CENTRAL FLORIDA EXPRESSWAY AUTHORITY

CFX Contract Number: 001844
CFX Project Number: 528-307

PRELIMINARY ENGINEERING REPORT

SR 528 & DALLAS BLVD INTERCHANGE

Martin Andersen Beachline Expressway

PROJECT DEVELOPMENT & ENVIRONMENT STUDY

Submitted By:

Signature: _____

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July 25, 2023

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Appendix

1.0 - Project Information

Project Name: State Road (SR) 528 & Dallas Boulevard (Blvd) Interchange

Projects Limits: The project area covers SR 528 and the existing CFX right-of-way from the Econlockhatchee River bridge to approximately ¾ mile east of Dallas Boulevard. The project area also includes the interchange and the transition areas along Dallas Boulevard and Starry Street in the Wedgefield neighborhood, located within eastern Orange County.

County: Orange

Proposed Activity: This PD&E Study will analyze and evaluate the completion of the Dallas Blvd interchange by adding a westbound off-ramp and eastbound on-ramp to SR 528 to provide enhanced access and mobility to the Wedgefield community and eastern Orange County.

Responsible Agency: CFX

Planning Organization: CFX

Phase: Project Development & Environment (PD&E) Study

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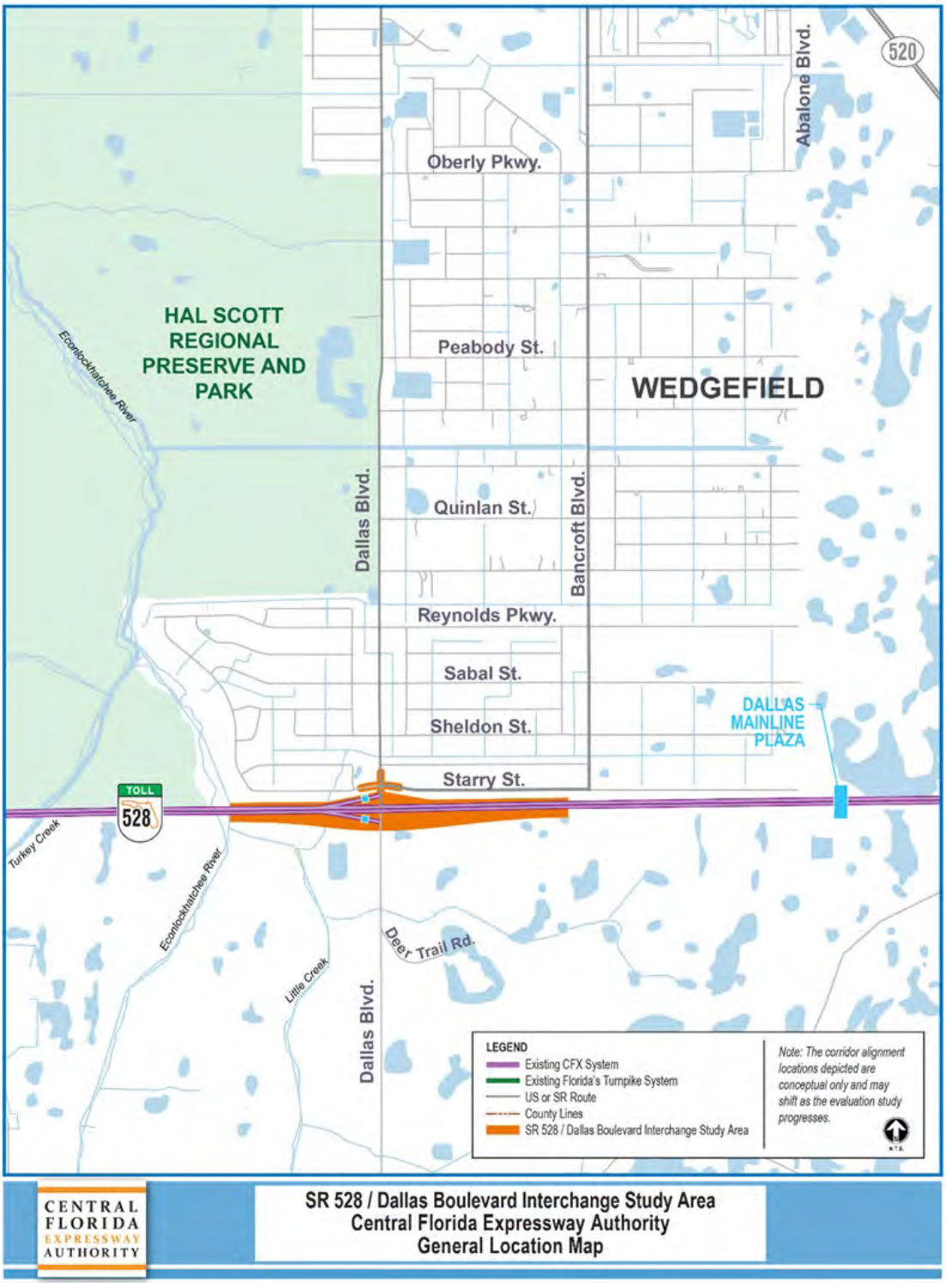
Project Location Map

Figure 1 – Project Location



Project Background & Description

Background

In December 2022, CFX began a PD&E Study of the SR 528 & Dallas Blvd Interchange. The study is evaluating the completion of the Dallas Blvd interchange by adding a westbound off-ramp and eastbound on-ramp to SR 528 to provide enhanced access and mobility to the Wedgefield community and eastern Orange County.

Study Description

Currently, the Dallas Blvd interchange (Exit 24) on SR 528 (Martin B. Andersen Beachline Expressway) is a half interchange – consisting of a westbound on-ramp and an eastbound off-ramp. The completion to a full interchange, by adding a westbound off-ramp and eastbound on-ramp, has been identified as a need to provide enhanced access and mobility to the Wedgefield community and eastern Orange County. Currently, residents within Wedgefield must travel north in the subdivision to access SR 520 and then travel south to access SR 528 in the eastbound direction – a distance that can range from approximately seven to thirteen miles – and vice versa when travelling westbound on SR 528. Therefore, this PD&E Study will analyze and evaluate the completion of the Dallas Blvd interchange by adding a westbound off-ramp and eastbound on-ramp. See **Figure 1** for the Project Location Map.

Purpose

The projected regional growth and corresponding traffic forecasts generated for the entire CFX Expressway System, as summarized in their 2040 Master Plan, has indicated that the Dallas Blvd interchange is located within the projected high growth areas of Orange County. The actual development and associated travel demand that has occurred at the Dallas Blvd interchange has greatly outpaced the original projections. It is anticipated that future traffic demand at this interchange will further exceed the design capacities as development continues to intensify. The purpose of this study is to provide enhanced access and mobility for the existing community bordering Dallas Blvd, and future developments. Additional purposes for the project include improved emergency vehicle access and response, and supporting economic development. Therefore, this PD&E Study will analyze and evaluate a proposed full interchange expressway connection from Dallas Blvd to SR 528.

Need

There are five (5) project needs that serve as justification for the proposed improvements. These needs are to:

1) **Provide System Linkage**. A full interchange has been identified as a need to provide enhanced access and mobility to the Wedgefield area of Orange County from SR 528. Currently, vehicles in the vicinity of SR 528 who need to travel east on SR 528 must detour up to 13 miles to SR 520 southbound. Vehicles traveling westbound on SR 528 wishing to access Dallas Blvd or the Wedgefield area are required to utilize northbound SR 520, then enter Wedgefield and perform a detour of up to 13 miles.
2) **Provide Regional Connectivity and Mobility -** This connection will improve mobility and future connectivity within the region, specifically to allow connection to and from the Space Coast and Cocoa Beach area to the east.

3) **Support Social and Economic Needs -** The proposed improvements will provide enhanced regional connectivity in the eastern Orlando Metro area within unincorporated Orange County, with anticipated development to the south of the project area. The project will assist in providing improved access to jobs, services, and recreation. The enhanced mobility will continue to drive economic development.
4) **Provide Consistency with Local and Regional Plans -** The Interchange is consistent with planned CFX capacity improvement projects and future development, along with consistency with regional transportation plans for the area.
5) **Design a Safe and Operational Interchange –** The interchange will provide safety improvements over existing conditions.

Preliminary Engineering Report

Preliminary Engineering Report (PER) Overview

General Overview

The purpose of the SR 528/Dallas Blvd Full Interchange PD&E Study is to develop a proposed improvement strategy that is technically sound, environmentally sensitive and publicly acceptable. Emphasis has been placed on the development, evaluation and documentation of engineering and environmental studies including data collection, conceptual design, environmental analyses, project documentation and the preparation of a Preliminary Engineering Report.

CFX is presently evaluating the feasibility to complete a Full Interchange at Dallas Blvd along SR 528, a strategic transportation investment aimed at supporting existing and future growth in the Wedgefield and surrounding area of eastern Orange County. The primary objectives of this transportation improvement project are to expand regional connectivity in Orange County and expand the existing Dallas Blvd half interchange by adding a westbound off-ramp and eastbound on-ramp, while being consistent with accepted local and regional plans.

The following documents, available under separate cover, were prepared and submitted to CFX for this PD&E Study**:**

- **Air Quality Technical Memorandum**
- **Conceptual Design Roadway Plan Set**
- **Contamination Screening Evaluation Technical Memorandum**
- **Cultural Resources Desktop Analysis Technical Memorandum**
- **Environmental Assessment Technical Memorandum**
- **Existing Conditions Technical Memorandum**
- **Geotechnical Technical Memorandum**
- **Pond Sizing Technical Memorandum**
- **Project Traffic Analysis Technical Memorandum**
- **Traffic Noise Study Report**
- **Typical Section Package**
- **Utility Assessment Technical Memorandum**
- **Water Quality Impact Evaluation Checklist**

Roadway Analysis

Roadway Analysis

EXISTING CONDITIONS

SR 528 is a rural four lane divided, east-west expressway within the project limits. In general, SR 528 is a crucial roadway network connecting residents and visitors to the Orlando International Airport and the east coast beaches, cities, and Cape Canaveral. Within the project limits, SR 528 has a half diamond interchange at Dallas Blvd which provides regional connectivity to the Wedgefield neighborhood and eastern Orange County. The interchange consists of a westbound on-ramp and eastbound off-ramp. SR 528 is a designated Strategic Intermodal System (SIS) highway corridor. The mainline bridge substructure for SR 528 over Dallas Blvd consists of piers partially embedded by a concrete slope pavement embankment. The embankment abuts the road. There is no eastbound re-entry onto SR 528, as well as no access from westbound SR 528. Outside of the existing interchange, access to and from this community is circumvented by the use of SR 520 which is seven miles east of the Dallas Blvd interchange, and then another seven miles north until you reach the entrance into Wedgefield. SR 528 is grade separated at this crossing.

The Brightline High-Speed Rail/All Aboard Florida (AAF) travels parallel to SR 528 and is also grade separated at Dallas Blvd. The crossing over Dallas Blvd is located approximately 600 feet south of the SR 528 crossing.

Dallas Blvd is a two-lane undivided, north-south roadway serving the Wedgefield neighborhood. Dallas Blvd crosses under SR 528 and the Brightline railway. Within the project limits, Dallas Blvd intersects Starry St approximately 300 feet north of the westbound on-ramp. These two roads intersect at an all way stop controlled intersection. Dallas Blvd to the south of the SR 528 eastbound off-ramp turns into a private, gated road.

Starry St is a two-lane undivided, east-west roadway serving single residential homes in the Wedgefield neighborhood. Starry St dead ends at both termini.

Existing Roadway Design Controls

The design controls are functional classification, context classification, and design speed. These three elements establish the geometric and operational characteristics and criteria of the roadway. The functional classification is based on vehicular travel characteristics and the degree of access provided to adjacent properties. Context Classification establishes design criteria based on environmental conditions and the surrounding land use in order to harmonize the roadway characteristics and features with the intended land uses (i.e. existing and planned). Design Speed is a principal design control that regulates the selection of many of the project standards and criteria used for design. **Tables 1, 2** and **3** list the existing classifications and design speed as determined by the consultant using all available data and documentation.

Table 1 - Roadway Functional Classification

Roadway Name	Urban or Rural	Functional Class	Divided or Undivided
SR 528	Rural	Principal Arterial	Divided
Dallas Blvd	Rural	Collector	Undivided
Starry St	Rural	Local	Undivided

Table 2 - Roadway Context Classification

Roadway Name	FDOT Context Class
SR 528	Limited Access
Dallas Blvd	N/A
Starry St	N/A

*FDOT Context Class only applicable for arterials and collectors on the SHS
N/A = not applicable

Table 3 - Roadway Speeds

Roadway Name	Design Speed (mph)	Posted Speed (mph)
SR 528	70	70
Dallas Blvd^	45	40
Starry St^	55	50

^ Where design speed could not be determined by existing plans, it was assumed to be 5 mph greater than the current posted speed

Existing Access Classification

Under Florida Statutes 335.18 the legislature authorized the Florida Department of Transportation (FDOT) to develop rules to administer the "State Highway System Access Management Act". These rules regulate access to the state highway system in order to preserve the functional integrity of the system. FDOT uses seven access classifications numbered one thru seven as defined in Rule 14-97. In general, as the access classification increases so does the number of access points and connections to the facility. On the other hand, speed is inversely related, and as the access classification increases the speed on the facility decreases. **Table 4** lists the access classification as determined by the consultant using all available data and documentation.

Table 4 - Access Classification

Roadway Name	Access Classification
SR 528	Access Class 1, Area Type 4
Dallas Blvd	N/A
Starry St	N/A

*FDOT Access Classification only applicable for SHS
N/A = not applicable

Existing Roadway Characteristics

The following sections discuss the characteristics of primary roadways in the project area. SR 528 features were determined using As-Builts from CFX Project No. 528-131. All other roadways and their features were determined using information and measurements collected from site visits and the Orange County Property Appraisers website. **Tables 5 - 7** summarize the existing roadway characteristics.

Typical Section

Table 5 - Typical Section

Roadway Name	No. of Lanes (Width)	Median Width	Outside Paved Shoulder Width	Inside Paved Shoulder Width	Roadside Ditch (Y or N)	Curb & Gutter (Y or N)	Pedestrian Facility (Y or N)	Bicycle Facility (Y or N)	R/W Width (ft)
SR 528	4 (12')	40	10'	4'	Y	N	N	N	300' Min
Dallas Blvd	2 (11')^	N/A	0'*	N/A	N	N	N	Y*	105'
Starry St	2 (12')^	N/A	N/A	N/A	N	N	N	N	60'

^ Field measurements
*Outside paved shoulder is present at the limits of project; edge lines delineate shoulder
N/A = Not Applicable

Pavement Condition

Table 6 - Existing Roadway Pavement Conditions

Roadway Name	Pavement Type	Pavement Condition	Description/ Comments
SR 528	FC-5	Good	No apparent pavement failures
Dallas Blvd	Asphalt (Grade Unknown)	Fair	Minor raveling along edge of pavement. 2-inch average drop off measured. Notable amount of silt build-up particularly near the SR 528 overpass.
Starry St	Asphalt (Grade Unknown)	Fair	Minor delamination noted on west leg at Dallas Blvd

Horizontal Alignment

Table 7 - Horizontal Alignment

Roadway Name	Alignment Description	Deflection Angle	No. of Curves	Curve Radius (ft)	Curve Length (ft)	Comments
SR 528	Straight	N/A	N/A	N/A	N/A	No apparent shifts in alignment
Dallas Blvd	Straight	8°50' ^	N/A	N/A	N/A	No apparent shifts in alignment. High skew/ lane shift observed at intersection.
Starry St	Curved	N/A	4 (Two per Approach)	800' (+/-)	150' (+/-)	Sharp curvatures observed on approach to intersection (both approaches).

Note: Evaluation limits based on proposed concepts provided by CFX

N/A = not applicable, ^ Deflection angle through intersection only

Horizontal Stopping Sight Distance

Based on information collected from the field as well as existing aerial imagery there were no horizontal obstructions to sight distance. There are no known intersection related sight distance issues.

Vertical Alignment

Terrain is relatively flat along Dallas Blvd and Starry St. SR 528 is grade separated over Dallas Blvd. The lowest vertical clearance over the roadway is 14'-5" as determined by existing overhead "Low Clearance" warning sign.

Vertical Stopping Sight Distance

Based on information collected from the site visit as well as contours generated from GIS there were no vertical obstructions to sight distance. No intersection sight distance issues have been identified.

Cross Slope & Superelevation

Cross slopes for all facilities were observed as having normal crown conditions. No super-elevated segments were observed. Cross slope data was not collected for this project.

Intersections

SR 528 intersects at a half diamond interchange at Dallas Blvd. An eastbound off-ramp and westbound on-ramp are present. The off-ramp is stop controlled.

Dallas Blvd and Starry St intersect 300 feet from the westbound off-ramp (uncontrolled). This intersection is All Way Stop Controlled.

Existing Condition Safety – Crash Data

SR 528 intersects at a half diamond interchange at Dallas Blvd. An eastbound off-ramp and westbound on-ramp are present. The off-ramp is stop controlled. Dallas Blvd and Starry Street intersect 300 feet from the westbound on-ramp (uncontrolled). Crash data for SR 528 mainline and intersections along Dallas Blvd were processed from 2017 through 2022 from the Signal Four Analytics tool, the FDOT's official crash data repository. The data was reviewed for accuracy and updated where applicable.

A total of 735 crashes were reported on SR 528 between Innovation Way and SR 520 from 2017 to 2022. There was an increase in the number of crashes from 2017 to 2019 and a reduction from 2020 to 2022, as shown on **Figure 2**. The reduction in crashes in 2020 is attributed to COVID-19 impacts which reduced traffic, especially along SR 528 that has a high proportion of tourist traffic. A review of historical data showed that traffic in 2021 was still lower than in 2019 in this section of SR 528. Nevertheless, on average, 123 crashes were reported per year from 2017 to 2022. A review of the hourly crash distribution showed that approximately 24 percent of the crashes occurred between 3 PM and 7 PM. The data indicated that crashes predominantly occurred in the westbound direction. **Figure 2** summarizes the yearly crash counts.

Figure 2 – Number of Crashes by Year on SR 528 from Innovation Way to SR 520

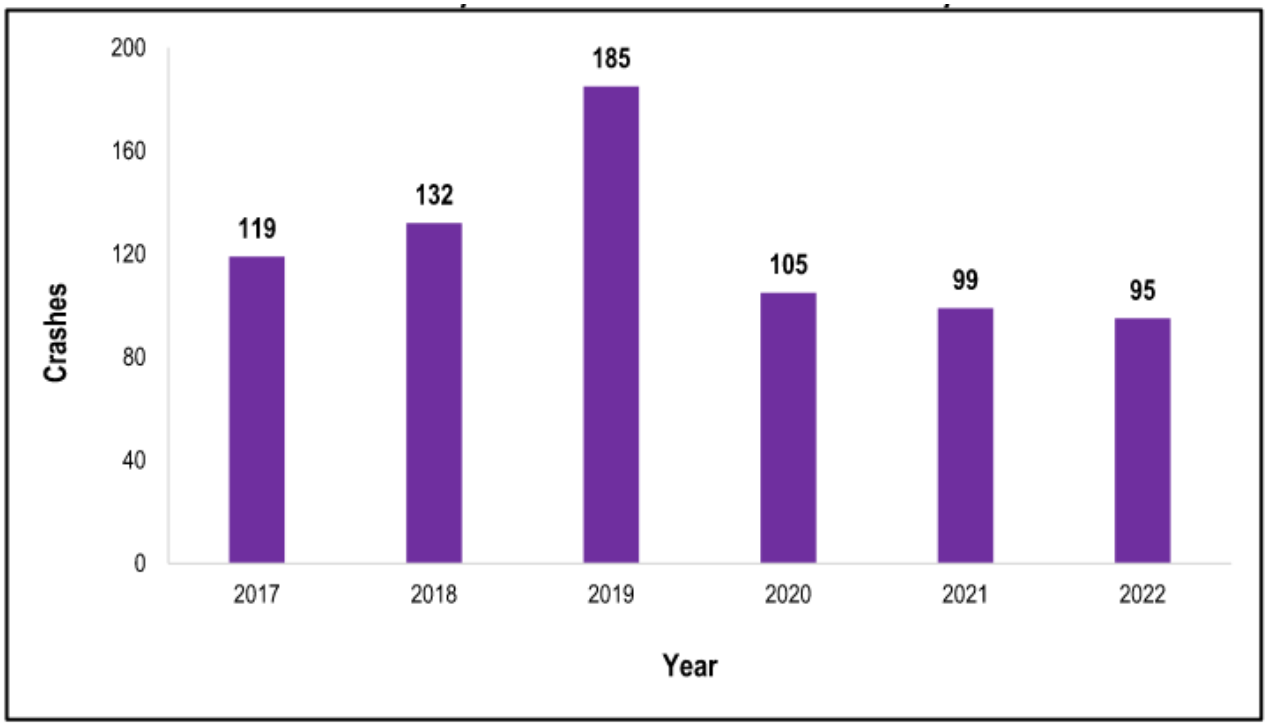
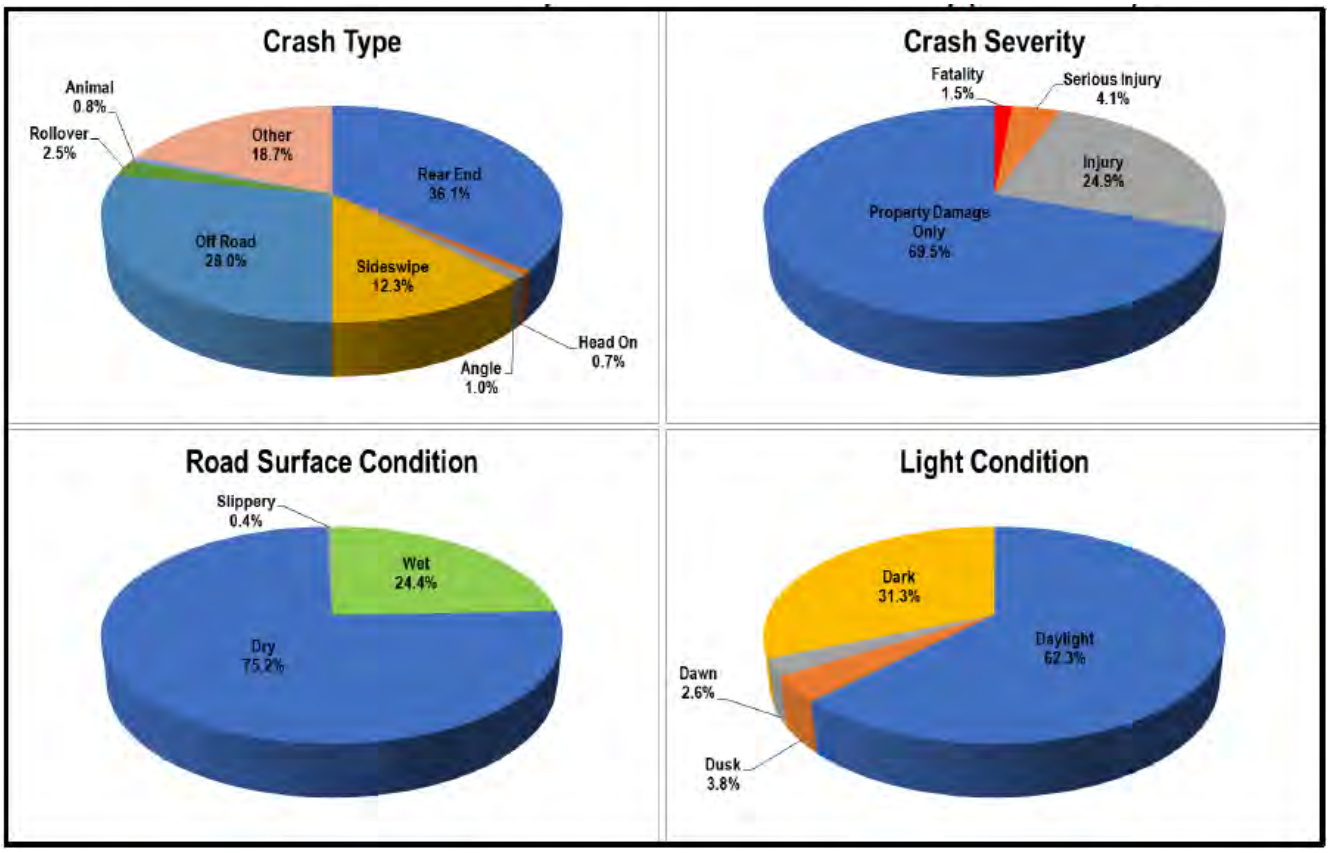


Figure 3 summarizes the SR 528 crashes by type, severity, road surface and light conditions. The data showed that the most common types of reported crashes were rear end (36.1 percent), followed by run-off-road (28.0 percent) crashes. A review of the crash reports showed that the contributing factors for rear end and run-off-road crashes were speeding, following too closely and driving while fatigued. Overall, the majority of crashes occurred on dry pavement and during the day. Most of the crashes resulted in property damage only (69.5 percent) but there were a few serious injuries (4.1 percent) and 11 fatalities (1.5 percent). The 11 fatalities reported were mainly due to run-off-road crashes and occurred at night on dry pavement.

Figure 3 – SR 528 from Innovation Way to SR 520 Crash Data Summary (2017 – 2022)



Thirteen (13) crashes occurred along Dallas Blvd within the study limits during the study period from 2017 to 2022: eight (8) at the SR 528 eastbound ramp terminal, two (2) at the SR 528 westbound ramp terminal and three (3) at the Starry St intersection. Crash analysis at the Dallas Blvd intersections included a 250-foot influence area. The analysis showed that most of the crashes reported at the intersections were run-off-road, resulted in property damage only and occurred on dry pavement during the day. A review of the crash reports indicated that all run-off-road crashes involved a single vehicle colliding with a fixed object. There was one fatality at the SR 528 westbound ramp terminal, resulting from a run-off-road crash that occurred on dry pavement at night

PROJECT DESIGN CONTROLS & CRITERIA

The design criteria used in the development of the interchange Alternatives is per the 2022 CFX Design Guidelines, the FDOT Design Manual January 2022 (FDM), and the 2018 Florida Greenbook. The criteria are detailed below in **Table 8**.

Table 8 - Geometric Design Criteria

Design Element	Design Standard	Source
Context Based Design		
SR 528	Limited Access, SIS (Interstate)	CFX 200.1
Dallas Blvd	Minor Collector (Non SHS)	FDM 200.2
Starry St	Local Road	
Design Year	2045	CFX Master Plan 2040
Design Vehicle	WB-62FL	FDM 201.6
Design Speed		
Limited Access	70 mph	FDM Table 201.5.2
Ramps		
Loops and Semi-Direct	30 mph (min)	
Direct Connection	50 mph (min)	
Urban Collector	30 mph (min) to 50 mph (max)	Greenbook Table 3-1
Rural Local	30 mph (min) to 50 mph (max)	
Lane Widths		
Limited Access	12-ft	FDM 211.2
Ramps		FDM 211.2.1
One Lane	15-ft	
Two Lane	24-ft	
Turning Roadway	Case Dependent	
Urban Collector	11-ft	Greenbook Table 3-20
Rural Local	11-ft	
Cross Slopes (one-way)		
One Lane	0.02	FDM Figure 211.2.1
Two Lane	0.02 (All)	
Three Lane	0.02 (Inside & Middle), 0.03 (Outside)	
Four Lane	0.02 (Inside & Middle) 0.03 (Middle & Outside)	
Bridge	0.02 (All)	
Max Algebraic Diff. (Ramp Terminal)	5.0% (at crossover line)	FDM Table 211.2.2
Median Width		
Interstate without barrier	64-ft	FDM Table 211.3.1
Interstate with barrier		
Arterial and Collectors (≤45 mph)	26-ft 22-ft (min.)	Greenbook Table 3-23

Design Element	Design Standard	Source
Shoulder Width *Limited Access:* Travel Lanes 2-Lane 3-Lane or more Ramps 1-Lane 2-Lane Aux. Lanes (All) *Non SHS:* Two Lane Undivided ADT (2-Way) 0 ≤ 400 ADT (2-Way) 401 - 750 ADT (2-Way) >750 Multilane Divided 2 Lanes 3 or More Lanes Shoulder Cross Slope Limited Access Non SHS	**Full Width, ft [Paved Width, ft]** Outside / Median 12 [10] / 8 [4] 12 [10] / 12 [10] Outside / Inside 6 [4] / 6 [2] 12 [10] / 8 [4] 12 [10] / 8 [4] Outside 2 [2] 6 [6] 8 [8] Outside / Median 8 [8] / 4 [4] 10 [10] / 6 [6] 0.06 (Outside) 0.05 (Median) Range 0.02 to 0.06	FDM Table 211.4.1 CFX 211.4 (*CFX preference to provide wider usable shoulder for emergency use and to accommodate stopped or disabled vehicles; 14-ft full with 12-ft paved*) Greenbook Table 3-21 FDM 211.4.2 Greenbook Table 3-22
Roadside Slopes Front Slope Back Slope Front Slope (Curbed) Back Slope (Curbed)	 1:6 (Fill height 0 – 5 ft) 1:6 to edge of clearzone, then 1:4 (Fill height 5 – 10 ft) 1:6 to edge of clearzone, then 1:3 (Fill height 10 – 20 ft) 1:4 (All fill heights) or 1:3 with standard trapezoidal ditch and 1:6 front slopes (All fill heights) 1:2 or to suit property owner; 1:6 min. (Fill height 0 – 6 ft) 1:3 or to suit property owner; 1:6 min. (Fill height > 6 ft) 1:2 or to suit property owner; 1:6 min. (All fill heights)	FDM Table 215.2.3 CFX 215.2.6 (*1:3 maximum slopes preferred for maintenance purposes*)
Border Width Limited Access	 94-ft (desirable)	 FDM 211.6

Design Element	Design Standard	Source
Horizontal Alignment		
Max. Deflection	Design Speed ≤ 40 mph; 2°00'00 Design Speed ≥ 45 mph; 0°45'00	FDM 211.7.1
Curve Length Interstate High Speed Ramp Low Speed Ramp	V= Design Speed Length = 30V Length = 30V Length = 15V	FDM Table 211.7.1
Max Curvature (Degree of Curve) DS = 70 mph (Interstate) DS = 50 mph (High Speed Ramp) DS = 30 mph (Low Speed Ramp)	D=3°30' D=8°15' D=24°45'	FDM Table 210.9.1 (e_{max} = 0.10)
Normal Crown/ Reverse Crown Break Points (Radius in ft) DS = 70 mph (Interstate) DS = 50 mph (High Speed Ramp) DS = 30 mph (Low Speed Ramp)	Normal Crown [Reverse Crown] 14,714 [10,955] 8,337 [6,171] 3,349 [2,471]	FDM Table 210.9.1 (e_{max} = 0.10)
Superelevation (SE)		
SE Transition Tangent Curve *Spirals*	80% (50% min.) 20% (50% min.) *Do not use on curves less than 1°30'00"*	FDM 210.9.1 *CFX 211.7*
SE Rates High Speed Roadways Design Speed 45-50 Design Speed 55-60 Design Speed 65-70 Low Speed Roadways Design Speed 40 Design Speed 45	e_{max} = 0.10 (100-ft min transition length) *SE slope rate = 1:160* *SE slope rate = 1:180* *SE slope rate = 1:200* e_{max} = 0.05 (75-ft min transition length) *SE slope rate = 1:125* *SE slope rate = 1:150*	FDM 210.9 FDM Table 210.9.3 *CFX 211.8 (Zero percent cross slopes are to be avoided with 150-ft of the high point or low point of crest and sag vertical curves)*

Design Element	Design Standard	Source
Vertical Curves Min. K Values Interstate (70 mph) Ramps (50 mph) Ramps (30 mph) Min. Curve Length, ft Interstate (70 mph) Ramps (50 mph) Ramps (30 mph)	Length, L = KA Sag = 206, Crest = 506 Sag = 96, Crest = 136 Sag = 37, Crest = 31 Sag = 800, Crest (open highway) = 1,000 Crest (Within Interchanges) = 1,800 Sag = 200, Crest = 300 Sag = 90, Crest = 90	FDM Table 211.9.2 FDM Table 211.9.3
Maximum Grades LA Facilities Ramps DS = 50 mph DS = 30 mph	 3% 5% 7%	 FDM Table 211.9.1 For truck traffic 10% or greater, do not exceed 4%
Minimum Stopping Sight Distance (grade 2.0%) DS =70 DS = 50	 820-ft 495-ft	FDM Table 211.10.1
Decision Sight Distance DS =70 DS = 50 DS = 30	 780 – 1,445 ft 465 – 1,030 ft 220 – 620 ft	FDM Table 211.10.2 (AASHTO Exh. 3-3) *CFX 211.10 (Do not place decision points e.g. ingress or egress within the limits of reduced sight distance)*
Vertical Clearance Over LA Roadway Over Arterial or Collector Roadway Over Railroad	 16.5-ft 16.5-ft 23.5-ft	FDM Table 260.6.1
Clear Zone Travel Lanes & Multilane Ramps DS ≥ 60 mph DS = 50 mph DS = 30 mph	Travel Lanes & Multilane Ramps [Auxiliary Lanes & Single Lane Ramps] 36-ft [24-ft] 30-ft [18-ft] 12-ft [10-ft]	FDM Table 215.2.1
Ramps Ramp Terminals Length Taper	Entrance / Exit "Parallel-Type" / "Taper-Type" 900 to 1,200 ft / 340-ft Min. 300-ft / 2° to 5°	CFX 211.13 (*For Single lane ramp terminals, it is CFX's preference to use the taper-type design for exit ramps, and parallel-type for entrance ramps. Acceleration lane length of at least 1,200 ft plus taper is desirable.*)

PROJECT DESIGN CONCEPT ALTERNATIVES

No-Build Alternative

The No-Build Alternative serves as a baseline against the proposed build Alternatives. The No-Build Alternative is defined as the Alternative in which the proposed project activity would not take place. However, the No-Build Alternative does include any on-going construction, and planned or programmed transportation improvements scheduled to be implemented by the 2045 Design Year of the project. These projects must be listed in either the CFX's Five-Year Work Program, CFX Master Plan 2040, FDOT's Five-Year Work Program, Orange County's 2030 LRTP, or MetroPlan Orlando's 2045 Cost Feasible Plan. The CFX 2040 Master Plan outlines six lane capacity improvements for SR 528 by the year 2040 in order to keep up with travel demand while also maintaining an adequate level of service for its users. A capacity improvement study (PD&E) is programmed for FY 25, as documented in the CFX Five-Year Work Plan FY 23-27, and the project limits are from Innovation Way to SR 520 which fall within this project's limits. There are no scheduled improvements for the Dallas Blvd corridor. The No-Build Alternative as well as the future improvements along SR 528 do not address the purpose of this project.

Build Alternatives

Build Alternatives were developed along SR 528, Dallas Blvd, and Starry St to address the purpose and need of the project. The Build Alternatives evaluated as part of this study are Alternative 1- *Roundabout Interchange* and, Alternative 2 - *Signalized Braided Ramp Interchange*. A plan sheet of each Alternative is provided as **Appendix A – Interchange Alternative Concepts**. These two build Alternatives were evaluated operationally to be synchronous with CFX's future improvements (i.e. six-lane capacity improvement along SR 528 from Innovation Way to SR 520) as well as Orange County's future transportation plans and goals. Traffic demand for the area was modeled using a 2050 design year. Expansive site development, and other significant changes to land use south of the project limits were factored into traffic modeling for each condition. The resulting traffic demand determined that capacity focused improvements along Dallas Blvd were not necessary for the interchange to operate optimally. However, future capacity related improvements for Dallas Blvd were considered as part of this project to account for rapid community growth, and to circumvent future construction staging and costs. It should be noted that the aforementioned traffic variables were assumed for traffic generation purposes only and are not based on any planned, programmed or documented sources from Orange County, nor any other regional planning authorities. The proposed build Alternatives developed were found to fit within the existing Limited Access (LA) right-of-way and would have minimal impact beyond the interchange. This approach also satisfies the purpose and need of the project while also being cognizant of the regional planning for community. It is recommended that traffic studies be performed within six months following construction and opening of the build Alternatives.

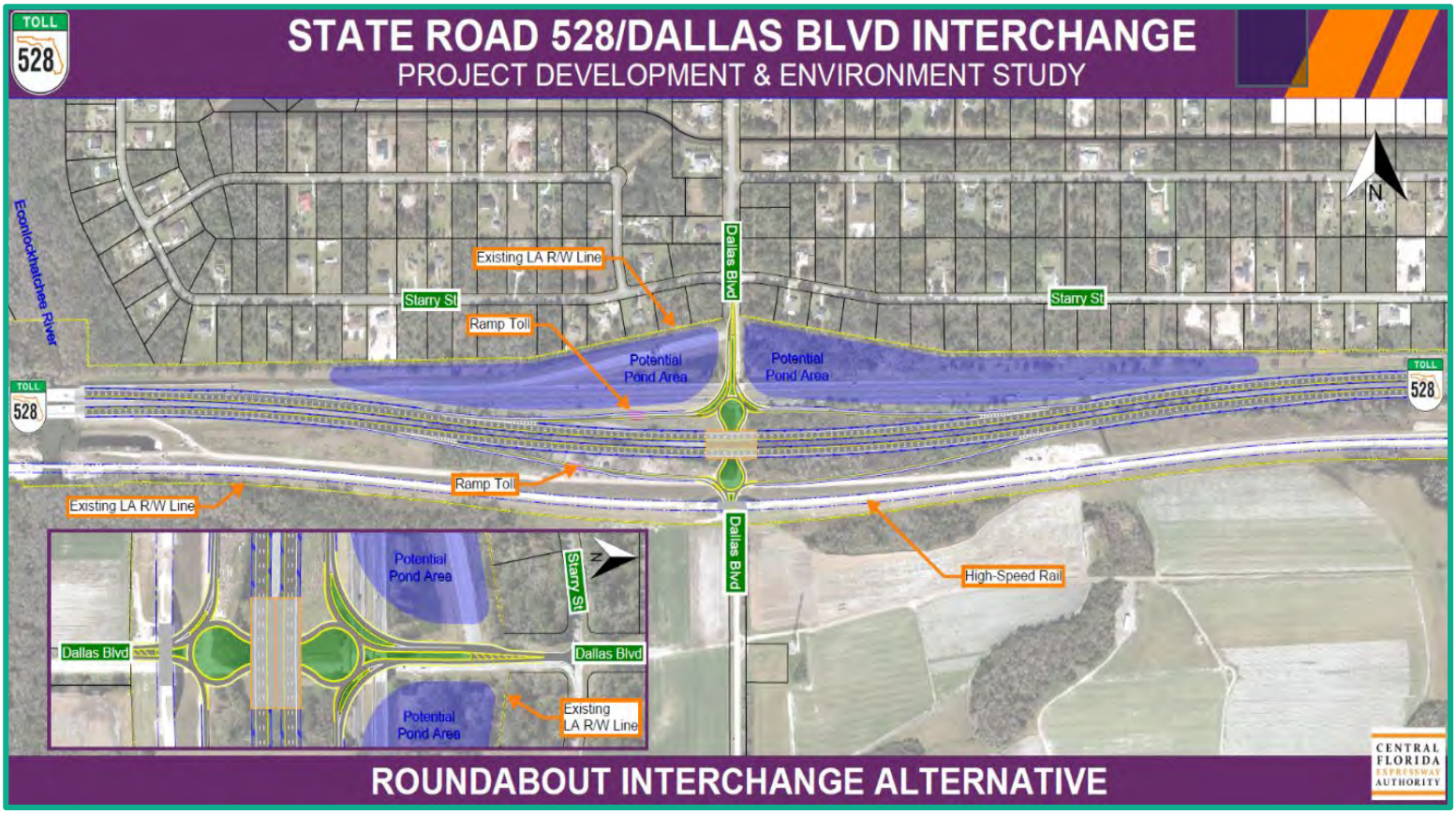
Both build Alternatives propose widening SR 528 using the same developed typicals, available in the **Typical Section Package**, available under separate cover. The on and off ramps will also use the same typicals for each Alternative. The proposed bridges will meet vertical clearance criteria. It is recommended to realign this segment of SR 528 in order to maintain through traffic during construction. The study limits vary minimally for each Alternative but are roughly bounded by the SR 528 Econlockhatchee River Bridge to the west, the turning alignment of the AAF Railroad to the east, the AAF Railroad bridge over Dallas Blvd to the south, and the intersection of Dallas Blvd and Starry St to the north. A brief description of each typical section is provided below:

- **SR 528 Mainline:** Six lane divided roadway with 12' travel lanes, 50' grassed median, 10' inside shoulder (8' paved), 14' outside shoulder (12' paved). Normal crown conditions are proposed.
- **SR 528 Off Ramps (EB & WB):** Single lane ramp with a 15' travel lane, 4' outside shoulder (2' paved), 2' inside shoulder (1' paved). Taper-type exit.
- **SR 528 On Ramps (EB & WB):** Single lane ramp with a 15' travel lane, 4' outside shoulder (2' paved), 2' inside shoulder (1' paved). Parallel-type entrance (acceleration lanes lengths vary).

Alternative 1 – Roundabout Interchange

A roundabout type interchange is proposed to meet the purpose and need of this project. This Alternative provides a complete interchange by an at grade hourglass shaped roundabout. One end will be located north of the realigned SR 528 mainline and will service the westbound (WB) ramps. The other end will be located south of the realigned SR 528 mainline and will service the eastbound (EB) ramps. In general, roundabouts operate by bringing in traffic at reduced speeds and allow for safer crossings between traffic streams. Signing and pavement markings will aid in these safe operations and will be evaluated as part of the design phase. The addition of pedestrian facilities will be coordinated with Orange County in the design phase as well. A single lane roundabout with a 180' inscribed circle diameter is proposed. The wider diameter is recommended to facilitate future capacity improvements, and accommodate a dual lane configuration. The circulatory roadway width will be 17'. A curb and gutter section is recommended. A 46' median will separate circulating traffic. The SR 528 off ramps will have an exclusive left turn lane that operates in the roundabout and a partial right turn bypass lane to Dallas Blvd. Southbound (SB) traffic approaching the interchange will have a full right turn bypass lane to enter the westbound on ramp, and will utilize the south portion of the roundabout to access the eastbound on ramp. Northbound (NB) traffic approaching the interchange will utilize the roundabout to access the eastbound on ramp, and will utilize the northern portion of the roundabout to access the westbound on ramp. Operationally, Dallas Blvd can remain as a two lane, two-way roadway. Dallas Blvd will be constructed with curb and gutter. Splitter islands will be utilized on approaches to the roundabout. As previously mentioned, the AAF bridge is located south of the realigned SR 528 bridge. The pier column supporting the AAF bridge will be bordered by a splitter island. The need for pier protection barrier should be evaluated as part of the design phase. In general, modern roundabouts do not have merging or weaving traffic streams and have a reduced number of conflict points as compared to other types of intersection controls. In addition, roundabouts have been shown to significantly reduce the number of serious injury and fatalities in relation to other types of intersection controls as well as reduce emissions from idling vehicles. Utilizing the CFX Cost Estimating Template Version 7, the estimated cost for Alternative # 1 – Roundabout Interchange was calculated as **$80,885,612**.

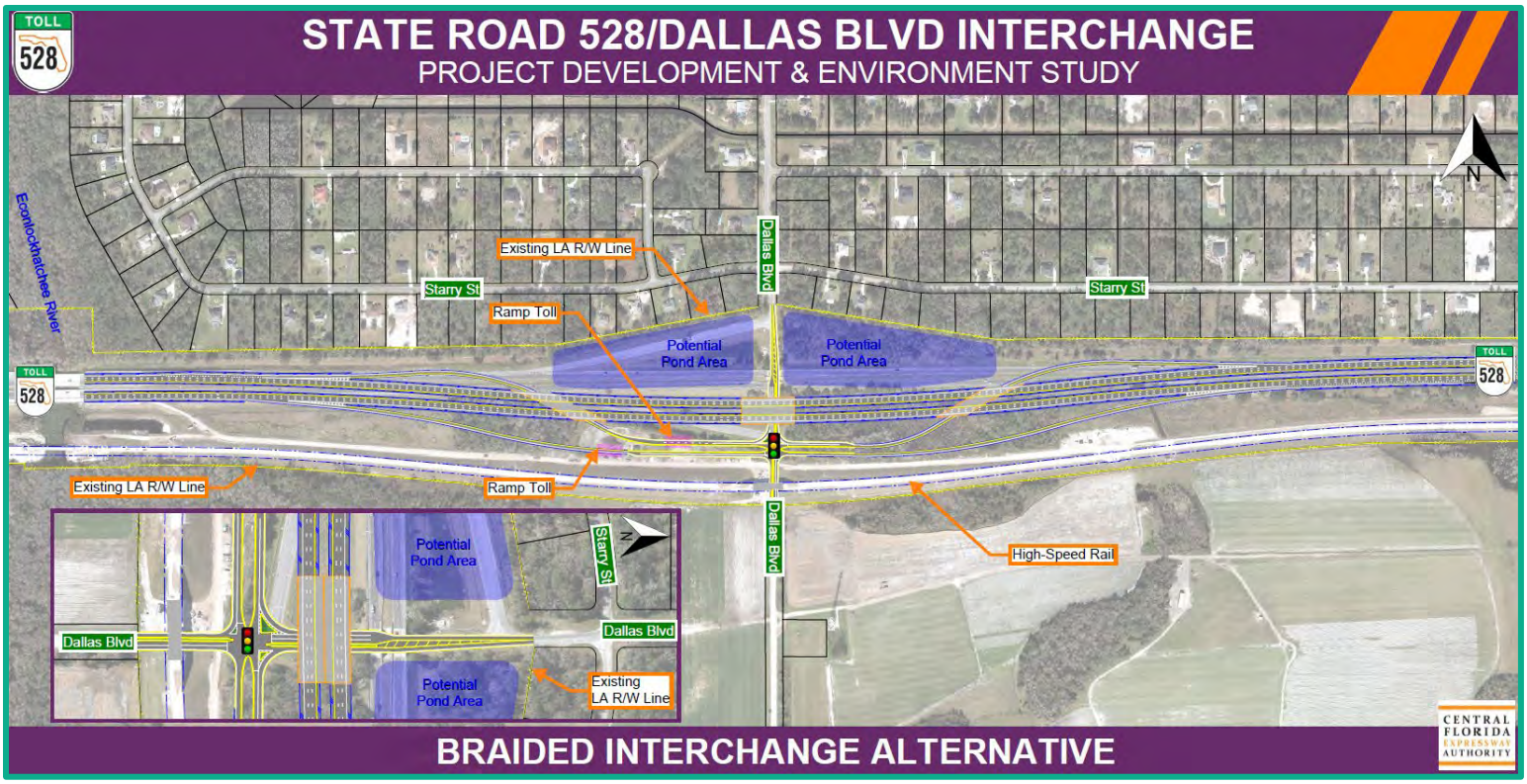
Figure 4 – Alternative 1 – Roundabout Interchange



Alternative 2 - Signalized Braided Interchange

A signalized braided ramp type interchange is proposed to meet the purpose and need of the project. This Alternative provides a complete interchange by converging all ramps to a single point just south of the realigned SR 528 mainline. All ramps will be at grade and the SR 528 mainline will cross over them. The eastbound ramps will be direct-connect ramps, while the westbound ramps will be semi-direct connect ramps. The intersecting ramps and Dallas Blvd will be controlled with a traffic signal. Pedestrian facilities and traffic signal equipment will be coordinated with Orange County in the design phase. Three bridges are required for this Alternative to span the ramps and crossroad: (1) WB On Ramp, (2) Dallas Blvd, and (3) WB Off Ramp. The bridges over the westbound ramps will be designed to accommodate future two-lane ramps. The newly constructed AAF bridge lies on the south end of the project, and will affect the geometry along Dallas Blvd. The AAF bridge was constructed for a future four lane divided highway with a wide median (approx. 60') to accommodate future auxiliary lanes at the interchange. A pier column is located midspan. The northbound direction has a wider span between pier column and the bridge abutment as compared to the southbound direction; 104'-1" and 84'-1" respectively. Operationally, Dallas Blvd can remain as a two lane, two-way roadway. Dallas Blvd will be constructed with curb and gutter. The Dallas Blvd alignment is shifted to the east so that the geometry can run between the wider span. Single left turn storage lanes will be provided at the new intersection to provide access onto the expressway. Channelized right turn lanes will be provided for each leg of the intersection except for the south leg. That approach will instead operate as a shared thru-right movement. Utilizing the CFX Cost Estimating Template Version 7, the estimated cost for Alternative # 2 – Signalized Braided Interchange was calculated as **$106,015,107**.

Figure 5 – Alternative 2 – Braided Interchange



Lane Configurations & Storage Lengths

The proposed lane configurations, geometry, and storage lengths for each Alternative are depicted in **Figures 6 & 7**. These figures were utilized for design on the Alternative concepts.

Figure 6 – Proposed Lane Geometry and Storage lengths for Alternative 1

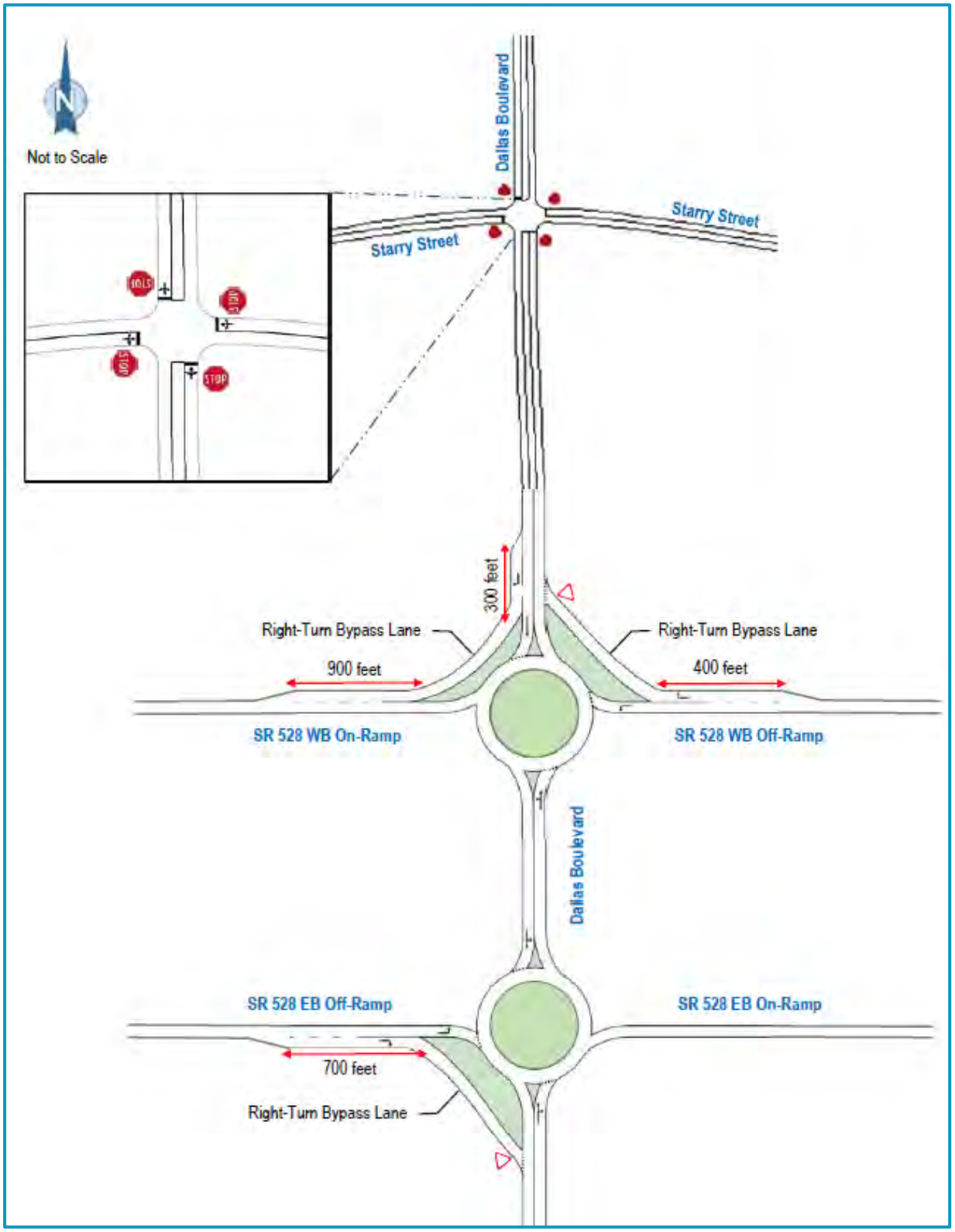
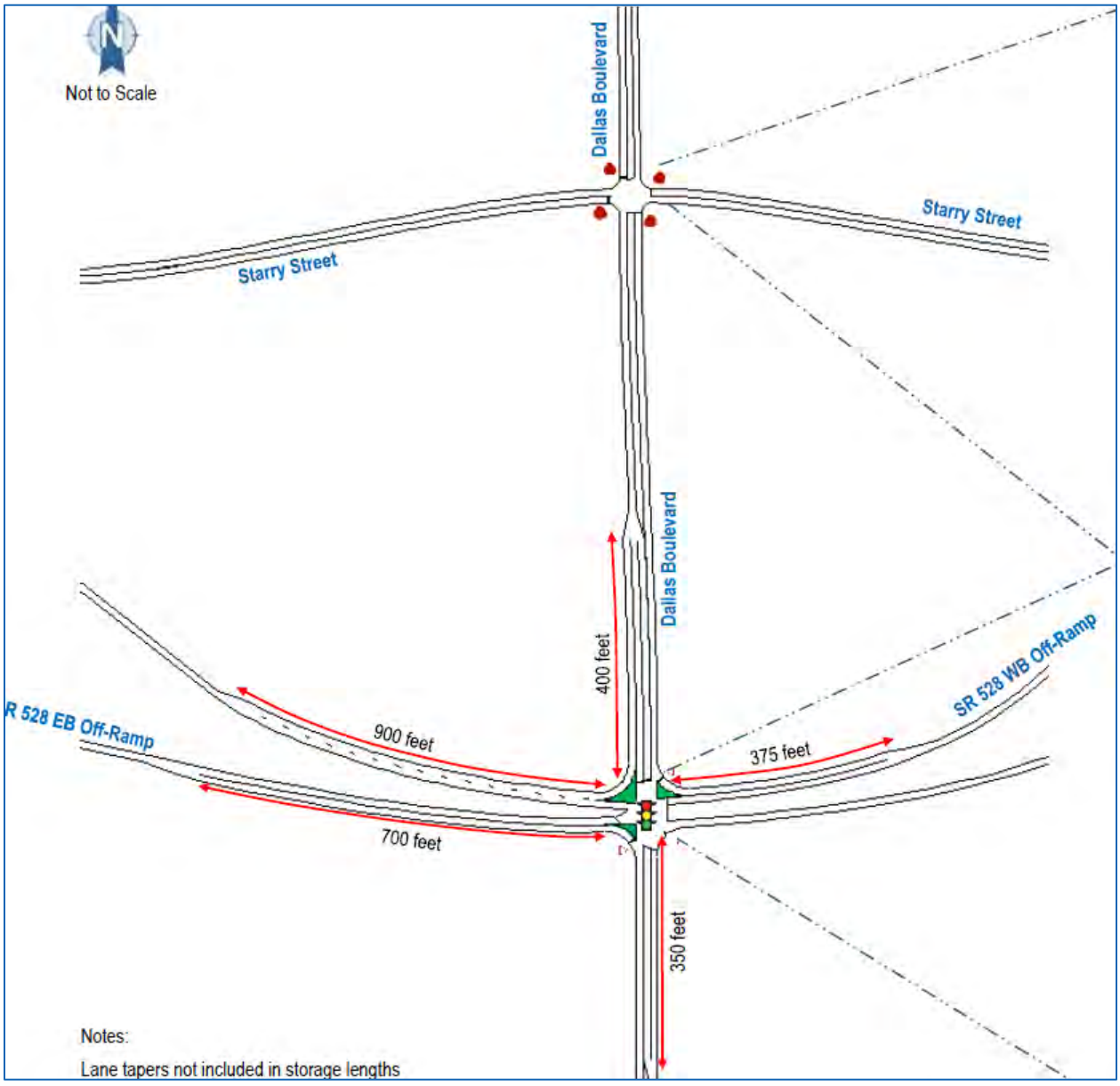


Figure 7 – Proposed Lane Geometry and Storage lengths for Alternative 2



Horizontal and Vertical Geometry

Both Alternatives and their respective horizontal alignments utilize the same design controls with the following exceptions listed below for Alternative 2. The design speed along SR 528 mainline was determined using previous As-Builts. The recommended design speed for SR 528 is 70 mph. The design speed (minimum) along the ramps were based on FDM Table 201.5.2. All direct connect ramps were designed for 50 mph design speed while the semi-direct connect ramps (*Alternative 2, Ramps A & D*) were designed for 30 mph. The Dallas Blvd alignment was aligned tangentially with the center of the Starry Street intersection and the center of the AAF bridge pier column. The design speed for Dallas Blvd is 45 mph and should be coordinated with Orange County in the design phase. The braided ramps for Alternative 2 would require superelevated sections for both curvatures ranging from 0.058 ft/ft to 0.072 ft/ft with the lower rate being applied on approach to Dallas Blvd and the higher rate being applied near the ramp terminals. The required superelevation, and the subsequent transitions, result in higher material cost, drainage and ponding mitigation measures, and an overall more complex construction effort.

Both Alternatives generally follow the existing profile, where necessary, except when meeting CFX vertical clearance requirements. Alternative 1 would need to meet the vertical clearance requirements over Dallas Blvd, approximately 300 ft in length, as compared to Alternative 2 which would need to sustain the same vertical clearance over Dallas Blvd and the two westbound ramps, approximately 2,600 ft in length. Consequently, Alternative 2 would require more fill and a longer earth retention structure to be operational. Regardless of Alternative, the vertical curvature and alignment can meet the vertical clearance requirements without falling outside of the existing LA R/W. **Tables 9 to 14** detail the geometric design of the project.

Table 9a: SR 528 Mainline Horizontal Geometry (Alternative 1)

POINT	CHAINAGE (Station, ft)	NORTHING (ft)	EASTING (ft)	ELEMENT	LENGTH (ft)	e Req'd (ft/ft)
PC	108+79.54	1,496,857.21	621,723.53			
				CURVE R = 14,714'	2,016	NC
PRC	128+95.10	1,496,745.61	623,734.43			
				CURVE R = (-) 14,714'	4,031	NC
PRC	169+26.23	1,496,798.07	627,752.62			
				CURVE R = 14,714'	2,016	NC
PT	189+41.80	1,496,962.12	629,759.92			

***POB** – Point of Beginning, **PC** – Point of Curvature, **POE** – Point of Ending, **PRC** – Point of Reverse Curvature, **PT** – Point on Tangent, **NC** – Normal Crown, **RC** – Reverse Crown*

Table 9b: SR 528 Mainline Horizontal Geometry (Alternative 2)

POINT	CHAINAGE (Station, ft)	NORTHING (ft)	EASTING (ft)	ELEMENT	LENGTH (ft)	e Req'd (ft/ft)
PC	109+82.94	1,496,858.56	621,826.92			
				CURVE R = 22,918'	2,132	NC
PRC	131+14.55	1,496,787.29	623,956.57			
				CURVE R = (-) 18,000'	3,348	NC
PRC	164+62.94	1,496,830.93	627,299.84			
				CURVE R = 22,918'	2,132	NC
PT	185+94.55	1,496,957.77	629,426.92			

***POB** – Point of Beginning, **PC** – Point of Curvature, **POE** – Point of Ending, **PRC** – Point of Reverse Curvature, **PT** – Point on Tangent, **NC** – Normal Crown, **RC** – Reverse Crown*

Table 10a: Ramp A Horizontal Geometry (Alternative 1)

POINT	CHAINAGE (Station, ft)	NORTHING (ft)	EASTING (ft)	ELEMENT	LENGTH (ft)	e Req'd (ft/ft)
PC	1000+00	1,496,818.05	623,743.45			
				CURVE R = (-) 6,171'	1,133	RC
PRC	1011+32.62	1,496,781.69	624,873.90			
				CURVE R = 8,337'	564	NC
PRC	1016+96.14	1,496,796.23	625,437.13			
				CURVE R = (-) 14,551'	163	NC
PT	1018+59.57	1,496,795.84	625,600.56			

***POB** – Point of Beginning, **PC** – Point of Curvature, **POE** – Point of Ending, **PRC** – Point of Reverse Curvature, **PT** – Point on Tangent, **NC** – Normal Crown, **RC** – Reverse Crown*

Table 10b: Ramp A Horizontal Geometry (Alternative 2)

POINT	CHAINAGE (ft)	NORTHING (ft)	EASTING (ft)	ELEMENT	LENGTH (ft)	e Req'd (ft/ft)
PC	1000+00.00	1,496,928.51	622,605.27			
				CURVE R = (-) 11,459'	1,000	NC
PRC	1010+00.00	1,496,951.29	623,604.70			
				CURVE R = 1,432'	780	0.072
PT	1017+80.54	1,496,793.52	624,359.30			
				STRAIGHT	350	
PC	1021+30.85	1,496,632.17	624,670.24			
				CURVE R = (-) 716’	334	0.058
PT	1024+65.05	1,496,551.76	624,991.50			
				STRAIGHT	605	
POE	1030+70.98	1,496,544.55	625,597.39			

***POB** – Point of Beginning, **PC** – Point of Curvature, **POE** – Point of Ending, **PRC** – Point of Reverse Curvature, **PT** – Point on Tangent, **NC** – Normal Crown, **RC** – Reverse Crown*

Table 11a: Ramp B Horizontal Geometry (Alternative 1)

POINT	CHAINAGE (Station, ft)	NORTHING (ft)	EASTING (ft)	ELEMENT	LENGTH (ft)	e Req'd (ft/ft)
POB	2000+00	1,496,727.10	623,349.88			
				STRAIGHT	1,165	
PC	2011+64.62	1,496,532.53	624,498.13			
				CURVE R = (-) 6,171'	1,019	RC
PCC	2021+83.35	1,496,445.82	625,512.01			
				CURVE R = (-) 14,901'	84	NC
PT	2022+67.65	1,496,445.83	625,596.31			

***POB** – Point of Beginning, **PC** – Point of Curvature, **POE** – Point of Ending, **PRC** – Point of Reverse Curvature, **PT** – Point on Tangent, **NC** – Normal Crown, **RC** – Reverse Crown*

Table 11b: Ramp B Horizontal Geometry (Alternative 2)

POINT	CHAINAGE (ft)	NORTHING (ft)	EASTING (ft)	ELEMENT	LENGTH (ft)	e Req'd (ft/ft)
POB	2000+00	1,496,794.47	622,606.11			
				STRAIGHT	500	
PC	2005+00	1,496,749.12	623,104.05			
				CURVE R = 6,171’	917	RC
PRC	2014+17.49	1,496,598.42	624,008.23			
				CURVE R = (-) 3,820’	869	0.031
PT	2022+86.93	1,496,489.66	624,868.95			
				STRAIGHT	728	
POE	2030+14.67	1,496,481.00	625,596.63			

***POB** – Point of Beginning, **PC** – Point of Curvature, **POE** – Point of Ending, **PRC** – Point of Reverse Curvature, **PT** – Point on Tangent, **NC** – Normal Crown, **RC** – Reverse Crown*

Table 12a: Ramp C Horizontal Geometry (Alternative 1)

POINT	CHAINAGE (Station, ft)	NORTHING (ft)	EASTING (ft)	ELEMENT	LENGTH (ft)	e Req'd (ft/ft)
PC	3000+00.00	1,496,412.83	625,596.20			
				CURVE R = (-) 14,934'	103	NC
PCC	3001+03.10	1,496,413.48	625,699.30			
				CURVE R = (-) 6,171'	1,479	RC
PRC	3015+82.164	1,496,604.20	627,162.45			
				CURVE R = 6,171'	614	RC
PT	3021+95.70	1,496,725.89	627,763.53			

***POB** – Point of Beginning, **PC** – Point of Curvature, **POE** – Point of Ending, **PRC** – Point of Reverse Curvature, **PT** – Point on Tangent, **NC** – Normal Crown, **RC** – Reverse Crown*

Table 12b: Ramp C Horizontal Geometry (Alternative 2)

POINT	CHAINAGE (ft)	NORTHING (ft)	EASTING (ft)	ELEMENT	LENGTH (ft)	e Req'd (ft/ft)
POB	3000+00	1,496,481.14	625,596.64			
				STRAIGHT	499	
PC	3004+98.62	1,496,475.21	626,095.23			
				CURVE R = (-) 3,820'	1,119	0.031
PRC	3016+17.49	1,496,624.77	627,200.02			
				CURVE R = 6,171'	1,432	RC
PT	3030+49.91	1,496,859.44	628,609.83			

***POB** – Point of Beginning, **PC** – Point of Curvature, **POE** – Point of Ending, **PRC** – Point of Reverse Curvature, **PT** – Point on Tangent, **NC** – Normal Crown, **RC** – Reverse Crown*

Table 13a: Ramp D Horizontal Geometry (Alternative 1)

POINT	CHAINAGE (Station, ft)	NORTHING (ft)	EASTING (ft)	ELEMENT	LENGTH (ft)	e Req'd (ft/ft)
PC	4000+00.00	1,496,819.84	625,600.66			
				CURVE R = (-) 14,714'	183	NC
PRC	4001+82.88	1,496,821.59	625,783.53			
				CURVE R = 8,337'	613	NC
PRC	4007+95.61	1,496,808.79	626,395.99			
				CURVE R = (-) 6,171'	851	RC
PT	4016+46.38	1,496,818.39	627,246.04			
				STRAIGHT	499	
POE	4021+45.45	1,496,858.38	627,743.50			

***POB** – Point of Beginning, **PC** – Point of Curvature, **POE** – Point of Ending, **PRC** – Point of Reverse Curvature, **PT** – Point on Tangent, **NC** – Normal Crown, **RC** – Reverse Crown*

Table 13b: Ramp D Horizontal Geometry (Alternative 2)

POINT	CHAINAGE (ft)	NORTHING (ft)	EASTING (ft)	ELEMENT	LENGTH (ft)	e Req'd (ft/ft)
POB	4000+00	1,496,544.47	625,597.39			
				STRAIGHT	568	
PC	4005+68.28	1,496,537.72	626,165.63			
				CURVE R = (-) 716’	390	0.058
PT	4009+57.97	1,496,636.75	626,537.57			
				STRAIGHT	353	
PC	4013+10.77	1,496,815.83	626,841.55			
				CURVE R = 1,432’	792	0.072
PT	4021+02.76	1,497,013.70	627,598.03			
				STRAIGHT	1,000	
POE	4031+02.76	1,496,993.01	628,597.82			

***POB** – Point of Beginning, **PC** – Point of Curvature, **POE** – Point of Ending, **PRC** – Point of Reverse Curvature, **PT** – Point on Tangent, **NC** – Normal Crown, **RC** – Reverse Crown*

Table 14: Dallas Boulevard Geometry (Alternative 1 & Alternative 2)

POINT	CHAINAGE (Station, ft)	NORTHING (ft)	EASTING (ft)	ELEMENT	LENGTH (ft)	e Req'd (ft/ft)
POB	13+29.18	1,496,309.85	625,594.59			
				STRAIGHT	1,229.18	NC
POE	25+58.38	1,497,538.94	625,609.21			

***POB** – Point of Beginning, **PC** – Point of Curvature, **POE** – Point of Ending, **PRC** – Point of Reverse Curvature, **PT** – Point on Tangent, **NC** – Normal Crown, **RC** – Reverse Crown*

Alternative Evaluation

All Alternatives were evaluated using a comparative evaluation matrix that best addresses the purpose and need of the project. The categories evaluated include: Project Cost, Social & Economic Effects, Cultural Resources, Natural Resources, Physical Resources, and Traffic Operations & Safety. The categories were rated using a 1 to 5 numerical scale, with all categories resulting in a maximum total possible score of 100. A rating of **5** was used to describe a build Alternative that results in an overwhelmingly improved condition to the project area. Ratings of **4** thru **1** were used to describe the severity of potential impact to the project area regarding an existing or proposed condition; a rating of **4** represents no impact, a rating of **3** has minor impact potential with low effort of project coordination/ resolution, a rating of **2** has moderate impact potential with medium effort of project coordination/ resolution, and a rating of **1** has a likely direct impact to the project area with significant effort anticipated for project coordination/ resolution. The scores for each Alternative are then aggregated and the Alternative with the highest overall rating best meets the Purpose & Need of the project. Other considerations for the preferred Alternative include public input, and local agency coordination.

PREFERRED ALTERNATIVE

The comparative Alternative evaluation matrix is depicted in **Appendix B – Comparative Alternative Evaluation Matrix.** All findings and results are summarized in the matrix. The *Roundabout Alternative* received the highest ranking (80). The *Signalized Braided Alternative* resulted in the second-highest ranking (74) and the *No-Build Alternative* resulted in the lowest ranking (63). The Roundabout Alternative was preferred by public input received and coordination with Orange County resulted in a preference for the Roundabout Alternative. Therefore, the Roundabout Interchange is the recommended Preferred Alternative for this interchange.

The Preferred Alternative concept design is further evaluated in the **Level 1 PEIR**, prepared under separate cover.

Drainage Analysis

Drainage Analysis

EXISTING CONDITONS

Hydrology

The study area, depicted on **Figure 8**, consists of open basins that are part of the Econlockhatchee River, Rdd Primary Canal #1, and Little Creek Watershed. Rdd Primary Canal #1 and the Little Creek Watersheds ultimately discharge southwest to Little Creek. Little Creek in turn discharges northwest to the Econlockhatchee River. The project is located within the Econlockhatchee River WBID 2991, Ditches WBID 3052, and Little Creek WBID 3054.

This project is located within the jurisdiction of the St. Johns River Water Management District (SJRWMD). WBID 2991 has a verified impairment for E-coli but none of the WBID's are impaired for nutrients. The Econlockhatchee River is an Outstanding Florida Water (OFW). While the study area is also within the Econlockhatchee River Hydrologic basin, it does not contain any portions of the Econlockhatchee River Riparian Habitat Protection Zone (RHPZ). The Econlockhatchee River Hydrologic Basin has additional requirements to meet SJRWMD criteria related to peak discharge rates for both the mean annual and 25-year storm events, as well as providing floodplain compensation for any locations with upstream drainage area of one square mile or more.

Along SR 528 from the Econlockhatchee River Bridge to approximately Station 1439+30 roadway runoff sheetflows to either barrier wall inlets on the outside of the mainline or median inlets that discharge without treatment to roadside ditches that outfall to the Econlockhatchee River.

Between about Station 1439+30 to Station 1447+00 SR 528 runoff sheetflows from the road to ditches that drain to an existing 36" cross drain (CD-1). CD-1 conveys water from north to south and connects to the Econlockhatchee River floodplain on either side. Downstream of CD-1 is S-300. S-300 is a triple 42" cross drain proposed to be under the Brightline Railroad as part of the All Aboard Florida Project, Contract C02, that is currently under construction. The S-300 basin includes the discharge from Pond 403-1B and Pond 403-1A as Pond 403-1A outfalls to CD-1. The S-300 basin is 80.65 acres and extends to north of Starry St.

East of Dallas Blvd and south of SR 528 is a 20.0 acres area identified as EX A-1 in the All Aboard Florida Project that flows to existing double 29"x45" pipes that cross Dallas Blvd and ultimately discharges to S-300. A 39.0 acres area identified as EX A-2 is conveyed from south of the Brightline Railroad to the same double 29"x45" pipes.

The area east of Dallas Blvd and north of SR 528 either flows west towards a 19"x30" that crosses Dallas Blvd just north of the on-ramp or north towards 18" pipes that cross Starry St.

There are two existing stormwater management facilities within the project limits that provide treatment and attenuation, existing ponds 403-1A and 403-1B. Both were constructed in 2007 as part of the SR 528 Dallas Mainline Toll Plaza and Dallas Ramp Toll Plaza project, CFX Project No. 528-403, and both are located within the Dallas Blvd Ramps infield areas.

Basin 403-1A is 6.66 acres and begins at about Station 1447+00 along SR 528 and ends near Station 1458+00. The roadway runoff from SR 528 is collected by curb and gutter and conveyed to Pond 403-1A through a stormsewer system. Pond 403-1A is located between the westbound

on-ramp and SR 528 westbound mainline and was originally constructed as a dry pond to treat the widening of the Dallas Blvd westbound on-ramp and toll facility. As part of the SR 528 over Econlockhatchee River project, CFX Project No. 528-131, Pond 403-1A was modified to a wet detention pond to provide compensatory treatment for the road and bridge improvements over the Econlockhatchee River. Pond 403-1A currently provides the 0.88 ac-ft of treatment for 2.02 acres of impervious area that the pond is required to treat.

Basin 403-1B is 3.69 acres and treats the existing 0.71 acre of impervious area from the Dallas Blvd eastbound off-ramp and toll facility. Pond 403-1B is a dry retention facility that discharges through a control structure to the other side of the ramp. **Table 15** provides a Summary of the Existing Treatment Facilities.

Table 15 - Summary of Existing Treatment Facilities

Contract	Treatment Facility	Treatment Method	Treatment Criteria	Basin Area (ac)	Required Treatment (ac-ft)	Provided Treatment (ac-ft)	Discharge Location
528-403	Pond 403-1B	Dry Retention	0.5" x basin area + 0.5" x basin area for online + 50% to OFW	3.69	0.45	0.45	S-300
528-131	Pond 403-1A	Wet Detention	2.5" x impervious area + 50% to OFW	6.66	0.88	0.88	CD-1

Existing Florida Department of Environmental Protections (FDEP) and SJRWMD Permits for the project corridor were researched to obtain stormwater and environmental design information and are summarized in **Table 16**.

Table 16 - SJRWMD ERP Summary

CFX Project Name	SJRWMD Permit No.	Date Issued	Description
528-403	114678-1	7/7/2008	SR 528 Mainline Toll Plaza and Dallas Ramp Toll Plaza. Pond 403-1A and 403-1B Constructed.
528-131	114678-2	10/13/2016	SR 528 Over the Econlockhatchee River. Pond 403-1A modified to a wet detention pond.
All Aboard Florida Contract C02	136255-6	12/20/2017	Construction of a stormwater management system for All Aboard Florida East-West Railway PE02 CFX SJRWMD Segment

Figure 8 - Project Area FIRM Map

Floodplains

The Federal Emergency Management Agency (FEMA) has determined the 100-year floodplain limits in the vicinity of the project limits in the form of Flood Insurance Rate Maps (FIRM). On **Figure 8**, the 100-year floodplain limits are presented from Orange County Unincorporated Areas panel 12095C05000F effective 9/25/2009, with a Letter of Map Revision (LOMR) 16-04-8268P, effective 9/22/2017, that includes the Econlockhatchee Bridge.

The 100-year floodplain crosses the SR 528 R/W in the location of the Econlockhatchee bridge and CD-1 that connects the floodplain on either side of the road. At the bridge, the Econlockhatchee River has an established base flood elevation (BFE) of 59 feet North American Vertical Datum 88 (NAVD) . As part of the Brightline/All Aboard Florida permit the floodplain within the area of the Econlockhatchee River was permitted through the traversing works criteria. As such, the water elevation must not rise more than 1' in the 100-year event at the location of the bridge, nor can it increase more than 0.1' 500' upstream of the crossing.

STORMWATER & DRAINAGE ANALYSIS

The proposed roadway improvements include 34.3 acres of impervious area which is 14.7 acres additional impervious area over the existing condition. The proposed improvements will impact the existing Pond 403-1B and include expansion of existing Pond 403-1A. The expanded Pond 403-1A will be renamed Pond 307-1A and a new pond, Pond 307-1B, will be located in the northeast corner of the interchange. Both proposed ponds will be wet detention.

Treatment Volume & Attenuation

The pond sizing approach included stacking the required treatment volume on top of the required attenuation volume. Treatment volume was governed by the 2.5-inches over the impervious area and includes the additional 50% OFW criteria. Together, Pond 307-1A and Pond 307-1B are sized to treat all proposed impervious area plus the required compensatory treatment from 528-131 (0.88 ac-ft, refer to Attachment 1 for excerpt documentation from 528-131). For attenuation assumptions, the ponds are sized to attenuate the 25-year/24-hour storm event, which assumes to govern over the mean annual storm event, with a rainfall depth of 8.6 inches. The 8.6 inches rainfall depth was used for previous permits and is greater than the latest National Oceanic & Atmospheric Association (NOAA) Point precipitation frequency estimate for this location; therefore, providing a more conservative estimate for attenuation volume. Attenuation was considered not only for the additional impervious but also for the normal water levels of the proposed ponds. Floodplain compensation was not required since the upstream contributing area is less than one square mile. Refer to **Table 17** for a summary of the required pond volume for the project.

Table 17 - Summary of Required Pond Volume

Basin	Pond	Required Treatment Volume (ac-ft)	Required Roadway Attenuation Volume (ac-ft)	Required Pond Attenuation Volume (ac-ft)	Existing Pond Impacts (ac-ft)(1)	Total Floodplain Compensation Volume (ac-ft)	Total Required Pond Volume (ac-ft)
Project Area	Pond Area	13.8	8.9	7.4	0.88	0.0	30.6

Conceptual layouts of the ponds were developed to determine if there was sufficient pond area north of the proposed interchange to accommodate the stormwater water quality and quantity needs for the ultimate 8 lane proposed roadway improvements. With assumed normal water levels and top of berm elevations equal to the previously permitted Pond 403-1A of 60.90 feet NAVD and 63.4 feet NAVD, respectively, the combined provided storage volume is 32.43 Ac-ft which only provides 0.1 ft of freeboard for the 30.6 required Ac-ft. (See Pond Stage Area in Attachment 2). As there is additional area available, these calculations confirm that no additional R/W is needed for pond sites. The layout and optimization of these ponds will be finalized in design.

At a minimum, a nutrient analysis for this project is expected which results in a post-development loading which does not exceed the pre-development loading. If additional nutrient removal is required during final design, there are two options available for this project –

1. Utilize the approach of comparing the design condition to natural conditions and getting the full credit of reduction of the nutrients in the wet pond.
2. Utilize the approach of locating and providing dry retention pre-treatment swales/ponds from the mainline roadway which will have a much higher grade than natural ground.

The roadway profile will be finalized in design. To assist in profile development, the design high water elevation of the ponds should be considered to help set the profile since this will most likely govern the base clearance water elevation for the ramps and Dallas Blvd (which will control the SR 528 bridge low member elevation. Stacking the treatment volume on top of the attenuation volume results in a design high water stage of 63.4 feet NAVD. The lowest existing mainline elevation within the project area is estimated to be 62.4 feet NAVD at Station 1430+00, while the majority of the mainline is around 64.0 ft NAVD. Additionally, the profile should maintain at least 1 1/5 feet between the bottom of roadside ditches and the seasonal high groundwater.

Soil Conditions

According to desktop geotechnical analysis utilizing the Natural Resources Conservation Service (NRCS) Orange County Soil Survey, as depicted on **Figure 9**, near surface soils are primarily poorly drained sand soils. Natural ground surface topography varies from +55 to +70 feet National Geodetic Vertical Datum (NGVD). Additionally, groundwater depth is generally within 1 to 3 feet of natural grade.

Figure 9 - NRCS Orange County Soil Survey

Utilities & Railroad Analysis

Utilities & Railroad Analysis

EXISTING UTILITY AGENCY OWNER (UAO) ASSESSMENT

The UAO's in the study area were determined using a variety of sources. First, a Sunshine 811 Design Ticket was made to identify the utility providers and operators registered in the area. Next, a site visit was performed to visually identify marked utilities and the providers. These utility providers were then contacted to establish the proper personnel to assist with locating and identifying existing and planned utilities in the area. Lastly, plans, permits and/or mapping of the utilities were requested for review including any right-of-way or easement agreements along the affected corridors. UAO dispositions will be requested and documented at a later date as part of the design phase for this project. Cost and scheduling estimates associated with any relocation efforts will be documented as part of the design phase. The UAOs identified on the project are summarized in **Table 18**. The responses and other correspondence from the UAOs are provided in the **Utility Assessment Technical Memorandum**, available under separate cover. A description of all existing and planned utilities per UAO is listed below.

Table 18 - List of Utility Contact Information

Utility Owner	Contact	Email/ Phone	FACILITIES
AT&T Distribution	Alan Reynolds	AR2916@att.com	Buried Copper and Fiber (Telephone)
AT&T Transmission	Kenneth Wagner Craig Petrie	SWagner@pea-inc.com CPetrie@pea-inc.com	High-Capacity Buried Fiber
Charter	John "Smitty" Smith	John.Smith5@charter.com	Buried Cable & Overhead Facilities
City of Cocoa	John "Jack" Walsh	jwalsh@cocoafl.org	Buried Water Line for Well Field
Duke Energy Distribution	Leonardo Gonzalez	Leonardo.Gonzalez@duke-energy.com	Buried Electric for 2 street light poles
Duke Energy Transmission	Aric Rogers	ARogers@pike.com DefTransmissionGOV@duke-energy.com	No Facilities
Orange County Utilities (OCU)	Jose Hernandez Christina Crosby	Jose.Hernandez2@ocfl.net Christina.Crosby@ocfl.net	No Facilities (Possible Water, Sewer, Reclaim in the future)
Orlando Utilities Commission (OUC)	Robert Scheuerle	RScheuerle@ouc.com	Overhead Electric 12.47 kV
Sprint / T-Mobile Wireless	Jon Baker	Jon.Baker@t-mobile.com	Buried Fiber
Sprint / CenturyLink / Lumen / Embarq	Marlon Brown	Marlon.N.Brown@lumen.com	No Facilities

UTILITY IMPACTS & RELOCATION COSTS

AT&T (Distribution) and Sprint have indicated the need for relocation for both build Alternatives. Duke Energy (Distribution) and AT&T (Transmission) have indicated that they are within the project limits but will likely be unimpacted by the build Alternatives. Duke Energy has also expressed interest in relocating their facility as a result of the interchange reconfiguration. All other UAOs have responded with no facilities in the project area. All other UAOs have responded with no facilities in the project area. Listed providers in **Table 18** should be contacted as part of the ongoing utility coordination efforts.

Table 19 lists the following UAO dispositions. Costs and scheduling as well as any UAO dispositions and agreements pertaining to the relocation of any facilities will be further investigated as part of the design phase for this project.

Table 19 – UAO Dispositions & Utility Relocation Cost

Utility Owner	Description	Relocation Cost
AT&T Distribution	Facilities running north-south on the east side of Dallas Boulevard. Two buried fiber optic lines (24 and 48 FOC). Two buried copper lines (50 pr and 105 pr). Facilities running east-west along the north side of SR 528. The westerly line is out of service. The easterly line is buried fiber optic (12 FOC). AT&T anticipates relocating all of their affected utilities. A six-month schedule for design and construction is anticipated.	$100,000 to $150,000
City of Cocoa	During the last month of the Study, the City of Cocoa reached out regarding an 8" water line that runs within the R/W of Dallas Blvd. The line will likely need to be relocated to accommodate the Interchange and due to the late hour of coordination, relocation coordination will need to be performed during final design.	TBD
Duke Energy Distribution	Duke Energy poles and buried facilities will likely be unaffected by the project. However, Duke Energy has expressed interest in relocating their facilities as a result of the reconfigured interchange.	TBD
Orlando Utilities Commission	UC has electric facilities within the project area. Many of the OUC overhead electric lines may require relocation for each Alternative. The north-south lines on the east and west sides of Dallas Blvd may be relocated due to the proposed structures for SR 528. The lines running from both toll plazas will be removed as well. Relocation of these lines in anticipated, as OUC will provide service to CFX facilities.	TBD
Sprint	Multiple buried fibers along the project corridor. One BFOC runs parallel along the northern portion of westbound SR 528. This fiber continues along SR 528 until heading northeast to the existing right-of-way along the eastbound entrance ramp. It then runs south on the west side of Dallas Boulevard, and crosses Dallas Boulevard once south of the current interchange. This BFOC then runs south along the east side of Dallas Boulevard passing through the hand hole on the southeast corner of Dallas Boulevard and the exit ramp. The second BFOC runs along the south side of SR 528 heading east until the current eastbound exit ramp. Then this fiber runs along the south side of the exit ramp. It crosses Dallas Boulevard in a southeasterly direction into a hand hole on the southeast corner of Dallas Boulevard and the exit ramp. From the southeast hand hole, another BFOC heads northeast parallel to the current right-of-way until it reaches the eastbound lanes of SR 528. This line continues east along the south side of eastbound SR 528. Relocation is anticipated for all listed facilities. The anticipated relocation will extend 2 miles from the project area due to the nearest splice points for the buried fiber. No cost estimates or scheduling were provided at this time.	TBD

RAILROAD IMPACTS ANALYSIS

A recent addition to the project area is the construction of tracks for the new Brightline/All-Aboard Florida (AAF) rail service. These tracks are located within the southern portion of the CFX LA R/W, in easement granted to AAF. The rail will be south of the new SR 528 & Dallas Blvd Interchange. The new rail service within the project location provides high-speed rail connection from Orlando (Station located in new Terminal C at Orlando International Airport) down the east coast all the way to Miami. No stations or stops are being considered within or near the project area.

As a part of conceptual design, the new AAF Bridge design and the location of the structural support were used in creating the conceptual southern alignments for future buildout of Dallas Blvd south of the project area. The AAF bridge was designed to accommodate existing and future traffic demand conditions, along with providing opportunities for future bike/ped connectivity that were part of the Ultimate Buildout Conditions designs for the new Interchange. When the Deseret Ranches area south of the project area develops in the future, there will be additional demand for non-vehicular connectivity. The SR 528 Mainline Bridge was designed to provide for Ultimate Buildout to accommodate the potential future traffic demand.

A plan and elevation plan sheet for the AAF bridge over Dallas Blvd utilized in the design of the Alternatives is provided as **Appendix C – AAF Bridge Plan & Elevation Exhibit.**

Environmental Analysis

Environmental Analysis

EXISTING CONDITIONS

A study was conducted of existing environmental conditions and analysis of the potential Environmental Impacts of the Alternative Concepts. The full **Environmental Assessment Technical Memorandum** is available under separate cover.

Wetlands and Other Surface Waters

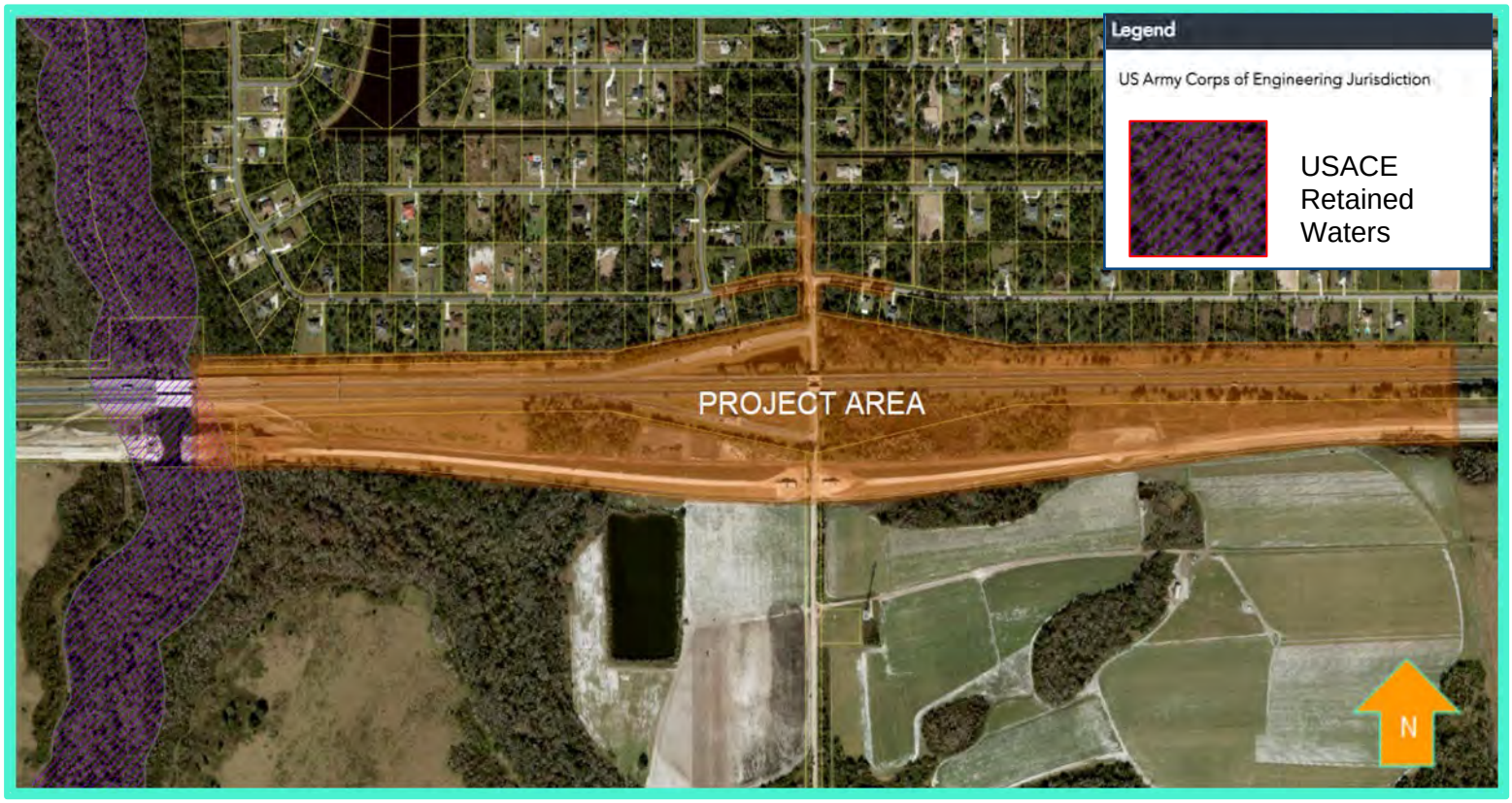
An assessment of wetlands and surface waters was conducted within the project study area utilizing the National Wetland Inventory (NWI) data (see **Figure 10**). Three wetland types were identified to overlap with some portion of the project area: freshwater emergent wetland, freshwater forested/shrub wetland, and riverine wetland. The riverine wetlands near the western limits of the project area are part of the Econlockhatchee River System, which is designated as an OFW. Primary impacts to the wetlands and RPHZ would result from construction activities and in situ placement of structures and could be minimized using Best Management Practices (BMPs).

Figure 10: National Wetlands Inventory

Water Resources

The riverine wetlands near the western limits of the project area are part of the Econlockhatchee River System, which is designated as an OFW. Design of the project will ensure that coordination with and proper permitting through FDEP is performed. A review was conducted of existing conditions related to natural resources for the project. The project will meet all applicable SJRWMD criteria related to water quality. The project is currently a non-federal action receiving no federal monies; therefore, concurrence from the EPA is not required according to the Safe Drinking Water Act. Best Management Practices to control erosion, sediment release, and storm water runoff to minimize adverse impacts on surface water resources will be implemented during design, permitting and construction. Determination has been made that the USACE retained waters associated with the Econlockhatchee River at the western project area limits are within 300' of the project, therefore the Project will be subject to FDEP State 404 Program Permitting (**Figure 11**). The **Level 1 PEIR** (under separate cover) contains a comprehensive list of anticipated permits for the construction of a Preferred Alternative. A **Water Quality Impact Evaluation Checklist** is available under separate cover.

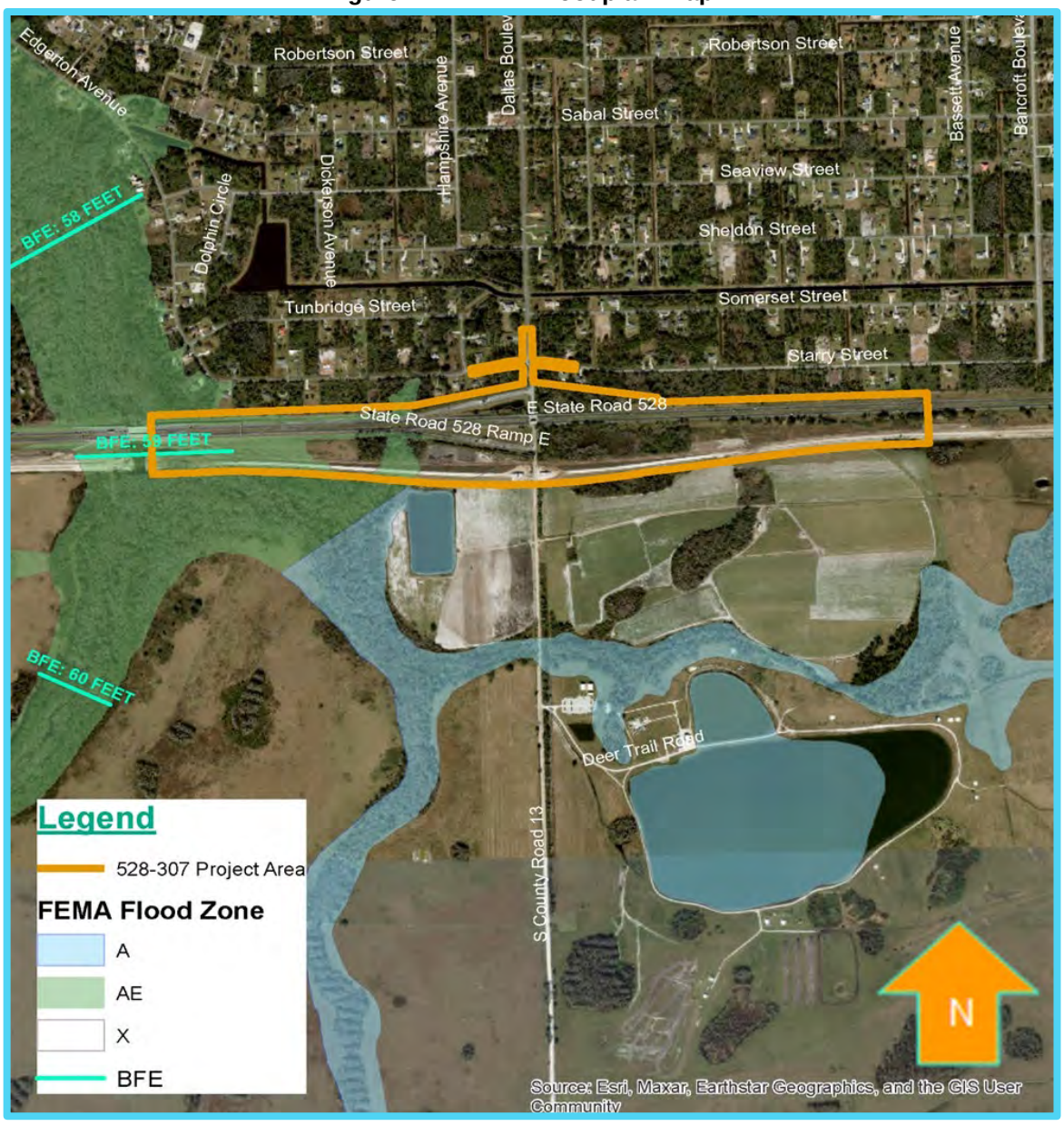
Figure 11 – USACE Retained Waters – 404 Permitting



Floodplains

Approximately 27 acres of the ±145-acre project site (18.6%) are classified as being within the FEMA Flood Zone AE, within the Special Flood Hazard Areas, where an established Base Flood Elevation has been determined (**Figure 12**). The remaining approximately 133 acres of the project site are classified as being within FEMA Flood Zone X, areas of minimal flood hazard. There is no FEMA Regulatory Floodway within the project study area (**Figure 12**).

Figure 12 – FEMA Floodplain Map



Structures Analysis

Structures Analysis

EXISTING CONDITONS

SR 528 Westbound (Bridge No. 750058)

The existing bridge was constructed in 1967 and consists of three spans, 16'-0", 48'-0", and 16'-0", with American Association of State Highway and Transportation Officials (AASHTO) Type II prestressed concrete girders and a 7-inch concrete deck superstructure. The vertical clearance over Dallas Blvd is 14.6 feet. The existing bridge provides two 12'-0" travel lanes with 4'-0" inside shoulder and 10'-0" outside shoulder over Dallas Blvd which consist of two 10'-0" asphalt roadway with unpaved shoulders. The total width of the SR 528 bridge deck from edge to edge is 42.5 feet. The inspection report dated July 2022 states that the bridge has a sufficiency rating of 91.5. The inspection report also indicated the Health Index rating is 92.57. The deck, superstructure, and substructure are indicated to be in fair to good condition.

SR 528 Eastbound (Bridge No. 750213)

The existing bridge was constructed in 1967 and consists of three spans, 16'-0", 48'-0", and 16'-0", with AASHTO Type II prestressed concrete girders and a 7-inch concrete deck superstructure. The vertical clearance over Dallas Blvd is 14.6 feet. The existing bridge provides two 12'-0" travel lanes with 4'-0" inside shoulder and 10'-0" outside shoulder over Dallas Blvd which consist of two 10'-0" asphalt roadway with unpaved shoulders. The total width of the SR 528 bridge deck from edge to edge is 42.5 feet. The inspection report dated July 2022 states that the bridge has a sufficiency rating of 91.6. The inspection report also indicated the Health Index rating is 94.49. The deck, superstructure, and substructure are indicated to be in satisfactory to good condition.

ANALYSIS OF STRUCTURES

Structures

Both Alternatives being considered for this study utilized the same mainline bridge conceptual design. In lieu of the two-bridge design for SR 528 over Dallas Blvd, the bridge concept is a single structure that will address current and future conditions. The SR 528 mainline bridge is designed to accommodate current and future buildout conditions. The current design of SR 528 mainline is being improved from a 4-lane to a 6-lane highway, with designs that utilize a wider inside shoulder for future capacity improvements of an additional lane. For the design of the SR 528 mainline bridge, the current 6-lane design is incorporated, along with wider inside shoulders that would accommodate future capacity improvements of 8-lanes.

In the vicinity of SR 528, Dallas Blvd is a local roadway that will carry two lanes of traffic in both the northbound and southbound directions. The northbound and southbound lanes are separated by a 22'-0' wide median. There are curb and gutters on each side of the road, as well as on both sides of the median. To the north of the bridge site, there is a proposed roundabout that will accommodate traffic from Dallas Blvd (both directions of traffic) as well as the westbound on-ramp and westbound off-ramp. Similarly, to the south of the bridge site, there is a proposed roundabout that will accommodate traffic from Dallas Blvd (both directions of traffic) as well as the eastbound on-ramp and eastbound off-ramp. Dallas Blvd has a posted speed limit of 40 under the jurisdiction of Orange County.

SR 528 is on a curved alignment (radius of 14714'-0') in this area and crosses Dallas Blvd approximately radially. The ultimate buildout configuration for Dallas Blvd will increase the number of lanes for each Alternative to handle future traffic demand Additionally, the bridge design would accommodate an Alternative interchange design such as a Single-Point Urban Interchange (SPUI). The SR 528 mainline bridge over Dallas Blvd will provide a 300'-0" opening from the faces of the Mechanically Stabilized Earth (MSE) walls below to accommodate numerous future interchange conditions. The bridge is approximately 314'-0" long and includes two spans of 157'-0" each. The 148'-8" wide bridge carries three 12'-0" lanes in each direction, 12'-0" outside shoulders, and 24'-0" inside shoulders. The bridge will have 36" Single-Slope Traffic Barriers on each side and a 36" Median Single-Slope Traffic Barrier separating the eastbound and westbound directions of traffic. The superstructure for the bridge is anticipated to be comprised of Florida-I 78 beams with an 8½" cast-in-place deck slab crowned with a cross slope of 2.0% towards the outsides. The bridge abutments are protected by MSE walls. The bridge will have 30'-0" approach slabs beyond the bridge abutments. Piers will be located within the median of Dallas Blvd.

Alternative 2 would require two additional bridges over the westbound on and off ramps. SR 528 is on a curved alignment (radius of 22,918') and the westbound ramps are also skewed as they cross under SR 528. These two factors result in a longer bridge span. The bridge spans vary from 170' to 230'. The composition of the superstructure has not been determined at this time, and should be evaluated as part of the design phase.

Traffic Analysis

Traffic Analysis

EXISTING CONDITIONS

Roadway Facilities

SR 528 is an east-west, limited-access tolled facility that begins at Interstate 4 (I-4) to the west and ends at US 1 to the east in Cocoa. This facility is owned and maintained by the Florida's Turnpike Enterprise (FTE), CFX and FDOT District 5. The section within the project limits is owned and operated by CFX. SR 528 provides a crucial connection for residents and visitors traveling to the International Drive attractions, Orlando International Airport, the east coast beaches, and Cape Canaveral. It also connects the John F. Kennedy Space Center and the aerospace industry with greater Orlando.

The existing typical section of SR 528 is a four-lane divided roadway with a median width of 40 feet within the study limits. Both the eastbound and westbound directions consist of two 12-foot-wide travel lanes, a 4-foot-wide inside shoulder, and 10-foot-wide outside shoulder. The posted speed limit within the study area is 70 mph. SR 528 forms a diamond interchange including a loop ramp with Innovation Way, a partial diamond interchange with Dallas Blvd and a diamond interchange with SR 520.

Dallas Blvd is a north-south, two-lane undivided major collector which serves the Wedgefield residential area. It has a direct access to SR 528 at Milepost (MP) 24, forming a partial interchange with unsignalized ramp terminal intersections that provide access to/from the west only. There is an adjacent closely spaced unsignalized intersection along Dallas Blvd at Starry St. The posted speed limit within the study area is 40 mph.

Starry St is an east-west, two-lane undivided road that serves residential land uses. It forms a four-legged, all-way stop-controlled intersection with Dallas Blvd. The posted speed limit is 30 mph within the study area.

Signalization

There is no signalization along SR 528 as it is a limited access facility. Signalization is not present at the intersections within the Dallas Blvd interchange.

The SR 528 eastbound off-ramp intersection at Dallas Blvd is a three-leg unsignalized intersection with stop control along the ramp approach. The off-ramp is one-way eastbound with two lanes approaching the intersection from the ramp toll plaza. At the intersection, the ramp has a left turn lane controlled by a STOP (R1-1) sign and a right turn lane controlled by a YIELD (R1-2) sign. Turns are prohibited from Dallas Blvd as the off-ramp is one-way.

The SR 528 westbound on-ramp intersection at Dallas Blvd is a three-leg unsignalized intersection. The on-ramp is one-way westbound departing the intersection with two lanes to the ramp toll plaza. Traffic control at the intersection involves motorists yielding right-of-way when turning left onto the ramp from Dallas Blvd. Turn lanes are not provided on Dallas Blvd at the intersection.

The intersection of Dallas Blvd at Starry St to the north of the interchange is a four-leg all-way stop-controlled intersection with STOP signs on each leg of the intersection. There are no turn

lanes on Dallas Blvd or Starry St at the intersection.

Traffic Signs

There are two overhead sign structures present on SR 528 within project limits. One of the structures (75A081) is a cantilever sign structure with an exit guide sign for the Dallas Blvd interchange. The other structure (75S865) is a Dynamic Message Sign (DMS) gantry west of the interchange. In addition, there are two overhead sign structures west of project limits with exit guide signs related to the Dallas Blvd interchange (75A079 and 75A080).

On Dallas Blvd, there are two overhead span wire sign assemblies in advance of the SR 528 overpass, one northbound (75C070) and one southbound (75C071), with warning signs informing motorists of the low bridge clearance (14'-5").

Existing signing within the project area including single post and multi-post regulatory, warning and guide sign assemblies are included in the **Existing Conditions Technical Memorandum,** available under separate cover.

Traffic – Crash Data

Crash data was reviewed for the primary roads identified and was discussed in the Roadway Existing Conditions (pg. 12) section of this document. The 2017-2022 crash period was selected due to the irregularity of traffic during 2020 as a result of the pandemic. Crash data has been collected from the Signal4 Analytics database. Crash data was evaluated based on environmental conditions, lighting conditions, road surface conditions, severity and frequency, and weather. The results are located in the **Project Traffic Analysis Technical Memorandum,** under separate cover.

TRAFFIC ANALYSIS

Traffic Analysis

A **Project Traffic Analysis Technical Memorandum** was developed under separate cover as part of this PD&E Study in order to evaluate the traffic operations along SR 528, Dallas Blvd, and the proposed ramp configuration. The study provides future traffic forecasts and operational analysis results for the 2022 existing year, 2030 opening year, and 2050 design year conditions. Traffic was generated for future planned developments in the area south of the interchange. The additional ramps also generated new trips resulting from the diversion of traffic from the SR 520 ramps to and from SR 528.

Signalization

Signalization would only be required for Alternative 2, as the Roundabout Concept of Alternative 1 does not require any signalization. The conceptual design for Alternative 2 brings all interchange ramps to a single signalized intersection south of the SR 528 mainline. The signalized intersection, as designed for Alternative 2 is anticipated to operate at an acceptable LOS for the Build Year. Further evaluation of the Intersection and Signalization is provided in the **Project Traffic Analysis Technical Memorandum,** available under separate cover.

Striping & Signage

The pavement striping for the SR 528 mainline, ramps, and roundabout will be installed per CFX design guidelines and per FDOT FDM and Standard Plans. A conceptual signing plan for the mainline and mainline ramps would be provided by CFX for the project, showing guide sign locations and messages.

The pavement striping for the SR 528 mainline, ramps, and intersection would be installed per CFX design guidelines and per FDOT FDM and Standard Plans. A conceptual signing plan for the mainline and mainline ramps will be provided by CFX for the project, showing guide sign locations and messages.

Traffic Forecasts

The traffic forecasts for SR 528 resulted in 77,900 Average Annual Daily Traffic (AADT) between Innovation Way and Dallas Blvd for 2030. The 2050 forecast for this same roadway is 114,300 AADT. The current half interchange at Dallas Blvd is forecast for a combined 7,500 AADT in 2030 and 11,000 AADT in 2050. The proposed eastbound on-ramp and westbound off-ramp combined are forecast at 2,900 AADT in 2030 and 5,200 in 2050.

Ramp Terminal Intersection Analysis Alternatives

The analysis of the Alternatives showed that all movements at the proposed Dallas Blvd and SR 528 full interchange ramp terminals are expected to operate at Level of Service (LOS) A in 2030 for the roundabout Alternative, and an acceptable LOS C or better for the signalized intersection Alternative. The overall LOS is A for the roundabout Alternative and B for the signalized intersection.

Future Intersection Operations Analysis

In the 2050 design year Build conditions, most of the movements are expected to operate at an acceptable LOS D or better at the proposed Dallas Blvd and SR 528 interchange ramp terminals for both the roundabout and signalized intersection Alternatives, except for the northbound through and right turns at the SR 528 eastbound ramps terminal in the PM. These movements are anticipated to operate at an unacceptable LOS F for the roundabout Alternative and E for the signalized intersection in the interim conditions, indicating that additional capacity improvements will be required along Dallas Blvd. The year of need for the four-lane widening of Dallas Blvd and an ultimate interchange configuration will depend on the pace at which development occurs in the region. Information obtained during the PD&E study indicated that most of the planned development in the area will occur beyond year 2050. The interim interchange operations will need to be monitored as development occurs to determine when the ultimate configurations will need to be implemented.

Traffic Analysis Conclusion

The overall LOS is A for the roundabout Alternative and B for the signalized intersection as analyzed for this PD&E study.

Lighting Analysis

Lighting Analysis

EXISTING CONDITIONS

Existing conventional lighting for the partial interchange was field verified from the end of the westbound on-ramp transition to just west of the bridge over Dallas Blvd. Twenty-three (23) light poles with 400W (Watt) High Pressure Sodium (HPS) fixtures and 15' arms at a 45' mounting height are along the mainline at an average spacing of 235', ten (10) light poles with 250W fixtures and 15' arms at a 35' mounting height are along the westbound on-ramp at an average spacing of 130', and ten (10) light poles with 250W fixtures and 15' arms at a 35' mounting height are along the eastbound off-ramp at an average spacing of 135'.

Additionally, the existing overhead sign structure at the eastbound off-ramp gore has two (2) sign fixtures that will need to be upgraded to LED. There are two (2) bridge mounted underdeck fixtures over the Dallas Blvd travel lanes at a mounting height of 16.5'. The surface mounted conduit runs to the southwest corner of the eastbound bridge and appears to connect to the eastbound mainline lighting circuit.

Load center 'A' is located adjacent to the toll building along the westbound on-ramp with a physical address of 12101 SR 528, Orlando FL 32833. Cabinet information references job number 1262-11 and a manufactured date of 11/01/11. Load center 'B' is located adjacent to the toll building along the eastbound off-ramp with a physical address of 12100 SR 528, Orlando FL 32832. Duke Energy is the power company within project limits.

ROADWAY LIGHTING ANALYSIS

Lighting for the Preferred Alternative intersections, ramps and bridge structures will be designed to meet CFX requirements and will be completed during Final Design. The Ultimate Buildout conditions should be incorporated into the lighting designs to avoid costly reconstruction, removal or relocation of lighting elements when the mainline and Dallas Blvd are built out to Ultimate conditions.

Intelligent Transportation Systems Analysis

Intelligent Transportation Systems (ITS) Analysis

EXISTING CONDITIONS

The ITS infrastructure within the project limits consists of fiber optic trunkline cable on both the north and south sides of the road beyond the outside limits of the paved shoulders. Electrical power service conductors are also present to power the device locations. The existing ITS devices include closed circuit television (CCTV) cameras, traffic monitoring stations (TMS), dynamic message signs (DMS) and data collection sensors (DCS). Toll plazas are present on the eastbound exit ramp and westbound entrance ramp and there is a load center on Dallas Blvd, north of SR 528. A detailed inventory of existing ITS devices can be found in the **Existing Conditions Technical Memorandum**, available under separate cover.

INTELLIGENT TRANSPORTATION SYSTEMS ANALYSIS

The existing ITS equipment within the project limits will be impacted by the proposed roadway design and will need to be replaced. This includes fiber optic cable and conduit, electrical power service conductors, and load centers. In addition, wrong-way driving systems will be installed at the proposed exit ramps. The following is a description of the equipment expected to be included as part of the ITS design.

- *CCTV cameras*: The CCTV sites allow for real time monitoring of the roadway and also serve to confirm DMS message displays. The proposed CCTV locations should be in the same general area as the existing sites. Consideration should also be given to including a CCTV on the Dallas Blvd. alignment to provide clear sight lines under the bridges for the SR 528 westbound exit and entrance ramps.
- *DMS*: DMS are used to display messages such as expected travel time, crash notifications and traffic conditions. The full span structure supporting the two DMS will be impacted by the proposed roadway realignment. The design team will determine a location for the new span and new DMS will be installed for both eastbound and westbound directions.
- *TMS*: TMS provide vehicular traffic data that includes vehicle volume and speed. This allows CFX to collect data which can identify high traffic areas and driver behavior. Existing TMS that are impacted should be replaced at the same general location.
- *DCS*: DCS are used for travel time analysis by detecting transponders located in the travelling vehicles. The DCS are installed at entrance/exit ramps and collect travel time information which can then be displayed on the DMS.
- *Wrong-Way Driving*: The wrong-way driving equipment includes wrong-way LED warning system signing that give wrong-way drivers a visible indication that they are traveling the wrong direction. The system utilizes radar and cameras to detect vehicles that are entering SR 528 via the exit ramp. When activated, the LED signs flash and an alert notification is sent to the Regional Transportation Management Center (RTMC) so that they can deploy the necessary safety protocol.

- *Fiber and Power Connections*: The existing backbone and feeder fiber optic cable will need to be replaced within the project limits. The proposed fiber will be installed under the outside shoulder per CFX standards. Drop cable connections will be provided to all device location and toll plazas. For this study it is assumed that there will be three load centers. The design team will verify proposed load center locations are acceptable and determine available power source locations. Disconnects, meters and a maintenance pad will be installed at all device locations.

Geotechnical Analysis

Geotechnical Analysis

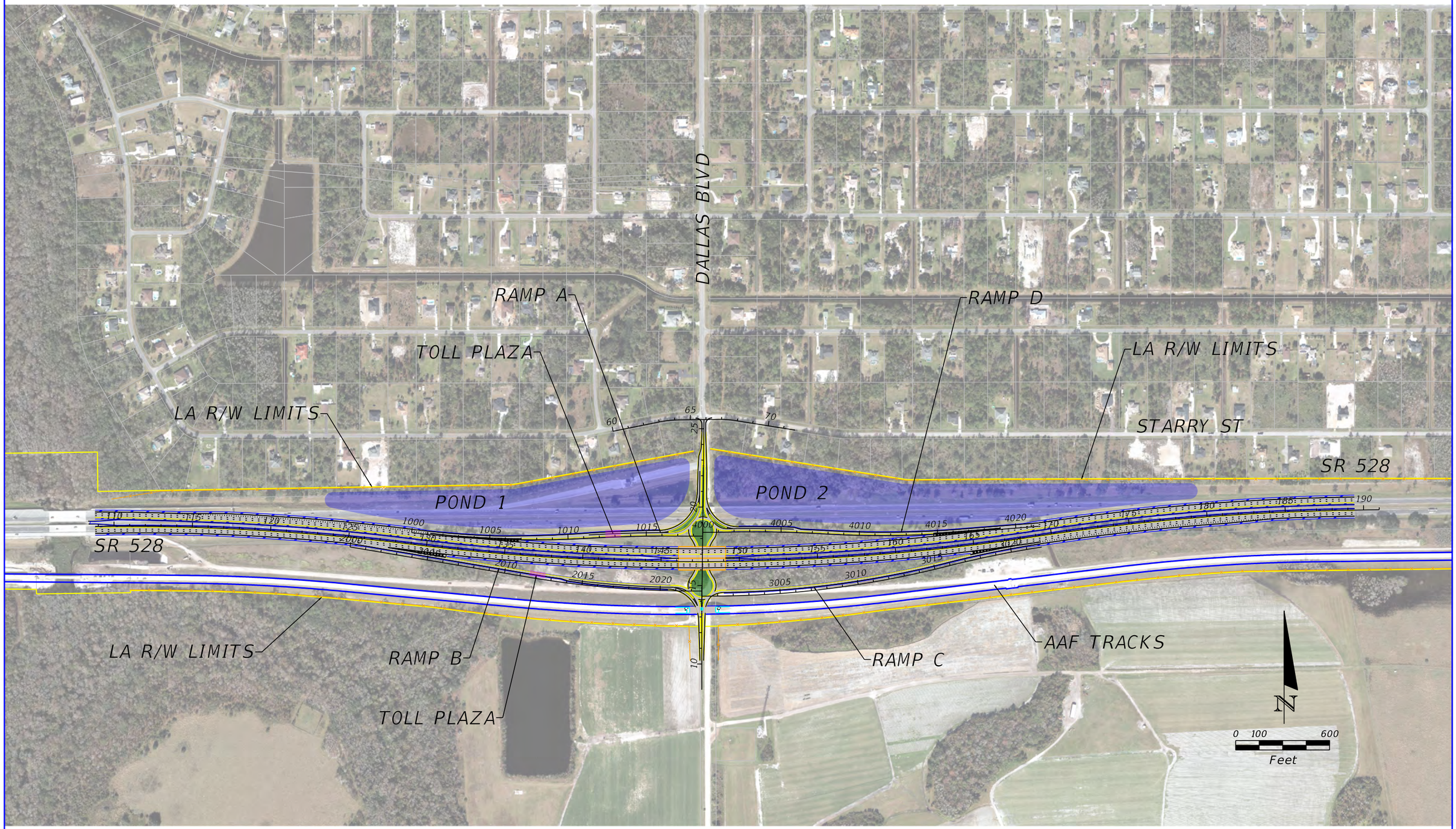
EXISTING CONDITIONS

Available documents, including the US Geological Survey (USGS) Quadrangle Map, the Natural Resources Conservation Service Orange County Soil Survey and current plans were reviewed. The following observations were noted:

- Natural ground surface topography varies from +55 to +70 feet National Geodetic Vertical Datum (NGVD).
- Land use is primarily residential north of SR 528 and undeveloped to the south.
- The newly constructed Brightline Railroad is also located south of the interchange.
- Near surface soils are primarily poorly drained sand soils.
- Groundwater depth is generally within 1 to 3 feet of natural grade.
- Review of available plans indicate the bridges were originally supported on 18-inch precast piles extending about 80 feet below natural grade.
- Geotechnical considerations include exploration for any highly compressible organic muck soils, evaluation of variable groundwater conditions and deep Standard Penetration Test (SPT) borings for bridge foundation design.
- Bridges should be supported on a deep driven pile substructure due to Karst environment and likely high Factored Loads required.
- Wet stormwater ponds will likely be required due to the near surface groundwater levels.

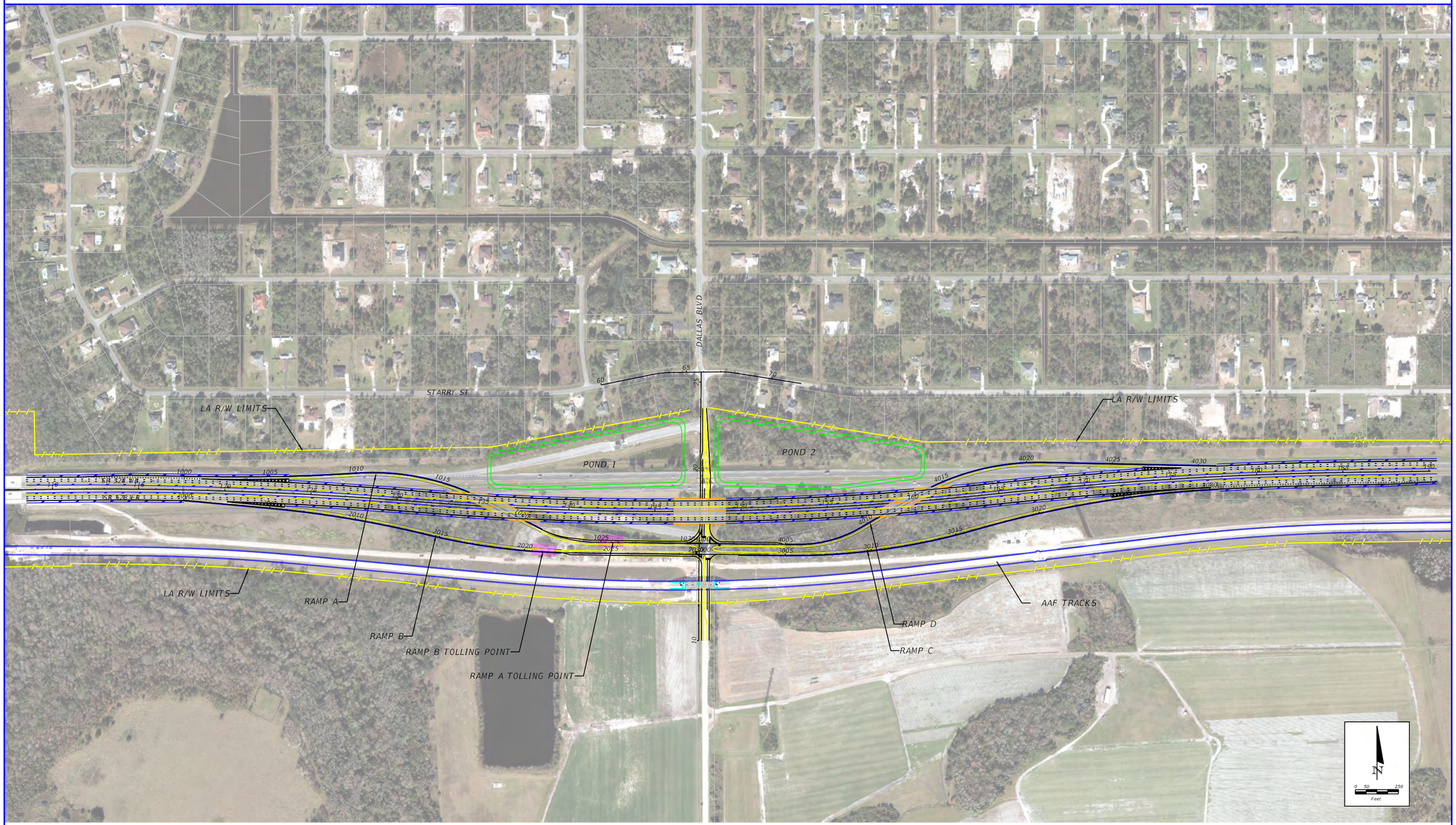
More detail can be found in the **Geotechnical Technical Memorandum**, available under separate cover.

Appendix A –Interchange Alternative Concepts



SR 528 DALLAS BLVD INTERCHANGE - ALTERNATIVE 1 (ROUNDABOUT)

SR 528 DALLAS BLVD INTERCHANGE		CENTRAL FLORIDA EXPRESSWAY AUTHORITY	SHEET NO.
ROAD NO.	PROJECT NO.		
SR 528	528-307		



SR 528 DALLAS BLVD INTERCHANGE - ALTERNATIVE 2 (BRAIDED)

SR 528 DALLAS BLVD INTERCHANGE	
ROAD NO.	PROJECT NO.
SR 528	528-307

CENTRAL FLORIDA EXPRESSWAY AUTHORITY

SHEET NO.

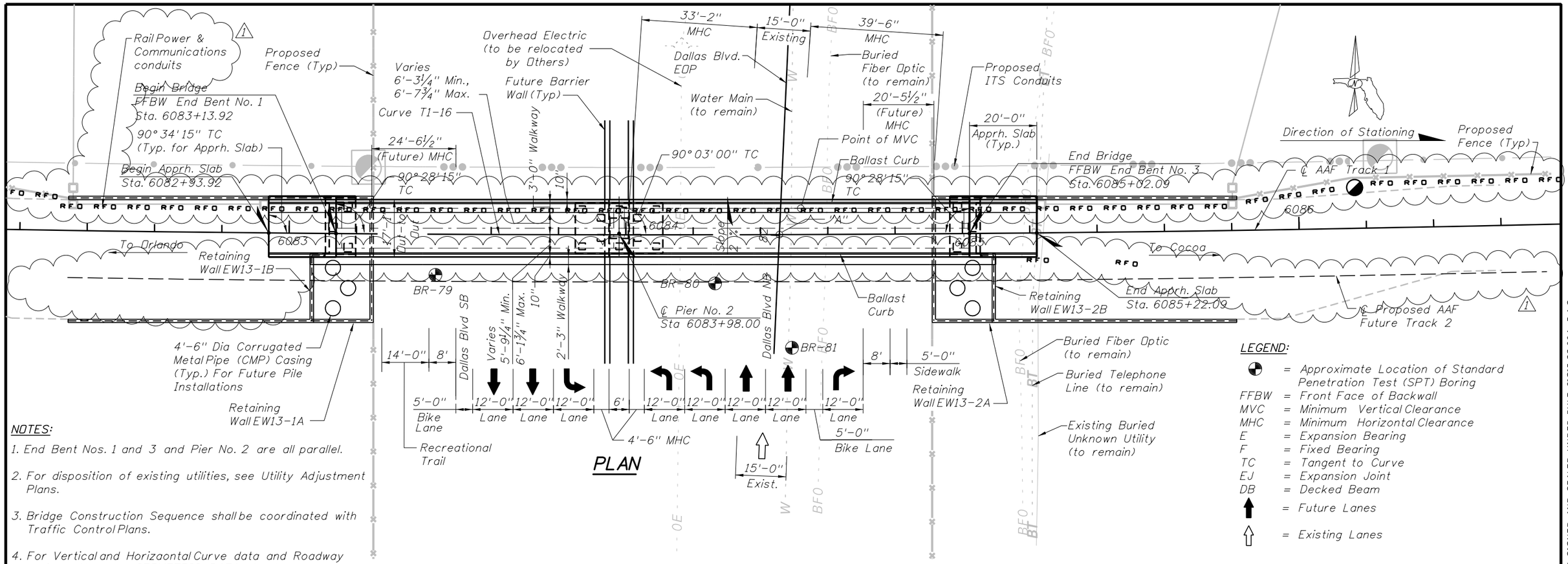
Appendix B – Comparative Alternative Evaluation Matrix

Comparative Alternative Evaluation Matrix

Legend: **Improved Conditions = 5 points** **No Impact = 4 points** **Minor Impact Potential/Low Effort Anticipated = 3 points** **Moderate Impact Potential/Medium Effort Anticipated = 2 points** **Impact Likely/Significant Effort Anticipated = 1 point**

Criteria / Alt.	Project Cost					Social and Economic Environment			Cultural Resources		Natural Environment			Physical Environment				Traffic Operations and Safety			Ranking
	Right-of-Way Cost	Construction	CEI	Wetland, Habitat, and Species	Utility Relocation	Right-of-Way Acquistion	Social and Neighborhood Impacts	Mobility	Historic Sites and Districts	Recreational Areas and Protected Lands	Wetlands and Other Surface Waters	Protectect Species and Habitat	Floodplain	Contamination	Noise	Water Resources	Air Quality	LOS	Delay	Safety	
No-Build Alternative	4 None	4 None	4 None	4 None	4 None	4 None	1 Exisiting Conditions create long detour due to lack of full interchange	1 An Eastbound on-ramp and Westbound off-ramp do not currently exist.	4 None	4 None	4 None	4 None	4 None	2 Contamination currently present in buried railroad line under Dallas Blvd	4 Current Mainline close to homes	4 None	4 None	1 Current conditions do not provide full interchange and bridge is substandard	1 No full interchange. Poor exisiting conditions.	1 Existing traffic controls will not support SR 528 widening improvements. Current bridge 550' from Starry St.	**63** **3**
Build Alternative 1 Dual Roundabout	4 None	3 Lower build costs than Alt. 2. Construction Costs for new mainline, one bridge, full interchange and Dallas Blvd improvements (includes lighting for roundabout). **Grand Total Project Cost: $80,885,612**	3 Less complex design & construction	3 Minor Wetland Impacts. 1.883 Acres Total Costs comparable to Alt. 2.	2 Moderate Utility Relocation Anticipated. - 2-3 Utility Conflicts (Sprint/T-Mobile Fiber, AT&T Fiber)	4 None	5 Full interchange improves quality of life, accomodates future development	5 Increases mobility of residents. Creates opportunity for future connectivity	4 None	4 None	3 Minor wetland impacts. 1.883 Acres. Can be mitigated.	4 No Anticipated Impact	4 Minor Impacts. To be mitigated within project footprint.	5 Existing minor contamination easily mitigated with new interchange. Project area then left in better condition	4 Alt. 1 2050 design yr noise levels predicted to meet or exceed the applicable NAC at 4 sites. The greatest noise level is predicted to be 67.7 dB(A) in NSA 2. No increases are considered	4 No impacts anticipated	4 No impacts anticipated	5 Full I-change, addt'l capacity.Setup for Ultimate Buildout. Dallas Blvd & SR 528 full interchange ramp terminals are expected to operate at LOS A in 2030 for Alt. 1. The overall LOS is A for Alt. 1	5 Ultimate Buildout will handle future traffic demand and will be re-evaluated as area develops in future. Roundabouts do not require traffic to stop, reducing delay.	5 10 Conflict Points Identified: - 6 Merge - 4 Diverge Bridge is 820' from Starry St	**80** **1**
Build Alternative 2 Signalized Braided	4 None	1 Higher build costs than Alt. 1. Construction Costs for new mainline, 3 bridges, full interchange and Dallas Blvd improvements (includes traffic signals). **Grand Total Project Cost: $106,015,107**	1 More complex design, more structural engineering	3 Minor Wetland Impacts 2.038 Acres Costs comparision to Alt. 1.	2 Moderate Utility Relocation Anticipated. - 2-3 Utility Conflicts (Sprint/T-Mobile Fiber, AT&T Fiber)	4 None	5 Full interchange improves quality of life, accomodates future development	5 Increases mobility of residents. Creates opportunity for future connectivity	4 None	4 None	3 Minor wetland impacts.2. 038 Acres. Can be mitigated.	4 No Anticipated Impact	4 Minor Impacts. To be mitigated within project footprint.	5 Existing minor contamination easily mitigated with new interchange. Project area then left in better condition	4 Alt. 2 2050 design yr levels predicted to meet/exceed applicable NAC at 10 sites, 3-NSA 1,7-NSA 2. Greatest level predicted @ 70.0 dB(A) in NSA 2. No increases considered substantial.	4 No impacts anticipated	4 No impacts anticipated	4 Full I-change, additional capacity. Setup for Ultimate Buildout. Dallas Blvd & SR 528 full interchange ramp terminals are expected to operate at LOS C in 2030 for Alt. 2. The overall LOS is B for Alt. 2.	5 Ultimate Buildout will handle future traffic demand and will be re-evaluated as area develops in future. Signals require traffic to stop, creating potential delay.	4 32 Conflict Points Identified: - 8 Merge - 8 Diverge -16 Crossing Bridge is 700' from Starry St	**74** **2**

Appendix C – AAF Bridge Plan & Elevation Exhibit

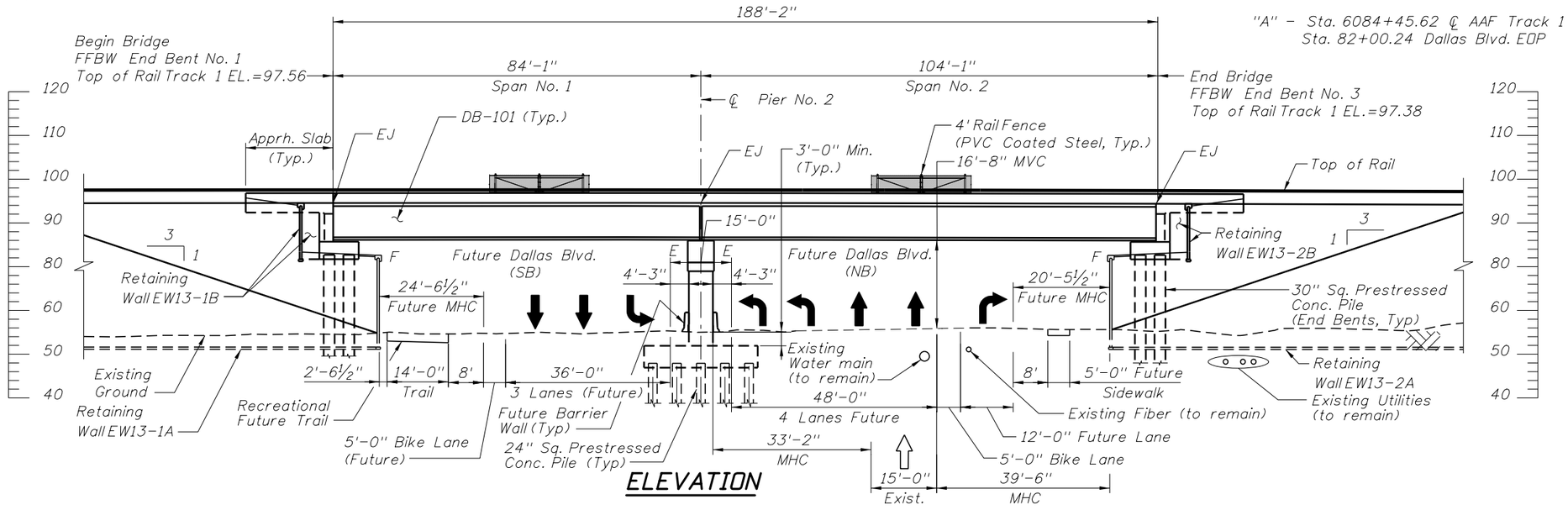


NOTES:

1. End Bent Nos. 1 and 3 and Pier No. 2 are all parallel.
2. For disposition of existing utilities, see Utility Adjustment Plans.
3. Bridge Construction Sequence shall be coordinated with Traffic Control Plans.
4. For Vertical and Horizaontal Curve data and Roadway information, see GEOMETRIC DATA sheet.

LEGEND:

- ◐ = Approximate Location of Standard Penetration Test (SPT) Boring
- FFBW = Front Face of Backwall
- MVC = Minimum Vertical Clearance
- MHC = Minimum Horizontal Clearance
- E = Expansion Bearing
- F = Fixed Bearing
- TC = Tangent to Curve
- EJ = Expansion Joint
- DB = Decked Beam
- ⬆ = Future Lanes
- ⇧ = Existing Lanes



ELEVATION

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
06/05/20	KWE	1 BULLETIN 25			

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

DRAWN BY:	CHECKED BY:	DESIGNED BY:	CHECKED BY:
JTC	DLB	CJM	WLH

ALL ABOARD FLORIDA

AAF CONTRACT	MILEPOST	COUNTY
C02	EW 115.21	ORANGE

SHEET TITLE:
PLAN AND ELEVATION
BR-EW13-115.21 DALLAS BLVD.

PROJECT NAME:
NEW RAILWAY
ORLANDO INT'L AIRPORT (MP 98.54) TO FEC RAILWAY (MP 137.58)

SHEET NO.
EW13-1

bvaughn 6/5/2020 10:34:12 AM c:\caddlib\pw\bvaughn\sediv\d0114177\B13PlanElev.dgn

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