges that which be addressed: vehicular safety, bike/pedestrian safety, access management, truck movements, streetlights, and transit access.

Small Group Meetings

During the S.R. 524 Corridor Study, several small group meetings were held to obtain input. These meetings included:

The Study Team presented the conceptual alternative at the following meetings to solicit additional feedback:

- Travel Demand Model Discussion – December 20, 2016; Study Team members met with representatives of the SCTPO, City of Cocoa, and FDOT D5 to discuss socio-economic data inputs. Upon the conclusion of the meeting, it was decided that traffic analysis zone (TAZ) socio-economic data would be updated and a subarea model developed to obtain more accurate population and employment projections.
- Preliminary Conceptual Alternatives Discussion – March 27, 2017; Study Team members held a web meeting with representatives from the City of Cocoa and Brevard County to discuss draft conceptual alternatives.
- Preliminary Conceptual Alternatives Discussion – May 15; 2017; Study Team members met with representatives of FDOT D5 Traffic Operations to review the corridor alternatives, particularly the segment from S. Friday Road to N. Friday Road.
- SCTPO Technical Committee Meeting and Citizen’s Advisory Meeting – July 10, 2017; presentation of conceptual alternative
- SCTPO Governing Board Meeting – July 13, 2017; presentation of conceptual alternative
- City of Cocoa City Council Meeting – July 25, 2017; presentation of conceptual alternative

3.4 Public Meetings

Two public meetings were held to share project information with the community and to obtain their feedback on the existing conditions and recommended improvements.

Public Involvement Kick-Off Workshop (Workshop #1)

The project kick-off meeting was held on October 20, 2016 at the Florida Solar Energy Center. The open house portion of the meeting began at 5:00 p.m. and attendees discussed their issues with the current corridor. The formal presentation began at 6:00 p.m. with the following objectives:

- Introduce project
- Review goals and objectives
- Identify current corridor opportunities and constraints
- Review findings to date
- Present schedule and next steps

Approximately 63 people attended the meeting. Displayed throughout the room were a series of boards to generate discussion. These boards included: Welcome, Map of Study Area, Study Process, Project Schedule, Project Development, Existing Roadway Conditions, and Title VI. Public comment forms were provided to all attendees upon entering the meeting location.

Alternatives Workshop (Workshop #2)

The second public meeting was held on June 12, 2017, also at the Florida Solar Energy Center. The open house portion of the meeting began at 5:00 p.m. with the formal presentation beginning at 5:30. This workshop had the following objectives:

- Review detailed findings
- Discuss recommendations
- Present next steps in study process

The meeting room was at capacity with over 160 people attending. There were continuous questions during the presentation and numerous comment forms submitted after the meeting. The public was overwhelmingly supportive of the widening of S.R. 524 to four lanes and had extensive questions about the timing of the next study phases, the roadway alignment and access management plan.

The presentation included a discussion of purpose and need, environmental and land use considerations, existing and future traffic conditions, and a presentation of the conceptual alternative. In closing, the final steps in the schedule were presented, as well as the next steps in the project study process. Following the presentation, the Study Team continued to field additional questions from the public, lasting until well after 7 p.m. The public was also encouraged to submit written comment forms.

4.0 Understanding the Problem

S.R. 524 serves a variety of land uses including: residential, commercial, and industrial, and this mixture of uses is set to continue into the future as properties currently vacant are developed. In addition, users of the corridor travel in automobiles, trucks, on bicycles and by foot, and are making both local trips to destinations along the corridor, as also traveling to I-95 and S.R. 528 for regional trips. Developing a safe and efficient roadway to serve all of the land uses and each of these transportation modes requires a context-sensitive approach.

The Purpose and Need for the improvements was developed from an understanding of the physical context of the corridor and the need to address the current and future mobility of the community. The issues and opportunities along the S.R. 524 Corridor, which are key inputs into the Purpose and Need, were documented during the data collection, stakeholder outreach, and traffic forecasting process, and is summarized below.

4.1 Issues and Opportunities

This section summarizes the issues and opportunities identified along the Corridor, which helped guide the development of potential improvement strategies. Many of these issues and opportunities were first identified during the data collection and existing conditions inventory process, and have been further expanded upon and reviewed during the stakeholder outreach and public involvement processes.

Traffic Conditions

Existing traffic conditions along the S.R. 524 Corridor are at an acceptable level, with the Corridor operating at LOS C. The highest segment AADT volume reaches 14,420 between the access to the Cocoa Commons/Coventry at Cocoa Shopping Center and Industry Road. However, by 2040, the majority of roadway segments in the Corridor are projected to operate at LOS E, and the majority of intersections within the Corridor at LOS F, with no geometric improvements to existing infrastructure (2-Lane Undivided Arterial). There is considerable opportunity to improve future traffic conditions along the roadway and at intersections along the S.R. 524 Corridor, particularly at the following locations:

- S.R. 524 and S. Friday Road intersection
- S.R. 524 and I-95 SB intersection
- S.R. 524 and I-95 NB intersection
- S.R. 524 and N. Friday Road intersection
- S.R. 524 and Industry Road intersection

Crash Analysis and Safety

From 2010 to 2014, the average crash rate on S.R. 524 was greater than the average statewide crash rates on comparable roads. The two segments with the highest number of crashes are between the two I-95 interchanges and between London Boulevard and Industry Road. As traffic volumes increase along S.R. 524, there is the potential for a proportionate increase in the number of crashes, particularly given the projected increases in freight traffic on the western side of the Study Area. However, there are opportunities for design options to help reduce potential crashes.

Bicycle and Pedestrian

While there is an existing multi-use path on a portion of the north side of S.R. 524, the remainder of the Corridor lacks acceptable bicycle and pedestrian facilities, which contributes to a reduced level of safety. Providing new bicycle and pedestrian facilities along the entirety of the Corridor has the potential to improve safety, encourage and enable multi-modal travel, and improve traffic operations.

Transit

Currently, there is minimal transit service along the S.R. 524 Corridor – the SCAT Routes 6 and 8 serve the edges of the Study Area, but provide no connection for travelers in between. Any proposed multi-modal improvement along S.R. 524 will interface with and be designed to complement pedestrian and bicycle networks, local SCAT transit services, as well as access to Port Canaveral and Orlando International Airport.

4.2 Guiding Principles

Building upon the data collected through the existing conditions inventory process and lessons learned from the stakeholder interviews and the first Public Meeting, a list of five guiding principles were developed for the S.R. 524 Corridor. These guiding principles speak to what the Cocoa community views as important as it relates to the multi-modal transportation vision and associated land use goals of the S.R. 524 Study Area, and they are the first attempt at defining the vision for S.R. 524. These guiding principles for the improvement strategies along the S.R. 524 Corridor are listed below:

- Safety and Security
 - Provide a safe and secure Corridor
- Mobility, Connectivity, and Accessibility
 - Facilitate the easy movement of people and goods
 - Improve interconnectivity between activity centers, I-95, S.R. 520, and S.R. 528
 - Provide access to different modes of transportation
- Environmental Stewardship
 - Protect the environment and the Cocoa Conservation Area
- Economic Vitality
 - Promote economic development, freight movement, and the development of a specialized economic hub along the Corridor
- Land Use Coordination
 - Promote livable communities and mixed-use development along the Corridor

4.3 Purpose and Need

The Purpose and Need Statement is the justification for undertaking a project. It is used to guide a project throughout its various phases by tying the project to solving a particular problem or need. Together with the identification and definition of the guiding principles of the corridor, the clear statement of purpose and need was developed. The purpose was based on the defined

problem established by the Existing and Future Condition Summaries and coordination from project stakeholders and the public.

Purpose: The purpose of this S.R. 524 Corridor Planning Study is to develop potential multi-modal transportation improvements along S.R. 524 to promote safe and efficient travel for all users, to, from and along the Corridor.

Need: An enhanced multimodal transportation network is needed along S.R. 524 to respond to desires for improved safety, improved traffic flow, and improved accommodations for pedestrians and bicyclists, as identified through the following observations:

- Large residential population along the Corridor
- Documented vehicular and pedestrian/bicyclist safety concerns
- Gaps in the sidewalk network
- Gaps in the transit network
- Desire for enhanced aesthetics along the Corridor
- Lack of lighting along the western portion of the Corridor

4.4 Evaluation Measures

Evaluation measures were identified to support the guiding principles and evaluate the effectiveness of the solutions needed for the S.R. 524 Corridor. These measures are based on the issues, opportunities, and guiding principles, and aim to measure how well a proposed alternative addresses the needs of the S.R. 524 Corridor.

Table 4.1: Guiding Principles for S.R. 524

Guiding Principle	Goal	Evaluation Measure
Safety and Security	To provide a safe and secure Corridor	Improvement In Estimated Crash Rate
		Improved Pedestrian Safety: Sidewalks Or Pathways
		Improved Bicyclist Safety: Bicycle Lanes
Mobility, Connectivity, and Accessibility	To facilitate the easy movement of people and goods, improve interconnectivity between activity centers, I-95, S.R. 520, and S.R. 528, and provide access to different modes of transportation	Provision Of Sufficient Travel Lanes
		Overall Access Management Strategy
		Improved Mobility: Sidewalk Connectivity
Environmental Stewardship	To protect the environment and the Cocoa Conservation Area	Impacts to Existing ROW Tied to Existing Stormwater and Drainage
		Impacts to Existing Drainage
Economic Vitality	To promote economic development, freight movement, and the development of a specialized economic hub along the Corridor	Promote Safe and Easy Access to Economic and Freight Activity Centers
		Promote Ancillary Development Adjacent To Freight Activity Centers, Supporting Retail, And Local Job Creation
Land Use Coordination	To promote livable communities and mixed use development along the Corridor	Promote Mixed-Use Adjacent To Existing Development To Promote Multi-Modal Access
		Promote Freight Or Industrial Land Uses Adjacent To Freight Activity Centers

5.0 Recommended Improvement Strategies

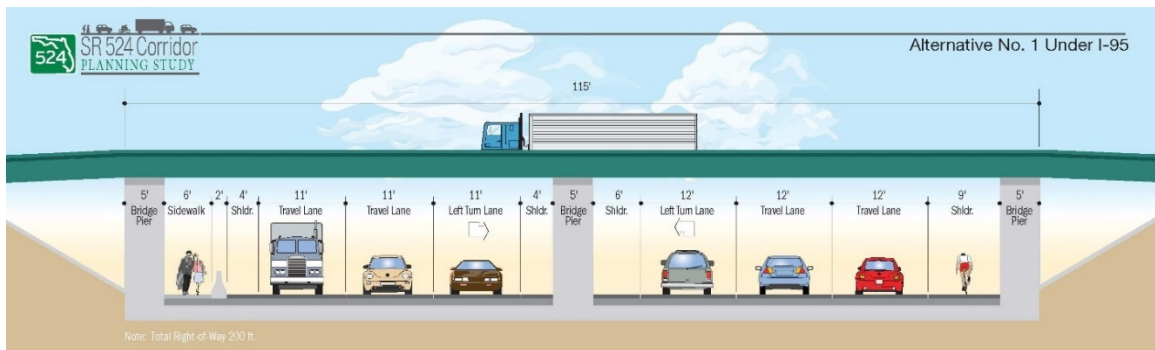
Through the development of the Purpose and Need statement, the Goals and Objectives, and the Project Visioning Team and Public Meetings, a series of alternative concepts were developed. These concepts were vetted with the stakeholders and the public, and refinements were made based on the feedback provided. This section discusses recommendations that were considered but are not recommended to carry forward, as well as recommendations that are anticipated to move forward into the PD&E Study phase.

The roadway improvement concepts in this study focused on identifying a refined set of typical sections to be further reviewed in the subsequent PD&E study. Specific horizontal and vertical alignment options were not identified. The intent in the PD&E study is to develop a final refined alignment for the most cost-effective four-lane widening improvement with the least amount of impact on the surrounding community and environmental areas.

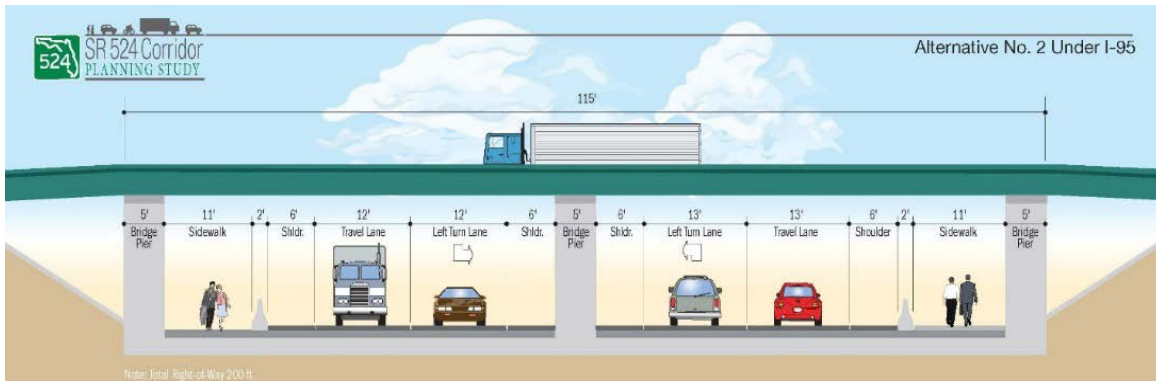
5.1 Preliminary Corridor Improvement Strategies – Not Carried forward

All of the following typical sections include two travel lanes in each direction, but vary across other design elements. The following concepts were assessed, but are not recommended for implementation.

1. **S.R. 524: I-95 Segment, Alternative 1 – Single WB Left Turn Lane/Limited Pedestrian and Bicycle Facilities.** This Alternative was eliminated for the following reasons:
 - a. Single left turn lane onto I-95 southbound indicates failing LOS in 2040.
 - b. Sidewalks and bike lanes were desired on both sides of the roadway.

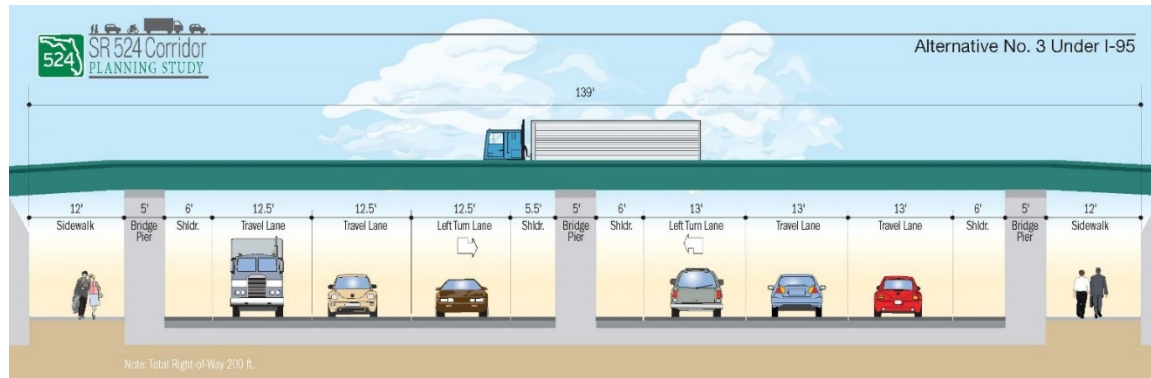


2. **S.R. 524: I-95 Segment, Alternative 2 – Single WB Left Turn Lane and Through Lanes.** This Alternative was eliminated for the following reasons:
 - a. Single through lanes are insufficient for demand.
 - b. Single left turn lane onto southbound I-95 showed failing LOS in 2040.
 - c. Sidewalks and bike lanes are desired on both sides of the roadway.



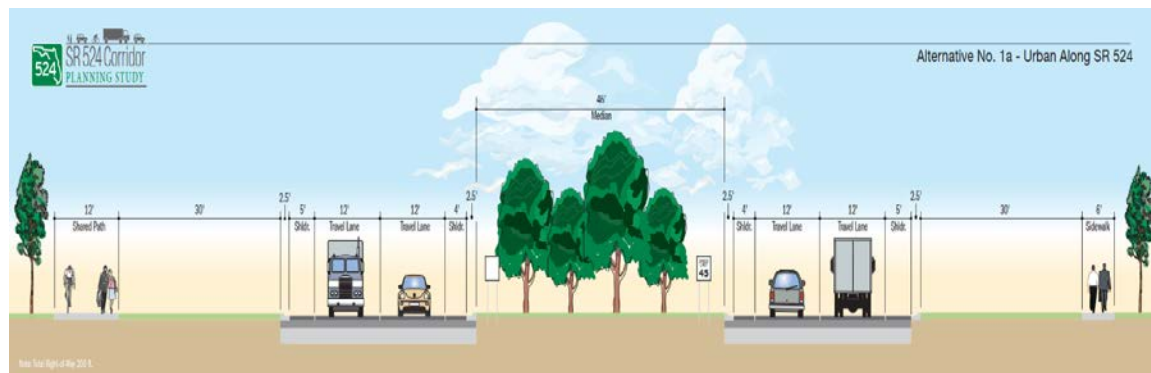
3. S.R. 524: I-95 Segment, Alternative 3 – Single Left Turn Lane/No Bike Lanes This Alternative was eliminated for the following reasons:

- a. Single left turn lane onto southbound I-95 indicates failing LOS in 2040.
- b. Buffered bike lanes are desired on both sides of the roadway.



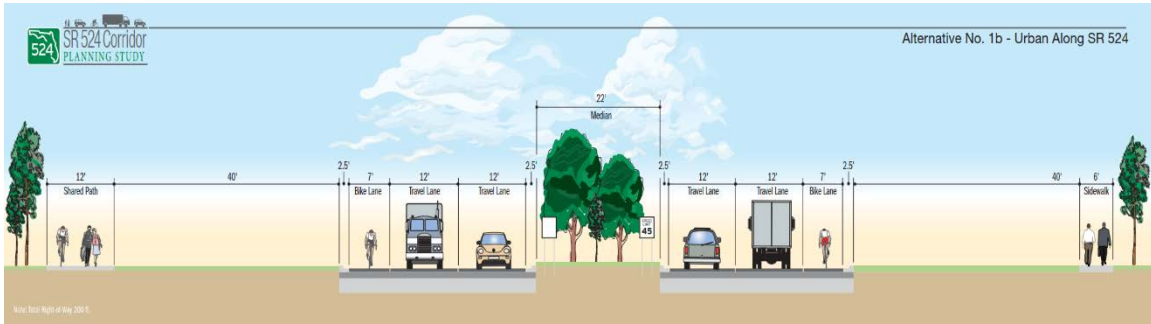
4. S.R. 524: Corridor Segment from N. Friday Road to Industry Road, Alternative 1a. – Urban Typical Section - 46-Foot Median/No Bike Lanes This Alternative was eliminated for the following reasons:

- a. Center median and grass buffer areas too wide. Promotes high travel speeds.
- b. Separation of shared path and sidewalk too far from travel lanes.
- c. Buffered bike lanes desired along entire corridor.



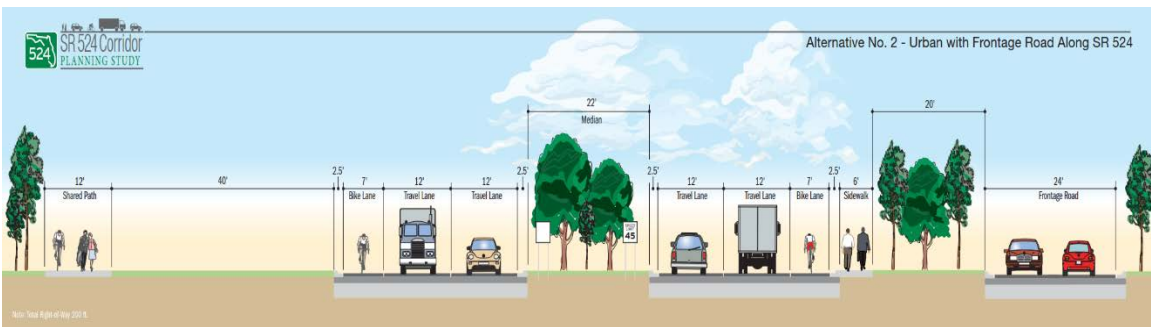
5. S.R. 524: Corridor Segment from N. Friday Road to Industry Road, Alternative 2 Urban Typical Section – 22-Foot Median/No Bike Lanes. This Alternative was eliminated for the following reasons:

- a. Grass buffer area too wide, promotes high travel speeds.
- b. Buffered bike lanes desired along entire corridor.



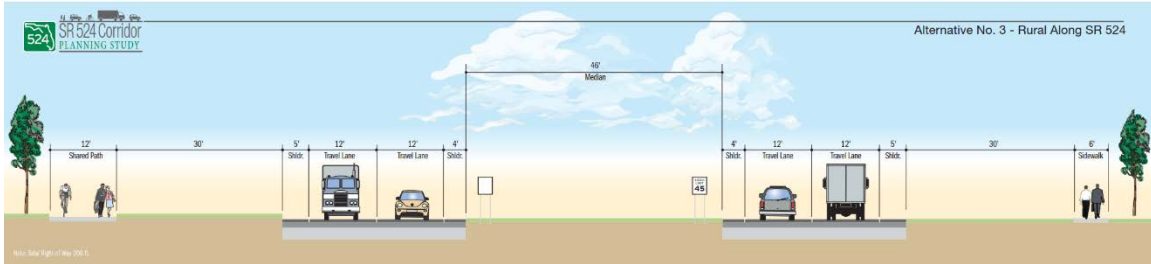
6. S.R. 524: Corridor Segment from N. Friday Road to Industry Road, Alternative 2 – Urban Typical Section with Frontage Road. This Alternative was eliminated for the following reasons:

- a. Demand for frontage road and widening of S.R. 524 was insufficient based on projected traffic volumes.
- b. Site plans and land uses for future developments are not conducive to frontage road access.
- c. 40' grass buffer area is too wide. Desire to have pedestrians closer to travel lanes.

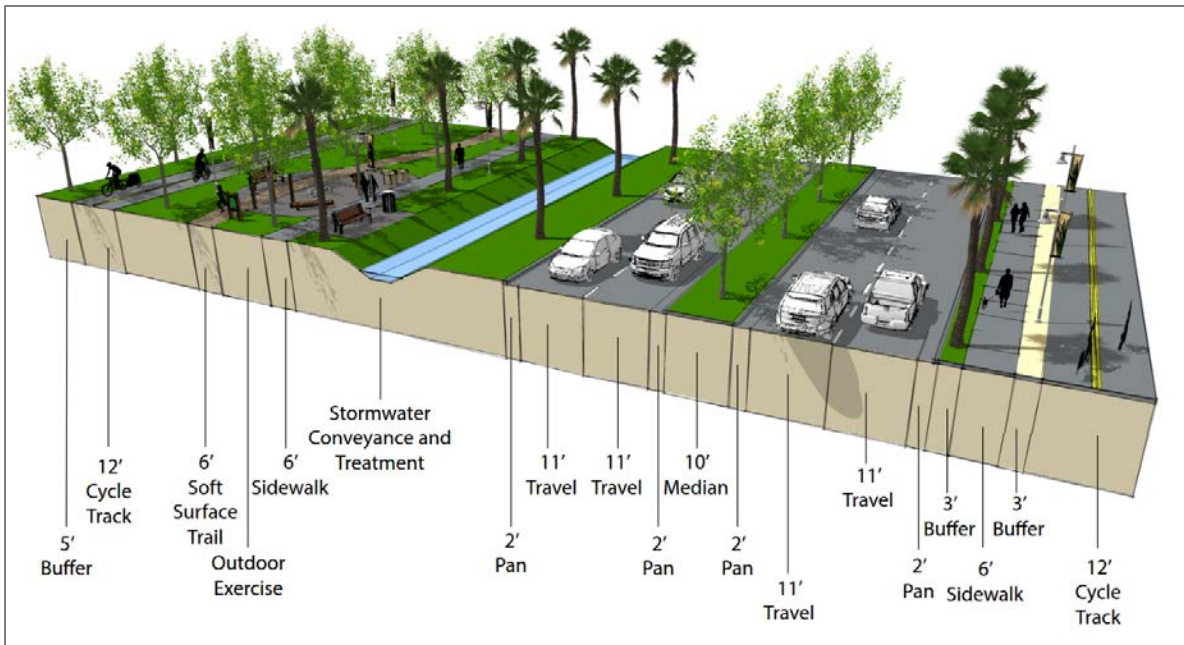


7. S.R. 524: Corridor Segment from N. Friday Road to Industry Road, Alternative 3 – Rural Typical Section. This alternative was eliminated for the following reasons.

- a. Median too wide.
- b. Grass buffer areas too wide.
- c. Buffered bike lanes desired along entire corridor.



- 8. S.R.524: Corridor Segment from Cox Road to Coventry Court – Linear Park.** This concept was eliminated for the following reasons:
- High maintenance costs and upkeep required.
 - Stormwater conveyance too close to roadway and requires upkeep.
 - Anticipated additional construction costs.



5.2 Improvement Strategies – Confirmed to Carry Forward

The S.R. 524 Corridor varies in land uses along the 3.1 mile roadway section, each with a slightly distinct character. As a result, the Study Team broke the corridor into four segments for analysis. Individual, but compatible typical sections were developed for each of the four segments. The segments are as follows:

- I-95 Interchange
- N. Friday Road to Cox Road
- Cox Road to Coventry Court
- Coventry Court to Industry Road

The following design features are consistent across all corridor segments:

- Two through travel lanes in each direction
- Center raised, landscaped median
- Multi-use path on north side of roadway
- Sidewalk on south side of roadway
- Buffered bike lanes on both sides of roadway
- Enhanced crosswalks and pedestrian signals at all intersections
- 45 mph posted speed limit
- Curb and gutter
- Grass buffer area between back of curb and sidewalks/shared path

Below is a description of each of the four segments, followed by figures illustrating the typical sections.

Segment 1: S.R. 524 at I-95 Typical Section – this section consists of two 12' through travel lanes in each direction; a single left turn lane onto the I-95 northbound; a shared through and left turn lane (to provide dual left turn lanes) onto I-95 southbound; a 7' buffered bicycle lane on both sides of the roadway; and modification to the bridge abutments to provide 6' sidewalks on both sides of S.R. 524. Bridge piers will need to be analyzed to determine whether they meet current crash standards. Any potential improvements to this section needs to be coordinated with the Interchange Operational Analysis Report (IAOR) that was recently completed as a separate study by FDOT D5.

Segment 2: S.R. 524: N. Friday Road to Cox Road Typical Section – this section generally consists of a 22' center median, raised and landscaped; two through lanes in each direction, the inside lanes at 11' and the outside lanes 12'; 7' buffered bicycle lanes on both sides of the roadway; a 6' shared path on the south side of S.R. 524 and a 12' shared path on the north side of S.R. 524. Grass buffers are to be provided between the bicycle lane and the shared use path/sidewalk, and to the edge of right-of way. The distances of these buffers will be determined with the alignment in the PD&E Study.

Segment 3: S.R. 524: Cox Road to Coventry Court Typical Section – this section continues the 22' center, landscaped and raised median; as well as the 12' shared path, 6' sidewalk, 7' buffered bicycle lanes, and grass buffers between the bicycle lane and the sidewalk, as well as between the

shared path/sidewalk and edge of right-of-way. This section reduces all travel lanes to 11'. Potential roundabout candidates should be considered within this roadway segment.

Segment 4: S.R. 524: Coventry Court to west of Industry Road Typical Section – this section replaces the raised, landscaped median with a raised impervious surface median. The median width will vary depending on the location along the segment. It also provides left and right turn lanes into the commercial shopping areas and consideration of green bicycle lanes. Two through travel lanes remain at 11', 7' buffered bicycle lanes, 12' shared path, 6' sidewalk, and grass buffers remain consistent with segment to the west.

It should be noted that this corridor study ends just west of Industry Road. The SR 501/Clearlake Road PD&E Study, completed by FDOT in 2016, includes the intersection of Industry Road and recommends the configuration below.

Figure 5.1: Intersection Configuration of Industry Road at SR 501/Clearlake Road

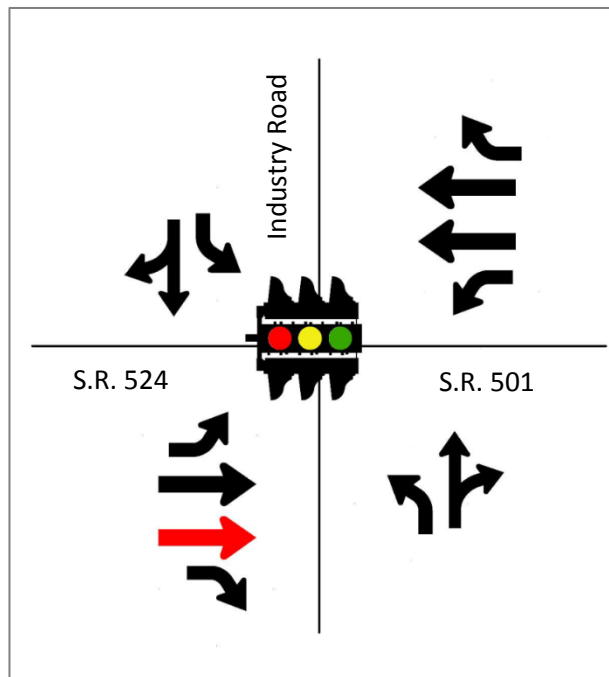


Figure 5.2: Segment 1 - S.R. 524 at I-95 Typical Section

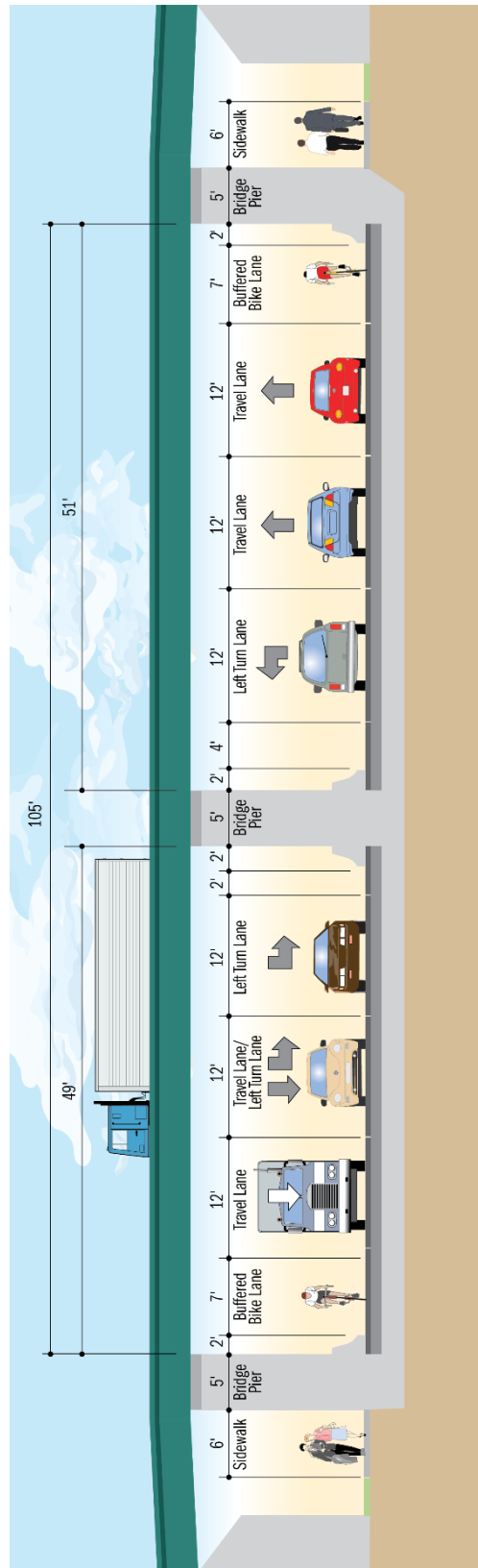


Figure 5.3: Segment 2 – N. Friday Road to Cox Road Typical Section

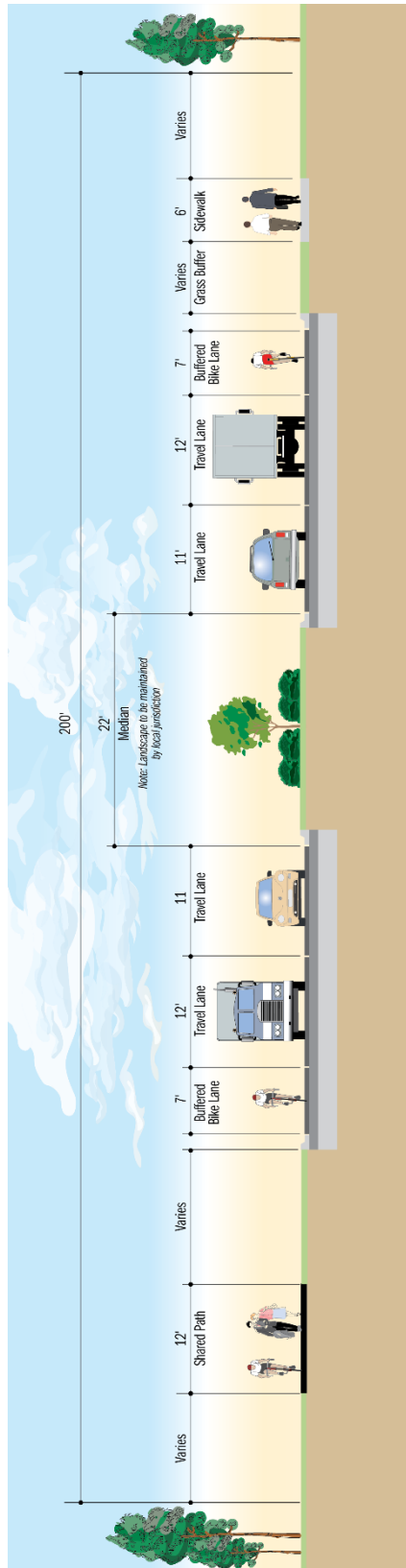


Figure 5.4: Segment 3 – Cox Road to Coventry Court Typical Section

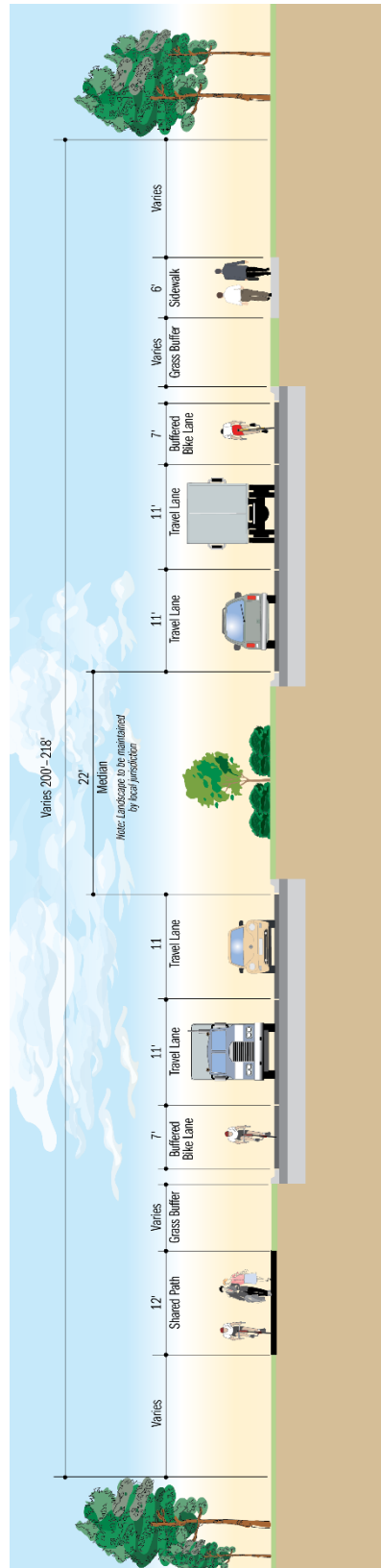
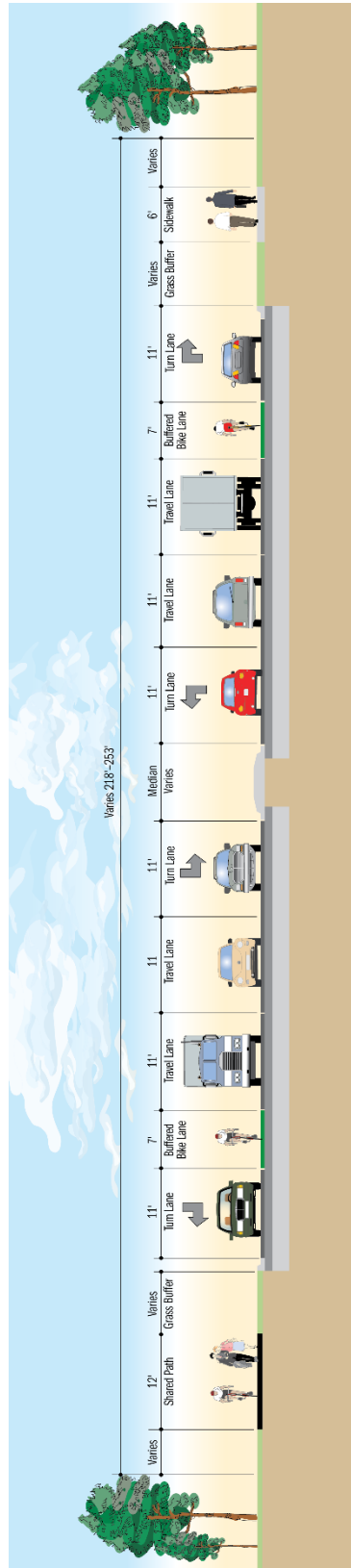


Figure 5.5: Segment 4 – Coventry Court to west of Industry Road Typical Section



5.3 Recommended Improvement Strategies – Spot Locations

In addition to the typical sections, additional improvement strategies were identified at key locations along the corridor. These include:

- Traffic signals are suggested for, and have been approved by FDOT District 5 along S.R. 524 at the following locations:
 - I-95 southbound ramps
 - I-95 northbound ramps
 - N. Friday Road
 - Main entrance into the new Walmart Distribution Center
- Traffic signal at S.R. 524 and S. Friday Road – the current configuration of this intersection is difficult for drivers to navigate. Traffic movements in and out of the Lost Lakes community are impeded by limited sight distances and vehicles turning into the BP gas station. Warrants will need to be met determined and distance between this signal and the new signal at S.R. 524 and the I-95 southbound ramps need to be reviewed, if they are, this location should be considered for a traffic signal. Figure 5.6 below shows the location of this intersection.
- Driveway reconfiguration at BP gas station and S. Friday Road – there are currently two driveway access points into the BP gas station, with one immediately adjacent to S. Friday Road (on the north side of S.R. 524). Vehicles turning left into the BP gas station travel into the westbound lanes of S.R. 524 and block access to and from S. Friday Road, causing safety issues with vehicles turning out of the Lost Lakes community. Consideration should be given to closing the westernmost access into the BP station, and instead providing a secondary access to connect with the Lost Lakes access to then have single channelized access to S.R. 524.

Figure 5.6: Intersection of S.R. 524 and S. Friday Road (Lost Lakes Community)



- Free-flowing right turn lanes at both the I-95 southbound and northbound off-ramps onto S.R. 524 should be eliminated, with right turns brought tighter into the new ramp. Signalized intersections will eliminate weaving conflicts between off-ramp right turns and left turns at the S. and N. Friday Road intersections.
- Eastbound right turn lane provided on S.R. 524 into the entrance to the Walmart distribution center.
- Level 1 Roundabout Screening Analysis was completed for the Corridor. Potential intersection location candidates for more detailed assessment include Cox Road and London Boulevard. FDOT D5 Traffic Operations will review Screening undertaken to date and provide course of action.
- The access management strategy is illustrated in Figure 5.7 below.

5.4 Roundabouts

Current FDOT policy on roundabouts states the following:

A roundabout alternative must be evaluated on new construction and reconstruction projects. Evaluation is also required for all other types of projects proposing new signalization or require a change in an un-signalized intersection control. An evaluation is not required for minor operational improvements such as changes to signal phasing, or for signal replacement projects where the primary purpose is to upgrade deficient equipment and installations.

While roundabouts may provide a community enhancement, they are constructed on state roads solely for this purpose. To construct a roundabout on the state highway system, one of the following criteria must be met:

- MUTCD traffic signal warrants 1 or 2
- Documented high frequency of severe crashes
- Context Sensitive Solution for the implementation of Complete Streets on a low speed facility

During S.R. 524 Corridor Study, a Level 1 Roundabout Screening Analysis was conducted for all of the intersections along the Corridor. The Department will further evaluate the draft results below during the PD&E Study phase and will move forward with the next level of evaluation as appropriate.

Table 5.1: S.R. 524 - Draft Level 1 Roundabout Screening Evaluation

Screening Criteria		Intersection												
		S. Friday Rd	I-95 SB Ramp	I-95 NB Ramp	N. Friday Rd	Walmart Distribution	Cox Rd	Pinyon Dr	Westminster Dr	Lance Blvd	London Blvd	Coventry Ct	Shopping Center Access	Industry Rd
1	Physical or Geometric Constraints	N	Y	Y	N	N	a/a	N	N	N	a/a	N	a/a	N
2	Major Roadway AADT Exceeds 90%	Y	N	N	Y	Y	N	Y	Y	Y	a/a	Y	a/a	N
3	Pedestrians w/Special Needs	N	N	N	N	N	N	N	N	N	N	N	N	N
4	Coordinated Signal Network	N	N	N	N	N	N	N	N	N	N	N	Y	Y
5	Downstream Queuing	N	N	N	N	a/a	N	N	N	N	N	N	Y	Y
6a	Impacts to Historic, 4f, or Environmentally Sensitive Areas	N	N	N	N	N	N	N	N	N	N	N	N	N
6b	Residential or Business Relocation	a/a	N	N	Y	N	a/a	a/a	a/a	a/a	a/a	a/a	N	N

* Level 2 Screening required if "No" for all criteria.

** "N" = favorable conditions for a roundabout "Y" = unfavorable conditions for a roundabout

5.5 Access Management Strategy

A key component of the improvement strategy for the S.R. 524 Corridor is an access management strategy. This strategy is intended to identify the location and level of access for different public street intersections along the corridor, associated with the overall proposed raised median development from S. Friday Road to Industry Road.

FDOT has seven access management classifications related to the state highway system, ranging from Class 1 (most restrictive, typically applicable to freeway/toll road facilities) to Class 7 (least restrictive (typically related to closely spaced urban street grid areas). Table 5.2 identifies the spacing and level of access guidelines for these different classifications.

Table 5.2: FDOT Access Class Spacing Standards

FDOT Access Management Class	Median	Minimum Median Opening Spacing (feet)		Minimum Signal Spacing (feet)	Minimum Connection Spacing (feet)
		Full	Directional		
Class 1 ¹	Restrictive	-	-	-	5,280 (CBD) – 31,680 (Rural)
Class 2	Restrictive with Service Roads	2,640	1,320	2,640	1,320 / 660 ²
Class 3	Restrictive	2,640	1,320	2,640	660 / 440 ²
Class 4	Non-Restrictive			2,640	660 / 440 ²
Class 5	Restrictive	2,640 / 1,320 ²	660	2,640 / 1,320 ²	440 / 245 ²
Class 6	Non-Restrictive			1,320	440 / 245 ²
Class 7	Both Median Types	660	330	1,320	125

Source: Section 14-97.003, Florida Administrative Code

¹ Access Class 1, for limited access facilities, only applies to interchange spacing, not median or signal spacing.

² Greater than 45 MPH posted speed / Less than or equal to 45 MPH posted speed

Today, the study corridor exhibits access conditions and is officially classified by FDOT as Access Classification 3 (through the I-95 interchange between S. Friday Road and Cox Road) and Access Classification 4 (between Cox Road and Industry Road). The existing posted speed limit is 55 mph between N. Friday Road and London Road; and 45 mph west of N. Friday Road to S. Friday Road, and east of London Road to Industry Road. Figure 5.1 identifies a refined access management classification reflective of the proposed roadway improvement and new development planned in the corridor. The figure also identifies the specific type and level of access at the public street intersections along the corridor, including the proposed location of traffic signals, and conversion of certain unsignalized intersections or major driveways to either directional access (left out movements from the side approaches restricted due to the median) or right-in, right-out access.

A more stringent classification of Access Classification 5 is proposed in the I-95 interchange area and east of Cox Road. In addition, lowering the speed limit to 45 mph throughout the corridor is proposed. Further discussion of the specific access modifications proposed along certain segments of the corridor includes:

S. Friday Road to N. Friday Road (I-95 Interchange Area)

In the I-95 interchange area, four traffic signals are proposed along S.R. 524, two at the existing unsignalized I-95 ramp intersections with S.R. 524, and at the S. Friday Road and N. Friday Road intersections. With the exception of the signal at S.R. 524 and S. Friday Road, each of the three signals has already been approved by the Department. At the existing BP gas station west of the interchange, there are currently two driveways. It is recommended that the easterly driveway be converted to right-in, right-out access, and the westerly driveway closed, with a connection made to the Lost Lakes access roadway to channelize all left turns in and out of the north approach to S. Friday Road to the Lost Lakes access (with the new signal at this intersection).

N. Friday Road to Cox Road

In this section of the corridor, a new traffic signal on S.R. 524 is already approved to coincide with the opening of Phase One of the Walmart Distribution Center. Two other median breaks are identified east and west of the new traffic signal to serve Phase Two development on the Walmart property (the type and degree of access pending final development levels planned to be served by each access). The existing Thien Thai Road approach to S.R. 524 which serves the New Fellowship Church, would be converted to a right-in right-out access.

Cox Road to Coventry Court

East of Cox Road, there are three existing unsignalized T-intersections along S.R. 524 at Pinyon Drive, Westminster Drive, and Lance Boulevard. Given Westminster Drive has the greatest continuity serving the residential areas north of S.R. 524 in this area, it is proposed that this intersection continues to have full unsignalized access, with both the Pinyon Drive and Lance Boulevard intersections having directional access, with eastbound left turns allowed, but not left turns from the side street approach.

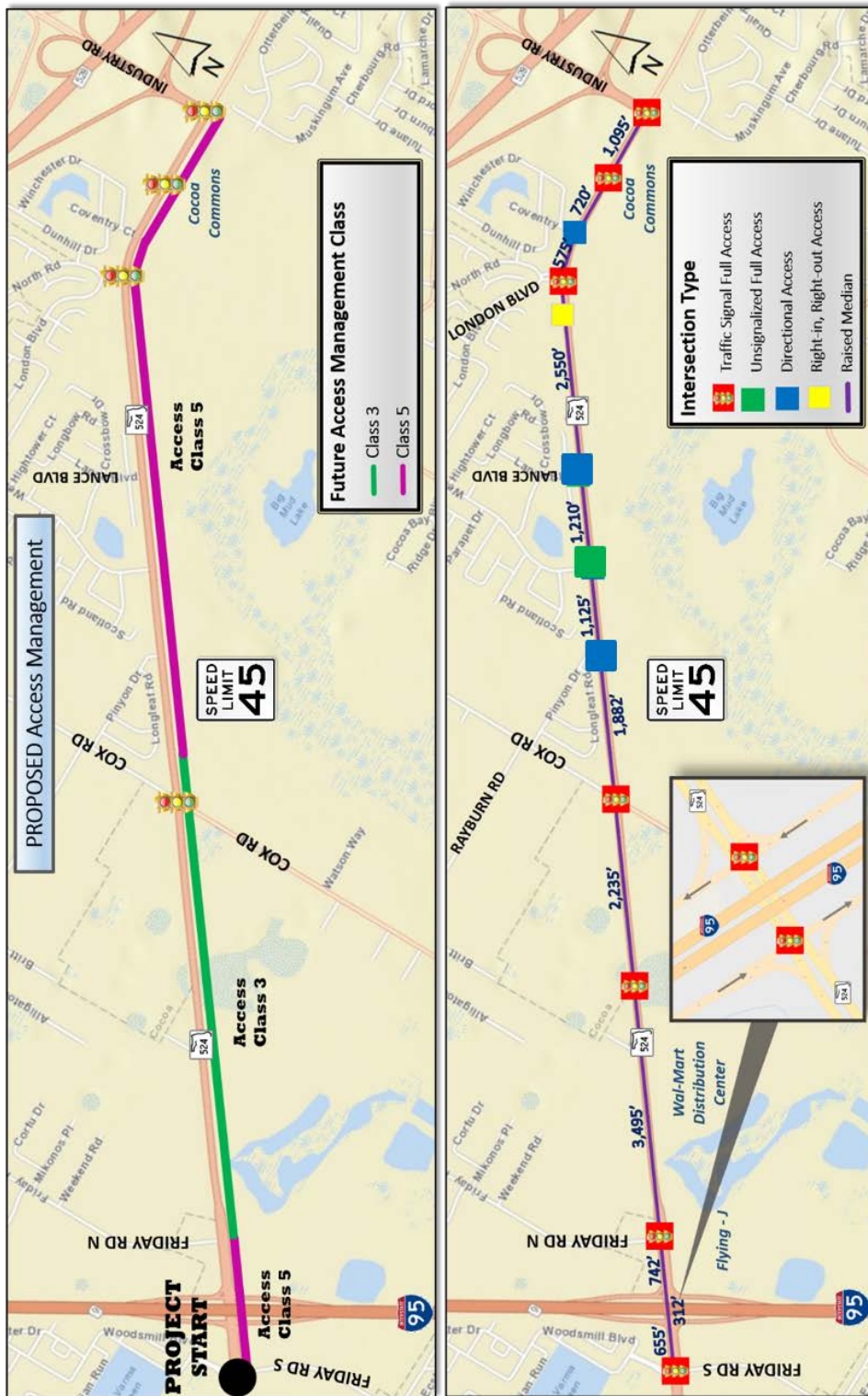
Just west of London Boulevard, there are plans to develop a new fire station. The plans call for two full movement access driveways, protected by a new emergency signal.

On the north side of S.R. 524, the access to the existing Sunoco gas station is proposed to be converted to a right-in, right-out access, given the station also has access today off London Boulevard. At Coventry Court, this intersection is also proposed to become a direction access, with eastbound left turns allowed, but not left turns from the Coventry Court approach.

Coventry Court to Industry Road

In this segment of the corridor, no changes to local access are planned. Primary access to both the Cocoa Commons and Coventry at Cocoa shopping centers would be provided by the existing traffic signal at the west end of the two properties. This signal will be supplemented with the existing right-in, right-out driveways between the signal and Industry Road.

Figure 5.7: Proposed Access Management Strategy



5.6 Evaluation of Conceptual Drainage Alternatives

Regulatory Issues and Design Criteria

The project is located within the upper St. Johns River drainage watershed and is under the jurisdiction of the Saint Johns River Water Management District (SJRWMD). It will be necessary to meet with SJRWMD during the PD&E phase to establish any project-specific requirements. For wet detention facilities, SJRWMD typically requires treatment for the greater of either the first inch of runoff over the right-of-way (ROW) area or the first 2.5 inches of runoff from the impervious area. The design will also need to demonstrate that the peak discharge rate in the post-development condition will not exceed the pre-development peak discharge rate for the 25-year / 24-hour design storm. SJRWMD will require nutrient loading calculations for the project area west of Thien Thai Lane because that segment is located within a WBID with an established Total Maximum Daily Load (TMDL) for nutrients.

Other Drainage-Related Information

The project traverses several floodplains and wetland areas. Floodplain compensation and wetland mitigation must be provided to offset any potential impacts. Approximately 6.4 acres of ROW acquisition will be needed to provide the required floodplain compensation for the proposed roadway improvements. The following conceptual drainage alternatives will examine if the proposed stormwater management will improve peak flood stages in the surrounding areas. Even if noticeable improvement cannot be made to flood stages, the project will be required to demonstrate that the proposed improvements will not cause any adverse impact to flood stages in the surrounding area.

Alternative 1: Linear Swales within Existing ROW

The first drainage alternative involves the use of linear swales to satisfy all stormwater management requirements. When existing conditions permit, linear treatment provides the opportunity to supply the required treatment and attenuation within the existing ROW, eliminating the need for ROW acquisition.

Dry retention is the more common form of linear stormwater management because wet detention ponds typically require more ROW width to satisfy stormwater management criteria. The limited ROW width along the corridor rules out the potential for linear wet detention within the existing ROW. While linear wet detention could still be an alternative with additional ROW acquisition, large ROW takes along frontage parcels have proven cost prohibitive in other analyses.

Due to historical failures and lack of recovery, District Five has published a drainage checklist that specifies that dry retention swales can only be used under certain conditions. These requirements include Type "A" in situ soils and a provision of a minimum of two feet of clearance above the prevailing seasonal high. Raising the roadway profile would allow the two-foot clearance requirement to be met, but Figure 3.1 illustrates that only the easternmost portion of the Study Area lies within Type "A" soils.

While the in-situ soils do not meet District Five's specific requirements for retention swales, FDOT may still accept linear treatment as a viable alternative with favorable geotechnical information. Linear dry treatment could be further evaluated as an option, especially within the last two drainage basins which are situated in Type "A" soils. Utilizing linear treatment in any portion of the Study Area would help reduce ROW acquisition costs associated with offsite ponds.

Alternative 2: Regional Stormwater Management Facility

Recently FDOT has placed more emphasis on the need for drainage designs to incorporate a more regional approach to stormwater management. Instead of designing SMFs that strictly benefit each basin within a project, FDOT updated the Drainage Manual to require projects to employ Environmental Look Arouns (ELA) to explore watershed needs and alternative permitting approaches.

This criterion requires the drainage design to coordinate with regional stakeholders to better evaluate the watershed issues surrounding the study area. Joint-use facilities, wetland hydration, flooding, TMDL needs and stormwater re-use are among the watershed opportunities that could potentially be evaluated. When the appropriate joint opportunities are available, partnerships with stakeholders can provide a large benefit to a regional watershed for a cost that is comparable or even less than a stormwater management plan designed strictly for FDOT ROW.

A variety of proposed developments along the southern boundary of SR 524 provide potential opportunities for regional partnership. Each of these developments will greatly benefit from SR 524 roadway improvements, and these stakeholders may be open to a partnering opportunity with FDOT construct the roadway improvements. A large wet detention pond that could serve multiple basins within the project could be explored at many of the potential developments along the corridor. Project needs for floodplain compensation, treatment, attenuation and fill material could potentially be addressed through an appropriate partnering opportunity.

While regional stormwater management presents many additional opportunities above a traditional drainage approach, there is often an increased risk associated with pursuing regional opportunities. Complicated negotiations, legal agreements and changing management by potential partners each present potential hurdles for the use of regional facilities.

Alternative 3: Offsite Ponds for Each Basin

The final conceptual alternative provides stormwater management in traditional offsite ponds for each basin. Based on the in-situ soils, wet detention would likely be the preferred form of stormwater management. Ponds could be offset from SR 524 frontage to reduce ROW costs. The offsite pond alternative would be an easily permitted option, but its benefit to the overall watershed would likely be minimal.

Finding suitable parcels for reasonable ROW costs in each basin may prove to be a challenge. Each pond location could potentially provide fill for the improvements to the corridor if suitable in situ soils are present.

Table 5.3: Summary of Advantages and Disadvantages of Stormwater Management Options

Alternative 1: Linear Swales within Existing ROW	Alternative 2: Regional Stormwater Management Facility	Alternative 3: Offsite Ponds for Each Basin
Advantages		
Reduces or eliminates ROW acquisition costs	May produce large benefits to regional watershed	Simple permitting process
Potentially reduces schedule length (Elimination of ROW phase*)	May also meet watershed improvement requirements for FDOT (i.e. BMAP)	Low maintenance costs
	Potentially eliminates/reduces ROW acquisition costs	May provide suitable fill for a portion of the corridor improvements
	May provide suitable fill for project improvements	Lower roadway profile required compared to other alternatives
	Typically offers better value for stormwater management per dollar spent	
Disadvantages		
Reduces the ROW available for future corridor improvements	Negotiations and legal work may complicate, delay or force abandonment of this alternative	Minimal benefit to regional watershed
Increases earthwork costs	Potential permitting complications	High ROW acquisition costs
Requires increase in roadway profile	May require roadway profile to be raised	
Requires suitable soils		
Most of the project does not meet District Five's specific requirements for retention swales		
Additional fill for linear swales would increase floodplain impacts		
Provides minimal benefit to regional watershed		
Historical maintenance issues with this type of facility		
* Assumes the project has no other need for ROW acquisition		

Estimated Costs

The table below provides the estimated cost for the recommended improvements along the S.R. 524 Corridor. These cost estimates are based on a planning level analysis and should not be considered as a final cost estimate. The improvement costs will be developed in greater detail based on the refined roadway design and mitigation strategy during the PD&E Study phase. It is assumed in this study that no additional right-of-way for roadway improvements will be required.

Table 5.4: Estimated Cost for Recommended Improvements (Existing \$)

	I-95 Interchange	I-95 to Cox Road	Cox Road to Coventry Court	Coventry Court to Industry Road ¹
Length	0.04	1.1	1.4	0.35
Roadway				
Widening	\$0.00	\$6,610,001	\$8,412,729	\$1,502,273
Re-Striping	\$10,000	\$0.00	\$0.00	\$0.00
Shared Use Path (12')	\$0.00	\$753,335	\$958,790	\$171,213
Sidewalk (6')	\$20,234	\$299,185	\$380,782	\$67,997
Bicycle Lanes* (7') ²	\$0.00	\$88,057	\$112,072	\$20,013
Abutment Modification	\$268,800	\$0.00	\$0.00	\$0.00
Pedestrian Crosswalks	\$7,779	\$5,186	\$2,593	\$5,186
Urban Mast Arm Signals ³	\$650,000	\$325,000	\$650,000	\$325,000
Overhead Signage	\$100,000	\$0.00	\$0.00	\$0.00
Drainage Ponds ⁴	\$40,742	\$1,183,133	\$1,505,806	\$268,894
I-95 SB Ramp Widening	\$122,300	\$0.00	\$0.00	\$0.00
Sub-Total	\$1,219,855	\$9,263,898	\$12,022,772	\$2,360,575
Project Unknowns (30%)	\$365,957	\$354,940	\$3,606,832	\$708,173
MOT (10%)	\$121,986	\$926,390	\$1,202,277	\$236,058
Mobilization (10%)	\$121,986	\$926,390	\$1,202,277	\$236,058
Total Construction Cost	\$1,829,783	\$11,471,618	\$18,034,158	\$3,540,863
Design (15%)	\$274,467	\$2,084,377	\$2,705,124	\$531,129
CEI (15%)	\$274,467	\$2,084,377	\$2,705,124	\$531,129
Total Segment Cost	\$2,378,718	\$15,640,372	\$23,444,406	\$4,603,122
Total Cost	\$48,490,847			

¹ Assumes 0.1 mile of buildout of 4-lane section with associated signal modifications at Industry Road will be done as part of planned SR 501 improvement, assumed to be completed before the SR 524 project.

² No bicycle lane cost assumed under I-95 Interchange because pavement already exists, however, re-striping cost is assumed to be included in widening.

³ Complete rebuild of existing signals assumed with 4-lane widening; does not include cost of new Walmart signal (assumed to be developer cost).

⁴ Assumes all drainage pond improvements would be made inside existing SR 524 right-of-way.

6.0 Next Steps

6.1 Considerations for PD&E Study

The PD&E Study phase is funded in Fiscal Year 2019. During this phase, the proposed improvements will be developed in further detail. Specific areas for further analysis include:

- Roadway alignment
- Access management plan
- Design and posted speed limit
- Stormwater impacts
- Lighting improvement
- Mitigation of potential noise impacts
- Incorporate recommendations from the I-95 IOAR into the S.R. 524 PD&E Study

6.2 Project Status

During the PD&E Study, additional opportunities for public and stakeholder outreach will be provided to ensure that the community is engaged throughout the duration of the project. Once the PD&E Study is complete, final design will begin, right-of-way acquisition will occur (if needed), and construction will follow.

There is over \$30.0 million identified as needed to widen S.R. 524 from two to four lanes between I-95 and Industry Road in the Space Coast TPO's Long Range Transportation Improvement Program (LRTP). In the LRTP, the widening is anticipated to need the following amounts allocated by phase: \$1.738 million for a Project Development & Environmental Study (PD&E) in FY 2019; \$3.24 million for Final Design (FD) in FY 2021; \$4.49 million for Right-of-Way (ROW) in FY 2021; and \$22.47 million for construction in FY 2022. Of the total amount programmed in the LRTP, only the PD&E Study Phase in the amount of \$1.738M is funded in the TPO's TIP and the FDOT's STIP (State Transportation Improvement Program).



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