

# **SunRail Extension to OIA (Phase 3) PD&E Study Preliminary Engineering Report**

For the  
**Central Florida Commuter Rail  
Orange County, Florida**

In preparation for



Florida Department of Transportation District 5

May 2018

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016, and executed by FHWA and FDOT.

# PRELIMINARY ENGINEERING REPORT

Florida Department of Transportation

District 5

## **SunRail Extension to OIA (Phase 3) PD&E Study**

From SunRail Commuter Rail Transit (CRT)  
Phase 2

To the Intermodal Terminal Facility (ITF) at  
Orlando International Airport (OIA).

Orange County, Florida

Financial Management Number: 429215-2-22-01

ETDM Number: 14147

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## **1.0 SUMMARY OF PROJECT**

### **1.1 Project Overview**

The Florida Department of Transportation (FDOT) District Five is conducting the SunRail Extension to OIA (Phase 3) Project Development and Environment (PD&E) study in cooperation with the City of Orlando, Orange County, Osceola County, Volusia County, Seminole County, Orlando Utilities Commission (OUC) and the Greater Orlando Aviation Authority (GOAA). The purpose of this study is to evaluate the potential of a premium transit connection between the SunRail Commuter Rail Transit (CRT) system and the new Intermodal Terminal Facility (ITF) at the Orlando International Airport (OIA). The SunRail Extension to OIA project is approximately five and one-half miles in length and would connect existing SunRail Phase 1 and Phase 2 South service, currently under construction, to the ITF along an existing spur track corridor owned by the City of Orlando and operated by OUC). The SunRail Extension to OIA (Phase 3) project would provide premium transit service to OIA from downtown Orlando and along the SunRail main line from Osceola County up to Volusia County. The Phase 3 project corridor is located within the limits of the City of Orlando on an existing rail spur with portions owned by the City of Orlando, FDOT and GOAA.

The rail spur connects to the Central Florida Rail Corridor (CFRC) at an existing wye turnout located approximately one mile north of the Meadow Woods Station. A transfer station is proposed near the wye that will allow direct passenger transfers from the SunRail CRT system main line to the SunRail Extension to OIA. This connection will be made using a heavy rail shuttle service beginning at the transfer station on the CFRC, running parallel to the existing OUC Stanton Spur then traveling north on GOAA property to reach the ITF.

### **1.2 Commitments and Recommendations**

Project commitments identified through the environmental analysis and documented in supporting memorandums are as follows:

1. FDOT will implement the Standard Protection Measures for Eastern indigo snakes.
2. Surveys for gopher tortoise and relocation if needed will be conducted prior to construction.
3. Coordination with The U.S. Fish and Wildlife Service (USFWS) for eagle nesting season protection measures will be required prior to construction.
4. Pre-construction surveys for Sandhill Crane nesting sites will be conducted within on-site wetlands and surface waters.
5. Mitigation for impacts to suitable wood stork foraging areas will be performed through Section 373.4137 F.S.
6. Water quality impacts resulting from erosion and sedimentation will be controlled in accordance with FDOT's "Standard Specifications for Road and Bridge Construction" and through the use of Best Management Practices.

7. A Level II field screening will be conducted if it is determined during the project's design that construction activities could be within their vicinity. From the results of the Level II analysis, a remedial action plan will be developed to insure activities will not be exacerbated.
8. Construction to minimize Air Quality impacts will be in accordance with FDOT's "Standard Specifications for Road and Bridge Construction" and through the use of Best Management Practices.
9. During design phase FDOT will continue coordination with City of Orlando Greater Orlando Aviation Authority (OIA) to minimize mitigation requirements to environmental impacts on airport property and minimize construction impacts.
10. During design phase FDOT will continue coordination with OUC to maximize use of existing railroad tracks and operations interface between the passenger and freight operations.

### **1.3 Description of Proposed Action**

The Build Alternative alignment for the SunRail Extension to OIA (Phase 3) project is based on the RTC analysis providing track (OIA track) to meet the 15-minute headways between the Transfer Station and the ITF Station. Double tracks will be required for approximately one mile on the west end and two miles at the east end of the total 5.3-mile segment to provide operations of two trains to meet the headway.

To provide passenger transfers from the CFRC main line and the Phase 3 extension to OIA, two center platforms are recommended between the two CFRC main line tracks and the new track to the OUC Spur. The northbound CFRC main line track (P2S) will be realigned 4,050 feet to provide 30 feet centerline to centerline for a center platform. The two OIA tracks will also be spaced to provide for a 300-foot center track platform. An intertrack fence will be located between the CFRC and OIA tracks with provision for cross track walkways connecting the two platforms. Additional right of way will be required for the Transfer Station. The proposed Transfer Station is shown on the Concept Plans included in Appendix A.

The two OIA tracks will begin at the transfer station platforms. The existing OUC Spur track on the existing north leg of the wye will be relocated to allow two tracks beneath the Orange Avenue structures. The realigned track is designated OIA ML2 with the new track designated OIA ML1. The realigned OIA ML2 track will be on the existing spur alignment at the Wetherbee Road grade crossing. A new crossover will be located south of the platform maintaining the OUC connection (OIA ML2) to access the CFRC main line. A portion of the existing wye geometry will also be realigned between Wetherbee Road and the tie-in with the south leg of the wye. The geometry and typical section of the realignment of OIA ML2 and the new track OIA ML1 are shown on the Concept Plans.

The existing OUC Spur track will be upgraded to a Class 1 line and shared with freight operations from the tie-in of the two legs of the wye a distance of 6,500 feet. The combined distance, including the wye, of existing track that will be realigned and/or upgraded for shared use is 12,300 feet. The freight operations are generally routed from the south, utilizing the south leg of the wye. A new passenger only track (OIA ML1) will be constructed to the north, within existing right-of-way (ROW), to a point just east of the Boggy Creek Road grade crossing. Within the limits from the wye to Boggy Creek Road, three existing concrete trestle structures will be matched for the new OIA ML1, see Section 8.5 Structures for further discussion.

Approximately 400 feet east of Boggy Creek Road, a second OIA ML2 will be developed as the alignment leaves the OUC corridor to the ITF Station. For operational considerations the second OIA track is required. The OIA ML1 will continue with the OIA ML2 track being located to the north. The two OIA ML tracks will be parallel to the existing OUC spur track for 1,100 feet before the two OIA tracks curve into the GOAA property to connect into the ITF. The addition of a third track to the north of the existing OUC spur track will require additional ROW for drainage considerations. Any ROW required from east of Boggy Creek Road to the ITF is owned by GOAA (City of Orlando).

As the OIA main line tracks veer from the OUC alignment, the tracks will be to the south of the All Aboard Florida (AAF) (d.b.a. Brightline) maintenance facility. An access road into the facility will be crossed by the OIA tracks and has been coordinated with AAF. At the Boggy Creek crossing, (Tradeport Ditch per GOAA drainage maps) an existing 750-foot wide floodway is designated on the Flood Insurance Rate Map (FIRM). Currently an 850-foot bridge is proposed for the OIA tracks to traverse this floodway; however, future coordination with GOAA is required as they are attempting to have floodways and floodplains redesignated by National Wetlands Inventory (NWI). An additional bridge is identified to cross the drainage canal to the south side of Canal Road. Canal Road, as coordinated with GOAA, will be an at-grade crossing with just crossing warning and stop signs.

North from the east side of the AAF maintenance facility and north of Canal Road, the Brightline and SunRail tracks will run parallel with each other. The OIA tracks will span the new South Terminal Access Road and pond, as coordinated with site engineers for GOAA. The OIA tracks will remain elevated from the South Terminal Access Road into the ITF with a second level platform.

The vertical profile of the OIA tracks will be at grade, matching the OUC Spur track within the concurrent right of way limits. As the OIA tracks leave the OUC corridor, the OIA tracks will remain at grade until the vertical profile extends over the South Terminal Access Road and into the ITF second level. Between the access road and the ITF terminal, the OIA tracks are proposed to be on MSE walls.

The connection to the ITF terminal will be made at the second level, connecting to an extended canopy over the first level at what is the Passenger Drop-off Lobby of the ITF. The limits of the OIA tracks and platform will meet the limits of the canopy, the canopy topping slab will be in place connecting the SunRail platform walkways to the PDL building. This is an approximate 95 to 100 foot gap between the end of the tracks/platform before the actual connection to the terminal building.

## **2.0 INTRODUCTION**

### **2.1 Project Description**

The Florida Department of Transportation (FDOT) is conducting Project Development to evaluate a commuter rail connection/extension using the Orlando Utilities Commission (OUC) Stanton Spur track that would provide a connection from the SunRail main line to the Orlando International Airport (OIA) Intermodal Terminal Facility (ITF) at the South Terminal now under construction. The study area is located within the City of Orlando on existing railroad corridors owned by either the City or FDOT and airport property owned by the City.

The project will be conducted in cooperation with the City of Orlando, Orange County, the Greater Orlando Aviation Authority (GOAA), MetroPlan Orlando, the Central Florida Regional Transportation Authority (LYNX), and OUC. The SunRail Phase 1 Project is the initial 32-mile commuter rail line that extends from DeBary to Sand Lake Road and started revenue operations in May 2014. SunRail service currently runs on the FDOT-owned railroad right-of-way (ROW) known as the Central Florida Rail Corridor (CFRC). The Phase 2 South Project, which is a southern extension of the Phase 1 from Sand Lake Road to Poinciana Boulevard in Osceola County, is currently under construction.

The Project Development Process shall follow the FDOT publication titled "Project Development and Environment (PD&E) Manual," published 07/01/88 and all subsequent revisions. The PD&E Manual incorporates all the requirements of the National Environmental Policy Act (NEPA); Federal law and executive orders; applicable Federal regulations included in the Federal Highway Administration Federal-Aid Policy Guide; and applicable State laws and regulations including Chapter 339.155 of the Florida Statutes. The project documentation prepared in accordance with the PD&E Manual shall therefore be in compliance with all applicable State and Federal laws, executive orders, and regulations.

The FDOT has prepared a Class of Action Determination Technical Memorandum (July 2015) demonstrating the project would take place entirely within existing rail ROW and on airport property and that the impacts to the environment will be minimal to non-existent. In addition, the project is consistent with the FTA Implementing Procedures. The FDOT's recommendation for a Class of Action Determination for a Categorical Exclusion was concurred to by FTA January 5, 2016.

The engineering and environmental services required for a Documented Categorical Exclusion, including consideration of all social, economic, environmental effects, and mitigation as required by the Federal Transit Administration (FTA), and/or the PD&E Manual, along with the required environmental documents, engineering reports, preliminary plans, public hearing, and ROW needs will be prepared in support of the Categorical Exclusion.

#### **Study Area**

The SunRail Phase 3 corridor is being studied along the existing OUC Stanton Spur corridor from the existing wye turnout on the SunRail main line to the proposed Intermodal Terminal Facility (to be constructed by GOAA) at the proposed South Terminal of OIA within the City limits of Orlando. The SunRail corridor extends from Poinciana Boulevard in Osceola County to DeLand in Volusia County (see

**Figure 3.1).** The SunRail Extension to OIA (Phase 3) is proposed to serve air passengers and employees from the Central Florida region to OIA.

## **Alternatives to be Considered**

### **No-Build Alternative**

The No-Build Alternative is a requirement of the National Environment Policy Act (NEPA) regulating and serving as the baseline for establishing the environmental impacts of the alternatives, the financial condition of implementing and operating agencies, and the effectiveness of the Build Alternative. The No-Build Alternative includes the current and planned roadway and transit projects that are committed and funded in the respective urban area and transit agency plans. It includes both highway and transit projects and provides a baseline for comparison to all of the other alternatives. The No-Build Alternative will include the entire 61-mile Phase 1 and Phase 2 SunRail system (DeLand to Poinciana).

### **Build Alternative**

The Build Alternative is a 5.5-mile Commuter Rail Transit (CRT) service extension operating within the OUC Stanton Spur and OIA ROW between the existing wye turnout along the existing SunRail main line and the proposed Intermodal Center as part of the OIA South Terminal in the City of Orlando (see **Figure 3.1**). As part of the Build Alternative analysis the operations along the existing 61-mile CFRC corridor and analysis of the existing Phase I and Phase 2 South stations and Vehicle Storage and Maintenance Facilities (VSMF) will be evaluated for need for additional improvements.

## **2.2 Purpose of Report**

The purpose of this report is to document the engineering and environmental analysis performed to support decisions related to evaluation of the project alternatives. In addition, it summarizes existing conditions, documents the purpose of and need for the project, and documents other data related to preliminary design concepts. These preliminary design concepts establish the functional or conceptual requirements that will be the starting point for the final design phase. The concept plans for this project are included as **Appendix A**.

## **3.0 PROJECT PURPOSE AND NEED**

### **3.1 Project Overview**

The Florida Department of Transportation (FDOT) District Five is conducting the SunRail Extension to OIA (Phase 3) Project Development and Environment (PD&E) study in cooperation with the City of Orlando, Orange County, Osceola County, Volusia County, Seminole County, Orlando Utilities Commission (OUC) and the Greater Orlando Aviation Authority (GOAA). The purpose of this study is to evaluate the potential of a premium transit connection between the SunRail Commuter Rail Transit (CRT) system and the new Intermodal Terminal Facility (ITF) at the Orlando International Airport (OIA). The SunRail Extension to OIA project is approximately five and one-half miles in length and would connect existing SunRail Phase 1 service and Phase 2 South, currently under construction, to the ITF along an existing spur track corridor owned by the City of Orlando and operated by OUC. The SunRail Extension to OIA (Phase 3) project would provide premium transit service to OIA from downtown Orlando and along the SunRail main line from Osceola County up to Volusia County. The Phase 3 project corridor is located within the limits of the City of Orlando on an existing rail spur with portions owned by the City of Orlando, FDOT and GOAA. The SunRail Extension to OIA project would also provide for direct transfers to the privately-funded All Aboard Florida (AAF) (d.b.a. Brightline), an express intercity rail project with passenger service between Miami-Fort Lauderdale-West Palm Beach to be in-service in 2017 with proposed extended service to OIA terminating at the ITF to follow by 2020.

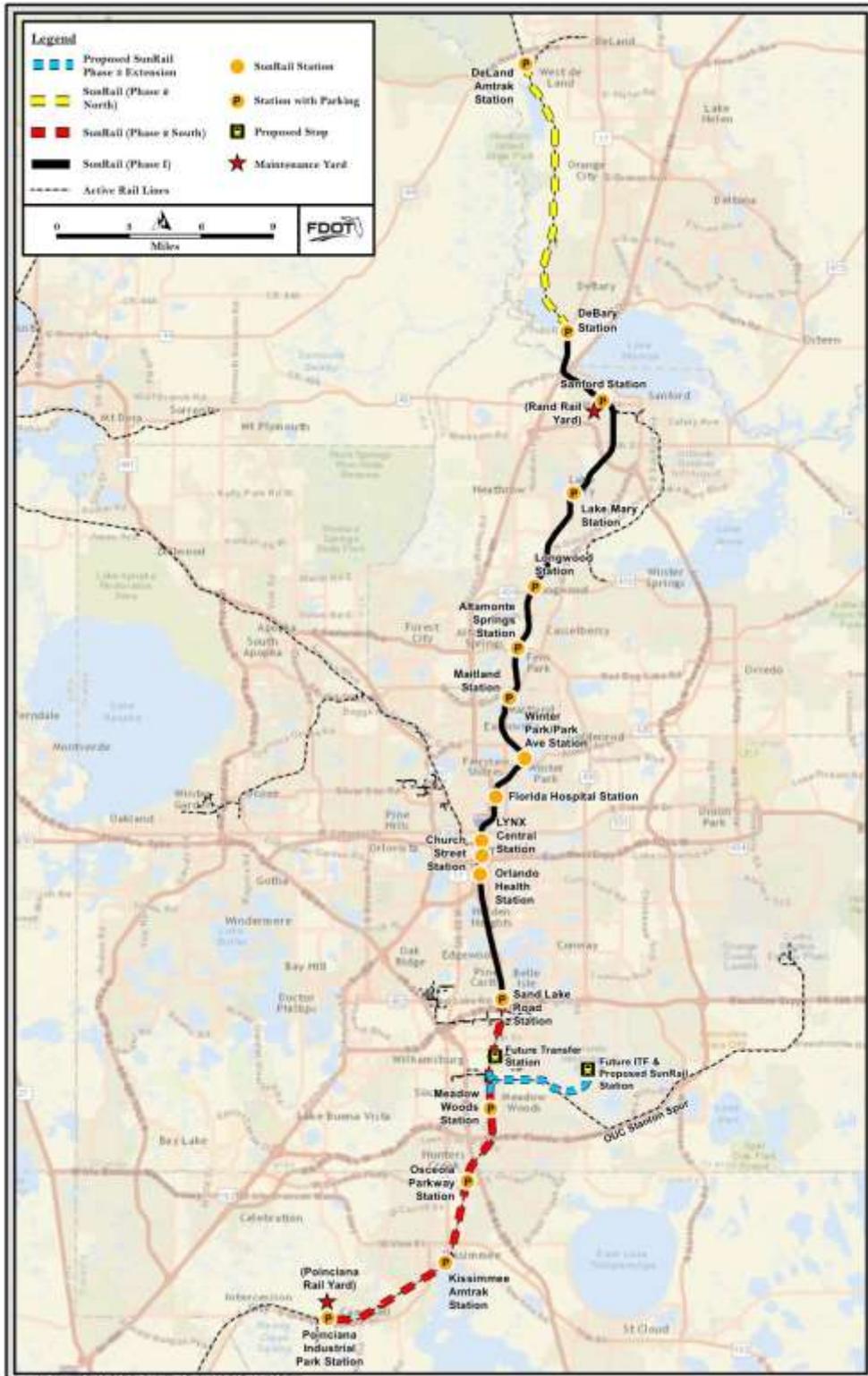
The primary goal of the SunRail Extension to OIA (Phase 3) PD&E Study is to identify the recommended premium transit alternative that best addresses the mobility needs of the study area. This study builds on the OIA Connector Refresh Alternatives Analysis (AA) study completed in January 2016. The OIA Connector Refresh AA study defined and screened 12 Initial Alternatives including a connection between SunRail and OIA's ITF. Based on the screening criteria and with broad support from regional stakeholders and the public, as expressed at OIA Connector AA public meetings held on March 12 and June 18, 2013, the SunRail Extension to OIA was identified early in the AA process as a regional transit priority. Due to the unwavering support from the local community, it was decided to carry this alternative independently into the Project Development phase through the Federal Transit Administration (FTA)'s Capital Investment Grant Program.

This PD&E Study will provide the technical analyses and environmental documentation necessary to advance the project through Project Development as defined by the FTA Fixed Guideway Capital Investment Grants Program, under the Small Starts category. The Purpose and Need determines project goals and objectives, clearly defines the purpose and scope of the project and identifies the need for proposed improvements.

#### **Study Area Definitions**

Because the SunRail Extension to OIA would affect mobility and access to jobs for the entire Central Florida region, two study area layers have been defined: Regional Influence Area and Corridor Study Area. The Regional Influence Area, shown in **Figure 3.1**, includes the 61-mile long Central Florida Rail Corridor (CFRC) and the proposed SunRail Extension to OIA. The CFRC includes the 12 Phase 1

Figure 3.1 | SunRail Regional Influence Area



stations currently operating, four additional Phase 2 South stations under construction, and the planned Phase 2 North extension to a DeLand station. The SunRail Extension to OIA connection will integrate the SunRail system with other regional mobility services, such as Brightline, Amtrak, commercial airlines and the mass transit providers serving the region, including Central Florida Regional Transportation Authority (CFRTA) (d.b.a. LYNX) and Votran. Connecting these transit linkages to the surrounding land uses of the Phase 1 and Phase 2 stations are the focus of the Regional Influence Area.

The Corridor Study Area, shown in **Figure 3.2**, focuses on the SunRail Extension to OIA corridor which includes a small portion of the wye owned by FDOT, approximately three and one-half miles of the existing OUC Stanton Spur and approximately two miles on GOAA property adjacent to the planned Brightline non-revenue tracks between the ITF and the Stanton Spur.

The OUC Stanton Spur corridor is a critical component of the proposed SunRail Extension to OIA corridor as it is an existing heavy rail (freight) corridor connecting the CFRC and the OIA property. The rail spur connects to the CFRC at an existing wye turnout approximately one mile north of the Meadow Woods Station (currently under construction). Surrounding land uses along the existing spur corridor include agricultural land, light manufacturing operations and transportation support services. The existing Stanton Spur corridor consists of a single track within 120 to 150 feet of existing right-of-way (ROW).

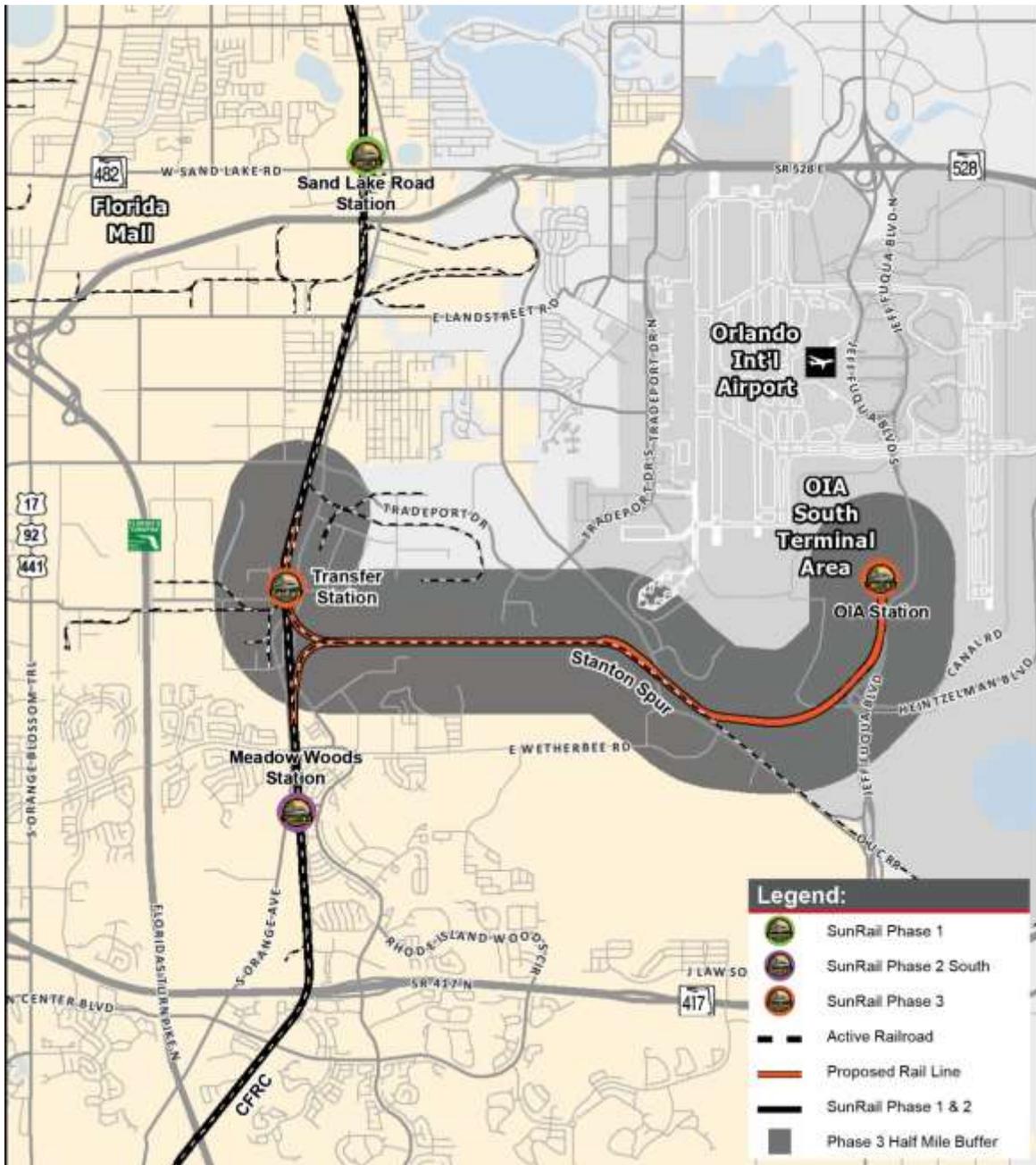
Up to two parallel tracks would be constructed within the existing railroad ROW to allow for frequent commuter service to extend from the existing SunRail main line to OIA. The existing Stanton Spur is not a Class I freight facility. The new parallel passenger tracks would meet standards for passenger service speeds up to 65 mph and improvements to the existing spur track would be considered as operational analysis is completed on the corridor.

A transfer station is proposed near the wye, shown in Figure 3.2, will allow direct passenger transfers from the SunRail CRT system main line to the SunRail Extension to OIA. This transfer station will serve only rail passenger transfers and local bus service connections; it does not provide any type of parking or kiss-and-ride at the station. It truly serves as a transfer station and is neither an origin nor destination station.

The eastern two miles of the corridor would be located on GOAA property. GOAA recently began construction on the South Terminal including the ITF, a parking garage and an extension of the Automated People Mover (APM) System connecting to the existing North Terminal. The ROW for this two mile section has been a part of the GOAA Master Plan; of which much of the corridor has previously been environmentally permitted and mitigated.

Up to two tracks would be constructed to extend from the Stanton Spur to the ITF including a rail bridge over Boggy Creek with elevated track connecting to a second level station platform at the ITF. This section of track may consist of fill, retaining wall or bridge structure. The ROW width in this section will be approximately 120 feet wide. The existing rapid infiltration basin (RIB) ponds are already impacted by Brightline and will be relocated or removed by others.

Figure 3.2 | SunRail Extension to OIA (Phase 3) Corridor Study Area



The SunRail Extension to OIA will connect with the SunRail commuter rail service and will include either the same or compatible rail vehicles as the existing SunRail trains. The existing Phase 1 stations and proposed Phase 2 South stations also will be evaluated to determine long-term (airport) parking impacts to these facilities. The existing Vehicle Storage and Maintenance Facility (VSMF) constructed as part of Phase 1 in Sanford and the Vehicle Storage and Light Maintenance Facility (VSLMF) under construction adjacent to the Poinciana Station will be evaluated further to determine any impacts of storing additional rail vehicles for the new service.

### **Previous and Current Studies**

The FDOT with the City of Orlando, Orange County, GOAA, MetroPlan Orlando, LYNX, OUC and other regional partners have worked collectively through many years to bring commuter rail and other transit options to the Central Florida region. A range of planning and permitting efforts on SunRail Phases 1 and 2 and the SunRail Extension to OIA have either been completed or are currently underway, including:

- OIA Intermodal Terminal and Associated High Speed Rail and Light Rail Alignments (2005). GOAA, in association with FTA, prepared the Environmental Assessment/Finding of No Significant Impact (EA/FONSI) for the OIA Intermodal Terminal to assess the proposed intermodal passenger facilities at OIA including light rail and high-speed rail alignments within the airport property that are planned to connect to the OIA Intermodal Terminal. The approved EA included provision of intermodal passenger facilities at OIA and associated rail alignments within GOAA property.
- Central Florida Commuter Rail Transit North/South Corridor Project Environmental Assessment (2007). The FTA determined on April 27, 2007 that the CFCRT North/South Corridor Project serving Orlando, Volusia, Seminole, Orange and Osceola Counties, FL, and sponsored by FDOT would not have any significant impact on the environment as documented in the Finding of No Significant Impact (FONSI). The FTA and FDOT subsequently conducted a Supplemental Environmental Assessment (SEA) along with the First Addendum to the FONSI as issued on July 28, 2008. A Second SEA was completed in 2010 in response to changes in the initial project. Ultimately, FTA issued a Second Addendum to the FONSI on September 10, 2010.
- The OIA 2011-2031 Master Plan Update (October 2014) includes a conceptual rail corridor and intermodal facilities in anticipation of future light rail and intercity high-speed rail connections.
- Orlando International Airport (OIA) Connector Refresh Alternatives Analysis (AA) (January 2016). The AA Study was conducted to evaluate the potential for a premium transit system in the area between OIA and major visitor attractions along International Drive. During development and evaluation of the initial alternatives, FDOT and its project co-sponsors agreed that the alternative connecting SunRail directly to the new OIA ITF using the OUC Stanton Spur should be advanced independently due to its potential local, regional and state-wide significance.
- MetroPlan Orlando, the Metropolitan Planning Organization (MPO), amended the 2014/15-2018/19 Transportation Improvement Plan (TIP) to identify committed funding to the Project Development phase of the SunRail Extension to OIA corridor.

- OIA environmental permits for impacts to the area of the SunRail Extension to OIA corridor on GOAA property include: South Florida Water Management District (SFWMD) permit number 48-00063-S; Army Corp of Engineers (ACOE) permit number 199800201(IP-ME). As the South Terminal design advances, permit modifications may be required. Any modifications will continue to account for the commuter rail alignment.

The above studies and actions demonstrate prior planning, permitting and mitigation efforts that local and regional agencies in the Central Florida area have undertaken to support mass transit, specifically rail options.

### **3.2 Goals and Objectives**

As Central Florida continues to experience substantial population growth and expansion of the area’s economy, travel demand in the region is also increasing. This growth has resulted in increased congestion and decreased mobility on major roadways within the existing transportation network. Public transportation services currently available are unable to meet the growing mobility needs of Central Florida residents, employees, visitors, and transit-dependent populations. At this time, premium transit service is provided by SunRail, which serves the north-south spine of the region. Other corridors, including service to OIA, are served by local bus service which is typically infrequent and is subject to local roadway congestion.

Meeting the existing and future travel patterns is necessary to sustain the region’s economy; maintain an acceptable level of service on the surrounding roadway network; provide residents, workers, tourists and visitors with alternative mobility options; connect major activity centers; and support local comprehensive plans and policies. If no improvements are made to the existing transportation system, a loss in mobility for the area’s residents, visitors, and employees can be expected, resulting in diminished economic opportunities and quality of life.

Through various efforts and initiatives, state and local transportation planning and transit officials in Central Florida have been working for years to diversify the regional transportation network to include expanding transit system solutions. A significant result of this effort to date is the SunRail commuter rail system that has become a regional transit “spine” connecting communities and major activity centers along the north-south corridor in Central Florida. The proposed SunRail Extension to OIA project provides the opportunity to connect the regional transit spine with OIA, a mobility and economic engine for Central Florida, serving both OIA workers and air passengers.

Specifically, the primary goals of the study are briefly described below:

#### **Mobility Benefits**

Introduce a premium transit connection between SunRail and OIA to expand mobility options for Central Florida residents, workers and visitors, meeting the needs of low income and transit dependent residents access to the approximately 18,000 jobs at OIA and provide visitors transit access to not only air travel services but also the Brightline express intercity rail project with passenger service between Miami-Fort Lauderdale-West Palm Beach.

### **Environmental Benefits**

Preserve and sustain the environmental assets of the region to the maximum extent possible, while taking opportunities to improve them.

### **Land Use and Development Patterns**

Enhance the existing transit system by developing a connection that is compatible with local comprehensive plans and supports existing and planned transit oriented land uses; utilize the transit supportive design elements of the OIA South Terminal expansion with improved transit accessibility and multimodal connectivity.

### **Cost Effectiveness**

Implement an extension to the existing SunRail system that is efficient to build, operate and maintain - making the entire SunRail system a smart and sound investment.

### **Congestion Relief**

Provide a viable transit connection that will reduce congestion and travel times on area roadways allowing air passengers and visitors an alternative to using the roadway system.

### **Economic Development**

Produce a direct, fixed guideway transit connection between downtown Orlando, suburban/activity centers and the airport, inducing additional transit supportive development.

## **3.3 Project Purpose**

The purpose of the SunRail Extension to OIA (Phase 3) project is to provide a premium transit connection from the SunRail main line to the ITF at OIA, providing mobility and economic development benefits to Central Florida residents, workers and visitors.

## **3.4 Study Area Needs**

An assessment of the study area identifies a distinct need to connect the regional rail transit system with one of the region's largest employers and busiest travel destinations at OIA. Today, the region's primary activity centers are connected to the airport principally by an aging highway and tollway system that is actively being expanded and rebuilt in an effort to keep up with the growing demand. The connections by local transit are present but are limited in their design to support regional trips. A premium transit connection to OIA would complement the highway investment and directly address the following project needs:

- The SunRail Extension to OIA would be a critical link in the regional mobility strategy;
- The SunRail extension would connect additional regional activity centers;
- The SunRail extension would provide a dependable transit alternative to the already stressed roadway network;

- The SunRail extension would meet travel demand from growing population and employment; and
- The SunRail extension is consistent with local and state comprehensive planning policies and guidelines.

### **Key Element to Regional Mobility Strategy**

The SunRail to OIA corridor is a key element in the regional transportation plan. Transit services are operated in the study area by SunRail, LYNX, Votran, Amtrak intercity passenger rail service, the planned Brightline intercity passenger rail service, and a number of private transportation operators. Providing convenient, dependable, attractive and safe premium transit service between SunRail and the ITF will enable OIA employees and air passenger's direct access to residential communities and major activity centers along the SunRail corridor and improved mobility options throughout southern Orange and Osceola counties as well as into Seminole and Volusia counties to the north.

### **SunRail Commuter Rail Service**

FDOT is the owner and operator of a 61-mile major north-south railroad corridor generally known as the Central Florida Rail Corridor or CFRC (formerly the CSXT 'A' Line) within the project study area. The SunRail service operates entirely at grade, sharing tracks owned by FDOT with freight service provided by CSXT and Florida Central Railroad (FCEN) and Amtrak intercity passenger rail service. The CFRC consists of 61 miles of track running from DeLand in Volusia County to Poinciana in Osceola County. The project is divided into two phases.

- Phase 1 of SunRail is 32 miles and runs from DeBary in Volusia County to Sand Lake Road in Orange County with 12 stations. Revenue service on Phase 1 began in May 2014. The current operating plan for SunRail service provides 30-minute peak service from 5:30 a.m. to 8:30 a.m. and from 3:30 p.m. to 6:30 p.m. on weekdays. Midday and early evening service is provided, with trains running every 120 to 150 minutes. Weekend or late evening service is not provided at this time.
- Phase 2 consists of South and North extensions to Phase 1. Phase 2 South will run 17 miles from the existing Sand Lake Road Station to Poinciana with four new stations at Meadow Woods, Tupperware (formerly known as Osceola Parkway), Kissimmee, and Poinciana. Phase 2 South construction began in April 2016 with passenger rail service expected to begin in 2018. Phase 2 North would extend 12 miles north from the existing DeBary Station to a new station in DeLand, adjacent to the Amtrak Station. Funding for the Phase 2 North Project has not yet been identified.

### **Bus Service**

LYNX operates a fleet of 265 buses on 61 local bus routes (Links), delivering more than 28 million annual passenger trips within Orange, Seminole and Osceola counties. Improvement and expansion of the public transit system is the backbone of the LYNX Transit Development Plan (TDP) 2013 - 2022, a \$585 million strategic plan to accommodate the population and employment growth forecast for the metropolitan Orlando region. The TDP calls for expansion of the transit coach and van fleet; development of multiple intermodal centers; building new operating facilities; and advancing a number of major transit investment studies. LYNX recently completed a Comprehensive Operations Analysis (COA) that evaluated its current bus operations and recommended service improvements.

LYNX currently operates six bus routes that serve the SunRail Sand Lake Road Station and six bus routes that terminate at the OIA North Terminal. Of these bus routes, three serve both the Sand Lake Road Station and OIA.

LYNX and private transportation vehicles serving OIA presently terminate at a transportation terminal adjacent to the North Terminal. All OIA-bound LYNX and private transportation buses will be relocated to serve the new ITF (upon completion) where they will connect with an extension of the APM that directly serves the North Terminal, Brightline trains and the SunRail Extension to OIA project. The ITF will become a key transportation hub in Central Florida.

Votran operates a fleet of 55 buses on 27 local bus routes, delivering more than 4 million annual passenger trips within Volusia County. Votran currently operates three bus routes that serve the DeBary SunRail Station.

### **Intercity Passenger Rail Service**

Amtrak provides intercity passenger rail service between Orlando and other cities across the U.S. Amtrak operates six trains per day within the CFRC with stations in Kissimmee, Orlando, Winter Park, Sanford, and DeLand. However, two of those trains, the Auto Train, do not operate south of the Sanford terminal. An additional station proposed as part of the Phase 2 North Project would be located adjacent to the DeLand Amtrak Station.

The Brightline intercity passenger rail service is a privately-owned and operated, express rail system connecting Miami, Ft. Lauderdale, and West Palm Beach to OIA via the Florida East Coast Railroad (FEC) corridor and a new corridor that will parallel SR 528 (Beachline Expressway) to OIA. Service between Miami and West Palm Beach will open in 2017 with service to Orlando to follow in 2019. The current operation plan for Brightline, when service begins, will be to provide 16 trains per day between Orlando and the South Florida cities.

### **Other Transportation Services**

A large number of private transportation operators provide a range of transportation services in the SunRail Extension to OIA study area. These services include taxicabs, limousines, shuttle vans and private buses that operate between OIA and hotels in downtown Orlando and Central Florida resorts, theme parks and other attractions. Seven rental car companies are located at the OIA North Terminal with three additional companies located on airport property and several others within close proximity. The operating environment of the SunRail Connector study area is unique in that the tourist attractions within the Central Florida region make it one of the largest rental car markets and private sector transportation markets in the country.

### **Regional Activity Centers Connectivity**

In Central Florida over the last three decades, activity centers have become the most dominant land use features. These centers represent a concentration of residential, business, and office/industrial land uses. Under the State Growth Management Act, local jurisdictions are required to develop and adopt a comprehensive Growth Management Plan with activity centers being one tool used to promote higher density development and transit friendly development in urban areas. In the Central Florida region the

CFRC with Phase 1 and Phase 2 South are serving the Heathrow/Lake Mary, Altamonte/Maitland, Orlando Central Business District, International Drive (I-Drive) and the Disney Orlando/Osceola activity centers.

The OIA is the 14<sup>th</sup> busiest airport in the U.S, the 3<sup>rd</sup> largest in land area and the 43<sup>rd</sup> busiest in the world. There are approximately 110,000 daily enplanements and currently over 40 million passengers per year. With over 45 million passengers projected within 5 years and over 60 million passengers over the next twenty years, GOAA recently began construction on a \$1.8 billion program with the construction of the South Terminal including the ITF and APM system providing a connection to the North Terminal. The first phase of the South Terminal expansion will be open in 2019. There are over 18,000 employees on airport property with over 20,000 jobs within the immediate vicinity of the airport. OIA ITF plans have accommodated rail services for intercity passengers and local commuters with the objective to reduce local bus service on the airport transportation network.

Regional centers adjacent to the airport, in close proximity to the ITF, are also being expanded. Significant employment growth will result from these nearby expansions providing opportunities for future regional employee access to the transit service connections being accommodated for at the ITF. Two of the centers adjacent to the airport property include Tradeport, located immediately west of OIA that has become a regional center for warehousing, shipping and light industrial activities and a Foreign Trade Zone. Located in nearby Lake Nona, southeast of OIA, Medical City includes the UCF College of Medicine, Nemours Children's Hospital, the Sanford-Burnham Medical Institute and the Orlando VA Medical Center. Medical City is projected to employ over 15,000 people within its development.

### **Stressed Roadway Network**

The roadway network within the project study area consists of freeways, toll facilities, principal and minor arterials, and major and minor collectors. Of these, the major east-west arterials that provide the roadway transportation links to OIA are the tolled SR 417 and SR 528 facilities. A number of arterial roadways connect to these main east-west roadways providing access to commercial and residential areas by collectors and local streets. In addition, the main toll roads and expressways in the region are planned, or are currently under reconstruction to address capacity deficiencies. Interstate 4 (I-4) is the main roadway through central Florida. It is currently under major reconstruction from SR 435 to north of SR 414 in Maitland, a distance of 21 miles. This reconstruction is expected to be completed in 2021 with the SunRail Phase 1 and Phase 2 South providing a transit alternative mode of transportation to passenger trips that utilize the I-4 corridor. The following roadways have initiated construction, are under design or have plans for capacity improvements:

- SR 528 (Beach Line Expressway) – capacity improvements implementing managed lanes within general use toll lanes, reconstruction/reconfiguration of main line toll plaza with additional lanes just north of OIA
- SR 417 (Central Florida GreeneWay) – capacity improvements, additional general use toll lanes, including sections of managed lanes
- Florida's Turnpike – additional lanes south from I-4
- Boggy Creek Road – widen to 4-lanes

- Heintzelman Boulevard Extension – extension to Wetherbee Road
- Osceola Parkway Extension – extension of 4-lane toll facility
- I-4 Beyond the Ultimate – extension of the I-4 Managed Lanes and Interchange Reconstruction

The continued growth in population and employment in Central Florida continues to identify the need for roadway capacity improvements and the need to provide transit alternative modes, such as SunRail, to provide transportation options.

### **Growing Population and Employment**

Based on data from the *U.S. Census* and the University of Florida’s *Bureau of Economic and Business Research* (BEBR), the population of the Orlando Metropolitan Statistical Area (MSA) grew by 165 percent between 1980 and 2010, from 800,000 to 2,100,000 people. Recent BEBR projections for 2040 predict that the four counties served by SunRail’s Phases 1 and 2 South could grow by over 70 percent which would bring over 1.7 million new people to Central Florida. Much of this growth is expected in Orange and Osceola Counties near traditional city centers and along the SunRail corridor.

### **Access to Affordable Housing**

The corridor study area, one-half mile each side of the study corridor, includes significant low-income and minority populations. Of the current study area population, about 59 percent are minority households. The ability for these typically transit dependent populations to access jobs is a critical component of the region’s tourism-based economy. An OIA Employee Travel Demand Management (TDM) Survey was completed in 2015. The results of this survey indicated that the largest area of OIA employment is concentrated in the Meadow Woods area southwest of OIA. This area also has a high concentration of minority, low income and below poverty populations.

The Regional Influence Area including the CFRC and the proposed Phase 3 Extension to OIA also affects mobility and access to jobs. The four new SunRail stations now under construction as part of Phase 2 South each have design concepts that can accommodate Transit Oriented Development (TOD) today. Most advanced are the plans for the Tupperware (Osceola Parkway) Station. This station has an approved 178 unit affordable apartment complex now under construction. Other local land use revisions to accommodate TOD plans are under consideration as construction of Phase 2 South continues. The proposed premium transit service between SunRail and OIA will provide improved access for minority and low-income residents to access jobs at OIA.

In 2006-2007, myregion.org worked with the Central Florida community and the East Central Florida Regional Planning Council to develop a vision for future growth call ‘*How Shall We Grow?*’ This vision has helped guide planning documents for the last decade including MetroPlan Orlando’s 2040 Long Range Transportation Plan which was adopted in January 2016. The vision called for an integrated multimodal transportation network supported by a robust, mixed-use community development framework. Redevelopment and in-fill development are necessary for realizing this vision. One of the most pragmatic ways local governments have aligned with the vision is to promote transit-oriented development in proximity with their Phase 1 and Phase 2 South SunRail stations.

## **Consistent with Comprehensive Plans**

The project is compatible with the City of Orlando's Growth Management Plan and Orange County's Comprehensive Plan. Both plans specifically mention a rail connector to OIA and use of an OIA Activity Center as a regional intermodal center.

- The Orlando Growth Management Plan states that: "Access to the Orlando International Airport shall be improved through a combination of improvements (including enhanced transit service and roadways system expansion) implemented by the City of Orlando, adjacent jurisdictions, LYNX, the Florida Department of Transportation, and the Greater Orlando Aviation Authority;" and "The City shall promote increased alternative transportation opportunities at the Orlando International Airport and Orlando Executive Airport to reduce reliance on automobile travel and encourage greater use of transportation alternatives."
- The City of Orlando depicts an intermodal terminal at Orlando International Airport, and a "Proposed Airport Corridor" on its Proposed Rail and Bus Rapid Transit Corridors 2030 map. The City's Transportation Element Support document identifies the extension of commuter rail to the airport as a potential option in the long-term.
- Orange County's Transportation Element Policy states that "Orange County strongly supports the use of a designated Orlando International Airport (OIA) Activity Center as a regional intermodal center." Orange County also shows "Airport-International Drive Light Rail Transit" on Map 5 Transportation Element Central Florida Long Range Rail Program in Orange County.
- The Future Land Use Map (FLUM) of the Comprehensive Plan shows several FLUM categories surrounding the project, including: City of Orlando Metropolitan Activity Center and Orange County Industrial.

## **Summary**

Central Florida's rapid population and employment growth is placing higher demands on the freeway and roadway systems. The planned roadway improvements, including the reconstruction of I-4, will place additional capacity on parallel and alternative roadways, affecting all modes of roadway dependent transportation modes. Increasing traffic congestion threatens to undermine the economic diversification currently underway and reduces the quality of life for local residents. Slower speeds on local roadways impact not only auto passengers but also bus riders. Effective premium transit service is particularly important in this area due to the large number of transit dependent residents in the OIA area.

The SunRail commuter rail system has become a regional transit "spine" that connects communities and major activity centers along the north-south corridor in Central Florida. The proposed SunRail Extension to OIA project provides the opportunity to connect the regional transit spine with OIA, a mobility and economic engine for Central Florida, serving both OIA workers and air passengers.

The SunRail Extension to OIA will substantially enhance regional access to the expanding airport and support its continued growth. The project will also improve labor force access to jobs within and near the airport, particularly for minority and low-income residents; and in essence support the successful implementation of local comprehensive plans.

## **4.0 EXISTING CONDITIONS**

### **4.1 Existing Transportation Conditions**

#### **4.1.1 Existing Track Corridor**

The Orlando Utilities Commission (OUC) Stanton Spur corridor is a critical component of the proposed SunRail Extension to OIA corridor as it is an existing heavy rail (freight) corridor connecting the CFRC and the GOAA property. The rail spur connects to the CFRC at an existing wye turnout approximately one mile north of the Meadow Woods Station (currently under construction). Surrounding land uses along the existing spur corridor include agricultural land, light manufacturing operations and transportation support services. The existing Stanton Spur corridor consists of a single track within 120 to 150 feet of existing right-of-way (ROW).

The Stanton Energy Center Spur line is owned by OUC. This active freight rail line is used for the delivery of coal to the Stanton Energy Center. The line is approximately 17.5 miles long. It begins at the Stanton Energy Center in southeast Orange County. It then heads south crossing under SR 528, turning southwest crossing under and paralleling S.R. 417. It then veers northwest crossing under Boggy Creek Road just south of OIA. It then turns west between Wetherbee Road and Tradeport Drive connecting to the CFRC near the Taft Yard. The section of the Stanton Spur for the CFRC to OIA is the corridor of study for the SunRail Extension to OIA.

The section of the Stanton Spur that is within the SunRail Extension to OIA proposed alignment begins at the wye from the CFRC main line. Within the limits of the wye, the existing single track crosses under Orange Avenue (SR 527) with an at-grade crossing with Wetherbee Road. Between Wetherbee Road and just east of Boggy Creek Road, there are three trestle bridge structures, five private crossings at Mile Posts (MP) 0.60, 0.74, 1.20, 1.50 and 2.45. One future crossing has been identified. The proposed alignment leaves the existing Stanton Spur alignment just east of the Boggy Creek Road at-grade, crossing and enters the GOAA property.

The eastern two miles of the study corridor are located on GOAA property. GOAA recently began construction on the South Terminal including the ITF, a parking garage and an extension of the Automated People Mover (APM) System connecting to the existing North Terminal. The ROW for this two mile section has been a part of the GOAA Master Plan, of which much of the corridor has previously been environmentally permitted and mitigated.

#### **4.1.2 Horizontal and Vertical Alignment**

The OUC Stanton Spur is limited in its operational speed to 25 mph, within the limits of the wye speed is restricted to 10 mph. The horizontal geometry allows for higher operational speeds. The vertical profile is essentially flat throughout the corridor.

#### **4.1.3 Existing Structures**

There is one existing roadway bridge structure over the OUC Stanton Spur. Orange Avenue crosses over the north leg of the wye with separate southbound and northbound structures. The vertical clearance at each structure is 23'-7". The horizontal clearance at the southbound structure is 50'-0" with 63'-8"

horizontal clearance under the northbound structure. On the OUC Stanton Spur three trestle bridges are within the project study area. These bridges allow conveyance of off-site drainage and are described in the Existing Drainage Conditions.

#### 4.1.4 Existing Drainage Conditions

The project is located within Orange County and is within the jurisdiction of South Florida Water Management District (SFWMD). The project boundaries are generally located within the Lake Okeechobee Basin and more specifically located within the Boggy Creek Basin. The project is contained within the Lake Okeechobee Basin Management Action Plan (BMAP) which has been identified by the Florida Department of Environmental Protection (FDEP) for impairment from total phosphorous. No net degradation calculations were provided as part of this study. The SunRail Phase 3 project corridor is located in one hydrologic basin; Boggy Creek. General basin boundaries were initially identified utilizing boundaries presented by the FDEP and the SFWMD and the sub basins were divided based on outfall locations, grade crossings and cross drains. Generally throughout the project corridor along SunRail Phase 3, existing retention swales and offsite conveyance ditches are presently managing the stormwater and utilizing existing cross drains to discharge into the major outfall locations. There are five existing cross drains and three existing concrete trestle bridges which convey stormwater runoff under SunRail Phase 3 and serve as outfall locations for the collection system. Generally, the cross drains and bridges convey stormwater runoff in a north to south direction under SunRail Phase 3. Cross drains CD-1, CD-2 and CD-5 and trestle bridges T-12, T-11 and T-10 were field verified. Cross drains CD-3 and CD-4 are based on permit number 48-00191-S. **Table 4.1** shows a **Summary of Existing Cross Drains**.

**Table 4.1 | Summary of Existing Cross Drains**

| Cross Drain | Approximate Location (CL Const. Phase 3) | Description                                   | Outfall     |
|-------------|--|---|-------------|
| CD-1        | 351+96                                   | (1) – 24” RCP                                 | Boggy Creek |
| CD-2        | 352+00                                   | (1) – 24” RCP                                 | Boggy Creek |
| T-12        | 385+00                                   | 48’ Concrete Trestle Bridge with Ballast Deck | Boggy Creek |
| T-11        | 409+00                                   | 96’ Concrete Trestle Bridge with Ballast Deck | Boggy Creek |
| T-10        | 437+35                                   | 48’ Concrete Trestle Bridge with Ballast Deck | Boggy Creek |
| CD-3        | 453+64                                   | (1) – 84” RCP                                 | Boggy Creek |
| CD-4        | 463+75                                   | (1) – 84” RCP                                 | Boggy Creek |
| CD-5        | 479+58                                   | (1) – 36” RCP                                 | Boggy Creek |

#### 4.1.5 Pedestrian and Bicycle Facilities

There are relatively few existing bicycle and pedestrian facilities in the study area. In the vicinity of the study area, existing trails are along Wetherbee Road from Orange Avenue to Boggy Creek Road and on Heintzelman Boulevard from Jeff Fuqua Boulevard to SR 528. Several facilities are planned for the future along Boggy Creek Road, the future extension of Heintzelman Boulevard to Wetherbee Road and on Jeff Fuqua Boulevard.

#### 4.1.6 Crash Data and Safety Analysis

Within the study area and along the OUC Stanton Spur, there is no recorded crash incidents associated with rail operations.

#### 4.1.7 Roadway Track Crossings

Two existing roadways cross the existing OUC Stanton Spur within the study area. East Wetherbee Road crosses within the limits of the wye. It is a rural two lane roadway with existing flashing barriers and gates. Boggy Creek road is a two lane rural roadway also with flashing barriers and gates. Both roadways are maintained by Orange County.

Signal system improvements at roadway grade crossings will include all signs, signals, warning devices, and their supports located within the rail ROW. The function of these systems will permit safe and efficient operation of commuter trains, on track equipment, highway traffic, and pedestrians over level grade crossings. Grade crossing warning devices shall be designed in conformance with the Florida Manual on Uniform Traffic Control Devices (MUTCD) and the recommended American Railway Engineering and Maintenance-of-Way Association (AREMA) practices.

Also within the limits of the study area, five private crossings at Mile Posts (MP) 0.60, 0.74, 1.20, 1.50 and 2.45. These crossings are unimproved, agricultural crossings and are in place through legal agreements with OUC. One future crossing has also been identified.

#### 4.1.8 Utilities

Several utilities, listed below in **Table 4.2**, have been identified as having facilities within the SunRail Phase 3 study area.

**Table 4.2 | Utilities**

| Utility Company                     | Service Type     |
|-------------------------------------|------------------|
| AT&T                                | Communications   |
| Kinder Morgan                       | Natural Gas      |
| City of Orlando                     | Wastewater       |
| Bright House Networks               | Communications   |
| Florida Gas Transmission            | Natural Gas      |
| Duke Energy                         | Electricity      |
| Level 3 Communications              | Communications   |
| MCI                                 | Communications   |
| Orange County Utilities             | Water/Wastewater |
| City of Orlando Traffic Engineering | Communications   |
| Orlando Telephone Company           | Communications   |
| Orlando Utilities Commission        | Potable Water    |
| Orlando Utilities Commission        | Electricity      |
| TECO Peoples Gas                    | Natural Gas      |
| Taft Water Association              | Potable Water    |

#### **4.1.9 Soils and Geotechnical**

The Natural Resources Conservation Service (NRCS) Soil Survey of Orange County was reviewed to obtain near-surface soils information along the project study corridor. The soils depicted by the NRCS Soil Survey map in the project vicinity are generally suitable for the proposed rail embankments with the exception of Samsula muck (40) and Sanibel muck (42). These soil groups are typically associated with lowland/wetland depressional areas and can have shallow to deep surficial muck deposits, which can have severe limitations for rail embankment construction. In addition to the muck soils, another limitation of these soils for rail construction is the shallow estimated seasonal high groundwater level. The NRCS Soil Survey indicates that throughout the majority of the project alignment the seasonal high groundwater levels range from 1.5 feet below the existing grade to 2.0 feet above the existing grade. Pondered water should be anticipated in the portions of the project alignment encompassed by soil groups 3 (Basinger fine sand), 40 and 42. Limits of the muck soils are to the east and west of the Boggy Creek Road crossing.

### **4.2 Natural and Physical Environment**

#### **4.2.1 Floodplains**

The Federal Emergency Management Agency (FEMA) has developed Flood Insurance Rate Maps (FIRM) for Orange County. The project corridor is located on FIRM Map Number 12095C0420F, 12095C0440F and 12095C0445F. There is a FEMA regulated floodway within the limits of the SunRail Phase 3 project. 100-year floodplain boundaries are located within the project corridor, with the majority located to the south and north of Canal Road on airport property (STA.548+23.00 to STA. 584+30.00). These areas are designated as Zone AE floodplains (floodplain boundaries in which base floodplain elevations have been established). The other floodplain designation within the project area is flood Zone X, which is outside of the 100-year floodplain boundary. The proposed improvements include a bridge that will span the regulated floodway per FEMA regulations. Floodplain impacts were also analyzed by comparing the elevations shown on FIRM Map Number 12095C0440F and 12095C0445F to the 2005 one foot (1') contours for Boggy Creek and Lake Hart Basins, Orange County, FL. This analysis showed that there were no impacts since the majority of the data from the 1 foot contours was above the flood elevation.

#### **4.2.2 Wetlands**

The wetland limits were identified in general accordance with the United States Army Corps of Engineers' (USACE) *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region* (November 2010) and the state of Florida's *Delineation of the Landward Extent of Wetlands and Surface Waters* (Chapter 62-340, Florida Administrative Code). In the event wetland boundaries differed between the two methods, the more landward extent was used to define that particular wetland system's boundary. Wetland communities found within the SunRail Extension to OIA corridor study area consists of cypress wetlands, forested mixed wetlands, emergent herbaceous wetlands and ditches. Wetland impacts are identified within the OUC Stanton Spur ROW with the addition of a single new track and drainage improvements and additional ROW within the GOAA property with a new ROW impact of 150 feet wide. The wetland impacts are identified as 25.3 acres with a full ROW width impact. Further minimization of impacts will be identified with further refinement of

alignment impacts in future project phases. Refer to Natural Resources Evaluation report for additional information.

Wetland impacts which will result from the construction of this project will be mitigated pursuant to Section 373.4137 F.S. to satisfy all mitigation requirements of Part IV, Chapter 373, F.S. and 33 U.S.C.s. 1344. Under Section 373.4137 F.S., mitigation of FDOT wetland impacts will be implemented by the appropriate Water Management District where the impacts occur. Each Water Management District will develop a regional wetland mitigation plan on an annual basis to be approved by the Florida State Legislature which addresses the estimated mitigation needs of FDOT. The Water Management District will then provide wetland mitigation for specific FDOT project impacts through a corresponding mitigation project within the overall approved regional mitigation plan. FDOT will provide funding to the Water Management District for implementation of such mitigation projects. Surface water impacts which will result from the construction of this project will be mitigated through on-site in-kind replacement. The proposed stormwater treatment and conveyance system will maintain existing surface water function. Temporary functional loss will occur during construction but no permanent direct, secondary or cumulative impact is anticipated.

#### **4.2.3 Wildlife and Habitat**

Potential habitat is defined as areas that may offer suitable habitat for one or more rare species based on land cover type, which may occur in the vicinity of the project. Several federally listed wildlife species have the potential to occur within the project limits. The U.S. Fish and Wildlife Service (USFWS) do not have designated areas of Critical Habitat within the project vicinity. Those species with the highest likelihood to occur within the project limits are identified in the Natural Resource Evaluation report.

Adverse impacts to individual species or regional populations of federal or state listed species or their habitat are not anticipated as a result of the construction of this project. A determination of “may effect, not likely to adversely affect” is requested for the wood stork and eastern indigo snake and “no affect” for all other species. This assessment is based on results of the literature review, data research, field surveys and coordination with agency personnel. Further evaluation of suitable habitat will be necessary for specific species as identified in the Natural Resource Evaluation report during the project design phase. If endangered or threatened species or species of special concern are identified within the construction area during design or construction phases, coordination will be initiated with the appropriate resource agencies to avoid or mitigate impacts. Furthermore, standard protection measures developed by the USFWS to address the protection of the eastern indigo snake will be implemented during the design and construction phase.

#### **4.2.4 Water Quality**

There are no sole source aquifers located within the project study area. The study area is located north of the streamflow and recharge source zones for the Biscayne Aquifer, which has been designated by EPA as a sole source aquifer.

#### **4.2.5 Special Designations**

No features with a Special Designation such as Outstanding Florida Waters (OFW), Aquatic Preserves, Scenic Highways, or Wild and Scenic Rivers exist within the study area.

#### **4.2.6 Contamination**

The Draft Contamination Screening Evaluation Report, Technical Memorandum evaluated the extent of the study area at the west end of the project where acquisition of additional ROW is proposed for the Transfer Station. Eleven (11) locations were investigated as sites that may present the potential for finding petroleum contamination or hazardous materials, and therefore may impact the proposed improvements for this project. Specific details for each site can be found in the study's Draft Contamination Screening Evaluation Report (CSER). Of the eleven (11) sites investigated, the following risk rankings have been applied: two (2) "High" ranking sites, four (4) "Medium" ranking sites, and five (5) "Low" ranking sites.

For sites ranked "Low" for potential contamination, no further action is required at this time. These sites/facilities have the potential to impact the project in the future, but based on select variables have been determined to have low risk, at this time. Variables that may change the risk ranking include a facility's non-compliance to environmental regulations, new discharges to the soil or groundwater, and modifications to current permits. Should any of these variables change, additional assessment of the facilities will be conducted to determine if the low risk ranking is still appropriate.

For those locations with a risk ranking of "Medium" or "High," Level II field screening will be conducted if it is determined during the project's design that its construction activities could be within their vicinity. These sites have been determined to have potential contaminants, which may impact the proposed roadway improvement project. A soil and groundwater sampling plan could be developed for each site, if applicable. The sampling plan would provide sufficient detail as to the number of soil and groundwater samples to be obtained and the specific analytical test to be performed. A site location sketch for each facility showing all proposed boring locations and groundwater monitoring wells would be prepared.

#### **4.2.7 Noise and Vibration**

The operational impacts were evaluated using the guidelines set forth by the FTA's guidance manual Transit Noise and Vibration Impact Assessment (FTA-VA-90-1003-06, May 2006). There are no local noise or vibration ordinances that apply to interstate rail operations or facilities from Orlando or Orange County. In accordance with the "Noise Control Ordinance of Orange County," Florida [Sec. 15-176], "railway locomotives or cars activity conducted in accordance with federal laws and regulations" are exempt from local noise restrictions. Additional detail of the noise analysis is included in the Noise and Vibration Technical Report.

Using the most recent OIA 2008 noise contours and FTA's typical estimates for noise exposure, the baseline noise levels in the Project study area were estimated to range from 50 to 60 dBA  $L_{dn}$  at residences and 55 dBA  $L_{eq}$  at a church. These levels represent a conservative or worst case estimate of the baseline conditions and will result in a higher count of impacts.

The estimated baseline noise levels in the project study area range from 50 dBA  $L_{dn}$  at Receptor Sites R2 and R3 (residences along Laxton and Bentry Streets) to 55 dBA  $L_{eq}$  at a church along Wetherbee Road to 60 dBA  $L_{dn}$  at Receptor Site R4 (a residence along Airport Park Drive). The lower noise levels are representative of land uses along the currently unused rail corridor while the higher noise levels reflect traffic along arterial roadways.

To gauge the level of long-term impact from the proposed Project, noise levels were predicted for each of the discrete receptors selected to be representative of the communities along the project corridor. As a result, maximum project noise levels under the Build Alternative are predicted to range from 52 dBA  $L_{dn}$  at Sites R2 and R3 (residences along Laxton and Bentry Streets) to 54 dBA  $L_{dn}$  at Site R4 (a residence along Airport Park Drive) to 56 dBA  $L_{eq}$  at Site R1 (a church along Wetherbee Road). The cumulative noise levels are dominated by the FRA-required sounding of the locomotive warning horn within one-quarter mile of all grade crossings. However, no exceedances of the FTA *moderate* or *severe* impact criteria are predicted anywhere.

Similarly, noise levels from construction activities from the Build Alternative, although temporary, could be a nuisance at nearby sensitive receptors such as residences. It is generally recognized that there would be temporary noise and vibration impacts during construction in some locations depending on the type of activity and the proximity of sensitive receptors.

The default FTA screening distances of 120 to 200 feet were utilized to identify vibration-sensitive receptors along the proposed project alignment and rail stations. However, since the closest vibration-sensitive receptors are well over 600 feet away from the proposed rail corridor, there is no likelihood for an exceedance of the FTA vibration criteria. Therefore, a vibration assessment was not conducted since it is not warranted under the FTA guidelines.

#### **4.2.8 Air Quality**

The project is located in an area that has been designated as attainment for all of the National Ambient Air Quality Standards (NAAQS) under the criteria provided in the Clean Air Act (CAA). Therefore, the CAA conformity requirements do not apply to the project. Both the MPO Long Range Transportation Plan (LRTP) and the Transportation Improvement Program (TIP) conform to the current NAAQS.

In the current Metroplan TIP, this project is designated by the FDOT FM number 4292152 and the LRTP reference is Tech Report 3, page 32.

According to the Early Transportation Decision Making (ETDM) report dated July 24, 2014, the addition of the diesel-electric commuter rail locomotives and cab cars on the five mile extension from the SunRail main line to the OIA south terminal will have minimal impact on air quality. The prime locomotive engine meets existing Environmental Protection Agency (EPA) Tier 0+ and head end power engine meets Tier 3 emissions standards. Both will run on ultra-low sulfur diesel fuel and fully comply with the Federal Statutes of the EPA.

### **4.3 Cultural Environment**

#### **4.3.1 Historical/Archaeological**

A desktop evaluation in support of the proposed SunRail Phase 3 Extension to OIA study area was defined as the proposed railroad corridor in addition to a one-half mile buffer. A review of the Florida Master Site File (FMSF) database updated in January 2016 indicates that 14 previous cultural resource surveys have been conducted within one-half mile of the SunRail Extension to OIA study area, of which seven intersect a portion of the project area. The most relevant to the current project are the surveys conducted by the Florida Division of Archives, History, and Records Management (FDAHRM) (1981,

FMSF Survey No. 363) for the Stanton Energy Center Railroad and a study of the Greater Orlando Aviation Authority's South Terminal Complex by Janus Research (1998, FMSF Survey No. 5389). Both of these surveys included shovel testing of the current project area. These surveys identified 12 cultural resources, of which none are located within the current Study Area.

The FMSF review also indicates that one structure, one archaeological site, and two historic cemeteries are located within one-half mile of the SunRail Extension to OIA proposed rail line. None of these resources are located within the proposed SunRail Extension to OIA rail corridor footprint. Additionally, the archaeological site and both cemeteries have been determined ineligible for the National Register of Historic Places (NRHP) by the State Historic Preservation Officer (SHPO); the historic structure has not yet been evaluated by SHPO, but was recommended ineligible for the NRHP by its surveyor.

In addition to the FMSF, the Orange County Property Appraiser's database in geographic information system (GIS) format was reviewed to identify historic parcels (parcels with Actual Year Built dates earlier than 1972). Fifteen (15) pre-1972 parcels are within the current study area, but not within the project footprint.

The potential for prehistoric sites to be identified within the project area was assessed based on an examination of environmental variables (soil drainage, access to wetlands and marine resources, relative elevation), as well as the results of previously conducted surveys. Due to the poorly-drained condition of the Study Area and the lack of previously recorded prehistoric resources in the vicinity of the project area, the probability for unrecorded prehistoric sites within the SunRail Phase 3 Study Area is considered low.

In June 2016, the desktop evaluation in support of the proposed connection of the SunRail Extension to OIA Phase 3 in Orange County, Florida was completed. In August 2016, the Federal Transit Administration (FTA) received a letter from the Florida Division of Historical Resources (FDHR) stating that the SHPO had reviewed the project and concluded that "the proposed project had no adverse effect on historic properties listed, or eligible for listing, on the National Register of Historic Places." Based on the results of the desktop analysis and the review by SHPO, no further work in support of the SunRail Extension to OIA project is recommended.

#### **4.3.2 Recreation Areas**

One park was identified within one-half mile of either side of the proposed alignment. The South Orange Youth Sports Complex was identified at 11800 South Orange Avenue, north of Wetherbee Road. The proposed action does not adversely impact this facility. Impacts during construction will be short-term and could be offset through early coordination to minimize disruptions to events planned at the facility.

### **4.4 Social Environment**

#### **4.4.1 Socioeconomic**

The SunRail Extension to OIA corridor is an existing freight rail corridor which will have no impact to communities or relocations. The Boggy Creek neighborhood is the only neighborhood within the study area. The Boggy Creek neighborhood is considered a Rural Neighborhood (based on population density) with medium-sized (three or four bedroom) to large (four, five or more bedroom) single-family homes and townhomes.

## Community Services

Within the defined study area, one community resource was identified. The Iglesias De Dios Pentecostal place of worship is located in the western part of the study area at 151 Wetherbee Road.

## Population, Employment, and Housing

The population, employment, and housing characteristics of the study area, the City of Orlando, and Orange County characteristics, based on MetroPlan Orlando 2015 data, are described below:

- **Population:** The population in the study area in 2015 was 15,165 and is expected to increase by 122 percent to 33,740 by 2030, which is much higher than what is anticipated for the City of Orlando (28 percent) and Orange County (22 percent).
- **Employment:** In 2015, employment in the study area was 17,678. It is projected to increase by 56 percent to 27,609 by 2030. By contrast, employment in the City of Orlando is projected to increase by 15 percent and by 18 percent in Orange County.
- **Housing:** There are approximately 5,695 single-family residences in the study area and 783 multi-family residences. Single-family residences are projected to increase by 69 percent by 2030 and multi-family residences to increase by 240 percent. In the City of Orlando, the single-family residences are projected to increase by 27 percent and by 28 percent in Orange County. Multi-family residences are projected to increase by 28 percent in the City of Orlando and by 38 percent in Orange County.

The Project would not result in a major change in community cohesion or neighborhood quality. Since the proposed service would operate primarily in existing ROW, the Build Alternative would not create any barriers or isolate communities within the study area. The Project would improve connections and access to neighborhoods and community facilities in the study area, especially for those that are transit-dependent.

## Environmental Justice

The environmental justice populations in the study area, defined as one-half mile on either side of the proposed project alignment, are described below.

- **Minority Populations:** Minority populations include persons who are American Indian or Alaskan Native, Asian American, Native Hawaiian or Other Pacific Islander, Black, and Hispanic or Latino. The racial and ethnic character of the populations within the study area, based on current U.S. Census Bureau survey data, is 67 percent considered minority, with the largest minority group being Hispanic. The percent of minorities in the study area is higher than the City of Orlando at 60 percent and Orange County at 56 percent.

- **Low-income Populations:** Low-income populations are defined as any readily identifiable group of low-income persons whose household income is at or below the U.S. Department of Health and Human Services (DHHS) poverty guidelines. For low-income populations, FTA encourages the use of a locally developed threshold such as that used for FTA’s grant program (Public Law 112-141), which defines “low-income individual” to mean “an individual whose family income is at or below 150 percent of the poverty line.”

The average median household income in the study area is \$57,431, higher than the medium household income within the City of Orlando (\$41,901) and Orange County (\$47,556). Approximately 16 percent of the population in the study area is living below the poverty line and 31 percent of the population is living at or below 150 percent of the poverty line. Both the City of Orlando and Orange County have higher percentages of the population living below the poverty level.

### **Existing Land Use**

The existing land uses in the study area are predominantly industrial and Metropolitan Airport Activity Center related, to the Orlando International Airport (OIA). These areas to the north and east of the study corridor are located within the City of Orlando limits. The remainder of the study area is within Orange County jurisdiction and is predominately industrial with several small areas of low-medium density residential. There are several conservation areas identified related to wetlands.

The existing OUC Stanton Spur line traverses the study area traveling east from the CFCRT main line to the OUC coal fired power plant.

### **Future Land Use**

The future land use categories are essentially the same as the existing land use. OIA has started their expansion of the South Terminal and the land use around this area is expected to develop with related industrial uses and Metropolitan Airport Activity Center related to the airport. The area along Tradeport Drive is classified as planned development that would be compatible with the surrounding land uses. Orange County’s classification of the area remains industrial uses directly adjacent to the railroad. Small areas currently zoned for office are included in the industrial area. The existing conservation areas remain in the future land use plan. The industrial zoned area to the west of the corridor is further consolidated with the conversion of the few commercial uses to industrial.

#### **4.4.2 Mobility**

Three primary public transit services provide for regional transit needs in Central Florida; SunRail, LYNX, and Votran. These existing transit services are operated by FDOT, the Central Florida Regional Transportation Authority (CFRTA, d.b.a. LYNX), and Volusia County, respectively. Both SunRail and LYNX have operations in the study area.

#### **SunRail Commuter Rail Service**

FDOT is the owner and operator of a 61-mile major north-south railroad corridor generally known as the Central Florida Rail Corridor or CFRC (formerly the CSXT ‘A’ Line) within the project study area. The SunRail service operates entirely at grade, sharing tracks owned by FDOT with freight service provided

by CSXT and Florida Central Railroad (FCEN) and Amtrak intercity passenger rail service. The CFRC consists of 61 miles of track running from DeLand in Volusia County to Poinciana in Osceola County. The project is being constructed in two phases.

- Phase 1 of SunRail is 32 miles, and it runs from DeBary in Volusia County to Sand Lake Road in Orange County with twelve stations. Revenue service on Phase 1 began in May 2014. The current operating plan for SunRail service provides 30-minute peak service from 5:30 a.m. to 8:30 a.m. and from 3:30 p.m. to 6:30 p.m. on weekdays. Midday and early evening service is provided, with trains running every 120 to 150 minutes. Weekend or late evening service is not provided at this time. Of the 12 stations, seven have dedicated parking for park and ride operation totaling 1,836 system-wide parking spaces. Recent counts show that more than 50 percent of the overall capacity is available with the DeBary station being the most popular with average use at 169 of the 263 parking stalls.
- Phase 2 consists of South and North extensions to Phase 1. Phase 2 South will run 17 miles from Sand Lake Road to Poinciana with four new stations at Meadow Woods, Tupperware (Osceola Parkway), Kissimmee Intermodal Terminal, and Poinciana Blvd. Phase 2 North will run 12 miles from DeBary to DeLand. Phase 2 South construction began in April 2016 with passenger rail service expected to begin in mid-2018. Funding for Phase 2 North has not been identified. All four new stations associated with Phase 2 South will have parking for park and ride operations adding 663 spaces to the total system.

## **LYNX**

LYNX operates a fleet of 265 buses on 61 local bus routes (Links), delivering more than 28 million annual passenger trips within Orange, Seminole and Osceola counties. Improvement and expansion of the public transit system is the backbone of the LYNX Transit Development Plan (TDP) 2013 - 2022, a \$585 million strategic plan to accommodate the population and employment growth forecast for the metropolitan Orlando region. The TDP calls for expansion of the transit coach and van fleet; development of multiple intermodal centers; building new operating facilities; and advancing a number of major transit investment studies. LYNX recently completed a Comprehensive Operations Analysis (COA) that evaluated its current bus operations and recommended service improvements. LYNX routes in the SunRail Extension to OIA study area are summarized in the following.

LYNX currently operates six bus routes that serve the SunRail Sand Lake Road station:

- Link 11 - S. Orange Ave./OIA
- Link 18 - S. Orange Ave./Kissimmee
- Link 42 - International Drive/OIA
- Link 111 - OIA/SeaWorld
- Link 208 - Downtown Kissimmee Express
- Link 418 - Meadow Woods/Lake Nona/Florida Mall

Six bus routes currently terminate at the OIA North Terminal Superstop:

- Link 11 - S. Orange Ave./OIA
- Link 42 - International Drive/OIA
- Link 51 - Conway Road/OIA
- Link 111 - OIA/SeaWorld
- Link 407 - Kissimmee/VA Hospital/OIA
- Link 436S - Fern Park/OIA

### **Votran**

Votran operates a fleet of 55 buses on 27 local bus routes, delivering more than four million annual passenger trips within Volusia County. Votran currently operates three bus routes that serve the DeBary SunRail station (31 SunRail/US 17-92, 32 SunRail/Deltona, 33 SunRail/Dupont Lakes).

### **Other Transportation Services**

A large number of private transportation operators provide a range of transportation services in the SunRail Extension to OIA study area. These services include taxicabs, limousines, shuttle vans and buses that operate between OIA and hotels in downtown Orlando and Central Florida resorts, theme parks and other attractions. Seven rental car companies are located at the OIA North Terminal with three additional companies located on airport property and several others within close proximity. The operating environment of the SunRail Extension to OIA study area is unique in that the tourist attractions within the Central Florida region make it one of the largest rental car markets and private sector transportation markets in the country.

#### **4.4.3 Aesthetics**

The existing OUC Stanton Spur traverses through an industrial corridor and the extension from the OUC Spur to the OIA Intermodal Terminal Facility is on undeveloped airport property. OIA may desire to consider aesthetic aspects as the new rail line connects to the future intermodal facility to ensure compatibility with the design and aesthetics of the OIA 'Experience'.

## **5.0 DESIGN CRITERIA**

The design criteria used to develop the Build Alternative is based on a combination of American Railway Engineering and Maintenance-of-Way Association (AREMA), CSXT, Amtrak, FDOT and CFR design requirements for a combined freight and passenger track improvement and a new passenger track. The conceptual engineering plans utilize an average running speed of 45 mph with a maximum speed of 60 mph.

The track alignment work under the Orange Avenue bridge structure will be at lower speed with consideration to horizontal clearance distance and proximity to the Transfer Station. Initial design constraints identify that minimum track to track distance and track to pier protection clearance distances will be required. In addition, a waiver from CFR design criteria to allow the foundation of the crash wall for pier protection to be under the track bed.

The conceptual track alignment plans will be further developed in a future project phase including a detailed design criteria document specific to the SunRail Phase 3 Extension to OIA.

## 6.0 OPERATIONS ANALYSIS

### 6.1 Ridership Projections

Ridership for the SunRail Extension to OIA (Phase 3) project was forecast using the regional modal and land use assumptions in compliance with the Federal Transit Administration (FTA) requirements and consistent with MetroPlan Orlando. The projected ridership for the Phase 3 extension is identified in **Table 6.1**.

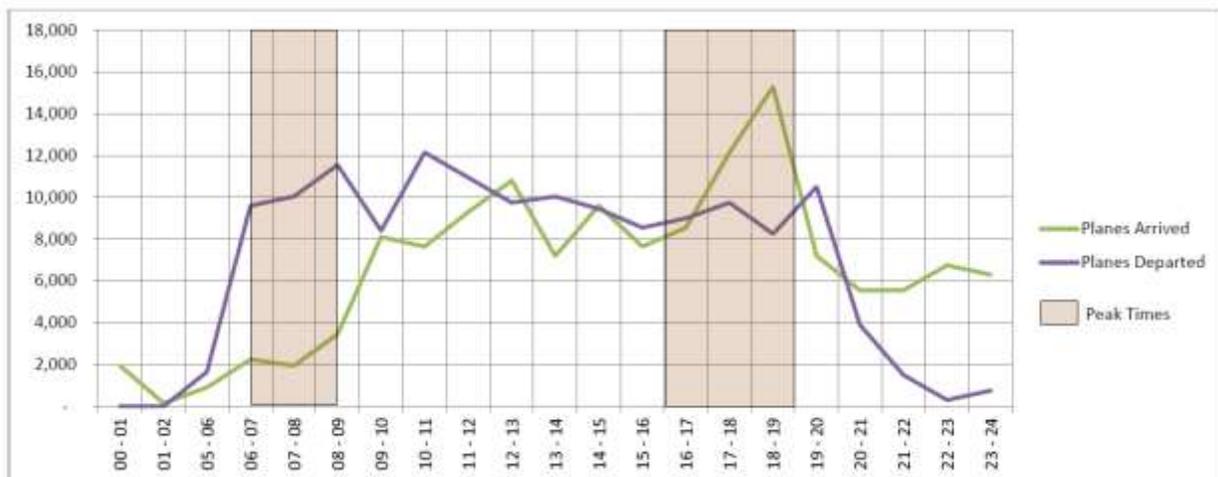
**Table 6.1 | SunRail Phase 3 Ridership**

| Projected Ridership     |     | Opening Year (2020) | Horizon Year (2030) |
|-------------------------|-----|---------------------|---------------------|
| Daily Boardings         |     | 2,550               | 3,050               |
| Peak Hour Boardings     | 10% | 255                 | 305                 |
| PH, Peak Direction      | 75% | 191                 | 228                 |
| DMU Seat Capacity       | 132 | 132                 | 132                 |
| Peak 15-Min Load Factor |     | 45%                 | 54%                 |

### 6.2 Alternative Technology Operations Considered

The Alternatives technologies considered were evaluated to compare operational aspects of the corridor. The span of service for the Opening Year (2020) was determined by normal operating hours of OIA (employee shifts and air passengers) as well as the span of service of connecting transit modes. Although OIA is a 24-hour operation, all but a few flights (and employee shifts) occur within the 5:00 a.m. to 11:00 p.m. window. **Table 6.2** identifies the peak flights pattern at OIA.

**Table 6.2 | OIA Flight Arrivals and Departures by Hour**



Source: AECOM, 2016

Connecting transit service will be provided by SunRail and LYNX fixed route bus service. At present, SunRail CFRC service is operated every 30 minutes during weekday peak periods, every 120 to 150 minutes during midday and evenings. No service is operated on weekends. For the Phase 3 Opening Year (2020), it is assumed that SunRail’s weekday midday and evening service will be increased to 60 minutes and SunRail will begin Saturday and Sunday service every 60 minutes.

Possible LYNX connecting bus routes include #18 S. Orange Ave./Kissimmee, #42 International Drive/OIA, #111 OIA/Sea World and #418 FastLink Meadow Woods/Lake Nona/Florida Mall. Route #11 S. Orange Ave./OIA could be discontinued. LYNX bus routes generally begin revenue service about 5:00 a.m. and end service about 11:00 p.m., similar to OIA hours. Routes #18 and #418 operate on weekdays and Saturdays. Routes #42 and #111 operate on weekdays, Saturdays and Sundays. **Table 6.3** presents the opening year bus service characteristic

**Table 6.3 | Opening Year (2020) Span of Service**

| Day of Week                   | Days per Year | Time Periods | Span of Service         |
|-------------------------------|---------------|--------------|-------------------------|
| <b>Weekdays</b>               | 254           | AM Peak      | 5:00 a.m. to 9:00 a.m.  |
|                               |               | Midday       | 9:00 a.m. to 3:00 p.m.  |
|                               |               | PM Peak      | 3:00 p.m. to 7:00 p.m.  |
|                               |               | Evening      | 7:00 p.m. to 11:00 p.m. |
| <b>Saturdays</b>              | 52            | All Day      | 5:00 a.m. to 11:00 p.m. |
| <b>Sundays &amp; Holidays</b> | 59            | All Day      | 5:00 a.m. to 11:00 p.m. |

### 6.2.1 Service Frequency

The Opening Year (2020) service frequency for the SunRail Phase 3 project would need to be able convenient transfers between connecting transit modes, SunRail and LYNX buses, and provide adequate capacity to meet the projected ridership demand. Service frequencies, shown below, are assumed to be 15 minutes during weekday peak periods and 30 minutes at all other times. **Table 6.4** summarizes the opening year service frequency to be considered by the alternative technologies.

**Table 6.4 | Opening Year (2020) Service Frequency**

| Day of Week                   | Span of Service         | Service Frequency |
|-------------------------------|-------------------------|-------------------|
| <b>Weekdays</b>               | 5:00 a.m. to 9:00 a.m.  | 15 min            |
|                               | 9:00 a.m. to 3:00 p.m.  | 30 min            |
|                               | 3:00 p.m. to 7:00 p.m.  | 15 min            |
|                               | 7:00 p.m. to 11:00 p.m. | 30 min            |
| <b>Saturdays</b>              | 5:00 a.m. to 11:00 p.m. | 30 min            |
| <b>Sundays &amp; Holidays</b> | 5:00 a.m. to 11:00 p.m. | 30 min            |

## 6.2.2 Travel Times

Travel times for each alternative transit technology were estimated based on the physical characteristics of the SunRail Phase 3 alignment and performance characteristics specific (normal acceleration and deceleration rates, maximum speed) to each technology. Run times, shown below in **Tables 6.5 through 6.8** for the CRT/DMU, LRT, APM, and BRT respectively and do not include layovers or scheduled recovery times at each end-of-line station.

**Table 6.5 | CRT/DMU Estimated Run Time**

| Station                 | Max Speed | Distance (miles) |           |             | Run Time (hr:min:sec) | Dwell Time (hr:min:sec) | Total Time (hr:min:sec) |
|-------------------------|-----------|------------------|-----------|-------------|-----------------------|-------------------------|-------------------------|
|                         |           | Stationing       | Increment | Total       |                       |                         |                         |
| <b>Transfer Station</b> |           | 5.00             |           | 0.00        |                       | 00:00:00                | 00:00:00                |
|                         | 30        |                  | 0.09      |             | 00:00:22              |                         |                         |
| Begin OUC Wye Curve #1  |           | 10.00            |           | 0.09        |                       | 00:00:00                | 00:00:22                |
|                         | 30        |                  | 0.57      |             | 00:01:11              |                         |                         |
| End OUC Wye Curve #1    |           | 40.00            |           | 0.66        |                       | 00:00:00                | 00:01:33                |
|                         | 55        |                  | 1.70      |             | 00:02:13              |                         |                         |
| Begin Curve #2          |           | 130.00           |           | 2.37        |                       | 00:00:00                | 00:03:47                |
|                         | 35        |                  | 0.38      |             | 00:00:41              |                         |                         |
| End Curve #2            |           | 150.00           |           | 2.75        |                       | 00:00:00                | 00:04:28                |
|                         | 45        |                  | 0.38      |             | 00:00:37              |                         |                         |
| Begin Curve #3          |           | 170.00           |           | 3.13        |                       | 00:00:00                | 00:05:05                |
|                         | 35        |                  | 0.38      |             | 00:00:41              |                         |                         |
| End Curve #3            |           | 190.00           |           | 3.50        |                       | 00:00:00                | 00:05:45                |
|                         | 45        |                  | 0.19      |             | 00:00:20              |                         |                         |
| Begin Curve #4          |           | 200.00           |           | 3.69        |                       | 00:00:00                | 00:06:05                |
|                         | 45        |                  | 1.33      |             | 00:01:51              |                         |                         |
| End Curve #4            |           | 270.00           |           | 5.02        |                       | 00:00:00                | 00:07:57                |
|                         | 45        |                  | 0.28      |             | 00:00:40              |                         |                         |
| <b>GOAA ITF</b>         |           | 285.00           |           | 5.30        |                       | 00:00:00                | 00:08:37                |
| <b>TOTAL</b>            |           |                  |           | <b>5.30</b> | <b>00:08:37</b>       | <b>00:00:00</b>         | <b>00:08:37</b>         |
|                         |           |                  |           |             | Avg. Speed =          | <b>36.9</b>             | <b>mph</b>              |

NOTES:  
1. Distances based on SunRail Phase 3 horizontal plan, HNTB, Dec. 2015.  
2. Run times based on acceleration & deceleration rates for up to 3 Diesel Multiple Units (Systra, 2005).  
3. Run times include 5.0% allowance for passenger comfort, dispatching delays, ADA compliance.  
4. Maximum 65 mph speed assumed; reduced speeds up to Authorized Speed (CSX Track Chart).

**Table 6.6 | LRT Estimated Run Time**

| Station                 | Max Speed | Distance (miles) |           |             | Run Time (hr:min:sec) | Dwell Time (hr:min:sec) | Total Time (hr:min:sec) |
|-------------------------|-----------|------------------|-----------|-------------|-----------------------|-------------------------|-------------------------|
|                         |           | Stationing       | Increment | Total       |                       |                         |                         |
| <b>Transfer Station</b> |           | 5.00             |           | 0.00        |                       | 00:00:00                | 00:00:00                |
|                         | 30        |                  | 0.09      |             | 00:00:18              |                         |                         |
| Begin OUC Wye Curve #1  |           | 10.00            |           | 0.09        |                       | 00:00:00                | 00:00:18                |
|                         | 30        |                  | 0.57      |             | 00:01:11              |                         |                         |
| End OUC Wye Curve #1    |           | 40.00            |           | 0.66        |                       | 00:00:00                | 00:01:29                |
|                         | 55        |                  | 1.70      |             | 00:02:09              |                         |                         |
| Begin Curve #2          |           | 130.00           |           | 2.37        |                       | 00:00:00                | 00:03:38                |
|                         | 35        |                  | 0.38      |             | 00:00:41              |                         |                         |
| End Curve #2            |           | 150.00           |           | 2.75        |                       | 00:00:00                | 00:04:19                |
|                         | 45        |                  | 0.38      |             | 00:00:35              |                         |                         |
| Begin Curve #3          |           | 170.00           |           | 3.13        |                       | 00:00:00                | 00:04:54                |
|                         | 35        |                  | 0.38      |             | 00:00:41              |                         |                         |
| End Curve #3            |           | 190.00           |           | 3.50        |                       | 00:00:00                | 00:05:35                |
|                         | 45        |                  | 0.19      |             | 00:00:18              |                         |                         |
| Begin Curve #4          |           | 200.00           |           | 3.69        |                       | 00:00:00                | 00:05:53                |
|                         | 45        |                  | 1.33      |             | 00:01:51              |                         |                         |
| End Curve #4            |           | 270.00           |           | 5.02        |                       | 00:00:00                | 00:07:44                |
|                         | 45        |                  | 0.28      |             | 00:00:36              |                         |                         |
| <b>GOAA ITF</b>         |           | 285.00           |           | 5.30        |                       | 00:00:00                | 00:08:20                |
| <b>TOTAL</b>            |           |                  |           | <b>5.30</b> | <b>00:08:20</b>       | <b>00:00:00</b>         | <b>00:08:20</b>         |
|                         |           |                  |           |             | Avg. Speed =          | <b>38.2</b>             | <b>mph</b>              |

NOTES:  
1. Distances based on SunRail Phase 3 horizontal plan, HNTB, Dec. 2015.  
2. Run times based on acceleration & deceleration rates for up to typical LRT vehicles.  
3. Run times include 5.0% allowance for passenger comfort, dispatching delays, ADA compliance.  
4. Maximum 55 mph speed assumed.

**Table 6.7 | APM Estimated Run Time**

| Station                 | Max Speed | Distance (miles) |           |             | Run Time (hr:min:sec) | Dwell Time (hr:min:sec) | Total Time (hr:min:sec) |
|-------------------------|-----------|------------------|-----------|-------------|-----------------------|-------------------------|-------------------------|
|                         |           | Stationing       | Increment | Total       |                       |                         |                         |
| <b>Transfer Station</b> |           | 5.00             |           | 0.00        |                       | 00:00:00                | 00:00:00                |
|                         | 30        |                  | 0.09      |             | 00:00:18              |                         |                         |
| Begin OUC Wye Curve #1  |           | 10.00            |           | 0.09        |                       | 00:00:00                | 00:00:18                |
|                         | 30        |                  | 0.57      |             | 00:01:11              |                         |                         |
| End OUC Wye Curve #1    |           | 40.00            |           | 0.66        |                       | 00:00:00                | 00:01:29                |
|                         | 35        |                  | 1.70      |             | 00:03:05              |                         |                         |
| Begin Curve #2          |           | 130.00           |           | 2.37        |                       | 00:00:00                | 00:04:34                |
|                         | 35        |                  | 0.38      |             | 00:00:41              |                         |                         |
| End Curve #2            |           | 150.00           |           | 2.75        |                       | 00:00:00                | 00:05:15                |
|                         | 35        |                  | 0.38      |             | 00:00:41              |                         |                         |
| Begin Curve #3          |           | 170.00           |           | 3.13        |                       | 00:00:00                | 00:05:56                |
|                         | 35        |                  | 0.38      |             | 00:00:41              |                         |                         |
| End Curve #3            |           | 190.00           |           | 3.50        |                       | 00:00:00                | 00:06:37                |
|                         | 35        |                  | 0.19      |             | 00:00:20              |                         |                         |
| Begin Curve #4          |           | 200.00           |           | 3.69        |                       | 00:00:00                | 00:06:57                |
|                         | 35        |                  | 1.33      |             | 00:02:23              |                         |                         |
| End Curve #4            |           | 270.00           |           | 5.02        |                       | 00:00:00                | 00:09:20                |
|                         | 35        |                  | 0.28      |             | 00:00:40              |                         |                         |
| <b>GOAA ITF</b>         |           | 285.00           |           | 5.30        |                       | 00:00:00                | 00:10:00                |
| <b>TOTAL</b>            |           |                  |           | <b>5.30</b> | <b>00:10:00</b>       | <b>00:00:00</b>         | <b>00:10:00</b>         |
|                         |           |                  |           |             | Avg. Speed =          | <b>31.8</b>             | <b>mph</b>              |

NOTES:

1. Distances based on SunRail Phase 3 horizontal plan, HNTB, Dec. 2015.
2. Run times based on acceleration & deceleration rates for up to typical APM vehicles.
3. Run times include 5.0% allowance for passenger comfort, dispatching delays, ADA compliance.
4. Maximum 35 mph speed assumed.

**Table 6.8 | BRT Estimated Run Time**

| Station                 | Max Speed | Distance (miles) |           |             | Run Time (hr:min:sec) | Dwell Time (hr:min:sec) | Total Time (hr:min:sec) |
|-------------------------|-----------|------------------|-----------|-------------|-----------------------|-------------------------|-------------------------|
|                         |           | Stationing       | Increment | Total       |                       |                         |                         |
| <b>Transfer Station</b> |           | 5.00             |           | 0.00        |                       | 00:00:00                | 00:00:00                |
|                         | 30        |                  | 0.09      |             | 00:00:18              |                         |                         |
| Begin OUC Wye Curve #1  |           | 10.00            |           | 0.09        |                       | 00:00:00                | 00:00:18                |
|                         | 30        |                  | 0.57      |             | 00:01:11              |                         |                         |
| End OUC Wye Curve #1    |           | 40.00            |           | 0.66        |                       | 00:00:00                | 00:01:29                |
|                         | 55        |                  | 1.70      |             | 00:02:09              |                         |                         |
| Begin Curve #2          |           | 130.00           |           | 2.37        |                       | 00:00:00                | 00:03:38                |
|                         | 35        |                  | 0.38      |             | 00:00:41              |                         |                         |
| End Curve #2            |           | 150.00           |           | 2.75        |                       | 00:00:00                | 00:04:19                |
|                         | 45        |                  | 0.38      |             | 00:00:35              |                         |                         |
| Begin Curve #3          |           | 170.00           |           | 3.13        |                       | 00:00:00                | 00:04:54                |
|                         | 35        |                  | 0.38      |             | 00:00:41              |                         |                         |
| End Curve #3            |           | 190.00           |           | 3.50        |                       | 00:00:00                | 00:05:35                |
|                         | 45        |                  | 0.19      |             | 00:00:18              |                         |                         |
| Begin Curve #4          |           | 200.00           |           | 3.69        |                       | 00:00:00                | 00:05:53                |
|                         | 45        |                  | 1.33      |             | 00:01:51              |                         |                         |
| End Curve #4            |           | 270.00           |           | 5.02        |                       | 00:00:00                | 00:07:44                |
|                         | 45        |                  | 0.28      |             | 00:00:36              |                         |                         |
| <b>GOAA ITF</b>         |           | 285.00           |           | 5.30        |                       | 00:00:00                | 00:08:20                |
| <b>TOTAL</b>            |           |                  |           | <b>5.30</b> | <b>00:08:20</b>       | <b>00:00:00</b>         | <b>00:08:20</b>         |
|                         |           |                  |           |             | Avg. Speed =          | <b>38.2</b>             | <b>mph</b>              |

NOTES:

1. Distances based on SunRail Phase 3 horizontal plan, HNTB, Dec. 2015.
2. Run times based on acceleration & deceleration rates for up to typical BRT vehicles.
3. Run times include 5.0% allowance for passenger comfort, dispatching delays, ADA compliance.
4. Maximum 55 mph speed assumed.

### 6.2.3 Operating Requirements

Opening Year (2020) operating plans were estimated for each technology based on the span of service, service frequency assumptions and the estimated run times. The tables below present the estimated Opening Year operating requirements for each technology. Although estimated run times and end-of-line layovers would vary by technology, each technology would require two peak and three fleet vehicles to operate the planned 15-minute peak period service.

**Table 6.9 | CRT/DMU Estimated Operating Requirements**

| Day of Week                | Annual Days | Operating Service Levels |                  |       |         | Operating Plans |            |                | Operating Requirements |                      |               |
|----------------------------|-------------|--------------------------|------------------|-------|---------|-----------------|------------|----------------|------------------------|----------------------|---------------|
|                            |             | Time Period              | Span of Service  | Hours | Headway | Layover Time    | Cycle Time | One-Way Trips  | Annual Revenue Miles   | Annual Revenue Hours | Peak Vehicles |
| Monday-Friday              | 254         | AM Peak                  | 5:00am - 9:00am  | 4     | 15      | 12.8            | 30.0       | 32             | 43,100                 | 2,030                | 2             |
|                            |             | Midday                   | 9:00am - 3:00pm  | 6     | 30      | 12.8            | 30.0       | 24             | 32,300                 | 1,520                | 1             |
|                            |             | PM Peak                  | 3:00pm - 7:00pm  | 4     | 15      | 12.8            | 30.0       | 32             | 43,100                 | 2,030                | 2             |
|                            |             | Evening                  | 7:00pm - 11:00pm | 4     | 30      | 12.8            | 30.0       | 16             | 21,500                 | 1,020                | 1             |
| Saturday                   | 52          | Daytime                  | 6:00am - 7:00pm  | 13    | 30      | 12.8            | 30.0       | 52             | 14,300                 | 680                  | 1             |
|                            |             | Evening                  | 7:00pm - 11:00pm | 4     | 30      | 12.8            | 30.0       | 16             | 4,400                  | 210                  | 1             |
| Sunday & Holidays          | 59          | Daytime                  | 6:00am - 7:00pm  | 13    | 30      | 12.8            | 30.0       | 52             | 16,300                 | 770                  | 1             |
|                            |             | Evening                  | 7:00pm - 11:00pm | 4     | 30      | 12.8            | 30.0       | 16             | 5,000                  | 240                  | 1             |
| <b>Total</b>               |             |                          |                  |       |         |                 |            | <b>180,000</b> | <b>8,500</b>           | <b>2</b>             |               |
| <b>Maintenance Spares</b>  |             |                          |                  |       |         |                 |            | <b>1</b>       |                        |                      |               |
| <b>Total Vehicle Fleet</b> |             |                          |                  |       |         |                 |            | <b>3</b>       |                        |                      |               |

**Table 6.10 | LRT Estimated Operating Requirements**

| Day of Week                | Annual Days | Operating Service Levels |                  |       |         | Operating Plans |            |                | Operating Requirements |                      |               |
|----------------------------|-------------|--------------------------|------------------|-------|---------|-----------------|------------|----------------|------------------------|----------------------|---------------|
|                            |             | Time Period              | Span of Service  | Hours | Headway | Layover Time    | Cycle Time | One-Way Trips  | Annual Revenue Miles   | Annual Revenue Hours | Peak Vehicles |
| Monday-Friday              | 254         | AM Peak                  | 5:00am - 9:00am  | 4     | 15      | 13.3            | 30.0       | 32             | 43,100                 | 2,030                | 2             |
|                            |             | Midday                   | 9:00am - 3:00pm  | 6     | 30      | 13.3            | 30.0       | 24             | 32,300                 | 1,520                | 1             |
|                            |             | PM Peak                  | 3:00pm - 7:00pm  | 4     | 15      | 13.3            | 30.0       | 32             | 43,100                 | 2,030                | 2             |
|                            |             | Evening                  | 7:00pm - 11:00pm | 4     | 30      | 13.3            | 30.0       | 16             | 21,500                 | 1,020                | 1             |
| Saturday                   | 52          | Daytime                  | 6:00am - 7:00pm  | 13    | 30      | 13.3            | 30.0       | 52             | 14,300                 | 680                  | 1             |
|                            |             | Evening                  | 7:00pm - 11:00pm | 4     | 30      | 13.3            | 30.0       | 16             | 4,400                  | 210                  | 1             |
| Sunday & Holidays          | 59          | Daytime                  | 6:00am - 7:00pm  | 13    | 30      | 13.3            | 30.0       | 52             | 16,300                 | 770                  | 1             |
|                            |             | Evening                  | 7:00pm - 11:00pm | 4     | 30      | 13.3            | 30.0       | 16             | 5,000                  | 240                  | 1             |
| <b>Total</b>               |             |                          |                  |       |         |                 |            | <b>180,000</b> | <b>8,500</b>           | <b>2</b>             |               |
| <b>Maintenance Spares</b>  |             |                          |                  |       |         |                 |            | <b>1</b>       |                        |                      |               |
| <b>Total Vehicle Fleet</b> |             |                          |                  |       |         |                 |            | <b>3</b>       |                        |                      |               |

**Table 6.11 | APM Estimated Operating Requirements**

| Day of Week                | Annual Days | Operating Service Levels |                  |       |         | Operating Plans |            |                | Operating Requirements |                      |               |
|----------------------------|-------------|--------------------------|------------------|-------|---------|-----------------|------------|----------------|------------------------|----------------------|---------------|
|                            |             | Time Period              | Span of Service  | Hours | Headway | Layover Time    | Cycle Time | One-Way Trips  | Annual Revenue Miles   | Annual Revenue Hours | Peak Vehicles |
| Monday-Friday              | 254         | AM Peak                  | 5:00am - 9:00am  | 4     | 15      | 10.0            | 30.0       | 32             | 43,100                 | 2,030                | 2             |
|                            |             | Midday                   | 9:00am - 3:00pm  | 6     | 30      | 10.0            | 30.0       | 24             | 32,300                 | 1,520                | 1             |
|                            |             | PM Peak                  | 3:00pm - 7:00pm  | 4     | 15      | 10.0            | 30.0       | 32             | 43,100                 | 2,030                | 2             |
|                            |             | Evening                  | 7:00pm - 11:00pm | 4     | 30      | 10.0            | 30.0       | 16             | 21,500                 | 1,020                | 1             |
| Saturday                   | 52          | Daytime                  | 6:00am - 7:00pm  | 13    | 30      | 10.0            | 30.0       | 52             | 14,300                 | 680                  | 1             |
|                            |             | Evening                  | 7:00pm - 11:00pm | 4     | 30      | 10.0            | 30.0       | 16             | 4,400                  | 210                  | 1             |
| Sunday & Holidays          | 59          | Daytime                  | 6:00am - 7:00pm  | 13    | 30      | 10.0            | 30.0       | 52             | 16,300                 | 770                  | 1             |
|                            |             | Evening                  | 7:00pm - 11:00pm | 4     | 30      | 10.0            | 30.0       | 16             | 5,000                  | 240                  | 1             |
| <b>Total</b>               |             |                          |                  |       |         |                 |            | <b>180,000</b> | <b>8,500</b>           | <b>2</b>             |               |
| <b>Maintenance Spares</b>  |             |                          |                  |       |         |                 |            | <b>1</b>       |                        |                      |               |
| <b>Total Vehicle Fleet</b> |             |                          |                  |       |         |                 |            | <b>3</b>       |                        |                      |               |

**Table 6.12 | BRT Estimated Operating Requirements**

| Day of Week       | Annual Days | Operating Service Levels |                  |       |         | Operating Plans |            |               | Operating Requirements |                      |               |
|-------------------|-------------|--------------------------|------------------|-------|---------|-----------------|------------|---------------|------------------------|----------------------|---------------|
|                   |             | Time Period              | Span of Service  | Hours | Headway | Layover Time    | Cycle Time | One-Way Trips | Annual Revenue Miles   | Annual Revenue Hours | Peak Vehicles |
| Monday-Friday     | 254         | AM Peak                  | 5:00am - 9:00am  | 4     | 15      | 13.3            | 30.0       | 32            | 43,100                 | 2,030                | 2             |
|                   |             | Midday                   | 9:00am - 3:00pm  | 6     | 30      | 13.3            | 30.0       | 24            | 32,300                 | 1,520                | 1             |
|                   |             | PM Peak                  | 3:00pm - 7:00pm  | 4     | 15      | 13.3            | 30.0       | 32            | 43,100                 | 2,030                | 2             |
|                   |             | Evening                  | 7:00pm - 11:00pm | 4     | 30      | 13.3            | 30.0       | 16            | 21,500                 | 1,020                | 1             |
| Saturday          | 52          | Daytime                  | 6:00am - 7:00pm  | 13    | 30      | 13.3            | 30.0       | 52            | 14,300                 | 680                  | 1             |
|                   |             | Evening                  | 7:00pm - 11:00pm | 4     | 30      | 13.3            | 30.0       | 16            | 4,400                  | 210                  | 1             |
| Sunday & Holidays | 59          | Daytime                  | 6:00am - 7:00pm  | 13    | 30      | 13.3            | 30.0       | 52            | 16,300                 | 770                  | 1             |
|                   |             | Evening                  | 7:00pm - 11:00pm | 4     | 30      | 13.3            | 30.0       | 16            | 5,000                  | 240                  | 1             |

**Total      180,000    8,500      2**  
**Maintenance Spares                      1**  
**Total Vehicle Fleet                        3**

Further discussion and evaluation of the alternative technologies considered are included in Section 7.2 of this report.

### 6.3 Recommended Operations Plan

#### 6.3.1 SunRail Extension to OIA (Phase 3) Operations

The recommended operations plan for the SunRail Extension to OIA (Phase 3) Build Alternative reflects utilizing the recommended technology of the existing SunRail commuter rail trains. The operating and capacity characteristics of the existing SunRail equipment have been used to identify and assess the operating plan for the Phase 3 project.

The Opening Year (2020) service frequency for the SunRail Phase 3 project would need to enable convenient transfers between connecting transit modes, SunRail and LYNX buses, and provide adequate capacity to meet the projected ridership demand. Service frequencies, shown in **Table 6.12**, are assumed to be 15 minutes during weekday peak periods and 30 minutes at all other times. **Table 6.13** presents the operating requirements for SunRail Phase 3.

The peak period schedules would require two locomotives and four passenger cars with an additional one locomotive and two passenger cars identified as maintenance spares. For SunRail Extension to OIA a total of three locomotives and six passenger cars are identified as fleet additions.

**Table 6.14** shows the station-to-station run times for the SunRail Phase 3 Build Alternative from the Transfer Station to the OIA ITF. The average commercial speed for the 5.3 mile SunRail Phase 3 extension is 34.2 mph with a run time of 09:19 (min:sec).

**Table 6.15** presents a preliminary train schedule for the Build Alternative Trains that would be dispatched from the VSLMF at Poinciana in the morning and evening. Midday train layover/storage would be at the VSLMF.

**Table 6.13 | Phase 3 - CRT Operating Plan**

| Day of Week       | Annual Days | Operating Service Levels |                  |       |         | Operating Plans |            |               | Operating Requirements |                      |               |
|-------------------|-------------|--------------------------|------------------|-------|---------|-----------------|------------|---------------|------------------------|----------------------|---------------|
|                   |             | Time Period              | Span of Service  | Hours | Headway | Layover Time    | Cycle Time | One-Way Trips | Annual Revenue Miles   | Annual Revenue Hours | Peak Vehicles |
| Monday-Friday     | 254         | AM Peak                  | 5:00am - 9:00am  | 4     | 15      | 12.8            | 30.0       | 32            | 43,100                 | 2,030                | 2             |
|                   |             | Midday                   | 9:00am - 3:00pm  | 6     | 30      | 12.8            | 30.0       | 24            | 32,300                 | 1,520                | 1             |
|                   |             | PM Peak                  | 3:00pm - 7:00pm  | 4     | 15      | 12.8            | 30.0       | 32            | 43,100                 | 2,030                | 2             |
|                   |             | Evening                  | 7:00pm - 11:00pm | 4     | 30      | 12.8            | 30.0       | 16            | 21,500                 | 1,020                | 1             |
| Saturday          | 52          | Daytime                  | 6:00am - 7:00pm  | 13    | 30      | 12.8            | 30.0       | 52            | 14,300                 | 680                  | 1             |
|                   |             | Evening                  | 7:00pm - 11:00pm | 4     | 30      | 12.8            | 30.0       | 16            | 4,400                  | 210                  | 1             |
| Sunday & Holidays | 59          | Daytime                  | 6:00am - 7:00pm  | 13    | 30      | 12.8            | 30.0       | 52            | 16,300                 | 770                  | 1             |
|                   |             | Evening                  | 7:00pm - 11:00pm | 4     | 30      | 12.8            | 30.0       | 16            | 5,000                  | 240                  | 1             |

**Total 180,000 8,500 2**

**Maintenance Spares 1**

**Total Vehicle Fleet 3**

NOTES:

1. Annual revenue bus-miles and bus-hours include layover time, but do not include report and deadhead time.
2. Minimum layover time assumed for breaks/scheduled recovery = 15%
3. Maintenance spare ratio = 20%

Prepared by HDR Engineering 30-Sep-16

**Table 6.14 | SunRail Phase 3 Run Times**

| Station                 | Max Speed | Distance (miles) |           |             | Run Time (hr:min:sec) | Dwell Time (hr:min:sec) | Total Time (hr:min:sec) |
|-------------------------|-----------|------------------|-----------|-------------|-----------------------|-------------------------|-------------------------|
|                         |           | Stationing       | Increment | Total       |                       |                         |                         |
| <b>Transfer Station</b> |           | 5.00             |           | 0.00        |                       | 00:00:00                | 00:00:00                |
|                         | 20        |                  | 0.09      |             | 00:00:23              |                         |                         |
| Begin OUC Wye Curve #1  |           | 10.00            |           | 0.09        |                       | 00:00:00                | 00:00:23                |
|                         | 20        |                  | 0.57      |             | 00:01:47              |                         |                         |
| End OUC Wye Curve #1    |           | 40.00            |           | 0.66        |                       | 00:00:00                | 00:02:10                |
|                         | 55        |                  | 1.70      |             | 00:02:19              |                         |                         |
| Begin Curve #2          |           | 130.00           |           | 2.37        |                       | 00:00:00                | 00:04:29                |
|                         | 35        |                  | 0.38      |             | 00:00:41              |                         |                         |
| End Curve #2            |           | 150.00           |           | 2.75        |                       | 00:00:00                | 00:05:10                |
|                         | 45        |                  | 0.38      |             | 00:00:37              |                         |                         |
| Begin Curve #3          |           | 170.00           |           | 3.13        |                       | 00:00:00                | 00:05:46                |
|                         | 35        |                  | 0.38      |             | 00:00:41              |                         |                         |
| End Curve #3            |           | 190.00           |           | 3.50        |                       | 00:00:00                | 00:06:27                |
|                         | 45        |                  | 0.19      |             | 00:00:20              |                         |                         |
| Begin Curve #4          |           | 200.00           |           | 3.69        |                       | 00:00:00                | 00:06:47                |
|                         | 45        |                  | 1.33      |             | 00:01:51              |                         |                         |
| End Curve #4            |           | 270.00           |           | 5.02        |                       | 00:00:00                | 00:08:39                |
|                         | 45        |                  | 0.28      |             | 00:00:40              |                         |                         |
| <b>GOAA ITF</b>         |           | 285.00           |           | 5.30        |                       | 00:00:00                | 00:09:19                |
| <b>TOTAL</b>            |           |                  |           | <b>5.30</b> | <b>00:09:19</b>       | <b>00:00:00</b>         | <b>00:09:19</b>         |
|                         |           |                  |           |             | Avg. Speed =          | <b>34.2 mph</b>         |                         |

NOTES:

1. Distances based on SunRail Phase 3 horizontal plan, HNTB, Dec. 2015.
2. Run times based on acceleration & deceleration rates for up to 3 Diesel Multiple Units (Systra, 2005).
3. Run times include 5.0% allowance for passenger comfort, dispatching delays, ADA compliance.
4. Maximum 65 mph speed assumed, reduced speeds up to Authorized Speed (CSX Track Chart).

**Table 6.15 | Phase 3: Phase 3 Preliminary Schedules w/ 15-minute Peak Service**

| <b>Train No.</b> | <b>Leave OIA</b> | <b>Passing Track</b> | <b>Arrive Transfer</b> | <b>Leave Transfer</b> | <b>Passing Track</b> | <b>Arrive OIA</b> |
|------------------|------------------|----------------------|------------------------|-----------------------|----------------------|-------------------|
| 1                | 5:15 a.m.        | 5:19 a.m.            | 5:23 a.m.              | 5:30 a.m.             | 5:34 a.m.            | 5:38 a.m.         |
| 2                | 5:30 a.m.        | 5:34 a.m.            | 5:38 a.m.              | 5:45 a.m.             | 5:49 a.m.            | 5:53 a.m.         |
| 1                | 5:45 a.m.        | 5:49 a.m.            | 5:53 a.m.              | 6:00 a.m.             | 6:04 a.m.            | 6:08 a.m.         |
| 2                | 6:00 a.m.        | 6:04 a.m.            | 6:08 a.m.              | 6:15 a.m.             | 6:19 a.m.            | 6:23 a.m.         |
| 1                | 6:15 a.m.        | 6:19 a.m.            | 6:23 a.m.              | 6:30 a.m.             | 6:34 a.m.            | 6:38 a.m.         |
| 2                | 6:30 a.m.        | 6:34 a.m.            | 6:38 a.m.              | 6:45 a.m.             | 6:49 a.m.            | 6:53 a.m.         |
| 1                | 6:45 a.m.        | 6:49 a.m.            | 6:53 a.m.              | 7:00 a.m.             | 7:04 a.m.            | 7:08 a.m.         |
| 2                | 7:00 a.m.        | 7:04 a.m.            | 7:08 a.m.              | 7:15 a.m.             | 7:19 a.m.            | 7:23 a.m.         |
| 1                | 7:15 a.m.        | 7:19 a.m.            | 7:23 a.m.              | 7:30 a.m.             | 7:34 a.m.            | 7:38 a.m.         |
| 2                | 7:30 a.m.        | 7:34 a.m.            | 7:38 a.m.              | 7:45 a.m.             | 7:49 a.m.            | 7:53 a.m.         |
| 1                | 7:45 a.m.        | 7:49 a.m.            | 7:53 a.m.              | 8:00 a.m.             | 8:04 a.m.            | 8:08 a.m.         |
| 2                | 8:00 a.m.        | 8:04 a.m.            | 8:08 a.m.              | 8:15 a.m.             | 8:19 a.m.            | 8:23 a.m.         |
| 1                | 8:15 a.m.        | 8:19 a.m.            | 8:23 a.m.              | 8:30 a.m.             | 8:34 a.m.            | 8:38 a.m.         |
| 2                | 8:30 a.m.        | 8:34 a.m.            | 8:38 a.m.              | 8:45 a.m.             | 8:49 a.m.            | 8:53 a.m.         |
| 1                | 8:45 a.m.        | 8:49 a.m.            | 8:53 a.m.              | 9:00 a.m.             | 9:04 a.m.            | 9:08 a.m.         |
| 1                | 9:15 a.m.        | 9:19 a.m.            | 9:23 a.m.              | 9:30 a.m.             | 9:34 a.m.            | 9:38 a.m.         |
| 1                | 9:45 a.m.        | 9:49 a.m.            | 9:53 a.m.              | 10:00 a.m.            | 10:04 a.m.           | 10:08 a.m.        |
| 1                | 10:15 a.m.       | 10:19 a.m.           | 10:23 a.m.             | 10:30 a.m.            | 10:34 a.m.           | 10:38 a.m.        |
| 1                | 10:45 a.m.       | 10:49 a.m.           | 10:53 a.m.             | 11:00 a.m.            | 11:04 a.m.           | 11:08 a.m.        |
| 1                | 11:15 a.m.       | 11:19 a.m.           | 11:23 a.m.             | 11:30 a.m.            | 11:34 a.m.           | 11:38 a.m.        |
| 1                | 11:45 a.m.       | 11:49 a.m.           | 11:53 a.m.             | 12:00 p.m.            | 12:04 p.m.           | 12:08 p.m.        |
| 1                | 12:15 p.m.       | 12:19 p.m.           | 12:23 p.m.             | 12:30 p.m.            | 12:34 p.m.           | 12:38 p.m.        |
| 1                | 12:45 p.m.       | 12:49 p.m.           | 12:53 p.m.             | 1:00 p.m.             | 1:04 p.m.            | 1:08 p.m.         |
| 1                | 1:15 p.m.        | 1:19 p.m.            | 1:23 p.m.              | 1:30 p.m.             | 1:34 p.m.            | 1:38 p.m.         |
| 1                | 1:45 p.m.        | 1:49 p.m.            | 1:53 p.m.              | 2:00 p.m.             | 2:04 p.m.            | 2:08 p.m.         |
| 1                | 2:15 p.m.        | 2:19 p.m.            | 2:23 p.m.              | 2:30 p.m.             | 2:34 p.m.            | 2:38 p.m.         |
| 1                | 2:45 p.m.        | 2:49 p.m.            | 2:53 p.m.              | 3:00 p.m.             | 3:04 p.m.            | 3:08 p.m.         |
| 1                | 3:15 p.m.        | 3:19 p.m.            | 3:23 p.m.              | 3:30 p.m.             | 3:34 p.m.            | 3:38 p.m.         |
| 2                | 3:30 p.m.        | 3:34 p.m.            | 3:38 p.m.              | 3:45 p.m.             | 3:49 p.m.            | 3:53 p.m.         |
| 1                | 3:45 p.m.        | 3:49 p.m.            | 3:53 p.m.              | 4:00 p.m.             | 4:04 p.m.            | 4:08 p.m.         |
| 2                | 4:00 p.m.        | 4:04 p.m.            | 4:08 p.m.              | 4:15 p.m.             | 4:19 p.m.            | 4:23 p.m.         |
| 1                | 4:15 p.m.        | 4:19 p.m.            | 4:23 p.m.              | 4:30 p.m.             | 4:34 p.m.            | 4:38 p.m.         |
| 2                | 4:30 p.m.        | 4:34 p.m.            | 4:38 p.m.              | 4:45 p.m.             | 4:49 p.m.            | 4:53 p.m.         |
| 1                | 4:45 p.m.        | 4:49 p.m.            | 4:53 p.m.              | 5:00 p.m.             | 5:04 p.m.            | 5:08 p.m.         |
| 2                | 5:00 p.m.        | 5:04 p.m.            | 5:08 p.m.              | 5:15 p.m.             | 5:19 p.m.            | 5:23 p.m.         |
| 1                | 5:15 p.m.        | 5:19 p.m.            | 5:23 p.m.              | 5:30 p.m.             | 5:34 p.m.            | 5:38 p.m.         |
| 2                | 5:30 p.m.        | 5:34 p.m.            | 5:38 p.m.              | 5:45 p.m.             | 5:49 p.m.            | 5:53 p.m.         |
| 1                | 5:45 p.m.        | 5:49 p.m.            | 5:53 p.m.              | 6:00 p.m.             | 6:04 p.m.            | 6:08 p.m.         |
| 2                | 6:00 p.m.        | 6:04 p.m.            | 6:08 p.m.              | 6:15 p.m.             | 6:19 p.m.            | 6:23 p.m.         |
| 1                | 6:15 p.m.        | 6:19 p.m.            | 6:23 p.m.              | 6:30 p.m.             | 6:34 p.m.            | 6:38 p.m.         |
| 2                | 6:30 p.m.        | 6:34 p.m.            | 6:38 p.m.              | 6:45 p.m.             | 6:49 p.m.            | 6:53 p.m.         |

| Train No. | Leave OIA  | Passing Track | Arrive Transfer | Leave Transfer | Passing Track | Arrive OIA |
|-----------|------------|---------------|-----------------|----------------|---------------|------------|
| 1         | 6:45 p.m.  | 6:49 p.m.     | 6:53 p.m.       | 7:00 p.m.      | 7:04 p.m.     | 7:08 p.m.  |
| 1         | 7:15 p.m.  | 7:19 p.m.     | 7:23 p.m.       | 7:30 p.m.      | 7:34 p.m.     | 7:38 p.m.  |
| 1         | 7:45 p.m.  | 7:49 p.m.     | 7:53 p.m.       | 8:00 p.m.      | 8:04 p.m.     | 8:08 p.m.  |
| 1         | 7:45 p.m.  | 7:49 p.m.     | 7:53 p.m.       | 8:00 p.m.      | 8:04 p.m.     | 8:08 p.m.  |
| 1         | 8:15 p.m.  | 8:19 p.m.     | 8:23 p.m.       | 8:30 p.m.      | 8:34 p.m.     | 8:38 p.m.  |
| 1         | 8:15 p.m.  | 8:19 p.m.     | 8:23 p.m.       | 8:30 p.m.      | 8:34 p.m.     | 8:38 p.m.  |
| 1         | 8:45 p.m.  | 8:49 p.m.     | 8:53 p.m.       | 9:00 p.m.      | 9:04 p.m.     | 9:08 p.m.  |
| 1         | 8:45 p.m.  | 8:49 p.m.     | 8:53 p.m.       | 9:00 p.m.      | 9:04 p.m.     | 9:08 p.m.  |
| 1         | 9:15 p.m.  | 9:19 p.m.     | 9:23 p.m.       | 9:30 p.m.      | 9:34 p.m.     | 9:38 p.m.  |
| 1         | 9:15 p.m.  | 9:19 p.m.     | 9:23 p.m.       | 9:30 p.m.      | 9:34 p.m.     | 9:38 p.m.  |
| 1         | 9:45 p.m.  | 9:49 p.m.     | 9:53 p.m.       | 10:00 p.m.     | 10:04 p.m.    | 10:08 p.m. |
| 1         | 9:45 p.m.  | 9:49 p.m.     | 9:53 p.m.       | 10:00 p.m.     | 10:04 p.m.    | 10:08 p.m. |
| 1         | 10:15 p.m. | 10:19 p.m.    | 10:23 p.m.      | 10:30 p.m.     | 10:34 p.m.    | 10:38 p.m. |
| 1         | 10:45 p.m. | 10:49 p.m.    | 10:53 p.m.      | 11:00 p.m.     | 11:04 p.m.    | 11:08 p.m. |

**NOTES:**

1. Run times based on HNTB RTC simulations, Dec. 2015.
2. Passing track tentatively located on tangent track along Boggy Creek.
3. Assumes 15-minute service during weekday peak periods and 30-minute service during midday & evening periods.
4. Midday trains temporarily stored at second platform at OIA ITF.

**6.3.2 Build Alternative Bus Operations**

The background and feeder bus network for the Build Alternative is consistent with the No-Build Alternative. LYNX currently operates six bus routes that serve the SunRail Sand Lake Road Station:

- Link 11 - S. Orange Ave./OIA
- Link 18 - S. Orange Ave./Kissimmee
- Link 42 - International Drive/OIA
- Link 111 - OIA/SeaWorld
- Link 208 - Downtown Kissimmee Express
- Link 418 - Meadow Woods/Lake Nona/Florida Mall

Six bus routes currently terminate at the OIA North Terminal Superstop:

- Link 11 - S. Orange Ave./OIA
- Link 42 - International Drive/OIA
- Link 51 - Conway Road/OIA
- Link 111 - OIA/SeaWorld
- Link 407 - Kissimmee/VA Hospital/OIA
- Link 436S - Fern Park/OIA

A summary of the bus routes serving the Sand Lake Road Station and the OIA North Terminal is shown on **Table 6.16**.

**Table 6.16 | LYNX Route Summary**

| Link   | Main Corridor(s)<br>Within Study Area                                 | Airport<br>Connection | Span of Service   | Service<br>Frequency | Average<br>Monthly<br>Ridership |
|--|---|-----------------------|---|----------------------|---------------------------------|
| 7  | Orange Ave  | No                    | 4:05 a.m. – 11:51 p.m. M-F  | 60 min               | 30,261                          |
|  |   |                       | 5:00 a.m. – 12:30 a.m. Saturday                                     |                      |                                 |
|  |   |                       | 5:15 a.m. - 8:35 p.m. Sunday  | 60 min               |                                 |
| 11   | Orange Ave<br>Sand Lake Road  | Yes                   | 5:11 a.m. - 11:26 p.m. M-F  | 30 min               | 33,836                          |
|  |   |                       | 5:13 a.m. - 10:28 p.m. Saturday                                     | 30 min               |                                 |
|  |   |                       | 6:25 a.m. - 8:25 p.m. Sunday  | 60 min               |                                 |
| 18   | Orange Ave<br>Osceola Parkway   | No                    | 4:30 a.m. - 11:00 p.m. M-F,<br>Saturday                             | 60 min               | 40,486                          |
|  |   |                       | No service Sunday   | --                   |                                 |
| 42   | International Drive<br>Oak Ridge Road<br>Sand Lake Road<br>McCoy Road | Yes                   | 5:35 a.m. – 10:10 p.m. M-F  | 30 min               | 79,557                          |
|  |   |                       | 5:40 a.m. – 10:10 p.m.<br>Saturday                                  | 30 min               |                                 |
|  |   |                       | 6:15 a.m. - 10:10 p.m. Sunday                                       | 60 min               |                                 |
| 51   | Orange Ave<br>Hoffner Ave   | Yes                   | 5:30 a.m. - 9:15 p.m. M-F, Sat.<br>5:15a - 8:21p Sunday             | 60 min<br>60 min     | 28,181                          |
| 111  | S.R. 528<br>Orange Blossom Trail<br>Sand Lake Road                    | Yes                   | 5:30 a.m. - 9:15 p.m. M-F, Sat.<br>5:15a - 8:21p Sunday             | 60 min<br>60 min     | 28,181                          |
| 208  | Florida's Turnpike<br>Sand Lake Road<br>S.R. 528                      | No                    | 6:10 a.m. - 8:45 p.m. M-F,<br>4:40 a.m. - 7:05 p.m. M-F             | 60 min<br>60 min     | 1,057**                         |
| 418*   | S.R. 417<br>Orange Ave<br>Sand Lake Road                              | No                    | 5:30 a.m. - 8:15 p.m. M-Sat   | 60 min               | 3,521**                         |
| 436S***  | Semorán Blvd  | Yes                   | 5:00 a.m. - 11:00 p.m. M-F,<br>Sat.<br>5:25 a.m. – 9:25 p.m. Sunday | 30 min<br>60 min     | 63,451                          |
| 407*   | US 441  | No                    | 5:50 a.m. - 6:42 p.m. M-F   | 30 min               | 5027                            |
| <i>*This is a FastLink route with Peak-Hour service in a.m. &amp; p.m. Peak only. Departures occur from 5:25 a.m. - 7:00 a.m. as well as 4:00 p.m. - 5:55 p.m.</i> |   |                       |   |                      |                                 |
| <i>** Based on a partial year of ridership data</i>  |   |                       |   |                      |                                 |
| <i>*** Was previously Link 41 and Link 100</i>   |   |                       |   |                      |                                 |

Detailed bus operating requirements by route will be further assessed in future analysis.

## **7.0 ALTERNATIVES ANALYSIS**

### **7.1 No-Build Alternative**

The No-Build Alternative is a requirement of the NEPA regulations and serves as the base condition for establishing the environmental impacts of the alternatives, the financial condition of implementing and operating agencies, and the cost-effectiveness of the TSM/Baseline Alternative. The No-Build Alternative can be defined in one of two ways:

- An alternative that incorporates “planned” improvements that are included in the fiscally constrained long-range plan for which need, commitment, financing, and public and political support are identified and are reasonably expected to be implemented.
- A conservative definition that adds only “committed” improvements – typically those in the annual element of the transportation improvement program or local capital programs – together with minor transit service expansions and/or adjustments that reflect a continuation of existing service policies into newly developed areas.

The SunRail Extension to Orlando International Airport (OIA) Phase 3 project includes planned improvements to the LYNX transit systems that are included in their current transit development plans (LYNX’s *Transit Development Plan (TDP) 2013-2022*) plus selected projects and services that are likely to be implemented in the next 20 years.

The No-Build Alternative will not address the purpose and need of the proposed project by not providing premium transit connection between the SunRail Commuter Rail Transit system and the new Intermodal Terminal Facility (ITF) at OIA. The primary goals of the project would not be met for the communities and citizens throughout central Florida.

The No-Build Alternative will provide connections to OIA on services that will continue to utilize a local roadway system with increasing traffic congestion threatening to undermine the economic diversification underway and reducing the quality of life for local residents. The No-Build Alternative would not address the needs of a growing transit dependent population, providing access to major activity centers and OIA for residents and workers.

### **7.2 Alternative Technology Assessment**

The range of technologies that would be appropriate for the application to connect SunRail CFRC and the ITF along the OUC Stanton Spur were identified based on the project’s intended purpose and goals in order to achieve the proper balance between operating speed, capacity, development potential, and capital cost. An initial assessment of transit technologies identified the following technologies as candidates for study: heavy rail (e.g., commuter rail, diesel multiple unit), light rail transit (LRT), automated people mover (APM) and bus way/bus rapid transit (BRT). The transit technologies have different aspects for consideration including:

- The transit technologies each have unique design characteristics that will affect horizontal and vertical alignment, horizontal and vertical clearance requirements with existing structures, need for grade separations with roadways (e.g. necessary with automated operations), capital costs, operating and maintenance (O&M) costs, and environmental impacts.
- The technologies also have unique vehicle dimensions and performance characteristics (e.g., maximum speed, seating capacity, acceleration and deceleration rates) that will affect the attractiveness of the service as well as potential ridership demand.
- The transit technologies will have unique operational and safety characteristics (e.g., positive train control) and governance issues (e.g., railroad and interlocal agreements, acceptability by project stakeholders) which will affect the project's viability.
- Finally, the transit technologies will also affect potential federal funding under the Federal Transit Administration's (FTA) Capital Investment Grant program (i.e., New Starts). The project's New Starts technical evaluation ratings, particularly the Mobility and Cost Effectiveness criteria, will be directly affected by the projected ridership and costs.

For these reasons, selecting the most appropriate and effective technology for the SunRail extension to OIA is a critical decision in the project development process.

The technologies identified above were evaluated for their applicability to conform to the project corridor. The project corridor along the OUC Stanton Spur currently contains an active freight railroad centered in a 120-foot wide right-of-way (ROW) and distribution power lines along the northern edge of the corridor. Orange Avenue crosses over the wye track between the SunRail main line and the Stanton Spur with an overpass which provides 25-feet of horizontal clearance from the track centerline to the endwall and to the center bridge piers, as well as 23'-7" of vertical clearance over the track to the low member of the bridge span. The remainder of the alignment includes at-grade crossings of two public roadways and several private roads, and should also consider a proposed service track extending from the Stanton Spur to the All-Aboard Florida (AAF) Vehicle Maintenance Facility. The vertical alignment is generally flat and the airport property is also generally flat, but as the alignment approaches the ITF, the alignment would need to be elevated to the second level of the ITF, as that is the configuration reserved for SunRail in the ITF.

This 25-foot horizontal clearance is the minimum SunRail and AREMA standard for horizontal clearance to permanent structures adjacent to active track without the use of a crash wall. The existing wye track could be relocated within the bridge opening, but that would require the installation of crash wall for the center bridge piers, however, the track would have to be no less than 8'-6" from the crash wall to meet the absolute minimum design standard for horizontal clearance. That means that the track centerline could not shift towards the center bridge piers more than approximately 15 feet from its current position.

### **CRT/DMU**

A parallel track could be constructed north of the existing Stanton Spur track within the existing ROW without relocating the existing track. However, a second track could not be constructed within the ROW without relocating either the existing spur track to the south or relocating the electric poles outside of the ROW. Under Orange Avenue, a single new track could be constructed parallel to the existing wye track

without relocating the existing wye track, but a second new track would require that the wye track be relocated closer to the center bridge piers, which would require crash walls. The new track construction would have impacts on the drainage swales within the corridor which could require additional drainage structures or retention ponds. The at-grade crossings would need to be expanded to relocate the gate arms and/or include additional crossing protection. The alignment could parallel the existing rail alignment but would need superelevation on the new tracks to accommodate the higher speed. Vertically, the CRT/DMU option does not present any challenges as the alignment is generally flat and the existing bridge structure would provide satisfactory vertical clearance of at least 23'-6".

## **LRT**

Similar to the CRT/DMU constraints, the LRT track could also be constructed north of the existing Stanton Spur track within the existing ROW without relocating the existing track. However, a second track could not be constructed within the ROW without relocating either the existing spur track or the electric poles within the ROW. Under Orange Avenue, a single new track could be constructed parallel to the existing wye track without relocating the existing wye track, but a second new track would require that the wye track be relocated closer to the center bridge piers, which would require crash walls. The new track construction would have impacts on the drainage swales within the corridor which could require additional drainage structures or retention ponds. The at-grade crossings would need to be expanded to relocate the gate arms and/or include additional crossing protection. The alignment could parallel the existing rail alignment but would need superelevation on the new tracks to accommodate the higher speed. Additional considerations would need to be made for the overhead catenary system as well, especially underneath the Orange Avenue overpass, but there appears to be adequate vertical clearance to allow for the Light Rail Vehicles and the overhead electric cable.

## **APM**

The APM alignment presents some additional challenges than either the LRT or CRT/DMU options. First, APM would need to be grade-separated for any of the roadway crossings of the alignment. Given the proximity of Wetherbee Road to the Orange Avenue overpass, it is unlikely that the APM would be able to go under Orange Avenue and then over Wetherbee Road without exceeding the maximum profile grade. Alternatives to this would be to reconstruct the Wetherbee Road over the APM and wye track, but that could result in removing access to properties within the wye intersection or additional property acquisition; or to take the APM alignment over Orange Avenue as well as Wetherbee Road, but doing so likely means that the APM terminal at the transfer station would be elevated. The elevated terminal would require elevators and be set back further from the SunRail platforms. The combined vertical and horizontal walking distance would hinder ridership for transfers. If the alternative to reconstruct Wetherbee Road is preferred, then the APM passing under the Orange Avenue overpass would require the existing wye track to be relocated closer to the center bridge piers, along with the construction of crash walls for those piers.

The APM would have to be spaced further north of the existing spur track than the LRT or CRT/DMU options as well to provide horizontal clearance from the spur track to the APM guideway or support piers, preferably 25 feet or more. This could require the relocation of the existing spur track to the south of its current alignment, which would still allow the track and the APM to be within the existing ROW. The

APM alignment would also need to be grade-separated over Boggy Creek Road and all of the private crossings.

## **BRT**

The BRT alignment would need to be a two-lane roadway constructed within the Stanton Spur ROW. This busway should be spaced 25 feet away from the centerline of the Stanton Spur alignment, which could result in requiring the relocation of the existing spur track to the south of its current alignment and the existing wye track closer to the center bridge piers under Orange Avenue. The busway would need to be 25 feet offset from the SunRail main line track and would need a turnaround at each terminal. All of the at-grade crossings could remain with some reconstruction to allow for a smoother ride for the busway. Signals or gates could be considered, but may not be mandatory for Boggy Creek Road or Wetherbee Road.

The conceptual design considerations for the corridor, order of magnitude cost estimates, operating plans, ridership projections, and applicability for federal New Starts funding are presented for comparison in an evaluation matrix shown in **Table 7.1**; Evaluation of Alternative Technologies.

Based on the above discussions of the considered technologies and incoordination with operational considerations within the proposed corridor with OUC and GOAA, the recommended technology is the Heavy Rail (SunRail) technology.

**Table 7.1 | SunRail – Phase 3 to OIA: Evaluation of Alternative Technologies**

| Evaluation Measure                                       | Heavy Rail<br>(SunRail)<br> | Light Rail<br>Transit (LRT)<br> | Automated People Mover<br>(APM)<br> | Busway / Bus<br>Rapid Transit (BRT)<br> |
|--|--|--|--|--|
| <b>DESIGN FEATURES / CAPITAL COSTS</b>                   |  |  |  |  |
| • New Lane-Miles   | 10.6   | 10.6   | 10.6   | 10.6   |
| • Positive Train Control                                 | Likely Required  | Not Required   | Not Required   | Not Required   |
| • Peak / Fleet Vehicles                                  | 2/3  | 2/3  | 6/8  | 2/3  |
| • Yard / Shop Facility                                   | Share w/ SunRail   | New On-site  | New On-site  | Share w/ LYNX  |
| • SunRail Est. Capital Cost for Add'l Trainset (million) | \$9 M  | \$9 M  | \$9 M  | \$9 M  |
| • Project Estimated Capital Cost (million)               | \$99 M   | \$171 M  | \$441 M  | \$62 M   |
| <b>PROJECT BENEFITS</b>                                  |  |  |  |  |
| • Daily Riders on Project – 2016                         | 1,970  | 1,970  | 1,970  | 1,970  |
| • Daily Riders on Project – 2030                         | 3,030  | 3,030  | 3,030  | 3,030  |
| <b>OPERATIONS</b>  |  |  |  |  |
| • Run Time OIA to Transfer Platform                      | 8.6 min  | 8.3 min  | 10.0 min   | 8.3 min  |
| • Estimated Travel Time from OIA to:                     |  |  |  |  |
| ○ Church St.   | 29   | 29   | 29   | 29   |
| ○ Kissimmee  | 28   | 28   | 28   | 28   |
| • SunRail Midday & Weekend Est. O&M Cost                 | \$15 M   | \$15 M   | \$15 M   | \$15 M   |
| • Project Estimated O&M Cost                             | \$7.5 M  | \$7.2 M  | \$5.9 M  | \$0.74 M   |
| • Potential to Expand                                    | Yes  | Yes  | No   | Yes  |
| <b>IMPACTS</b>   |  |  |  |  |
| • Transportation   | At-Grade Xings   | At-Grade Xings   | All Aerial Xings   | At-Grade Xings   |
| <b>SMALL STARTS APPLICABILITY</b>                        |  |  |  |  |
| • Potential to Meet Federal Criteria                     | Yes  | Yes  | No   | Yes  |

### **7.3 Station Analysis**

The analysis of station locations for the SunRail Extension to OIA (Phase 3) project initially considered extending service from the CFRC main line by diverting trains to the OIA ITF and back onto the CFRC main line with continuation of the south or north bound trains. Analysis of the Phase 1, Phase 2 South operating model with the addition of the Phase 3 route, quickly identified operating issues with this scenario identifying the need for additional train sets, significant delays in the direct CFRC main line trips resulting in loss of ridership and significant operational and maintenance cost increases.

Various scenarios were developed to utilize a shuttle system between OIA and either the Sand Lake Road Station or the Meadow Woods Station as a transfer point with the CFRC main line. Scenarios developed for each potential end station at Sand Lake Road and Meadow Woods, with the addition of a third platform at each site, were analyzed with preliminary Rail Traffic Controller (RTC) runs. The various scenarios at each location, with a summary of the RTC analysis, included:

- 30 minute headways with one train set between end station and OIA ITF: significant delay experienced by both SunRail and Amtrak trains. The 30 minute headways conflict with the Amtrak Autotrain delaying SunRail trains causing a butterfly effect that causes significant congestion near the OUC Spur.
- 30 minute headways with two train sets between end station and OIA ITF: significant delay experienced by both SunRail and Amtrak trains. The 30 minute headways conflict with the Amtrak Autotrain delaying SunRail trains causing a butterfly effect that causes significant congestion near the OUC Spur.
- 20 minute headways with two train sets between end station and OIA ITF: the addition of the Sand Lake Road Station causes increased delay to both SunRail and Amtrak trains. The addition of the Meadow Woods Station causes increased delay to Amtrak trains.
- 15 minute headways with two train sets between end station and OIA ITF: generally 15 minute headways are not feasible without the addition of separate SunRail Extension to OIA trains. Fifteen minute headways require a third track (Express track) from the OUC spur to either end station location.

With the results of the preliminary RTC analysis and consideration of operational and maintenance costs, a separate transfer station located near the OUC Spur wye along the CFRC main line was developed. Analysis through the RTC identified no impact to the overall schedule of the main line train service with the operations plan approved for the Phase 1 service with the additional Phase 2 South service. The transfer station will allow direct passenger transfers from the SunRail CRT system main line to the SunRail Extension to OIA. This transfer station will serve only rail passenger transfers and local bus service connections; it does not provide any type of parking or kiss-and-ride at the station. It serves strictly as a transfer station and is neither an origin nor destination station.

#### **7.3.1 Recommended Station**

Two potential sites based on property boundaries, land use and size were identified on the CFRC main line for the transfer station. The sites were just north of the wye and north of the Orange Avenue bridge structure and a site within the limits of the wye, south of the Orange Avenue bridge structure. Both sites

are owned by the same property owner. Within the available land for the site south of Orange Avenue, the platform limits would extend below the limits of the bridge structure and a new access point or intersection would be required. The site north of the Orange Avenue bridge structure provides flexibility for the location of the platforms and an existing T-intersection would be improved to a full intersection for access to the station site. The site north of the wye, north of the Orange Avenue bridge structure is the recommended site for further development of the transfer station.

#### **7.4 Build Alternative**

The Build Alternative features all of the transit services and projects included in the No-Build Alternative. Local bus routes operated by LYNX in the OIA study area have been modified to feed the OIA Transfer Station and the ITF Station with headway and span of service changes that are compatible with the proposed commuter rail service. New local and circulator bus routes have been proposed where appropriate to provide improved connections to nearby activity centers and/or residential neighborhoods. Duplicate fixed route service has been reduced or eliminated. Like the No-Build Alternative, the Build Alternative transit operating plans were defined for two forecast years: (1) Opening Year (2020) and (2) Horizon Year (2030).

In both the Opening Year and Horizon Year, OIA connector commuter rail trains would operate along the OUC Stanton Spur and on GOAA property between a new SunRail transfer station located north of the OUC wye junction and the OIA ITF. SunRail riders and LYNX bus riders would transfer to/from the OIA extension trains at the SunRail transfer center. OIA extension trains are assumed to operate every 15 minutes in each direction during weekday peak and midday periods and every 30 minutes during evenings and on weekends.

#### **7.5 Layover Alternatives Analysis**

The existing SunRail system operates 36 trains a day, serving 12 stations over 32 miles of track. The Phase 2 South expansion includes four new stations and approximately 17 miles of new service along the existing CFRC. Together, SunRail will provide service to 16 stations over 49 miles with peak period headways of 30 minutes in the opening year. SunRail Extension to OIA (Phase 3) is planned to provide 15 minute headway connections from the SunRail Transfer Station, located between the Sand Lake Road Station and the Meadow Woods Station on the CFRC, to OIA's ITF. The connection time for the shuttle train is approximately 10 minutes and will therefore require a train operating in either direction at the same time to maintain 15 minute peak headways. These two operating trains plus a single spare for maintenance periods will add three additional train-sets to the storage requirements of the SunRail system.

The Rand Yard is the Vehicle Storage and Maintenance Facility (VSMF) in Sanford, FL. It is adjacent to the SunRail Operations Control Center at 801 SunRail Drive in Sanford, FL, which provides storage and some of the nightly maintenance service to SunRail. All other maintenance needs are completed off system. **Figure 3.1** identified the location of the Rand Yard in relation to the SunRail system as well as other planned improvements. The Rand Yard in Sanford will be expanded to improve maintenance capability and increase storage concurrent with the other Phase 2 South improvements. The storage layout for the yard is being designed around 11 train-sets each including a locomotive and three passenger cars. The design train-set is 315 feet in length. These will be stored on four parallel tracks of lengths 980 feet,

980 feet, 965 feet, and 640 feet for a total of 3,545 feet of storage. The Poinciana Yard is being developed concurrent with Phase 2 South as a storage and layover facility. This second yard is located at the southern end of the SunRail system as identified in **Figure 3.1**. As a Vehicle Storage and Light Maintenance Facility (VSLMF), the yard will be sufficient for overnight train review, but regular maintenance operation will require that train-sets are brought back to the Rand Yard on a regular schedule.

The VSLMF is designed with a single storage track of 1,375 feet and a service and inspection track of 720 feet in length. It is assumed for this analysis that only the dedicated storage track will be used for overnight storage. The primary storage track can hold up to three train-sets consisting of two passenger cars and two train-sets consisting of three passenger cars.

The original plans for the Poinciana Yard, which included 3,200 feet of storage and inspection track, have been through environmental review, but through value engineering were reduced to serve the immediate need only.

The proposed operations of the SunRail Phase 3 will require storage of three new train-sets, each consisting of a locomotive and two passenger cars. Therefore, each new train-set will be 230 feet in length for a total of 690 feet in new storage requirements on the SunRail System.

The final configuration of the Rand Yard and the Poinciana Yard were developed based on the length of a train-set consisting of a locomotive and three passenger cars. The ridership forecast supporting the 2015 Transportation and Maintenance Operations Plan (TMOP) indicate that a train-set of a locomotive and two passenger cars will be sufficient to support demand in the 2030 horizon year. Based on the shorter train, analysis has been conducted to identify if the new SunRail Phase 3 trains could be stored at the Rand and Poinciana Yards.

**Table 7.2** outlines the storage of trains for the Phase 1 and Phase 2 South main line operation based on the vehicles in the 2015 TMOP. **Table 7.3** outlines the proposed storage of trains including the Phase 1 and Phase 2 South operation with the proposed Phase 3 train-sets. Based on the planned operations, the Phase 3 train-sets could be stored in the Rand and Poinciana Yards as configured for Phase 2 South until such time that a third passenger car is needed to handle peak ridership.

**Table 7.2 | Phase 1 and 2 South Storage Scenario – 17 Train-Sets at 230 Feet Each**

| Yard Location             | Track Number    | Track Length (ft) | No. of Two Passenger Car Train-Sets | Remaining Track (ft) |
|---------------------------|-----------------|-------------------|-------------------------------------|----------------------|
| Sanford<br>Rand Yard VSMF | Track 1         | 980               | 4                                   | 45                   |
|                           | Track 2         | 980               | 4                                   | 45                   |
|                           | Track 3         | 945               | 3                                   | 265                  |
|                           | Track 4         | 640               | 1                                   | 410                  |
|                           | Sanford Total   | 3,545             | 12                                  | 765                  |
| Poinciana<br>VSLMF        | Storage Track   | 1375              | 5                                   | 205                  |
|                           | S&I Track       | 720               | 0                                   | 720                  |
|                           | Poinciana Total | 2,095             | 5                                   | 925                  |
| System Total              |                 | 5,640             | 17                                  | 1,690                |

**Table 7.3 | Phase 1, 2 South, and 3 Storage Scenario – 20 Train-Sets at 230 Feet Each**

| Yard Location          | Track Number    | Track Length (ft) | No. of Two Passenger Car Train-Sets | Remaining Track (ft) |
|------------------------|-----------------|-------------------|-------------------------------------|----------------------|
| Sanford Rand Yard VSMF | Track 1         | 980               | 4                                   | 45                   |
|                        | Track 2         | 980               | 4                                   | 45                   |
|                        | Track 3         | 945               | 4                                   | 30                   |
|                        | Track 4         | 640               | 2                                   | 175                  |
|                        | Sanford Total   | 3,545             | 14                                  | 295                  |
| Poinciana VSLMF        | Storage Track   | 1375              | 5                                   | 205                  |
|                        | S&I Track       | 720               | 1                                   | 490                  |
|                        | Poinciana Total | 2,095             | 6                                   | 695                  |
| System Total           |                 | 5,640             | 20                                  | 990                  |

The currently proposed layout of the combined Sanford Rand Yard VSMF and the Poinciana Yard VSLMF can accommodate the three train-sets needed for SunRail Phase 3 and CFRC operations through 2030. The key assumptions of train car length and composition should be re-evaluated at the time of design to confirm that storage needs are still met. In the event that additional track is needed, the Poinciana Yard VSLMF could be expanded to the maximum approved length. This would allow for an additional 1,000 feet of storage based on the full Poinciana Yard limits approved in the SunRail Phase 2 Environmental Assessment, the First Supplemental Environmental Assessment (SEA) and the Second SEA.

## 7.6 Long Term Parking Analysis

The impacts to the existing station parking, constructed as part of Phase 1 stations, and the proposed station parking under construction as part of Phase 2 South was evaluated, particularly as it pertains to the needs for long-term parking. The existing SunRail system includes 12 stations with seven of the stations providing free parking for SunRail passengers. The Phase 2 South expansion of the SunRail system will include four new stations each with dedicated free parking. The parking is provided along with bus connections and drop-off lanes to provide access to the system for passengers outside of walking or bicycling distance.

The SunRail Extension to OIA (Phase 3) is expected to increase demand for parking at all of the SunRail stations that offer parking. The connection to OIA also establishes a new type of parking need, long-term parking. The parking demand for the SunRail system was analyzed based on both the opening and horizon years for SunRail Phase 3. To develop parking demand, an analysis of existing ridership and existing parking utilization was conducted. The existing pattern is assumed to be representative of the regional pattern for single day trips. For each of the SunRail Phase 1 stations, this yielded a ratio that compared trip origins, or where riders reached the SunRail System, with utilized parking spaces. For each station this was found to be less than 50 percent with the average at approximately 40 percent. Based on this parking demand per trip, the forecasted ridership could be translated into future parking demand for the traditional commuter trips. This method was used to assess the parking demand for each forecast year against the existing supply.

The parking demand for air and rail passengers was analyzed with a similar method as the single day trips, but accounting for the number of days and nights a vehicle is likely to remain in the parking lot. The estimated duration of parking at SunRail stations is based on data provided by OIA for the duration of stay at the airport operated parking facilities. The median length of stay in OIA parking is observed to be less than four days. Four days is used to establish a regional pattern for multi-day trips.

The multi-stage build-out of the SunRail system is expected to grow ridership over the next twenty years. The parking constructed to date is identified in **Table 7.4** alongside the anticipated full build size for the parking lots. Similarly, the opening year parking demand is compared with the horizon year parking demand. Utilization percentages for both are provided. No parking deficiencies are identified for opening day and total demand for parking is less than total supply based on ridership projections. Monitoring both the total horizon year ridership as well as its distribution is recommended based on the possibility for changing driver patterns and ridership distribution choices.

**Table 7.4 | Horizon Year Parking Supply and Utilization**

| Station                    | Full Build-out Parking | Horizon Year Demand | Utilization |
|----------------------------|------------------------|---------------------|-------------|
| DeLand                     | 180                    | 161                 | 89%         |
| DeBary                     | 470                    | 174                 | 37%         |
| Sanford                    | 300                    | 132                 | 44%         |
| Lake Mary                  | 650                    | 320                 | 49%         |
| Longwood                   | 354                    | 168                 | 47%         |
| Altamonte Springs          | 650                    | 280                 | 43%         |
| Maitland                   | 250                    | 143                 | 57%         |
| Sand Lake                  | 650                    | 293                 | 45%         |
| Meadow Woods               | 390                    | 289                 | 74%         |
| Osceola Parkway/Tupperware | 200                    | 228                 | 114%        |
| Kissimmee                  | 435                    | 356                 | 82%         |
| Poinciana                  | 250                    | 296                 | 118%        |
| <b>Totals</b>              | <b>4,779</b>           | <b>2,840</b>        | <b>59%</b>  |

*Source: Existing and Under Construction Parking; 2<sup>nd</sup> Supplemental EA*

In light of the new demand for long-term parking, SunRail plans to establish long-term parking areas to direct SunRail riders to the best place to leave a parked vehicle overnight. The parking spaces needed to accommodate this are proposed to be aggregated at several large and regionally diverse stations. The selected locations include DeBary Station in Volusia County, Altamonte Springs Station in Seminole County, Sand Lake Road Station in Orange County and the Poinciana Station in Osceola County. Each of these stations represents the demand from a region served by SunRail and has sections of parking that can be isolated to allow for clear demarcation.

**Table 7.5** provides a listing of the four stations and information about the long term parking associated with each.

**Table 7.5 | Proposed Long Term Parking Stations**

| Station           | Parking Spaces | Long Term Parking Space Options Identified | Description of Locations for Long-Term Spaces |
|-------------------|----------------|--|---|
| DeBary            | 470            | 58   | Two south aisles                              |
| Altamonte Springs | 322            | 142  | North end of P&R                              |
| Sand Lake Road    | 324            | 45   | South section                                 |
| Poinciana         | 248            | 84   | North aisle                                   |
| <b>Total</b>      | <b>1364</b>    | <b>329</b>                                 | <b>Four Locations</b>                         |

The SunRail system offers a wide range of access alternatives at the existing Phase 1 stations as well as the Phase 2 South stations under construction and the proposed terminal station at OIA. Access to these stations includes sidewalks, bicycle paths, and a number of bus transit, shuttle and private car options in addition to Park & Ride. Park & Ride accounts for almost half of the ridership as assessed from the existing field reviews, and it is anticipated to continue as an important part of the SunRail experience.

As SunRail ridership grows, further analysis of free parking lots will be needed. However, the existing and planned parking lot sizes are adequate to serve average demand based on the available ridership projections and parking duration data in the opening year.

The optimal locations for the designated long-term parking are the DeBary Station, the Altamonte Springs Station, the Sand Lake Station, and the Poinciana Station. These are the largest stations in their respective county and provide opportunities to clearly identify areas where long-term parking is welcomed. Rules and regulations for this parking should be developed to provide SunRail patrons with a clear understanding of the risks and expectations for parking overnight at SunRail.

## **8.0 RECOMMENDED ALTERNATIVE**

### **8.1 Alignment and Right Of Way Needs**

The Build Alternative alignment for the SunRail Extension to OIA (Phase 3) project is based on the RTC analysis providing track (OIA track) to meet the 15-minute headways between the Transfer Station and the ITF Station. Double tracks will be required for approximately one mile on the west end and two miles at the east end of the total 5.3 mile segment to provide operations of two trains to meet the headway.

To provide passenger transfers from the CFRC main line and the Phase 3 extension to OIA, two center platforms are recommended between the two CFRC main line tracks and the new track to the OUC Spur. The northbound CFRC main line track (P2S) will be realigned 4,050 feet to provide 30 feet centerline to centerline for a center platform. The two OIA tracks will also be spaced to provide for a 300-foot center track platform. An intertrack fence will be located between the CFRC and OIA tracks with provision for cross track walkways connecting the two platforms. Additional ROW will be required for the Transfer Station. The proposed Transfer Station is shown on the Concept Plans included in Appendix A.

The two OIA tracks will begin at the transfer station platforms. The existing OUC Spur track on the existing north leg of the wye will be relocated to allow two tracks beneath the Orange Avenue structures. The realigned track is designated OIA ML2 with the new track designated OIA ML1. The realigned OIA ML2 track will be on the existing spur alignment at the Wetherbee Road grade crossing. A new crossover will be located south of the platform maintaining the OUC connection (OIA ML2) to access the CFRC main line. A portion of the existing wye geometry will also be realigned between Wetherbee Road and the tie-in with the south leg of the wye. The geometry and typical section of the realignment of OIA ML2 and the new track OIA ML1 are shown on the Concept Plans.

The existing OUC Spur track will be upgraded to a Class 1 line and shared with freight operations from the tie-in of the two legs of the wye a distance of 6,500 feet. The combined distance, including the wye, of existing track that will be realigned and/or upgraded for shared use is 12,300 feet. The freight operations are generally routed from the south, utilizing the south leg of the wye. A new passenger only track (OIA ML1) will be constructed to the north, within existing ROW, to a point just east of the Boggy Creek Road grade crossing. Within the limits from the wye to Boggy Creek Road, three existing concrete trestle structures will be matched for the new OIA ML1, see Section 8.5 Structures for further discussion.

Approximately 400 feet east of Boggy Creek Road, a second OIA ML2 will be developed as the alignment leaves the OUC corridor to the ITF Station. For operational considerations the second OIA track is required. The OIA ML1 will continue with the OIA ML2 track being located to the north. The two OIA ML tracks will be parallel to the existing OUC spur track for 1,100 feet before the two OIA tracks curve into the GOAA property to connect into the ITF. The addition of a third track to the north of the existing OUC spur track will require additional ROW for drainage considerations. Any ROW required from east of Boggy Creek Road to the ITF is owned by GOAA (City of Orlando).

As the OIA main line tracks veer from the OUC alignment, the tracks will be to the south of the AAF (Brightline) maintenance facility. An access road into the facility will be crossed by the OIA tracks and has been coordinated with AAF. At the Boggy Creek crossing (Tradeport Ditch per GOAA drainage maps) an existing 750-foot wide floodway is designated on the FIRM maps. Currently an 850-foot bridge

is proposed for the OIA tracks to traverse this floodway, however, future coordination with GOAA is required as they are attempting to have floodways and floodplains redesignated by NWI. An additional bridge is identified to cross the drainage canal to the south side of Canal Road. Canal road, as coordinated with GOAA, will be an at-grade crossing with just crossing warning and stop signs.

North from the east side of the AAF maintenance facility and north of Canal Road, the Brightline and SunRail tracks will be run parallel and next to each other. The OIA tracks will span the new South Terminal Access Road and pond, as coordinated with site engineers for GOAA. The OIA tracks will remain elevated from the South Terminal Access Road into the ITF with a second level platform.

The vertical profile of the OIA tracks will be at grade, matching the OUC Spur track within the concurrent ROW limits. As the OIA tracks leave the OUC corridor the OIA tracks will remain at grade until the vertical profile extends over the South Terminal Access Road and into the ITF second level. Between the access road and the ITF terminal the OIA tracks are proposed to be on MSE walls.

The connection to the ITF terminal will be made at the second level, connecting to an extended canopy over the first level at what is the Passenger Drop-off Lobby of the ITF. The limits of the OIA tracks and platform will meet the limits of the canopy, the canopy topping slab will be in place connecting the SunRail platform walkways to the PDL building. This is an approximate 95 to 100 foot gap between the end of the tracks/platform before the actual connection to the terminal building.

## **8.2 Right-of-Way**

ROW requirements for the SunRail Extension to OIA (Phase 3) project are limited to the area required for the Transfer Station on the west end of the project and coordinating the use of the OUC Stanton Spur corridor and the corridor identified for commuter rail by GOAA on airport property. The use of the OUC and GOAA properties will be further coordinated between FDOT and the local government agency that owns the land.

The Transfer Station Build Alternative is identified to be 5.5 acres of a 28.1 acre parent tract owned by the Strates family, Winter Quarters Properties LLC. The property is currently used to store equipment and vehicles, including train cars associated with circus activities. No relocations occur with the proposed ROW taking.

## **8.3 Access Management**

Access management in the scenario of the SunRail Extension to OIA (Phase 3) project is maintaining access to common property owners on both sides of the existing OUC Stanton Spur corridor. There are currently five private crossings at Mile Posts (MP) 0.60, 0.74, 1.20, 1.50 and 2.45. One future crossing has also been identified. The agreements between the City of Orlando (OUC) and the property owners are to maintain 24 foot, unpaved crossings. These agreements state that OUC has the right to relocate these crossings with property owner coordination. The SunRail Phase 3 Build Alternative will coordinate the need to maintain these crossings over the second set of tracks. These crossings are currently unsignalized with RR cross bar warning signs. Coordination with the property owners will continue in the next phase of project development.

## 8.4 Drainage and Stormwater Management

The preliminary proposed improvements consist of realigning SunRail Phase 2 South Main line for 0.75 miles, a transfer station with two additional tracks for 0.14 miles located on the Strates Property adjacent to the SunRail Phase 2 South corridor, realigning the OUC Stanton Spur track for 0.57 miles, proposed additional track along the existing OUC Stanton Spur for 2.33 miles and proposed new double track for 0.32 miles along the OUC Stanton Spur and 2.0 miles through the GOAA property to the OIA ITF. The proposed improvements will also include grade crossing improvements, two proposed crossings, proposed track crossover, proposed culvert and proposed bridges.

Development of the additional tracks results in adding an additional ballast and track for approximately 2.90 miles and the new double track results in adding new ballast and track for approximately 2.46 miles.

Generally, the addition of a second track causes a slight difference in Pre and Post CN values. The difference in CN causes very slight increases in runoff volumes in these basins. This minimal difference of runoff is accommodated by existing and proposed swales that run parallel to the tracks. These swales can be modified and regraded to provide capacities that are large enough to accommodate the excess runoff caused by the addition of a second railroad track and any existing offsite runoff that flows towards the project corridor. Existing drainage patterns along the rail ROW will be maintained.

The increase in runoff between the pre and post development conditions is minor; however it is accounted for in the proposed swales. Downstream conditions will not be impacted with the regraded swales accommodating the difference in runoff. Existing swales were evaluated using the 2005 Contours for Boggy Creek & Lake Hart Basins, Orange County, FL. Using the one foot (1') contours to determine the average swale bottom elevation and average swale bottom width and the minimum swale top elevation and average swale top width.

Within the project corridor there is one major hydrologic drainage basin defined by outfall, Boggy Creek. The project has eight basins, which have been divided into 15 sub basins. General basin boundaries were initially identified utilizing boundaries presented by the FDEP and the SFWMD and the sub basins were divided based on outfall locations, grade crossings and cross drains.

The proposed swales are contained within the ROW of the project corridor except in sub basin MB30 which starts at Boggy Creek Road and extends to the GOAA property where the second OIA track is proposed to leave the OUC corridor. The swale in sub basin MB30 needs an additional 30-foot easement on parcel number 03-24-30-0000-00-002 owned by the City of Orlando/GOAA.

The proposed pond at the Transfer Station is a dry pond and is located within the station site on the Strates Winter Quarters Properties, parcel number 12-24-29-3044-08-010. The pond accommodates the transfer platforms, station site, the additional tracks at the transfer platform and the tracks below the Orange Ave Bridge. The pond will outfall to the existing swale located between the Phase 2 South track and the proposed station site and will continue through CD-1 and CD-2 which will be replaced with the realignment of the OUC track and the additional proposed track. The realignment of Phase 2 South and the realignment of the OUC track assumes the existing drainage will be modified and re-graded to maintain capacity.

The stormwater management for the project corridor that is located on GOAA property, starting at the floodway and extending to the OIA transfer platform, will be accommodated by the proposed GOAA stormwater facilities. This was discussed with GOAA during a coordination meeting on July 14, 2016.

## 8.5 Structures

There is one existing roadway bridge structure over the OUC Stanton Spur. Orange Avenue crosses over the north leg of the wye with separate southbound and northbound structures. The vertical clearance at each structure is 23'-7". The horizontal clearance at the southbound structure is 50'-0" with 63'-8" horizontal clearance under the northbound structure. On the OUC Stanton Spur three trestle bridges are within the project study area. These bridges allow conveyance of off-site drainage and are described in the Existing Drainage Conditions.

There are three existing concrete trestle bridges, which convey stormwater runoff under SunRail Phase 3 and serve as outfall locations for the collection system. Generally, the cross drains and bridges convey stormwater runoff in a north to south direction under SunRail Phase 3. SunRail Phase 3 will add a new track and match the existing concrete trestle bridges. These trestle bridges are identified as T-12, T-11 and T-10. Additional structures will be required for offsite drainage conveyance and for the new South Terminal Access Loop Road. The proposed structures with approximate lengths are identified on **Table 8.1, Summary of Structures**.

**Table 8.1 | Summary of Structures**

| Structure | Approximate Location (CL Const. Phase 3) | Description                                    | Comment  |
|-----------|--|--|--|
| T-12      | 385+00                                   | 48' Concrete Trestle Bridge with Ballast Deck  | Match Existing   |
| T-11      | 409+00                                   | 96' Concrete Trestle Bridge with Ballast Deck  | Match Existing   |
| T-10      | 437+35                                   | 48' Concrete Trestle Bridge with Ballast Deck  | Match Existing   |
|           | 545+00                                   | 830' Concrete Trestle Bridge with Ballast Deck | New: span existing floodway  |
|           | 560+35                                   | 270' Concrete Trestle Bridge with Ballast Deck | New – span drainage canal along Canal Road                                       |
|           | 566+30                                   | 2 – 10'x10' Concrete Box Culvert               | New  |
|           | 575+30                                   | 3 – 10'x10' Concrete Box Culvert               | New  |
|           | 622+20                                   | 475' Concrete Trestle Bridge with Ballast Deck | New – spans South Terminal Access Road and pond immediately south of access road |

## 8.6 Utilities

The utility companies identified in Section 4.8 were contacted to identify utilities that would be impacted by any track improvements or the addition of any new tracks in the existing OUC Stanton spur corridor. The locations of utilities within or crossing the OUC Spur are identified in **Table 8.2**.

**Table 8.2 | OUC Corridor Utilities.**

| Utility Company                     | Service Type               | Location  |
|-------------------------------------|----------------------------|---|
| AT&T                                | Communications             | Crosses spur at Orange Ave, Wetherbee Rd, and Boggy Creek Rd.   |
| AT&T Distribution                   | Communications             | Parallel to CFRC Tracks   |
| Bright House Networks               | Communications             | Aerial Crossings of Spur at Boggy Creek Rd and Wetherbee Rd. Underground Crossing of CFRC Tracks between north and south legs of wye                |
| City of Orlando                     | Wastewater                 | No Conflicts outside GOAA Property  |
| City of Orlando Traffic Engineering | Communications             | No Conflicts  |
| Florida Gas Transmission            | Natural Gas                | Crossing at Boggy Creek   |
| Kinder Morgan                       | Jet Fuel                   | Parallel to CFRC Tracks on east side 3-4' deep  |
| Level 3 Communications              | Fiber Optic Communications | Parallel to CFRC Tracks on east side. Crosses CFRC Tracks between north and south legs of wye. Crossings of spur at Wetherbee Rd and Boggy Creek Rd |
| MCI                                 | Communications             | Parallel to CFRC Tracks   |
| Orange County Utilities             | Water/Wastewater           | No Conflicts  |
| Orlando Utilities Commission        | Electric                   | Parallel to Spur from east end of wye to Boggy Creek Rd. Crosses Spur at substation and Boggy Creek Rd  |
| Orlando Utilities Commission        | Water                      | Crosses wye at Boggy Creek Rd and CFRC Tracks between north and south legs of wye   |
| Taft Water Association              | Potable Water              | No Conflicts  |
| TECO Peoples Gas                    | Natural Gas                | Crossing at Boggy Creek Rd  |

Additional coordination with on-going design and construction associated with the Brightline maintenance facility and the construction drawings of the Brightline tracks from the maintenance facility to the ITF are summarized in **Table 8.3**.

**Table 8.3 | GOAA Property Utilities**

| Utility Company              | Service Type               | Location   |
|------------------------------|----------------------------|--|
| City of Orlando              | Wastewater                 | Crosses new track STA 522.   |
| Orlando Utilities Commission | Electric                   | Proposed OH at maintenance facility access road crossing of new tracks   |
| Florida Gas Transmission     | Natural Gas                | Easement through GOAA crosses new track STA 602  |
| AAF (Brightline)             | Fiber Optic Communications | From maintenance facility to ITF east side of AAF leased property (between Brightline tracks and future CFRC tracks) |

Utility coordination will be continued in future development phases of the SunRail Extension to OIA (Phase 3) project. Brightline has committed to removing the existing rapid infiltration basins (RIBs), removing or abandoning existing utilities associated with the operations of these basins. The design of the South Terminal and the ITF is being progressed and close coordination will continue with GOAA for the location of utilities as the SunRail Phase 3 tracks approach the ITF.

### **8.7 Temporary Traffic Control**

Two public at-grade crossings are within the limits of the SunRail Phase 3 project, Wetherbee Road and Boggy Creek Road. Both crossings are two lane rural roadways and are maintained by Orange County. The traffic control plans for these two crossings are included as part of the Concept Plan Sheets in Appendix A.

Wetherbee Road traffic will be diverted to Orange Avenue located just west and parallel to Wetherbee Road. Boggy Creek Road is a local arterial with no parallel facilities. Traffic will also be diverted to Orange Avenue when the track crossing is under construction. Coordination with Orange County will be required as design is advanced.

### **8.8 Multimodal/Transit Connectivity**

The purpose of the SunRail Extension to OIA (Phase 3) project is to provide a premium transit service connection between the CFRC and the intermodal terminal facility (ITF) at OIA. The Build Alternative will provide this premium transit service to airport employees, air passengers and the tourists visiting central Florida. The airport, with the ITF, proposes to link air service, bus connections, and rail transit customers including commuter rail and intercity rail (Brightline) at a common intermodal facility. Together with proposed trail connections on airport property and established local trails, additional modal connectivity will be established with the local pedestrian and bicycle community.

## **8.9 Cost Estimates**

The SunRail Extension to OIA (Phase 3) has a total project cost estimate of \$256,981,241 (in 2015 dollars) developed utilizing Federal Transit Agency (FTA) Standard Cost Categories (SCC) worksheets. This is an established format for reporting, estimating and managing capital costs consistent with Federal transit projects. The construction costs are developed in SCC Coding, or Line Items, 10 through 90, for an order of magnitude cost estimate. The project cost estimate is based on the preferred operations plan of 30-minute SunRail main line, 15-minute OIA extension peak hour headways.

The cost estimate as developed per SCC category is summarized in **Table 8.4**. This table also identifies project capital cost notes identifying assumptions included in the estimate and any cost items to be provided by others.

## **8.10 Results of Public Involvement Program**

The SunRail Extension to OIA (Phase 3) project began as the Orlando International Airport (OIA) Connector Refresh Alternatives Analysis (AA) (2013-2016). The purpose of the AA study was to evaluate the potential of a premium transit system in the Central Florida area to serve as an alternative mode to highway travel. Based on the screening criteria and broad support from regional stakeholders and the public, as expressed at OIA AA public meetings held on March 12 and June 18, 2013, the SunRail to OIA connection was identified early in the AA process as a regional transit priority. Therefore, it was decided to carry this alternative independently into Project Development through the FTA process. The project was named SunRail Phase 3 at that time.

### **8.10.1 Public Hearing**

A public hearing was not conducted; the Categorical Exclusion documentation identified minimal to no environmental impacts. The vast majority of the corridor right of way impact is on property owned by the City of Orlando with rail operations by OUC or GOAA (OIA) property. One private property owner would potentially be affected by the proposed extension with separate meetings held with this owner.

## **8.11 Value Engineering Results**

A Value Engineering (VE) Study was held during November 2016 using the VE methodology to improve the PD&E for the SunRail Extension to OIA (Phase 3) project. The VE Team utilized concept plans and other study documents available at the time of the VE Study to develop design suggestions for the project. The objective is to identify opportunities and recommend concepts that may increase value in terms of capital cost improvements, improve constructability providing basic functional requirements of the project. The final VE Report documenting the proposals and design suggestions was issued November 2016 and is available under separate cover.

**Table 8.4 | SunRail Extension to OIA (Phase 3) Capital Cost Estimate Summary**

**Main Worksheet Phase 3 Build 2018 Draft Summary (\$2015)  
"30 Minute ML, 15 Minute OIA Extension Peak Hour Headways - May 2018"**

| <b>FTA Category No.</b> | <b>Description</b>                            | <b>2015 Base Year Cost W/O Contingency</b> | <b>2015 Allocated &amp; Unallocated Contingency</b> |               | <b>2015 Estimate With Contingency</b> |
|-------------------------|---|--|---|---------------|---------------------------------------|
| 10                      | Guideway and Track Elements                   | \$36,861,190                               | \$11,903,357  | 32.3%         | \$48,764,547                          |
| 20                      | Stations, Stops, Terminals, Intermodals       | \$10,284,780                               | \$3,085,434   | 30.0%         | \$13,370,214                          |
| 30                      | Support Facilities: Yards, Shops, Admin Bldgs | \$0  | \$0   | 0.0%          | \$0                                   |
| 40                      | Sitework & Special Conditions                 | \$14,253,415                               | \$4,276,024   | 30.0%         | \$18,529,439                          |
| 50                      | Systems                                       | \$17,148,980                               | \$5,144,694   | 30.0%         | \$22,293,673                          |
|                         | <b>Construction Subtotal (10-50)</b>          | <b>\$78,548,364</b>                        | <b>\$24,409,509</b>                                 | <b>31.1%</b>  | <b>\$102,957,873</b>                  |
| 60                      | Right-Of-Way, Land, Existing Improvements     | \$37,984,000                               | \$11,395,200  | 30.0%         | \$49,379,200                          |
| 70                      | Vehicles                                      | \$35,417,193                               | \$7,018,352   | 19.8%         | \$42,435,544                          |
| 80                      | Professional Services                         | \$32,203,025                               | \$8,105,599   | 25.2%         | \$40,308,624                          |
|                         | <b>Subtotal (Sum Categories 10-80)</b>        | <b>\$184,152,581</b>                       | <b>\$50,928,660</b>                                 | <b>27.66%</b> | <b>\$235,081,241</b>                  |
| 90                      | Unallocated Contingency (% Of Base Cost)      |  | \$21,000,000  | 11.40%        | \$21,000,000                          |
|                         | <b>Subtotal (Sum Categories 10-90)</b>        | <b>\$184,152,581</b>                       | <b>\$71,928,660</b>                                 | <b>39.06%</b> | <b>\$256,081,241</b>                  |
| 100                     | Finance Charges                               |  |   |               | \$900,000                             |
|                         | <b>TOTAL</b>                                  | <b>\$184,152,581</b>                       | <b>\$71,928,660</b>                                 | <b>39.06%</b> | <b>\$256,981,241</b>                  |

**Notes: The following is a list of Phases 3 project capital cost notes and items to be provided by others:**

- 1 Connector platform elements at the OIA South Airport Passenger Drop-Off Lobby (Platforms, Guideways, Track, Structural enhancements, furnishings, amenities, etc.) This estimate assumes cost of track & guideway up to the roof edge and does not include any costs to modify the platform on the roof or strengthen the structure supporting the roof.
- 2 Improvements to existing SunRail stations to accommodate long term parking.
- 3 Improvements to the existing OUC track beyond what is required to provide the "connector service" on an adjacent track.
- 4 Cost associated with improvements to remainder parcels (replacement storage track, new water, new sewer, new turnouts, etc.) associated with the transfer station.
- 5 Improvements to the existing SunRail VSMF to store/maintain additional vehicles.
- 6 Costs associated with rerouting LYNX buses to provide service to the new transfer station.
- 7 Cost to address remediation of potential hazardous materials.
- 8 Cost to provide connections to the Brightline (d/b/a All Aboard Florida facilities).
- 9 Phase 3 costs for the integration of PTC into the existing CFRC System – CFRC Dispatch/Backoffice Systems has not yet been determined and costs cannot be estimated for integration of Phase 3 into an unknown system.
- 10 New rolling stock (locomotives, Passenger Coach, etc.) projected from 2011 costs
- 11 Costs associated with relocating or modifying the gas pipeline at Sta 603+00
- 12 Estimates, opinions of probable construction or implementation costs, financial evaluations, feasibility studies or economic analyses prepared by Engineer will represent its best judgment based on its experience and available information. The Client recognizes that Engineer has no control over costs of labor, materials, equipment or services furnished by others or over market conditions or contractors' methods of determining prices, and that any evaluation of a facility to be constructed or work to be performed is speculative. Accordingly, Engineer does not guaranty that proposals, bids or actual costs will not vary from opinions, evaluations or studies submitted by Engineer.

The VE Team generated 26 ideas of which two were determined to be design suggestions identified during the Creative Ideas phase of the VE process. The VE Team ultimately categorized 12 ideas as recommendations that should be further investigated. Of these recommendations, in coordination with FDOT, seven were rejected and three were incorporated into further development of the concept plans. Of the remaining two recommendations, the following are identified for further study based on additional coordination with OUC and OIA as the project proceeds into final design:

Comment: For the section between 440 and 500+/- can the existing track be used versus new track

Response: The limits of the shared OUC track were established through coordination with OUC, their operational concerns and based on the RTC runs provided by the GEC. Additional coordination with OUC and revised RTC runs are required based on the need for 10 minute turn around times.

Comment: Increase the approach grade for the ITF from 2.5% to 3% and shift the start of grade to the north

Response: Current design of 2.5% grade was coordinated with FDOT in review of plans. Maximizing grade and minimizing vertical curve lengths to extremes are not generally desirable until the project is more defined. A higher grade may have impact to power needs, rider comfort, design of safe braking distances and bumping post at the ITF station. Additional costs in track maintenance may occur with additional forces on track due to deceleration/acceleration from stopping and starting on steeper sloped grades in close proximity to the ITF station. A change would also require an update to the CFRC Design Criteria.

These remaining VE Team recommendations will be further evaluated during design.

## **9.0 LIST OF TECHNICAL REPORTS**

In preparation of the Categorical Exclusion and this Preliminary Engineering Report, the following supporting documentation has been prepared and is available upon request.

- Existing Conditions Report
- Purpose and Need Statement
- Vehicle Storage Maintenance Facility Report
- Conceptual Design Plans/Profiles
- Operations Plans
- Maintenance of Traffic Plans
- Value Engineering Information Report
- Capital and O&M Cost Methodology and Results Report
- Right of Way Parcel Plans
- Drainage Summary Technical Memorandum
- Cultural Resource Assessment Desktop Technical Memorandum
- Natural Environmental Report
- Noise and Vibration Technical Report
- Air Quality Report
- Contamination Screening Evaluation Report
- Class of Action Determination
- Documented Categorical Exclusion

**Appendix A | Conceptual Design Plans – September 26<sup>th</sup>, 2016**

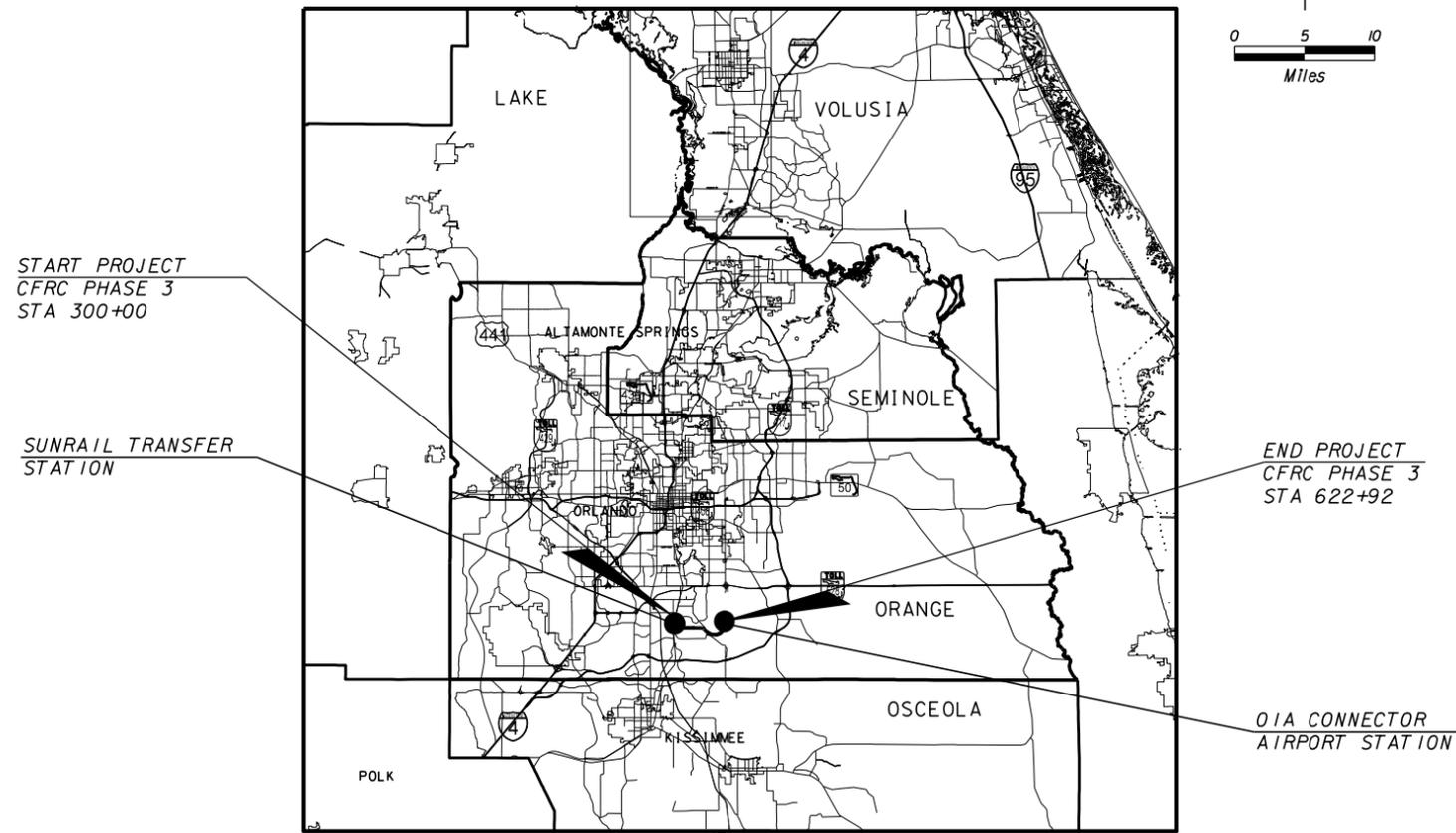
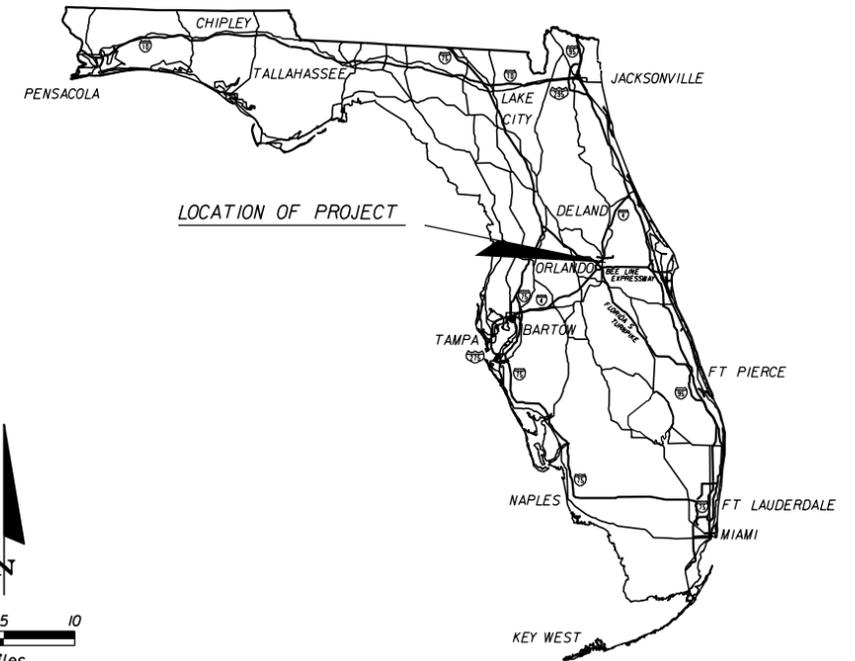
SHEET NAME                      SHEET NO.  
 TYPICAL SECTIONS              TI-T2  
 PLAN AND PROFILE              I-12  
 TRAFFIC CONTROL PLANS      TCP 01 - TCP 02

**STATE OF FLORIDA**  
**DEPARTMENT OF TRANSPORTATION**

**CONTRACT PLANS**

FINANCIAL PROJECT ID 429215-2-22-01  
 (FEDERAL TRANSIT ADMINISTRATION FUNDS)  
 ORANGE COUNTY (75)

CENTRAL FLORIDA COMMUTER RAIL TRANSIT  
 PHASE 3 OIA CONNECTOR



PLANS PREPARED BY:  
 AECOM TECHNICAL SERVICES, INC.  
 315 EAST ROBINSON STREET, SUITE 245  
 ORLANDO, FL. 32801  
 PHONE (407) 422-0353  
 CERTIFICATE OF AUTHORIZATION # 8115 www.aecom.com  
 CONTRACT # C-8714  
 VENDOR # 952661922-011

NOTE: THE SCALE OF THESE PLANS MAY  
 HAVE CHANGED DUE TO REPRODUCTION.

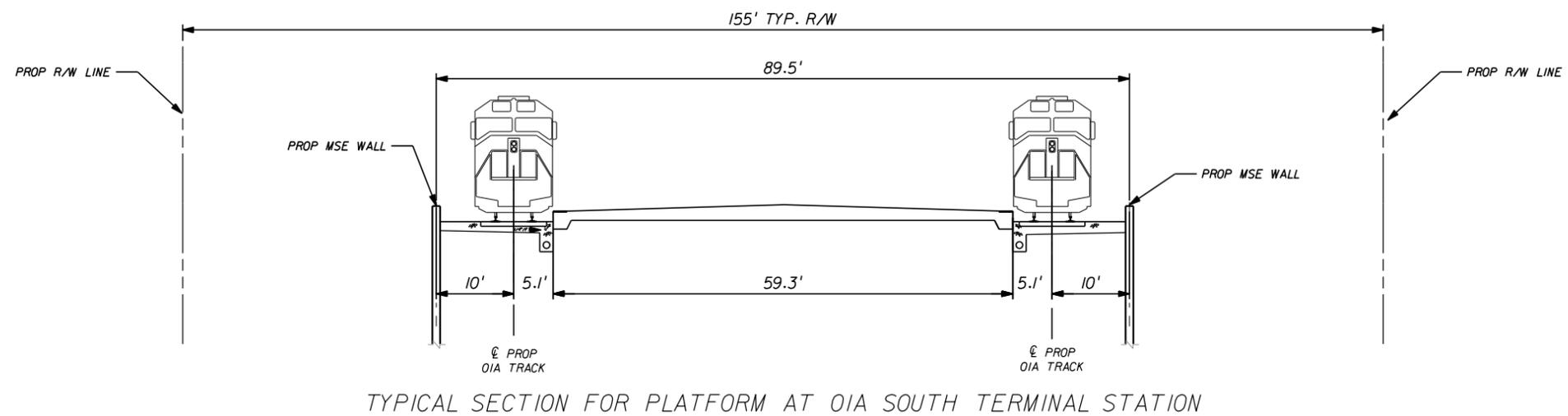
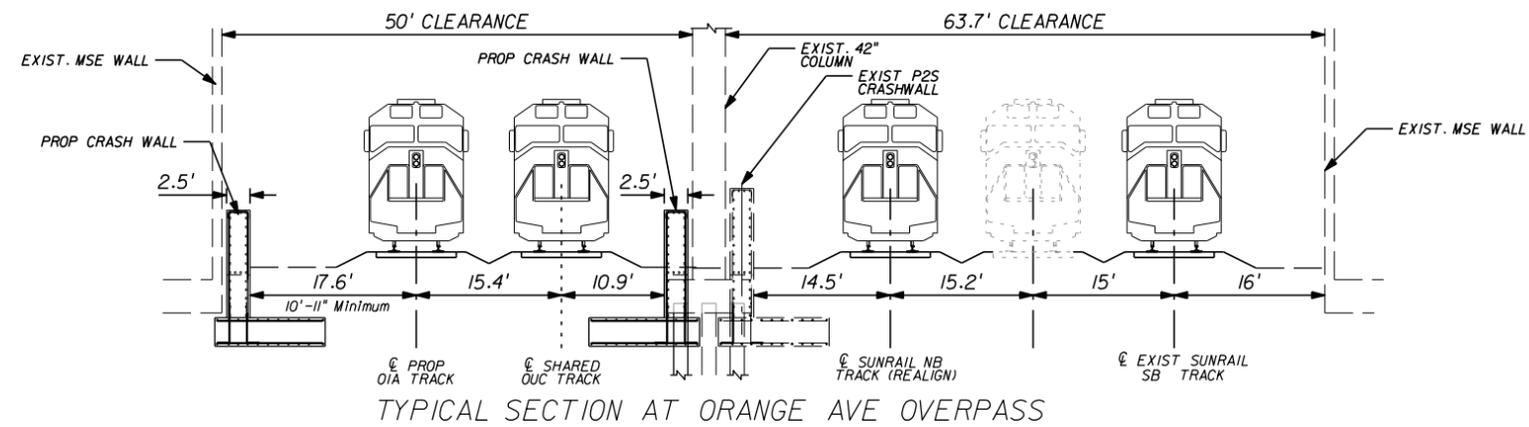
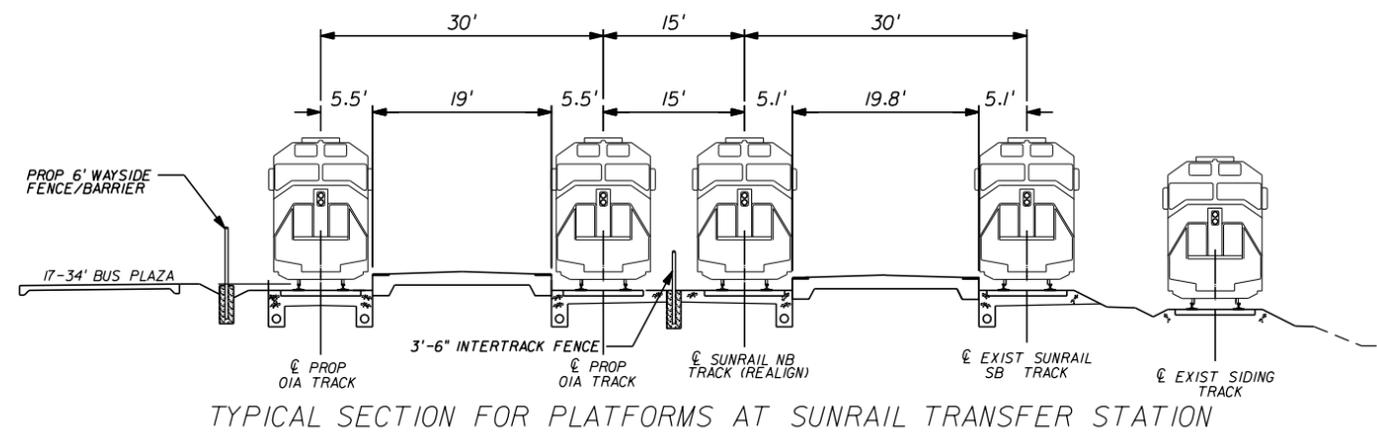
GOVERNING STANDARDS:  
 CENTRAL FLORIDA RAIL CORRIDOR  
 MAINTENANCE OF WAY INSTRUCTIONS, DATED 2015  
 CENTRAL FLORIDA RAIL CORRIDOR  
 SIGNAL DESIGN INSTRUCTIONS, DATED 2015:  
 FLORIDA DEPARTMENT OF TRANSPORTATION,  
 2016 DESIGN STANDARDS  
 FLORIDA DEPARTMENT OF TRANSPORTATION,  
 STANDARD SPECIFICATIONS FOR ROAD AND  
 BRIDGE CONSTRUCTION DATED 2016,  
 AS AMENDED BY CONTRACT DOCUMENTS.  
 DESIGN CRITERIA FOR THE CENTRAL FLORIDA  
 COMMUTER RAIL TRANSIT PROJECT  
 REV. 3 DATED 6-15-2015  
 APPLICABLE DESIGN STANDARDS MODIFICATIONS: 12-15-15  
 For Design Standards Modifications click on  
 "Design Standards" at the following web site:  
<http://www.dot.state.fl.us/rddesign/>

| LENGTH OF PROJECT       |             |       |
|-------------------------|-------------|-------|
|                         | LINEAR FEET | MILES |
| ROADWAY                 | N/A         | N/A   |
| BRIDGES                 | N/A         | N/A   |
| NET LENGTH OF PROJECT   | N/A         | N/A   |
| EXCEPTIONS              | N/A         | N/A   |
| GROSS LENGTH OF PROJECT | 32292       | 6.12  |

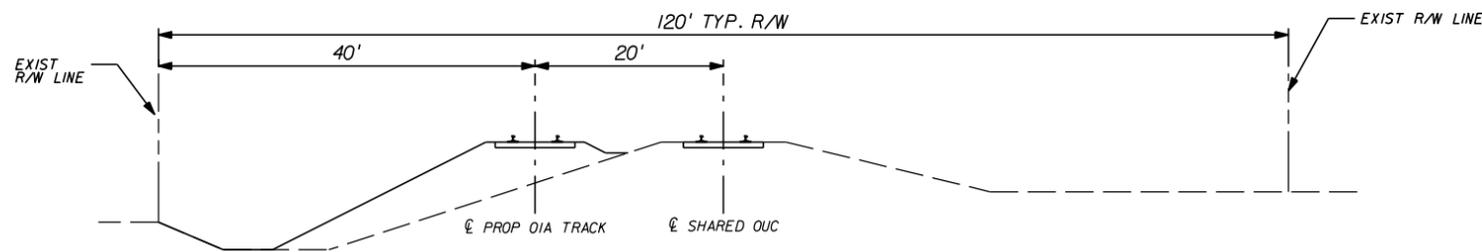
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|---------------------|----|-------------|
| DATE                | BY | DESCRIPTION |
|                     |    |             |

FDOT PROJECT MANAGER: TY GARNER

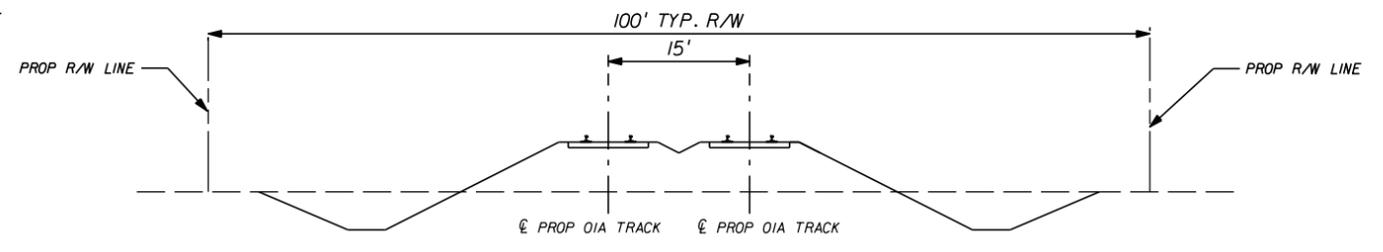
CONCEPTUAL DESIGN PLANS  
 SEPTEMBER 26, 2016



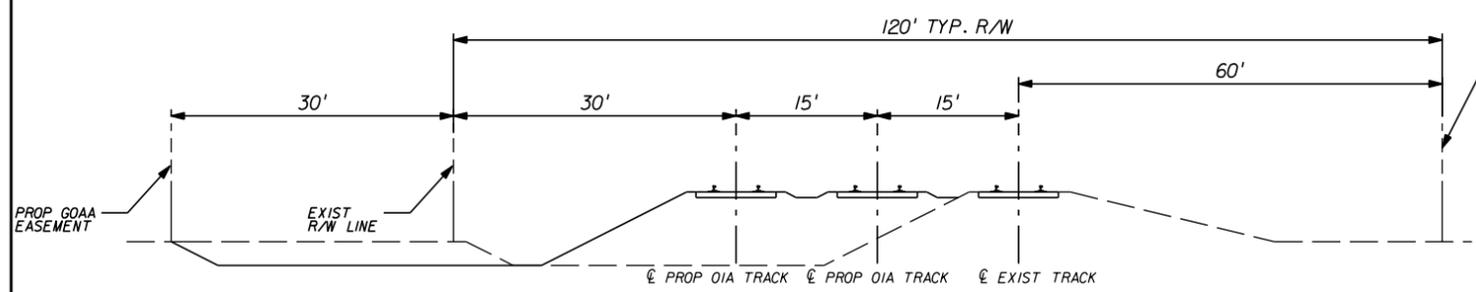
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|-----------|-------------|----------------------|--|--|--|--|--|-----------|--------|----------------------|---------|--------|----------------|----|
| DATE      | DESCRIPTION | DATE                 | DESCRIPTION                                  | DEPARTMENT OF TRANSPORTATION   |  |  |  |           |        |                      |         |        |                |    |
|           |             |                      | CONCEPTUAL DESIGN PLANS NOT FOR CONSTRUCTION | AECOM TECHNICAL SERVICES, Inc.<br>315 East Robinson Street<br>Suite 245<br>Orlando, FL 32801-1949, USA<br>T: +1-407-422-0353<br>Certificate of Authorization No. 8115<br>www.aecom.com |  |  | <table border="1"> <tr> <th>ROAD NO.</th> <th>COUNTY</th> <th>FINANCIAL PROJECT ID</th> </tr> <tr> <td>CFRC P3</td> <td>ORANGE</td> <td>429215-2-22-01</td> </tr> </table> | ROAD NO.  | COUNTY | FINANCIAL PROJECT ID | CFRC P3 | ORANGE | 429215-2-22-01 | T1 |
| ROAD NO.  | COUNTY      | FINANCIAL PROJECT ID |  |  |  |  |  |           |        |                      |         |        |                |    |
| CFRC P3   | ORANGE      | 429215-2-22-01       |  |  |  |  |  |           |        |                      |         |        |                |    |



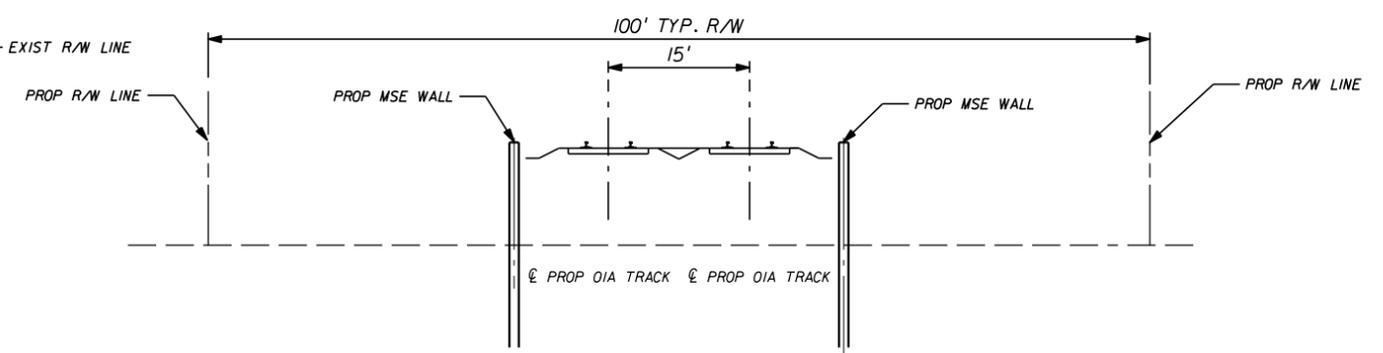
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OUC TRACK W/ NEW SINGLE TRACK



PROPOSED TYPICAL SECTION  
NEW DOUBLE TRACK



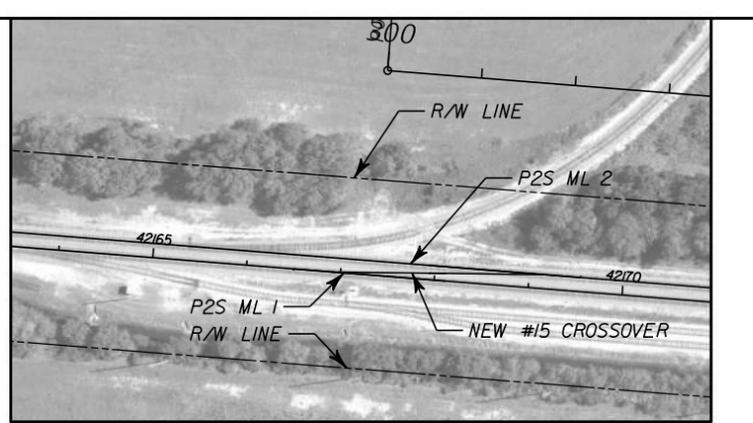
PROPOSED TYPICAL SECTION  
EXISTING OUC TRACK W/ NEW DOUBLE TRACK



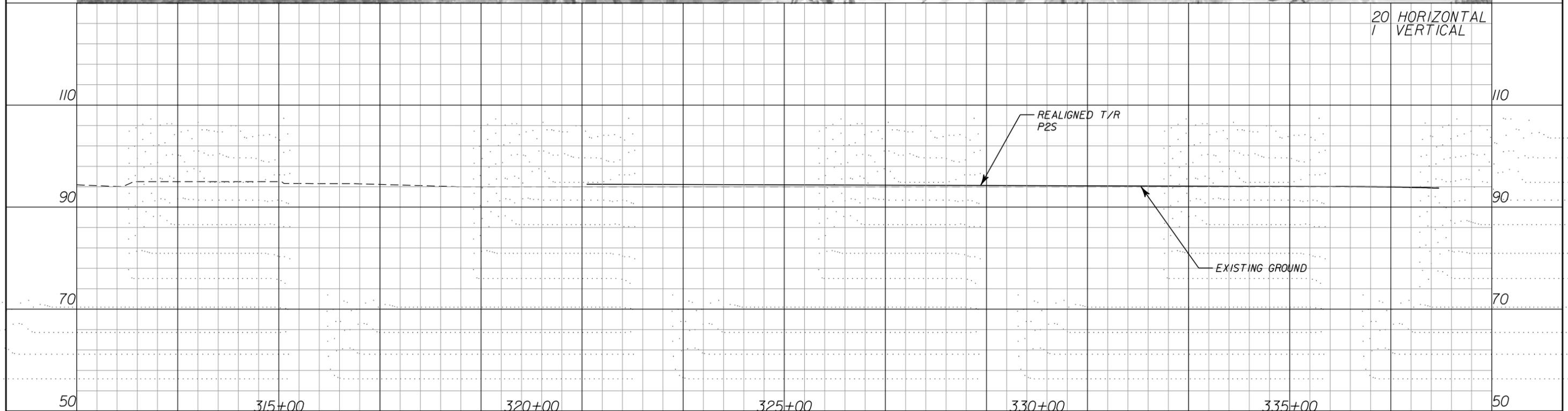
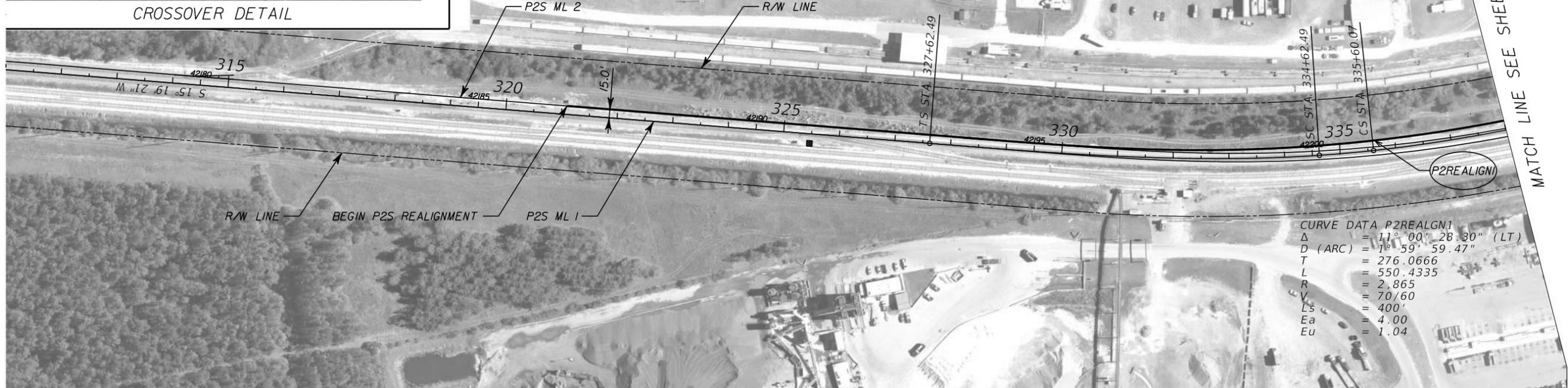
PROPOSED TYPICAL SECTION  
NEW DOUBLE TRACK W/MSE WALL

| REVISIONS |             | TRANSPORTATION |  | STATE OF FLORIDA             |        |                      | CENTRAL FLORIDA COMMUTER RAIL TRANSIT (CFCRT) PHASE 3 | SHEET NO. |
|-----------|-------------|----------------|--|------------------------------|--------|----------------------|---|-----------|
| DATE      | DESCRIPTION | DATE           | DESCRIPTION                                  | DEPARTMENT OF TRANSPORTATION |        |                      | TYPICAL SECTIONS                                      | NO.       |
|           |             |                |  | ROAD NO.                     | COUNTY | FINANCIAL PROJECT ID |   |           |
|           |             |                | CONCEPTUAL DESIGN PLANS NOT FOR CONSTRUCTION | CFRC P3                      | ORANGE | 429215-2-22-01       |   | T2        |

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CROSSOVER DETAIL



| REVISIONS |             | DESCRIPTION |   |
|-----------|-------------|-------------|---|
| DATE      | DESCRIPTION | DATE        | DESCRIPTION                                     |
|           |             |             | CONCEPTUAL DESIGN PLANS<br>NOT FOR CONSTRUCTION |

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| STATE OF FLORIDA<br>DEPARTMENT OF TRANSPORTATION |        |                      |
|--|--------|----------------------|
| ROAD NO.   | COUNTY | FINANCIAL PROJECT ID |
| CFRC P3  | ORANGE | 429215-2-22-01       |

CENTRAL FLORIDA COMMUTER RAIL TRANSIT (CFCRT) PHASE 3  
**OIA CONNECTOR**  
**PLAN AND PROFILE**

SHEET NO.  
1

MATCH LINE SEE SHEET 1

MATCH LINE SEE SHEET 3

CURVE DATA O1AML11  
 $\Delta = 0^\circ 57' 08''$  (RT)  
 $D$  (ARC) =  $0^\circ 52' 53''$   
 $T = 54.02$   
 $L = 108.03$   
 $R = 6,500.00$   
 $V = 55/55$   
 $Ls = 100'$   
 $Ea = 1.00''$   
 $Eu = 0.87''$

CURVE DATA O1AML12  
 $\Delta = 15^\circ 15' 02''$  (LT)  
 $D$  (ARC) =  $6^\circ 32' 53''$   
 $T = 117.14$   
 $L = 232.90$   
 $R = 875.00$   
 $V = 20/20$   
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 $Ea = 0.50''$   
 $Eu = 1.33''$

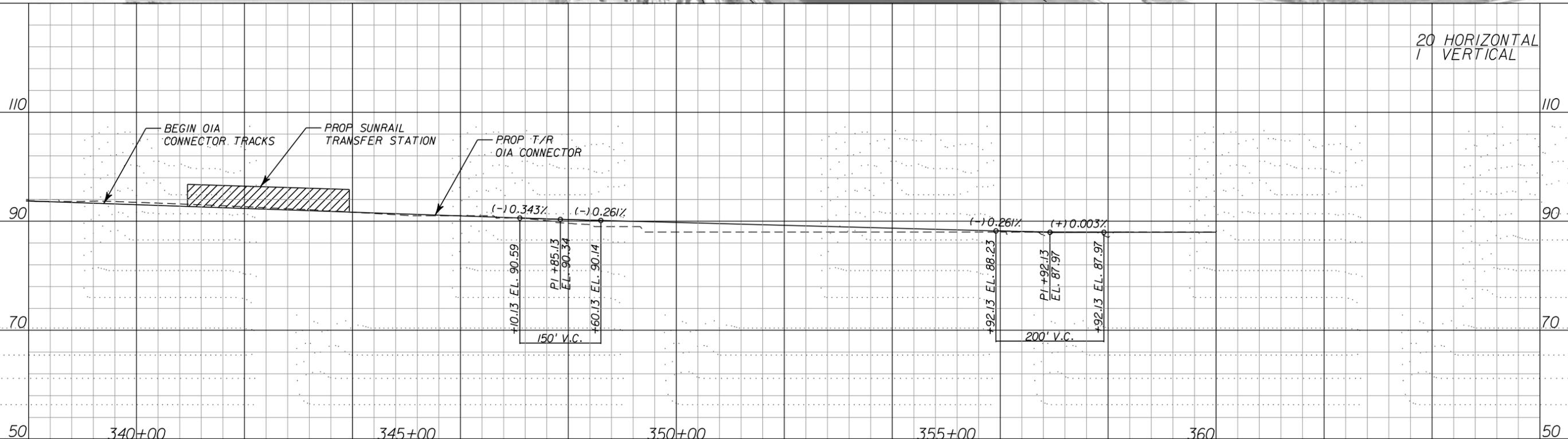
CURVE DATA O1AML13  
 $\Delta = 63^\circ 10' 16''$  (LT)  
 $D$  (ARC) =  $3^\circ 10' 59''$   
 $T = 1,106.74$   
 $L = 1,984.57$   
 $R = 1,800.00$   
 $V = 25/25$   
 $Ls = 100'$   
 $Ea = 0.50''$   
 $Eu = 0.89''$

CURVE DATA P3OUC1  
 $\Delta = 13^\circ 16' 57''$  (LT)  
 $D$  (ARC) =  $6^\circ 11' 39''$   
 $T = 107.70$   
 $L = 214.44$   
 $R = 925.00$   
 $V = 20/20$   
 $Ls = 100'$   
 $Ea = 0.50''$   
 $Eu = 1.23''$

CURVE DATA P3OUC2  
 $\Delta = 63^\circ 40' 37''$  (LT)  
 $D$  (ARC) =  $3^\circ 09' 56''$   
 $T = 1,123.93$   
 $L = 2,011.58$   
 $R = 1,810.00$   
 $V = 30/30$   
 $Ls = 100'$   
 $Ea = 0.50''$   
 $Eu = 1.50''$

CURVE DATA P2REALGN2  
 $\Delta = 2^\circ 14' 01''$  (RT)  
 $D$  (ARC) =  $0^\circ 30' 00''$   
 $T = 223.36$   
 $L = 446.66$   
 $R = 11,458.00$   
 $V = 55/55$   
 $Ls = 0'$   
 $Ea = 0''$   
 $Eu = 1.06''$

CURVE DATA P2REALGN3  
 $\Delta = 2^\circ 03' 10''$  (LT)  
 $D$  (ARC) =  $0^\circ 30' 00''$   
 $T = 205.29$   
 $L = 410.53$   
 $R = 11,458.00$   
 $V = 55/55$   
 $Ls = 0'$   
 $Ea = 0''$   
 $Eu = 1.06''$



| REVISIONS |             | TRANSPORTATION |             | STATE OF FLORIDA             |        |                      | CENTRAL FLORIDA COMMUTER RAIL TRANSIT (CFCRT) PHASE 3 | SHEET NO. |
|-----------|-------------|----------------|-------------|------------------------------|--------|----------------------|---|-----------|
| DATE      | DESCRIPTION | DATE           | DESCRIPTION | DEPARTMENT OF TRANSPORTATION |        |                      |   |           |
|           |             |                |             | ROAD NO.                     | COUNTY | FINANCIAL PROJECT ID | OIA CONNECTOR<br>PLAN AND PROFILE                     | 2         |
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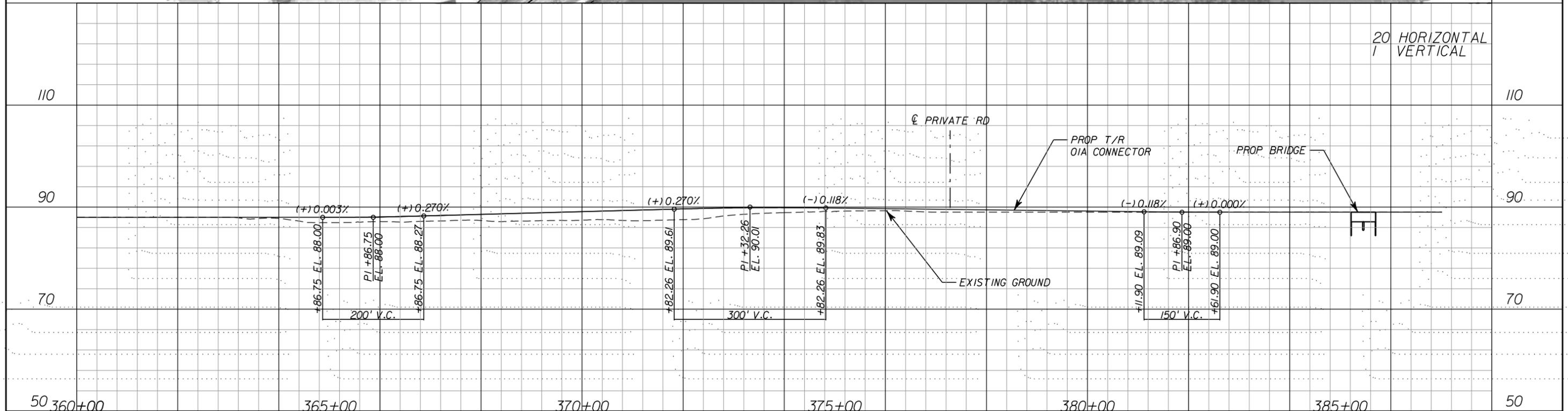
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 $R = 1,810.00$   
 $V = 30/30$   
 $Ls = 100'$   
 $Ea = 0.50''$   
 $Eu = 1.50''$

CURVE DATA O1AML13  
 $\Delta = 63^\circ 10' 16''$  (LT)  
 $D$  (ARC) =  $3^\circ 10' 59''$   
 $T = 1,106.74$   
 $L = 1,984.57$   
 $R = 1,800.00$   
 $V = 25/25$   
 $Ls = 100'$   
 $Ea = 0.50''$   
 $Eu = 0.89''$



MATCH LINE SEE SHEET 2

MATCH LINE SEE SHEET 4



20 HORIZONTAL  
1 VERTICAL

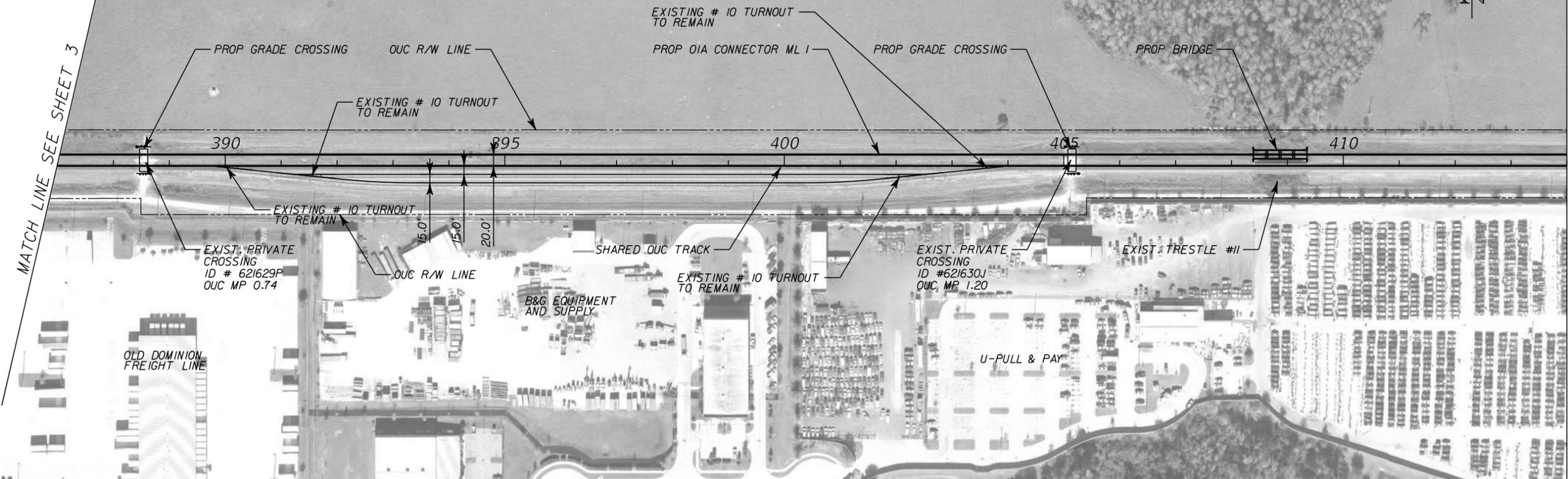
| REVISIONS |             | DESCRIPTION |   | TRANSPORTATION<br>AECOM TECHNICAL SERVICES, Inc.<br>315 East Robinson Street<br>Suite 245<br>Orlando, FL 32801-1949, USA<br>T +1-407-422-0353<br>Certificate of Authorization No. 8115<br>www.aecom.com | STATE OF FLORIDA<br>DEPARTMENT OF TRANSPORTATION |        |                      | CENTRAL FLORIDA COMMUTER RAIL TRANSIT (CFCRT) PHASE 3<br>OIA CONNECTOR<br>PLAN AND PROFILE | SHEET<br>NO.<br>3 |
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| DATE      | DESCRIPTION | DATE        | DESCRIPTION                                     |   | ROAD NO.   | COUNTY | FINANCIAL PROJECT ID |  |                   |
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1" = 200'

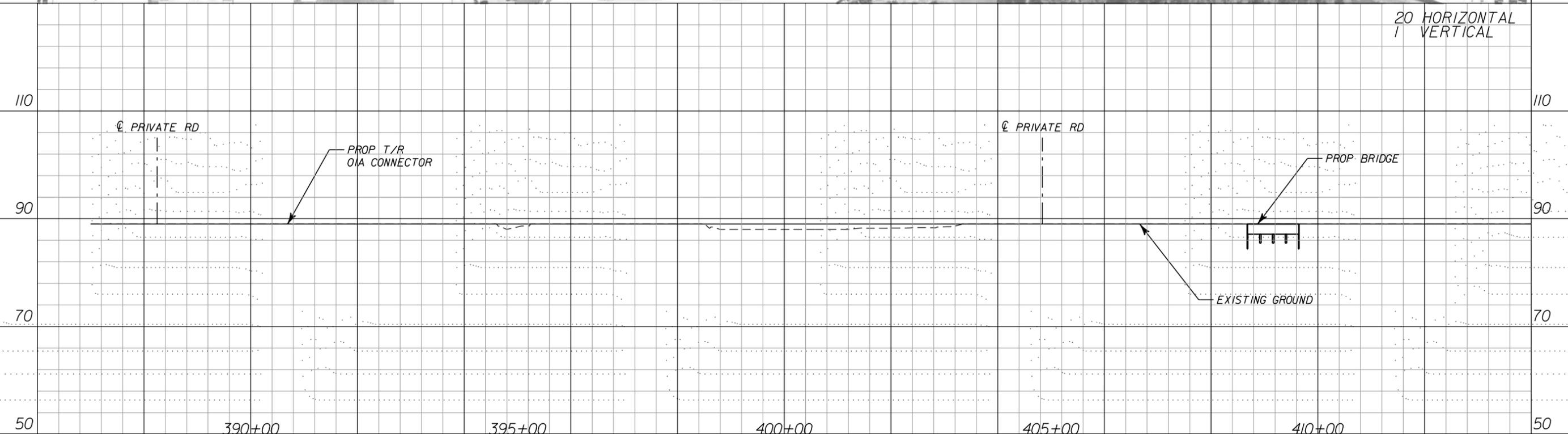


MATCH LINE SEE SHEET 3

MATCH LINE SEE SHEET 5



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1 VERTICAL



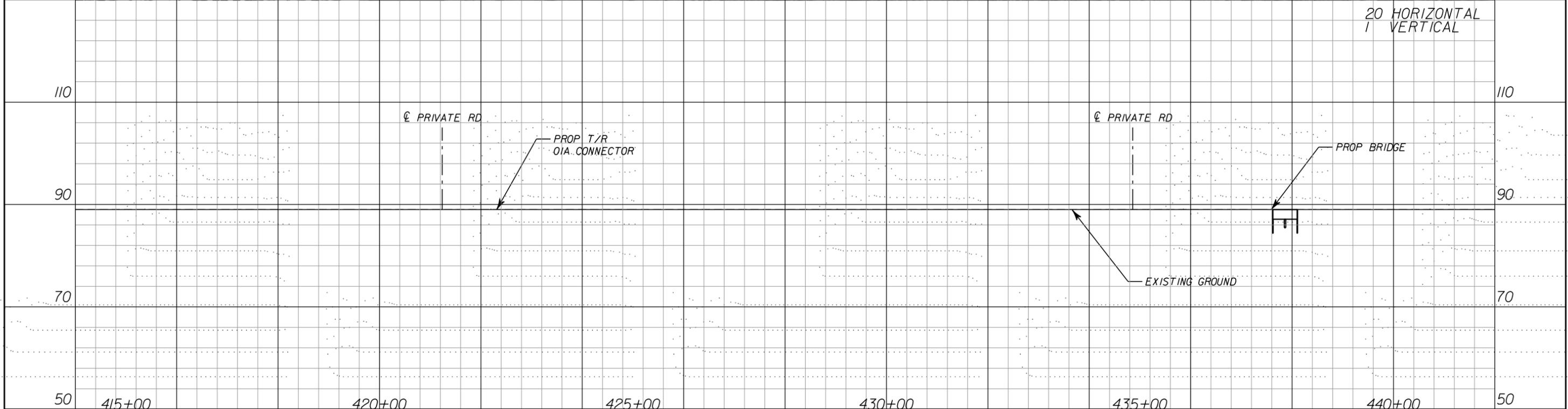
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| DATE      | DESCRIPTION | DATE        | DESCRIPTION                                     |
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|--|--------|----------------------|
| ROAD NO.   | COUNTY | FINANCIAL PROJECT ID |
| CFRC P3  | ORANGE | 429215-2-22-01       |

**CENTRAL FLORIDA COMMUTER RAIL TRANSIT (CFCRT) PHASE 3**  
**OIA CONNECTOR**  
**PLAN AND PROFILE**

SHEET  
NO.  
4



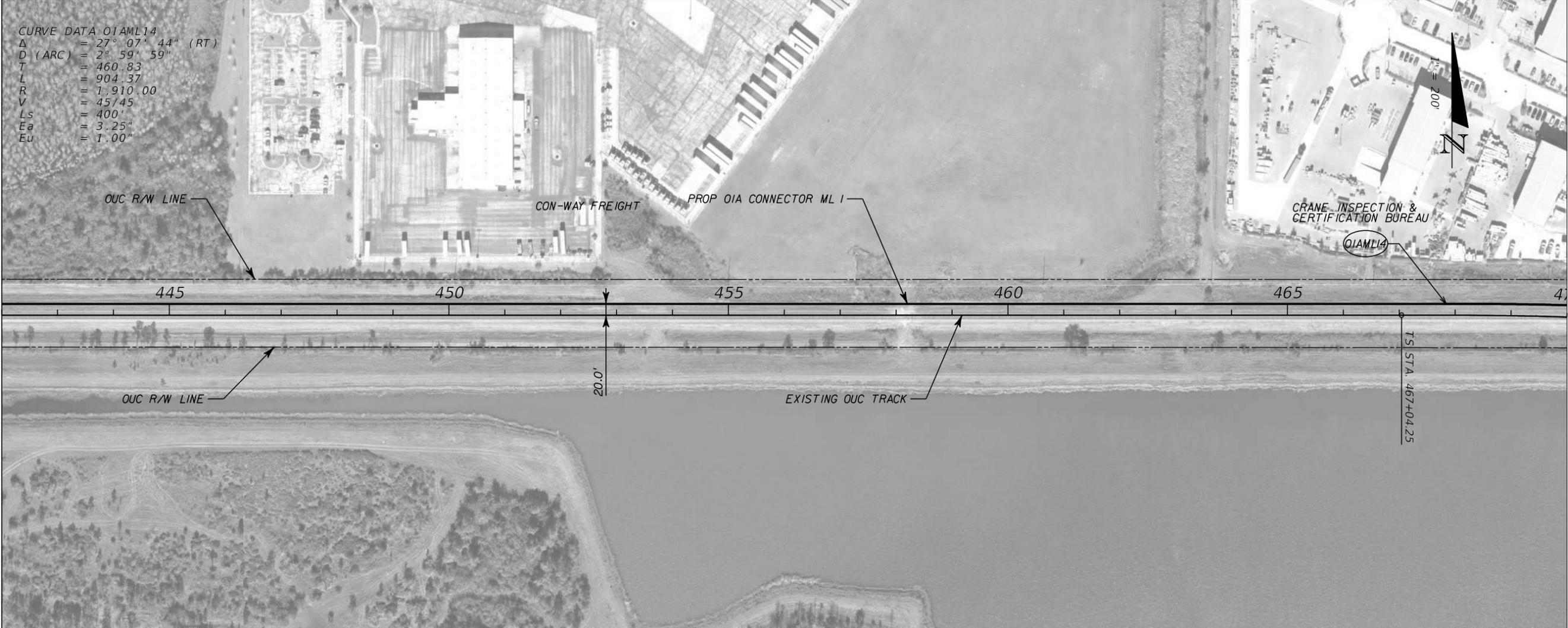
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|---|-------------|----------------------|-------------|------|-------------|--|--|--|--|--|--|----------|--------|----------------------|---------|--------|----------------|--|---------------------------------|
| DATE  | DESCRIPTION | DATE                 | DESCRIPTION |      |             |  |  |  |  |  |  |          |        |                      |         |        |                |  |                                 |
|   |             |                      |             |      |             |  |  |  |  |  |  |          |        |                      |         |        |                |  |                                 |
| ROAD NO.  | COUNTY      | FINANCIAL PROJECT ID |             |      |             |  |  |  |  |  |  |          |        |                      |         |        |                |  |                                 |
| CFRC P3   | ORANGE      | 429215-2-22-01       |             |      |             |  |  |  |  |  |  |          |        |                      |         |        |                |  |                                 |

CURVE DATA 01AML14  
 $\Delta = 27^\circ 07' 44''$  (RT)  
 $D$  (ARC) =  $2^\circ 59' 59''$   
 $T = 460.83$   
 $L = 904.37$   
 $R = 1,910.00$   
 $V = 45/45$   
 $L_s = 400'$   
 $E_a = 3.25''$   
 $E_u = 1.00''$



MATCH LINE SEE SHEET 5

MATCH LINE SEE SHEET 7



| REVISIONS |             |
|-----------|-------------|
| DATE      | DESCRIPTION |
|           |             |

TRANSPORTATION  
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 Orlando, FL 32801-1949, USA  
 T +1-407-422-0353  
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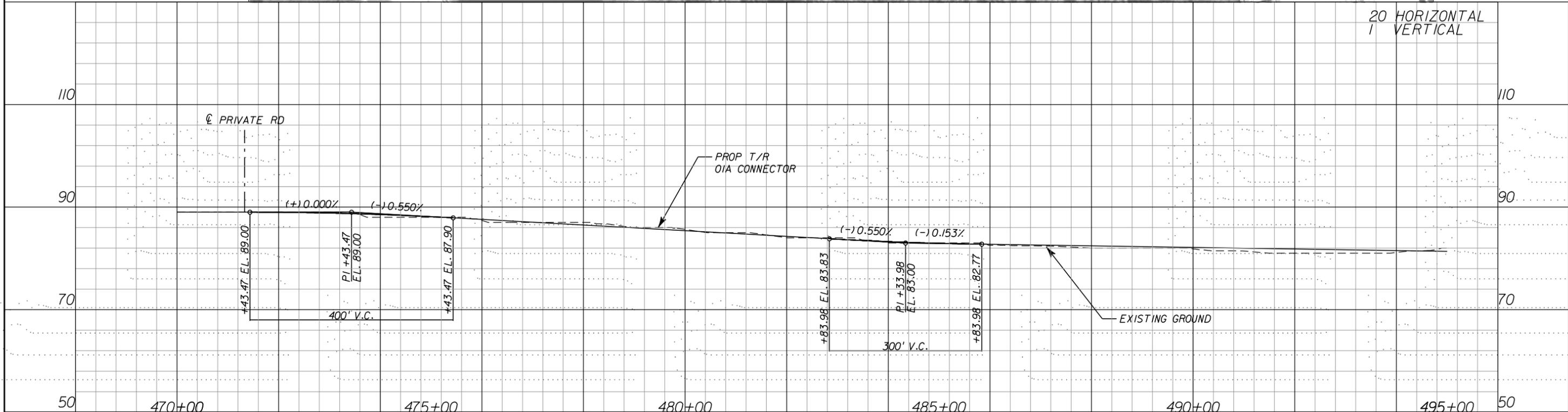
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| STATE OF FLORIDA<br>DEPARTMENT OF TRANSPORTATION |        |                      |
| ROAD NO.   | COUNTY | FINANCIAL PROJECT ID |
| CFRC P3  | ORANGE | 429215-2-22-01       |

**CENTRAL FLORIDA COMMUTER RAIL TRANSIT (CFCRT) PHASE 3**  
**OIA CONNECTOR**  
**PLAN AND PROFILE**

SHEET NO.  
6



| CURVE DATA P30UC3 |                    | CURVE DATA O1AML14 |                    |
|-------------------|--------------------|--------------------|--------------------|
| Δ                 | = 18° 58' 41" (RT) | Δ                  | = 27° 07' 44" (RT) |
| D (ARC)           | = 3° 15' 00"       | D (ARC)            | = 2° 59' 59"       |
| T                 | = 294.67           | T                  | = 460.83           |
| L                 | = 583.94           | L                  | = 904.37           |
| R                 | = 1,762.95         | R                  | = 1,910.00         |
| V                 | = 45/45            | V                  | = 45/45            |
| Ls                | = 620'             | Ls                 | = 400'             |
| Ea                | = 3.50"            | Ea                 | = 3.25"            |
| Eu                | = 1.11"            | Eu                 | = 1.00"            |



20 HORIZONTAL  
1 VERTICAL

| DATE |  | DESCRIPTION |  | REVISIONS |  | DESCRIPTION                                     |  | TRANSPORTATION  |  | STATE OF FLORIDA             |  | CENTRAL FLORIDA COMMUTER RAIL TRANSIT (CFCRT) PHASE 3 |  | SHEET NO. |  |
|------|--|-------------|--|-----------|--|---|--|---|--|------------------------------|--|---|--|-----------|--|
|      |  |             |  |           |  | CONCEPTUAL DESIGN PLANS<br>NOT FOR CONSTRUCTION |  | AECOM TECHNICAL SERVICES, Inc.<br>315 East Robinson Street<br>Suite 245<br>Orlando, FL 32801-1949, USA<br>T +1-407-422-0353<br>Certificate of Authorization No. 8115<br>www.aecom.com |  | DEPARTMENT OF TRANSPORTATION |  | ROAD NO. COUNTY FINANCIAL PROJECT ID                  |  | 7         |  |
|      |  |             |  |           |  |   |  |   |  | CFRC P3 ORANGE               |  | 429215-2-22-01  |  |           |  |

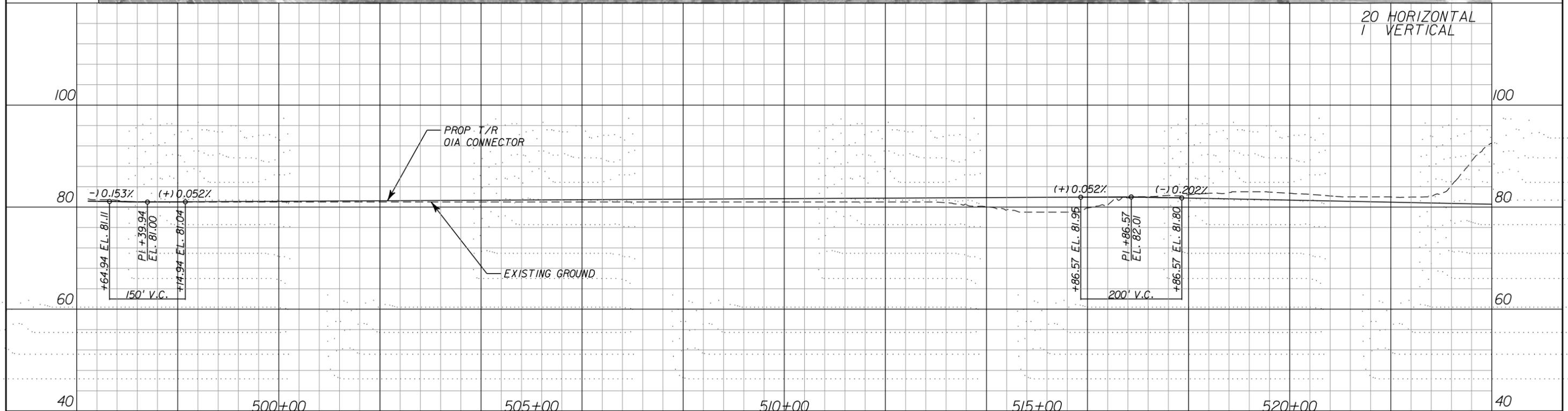
CURVE DATA 01AML21  
 $\Delta = 3^\circ 49' 06''$  (RT)  
 $D$  (ARC) = 76.40  
 $L = 152.75$   
 $R = 2,292.01$   
 $V = 25/25$   
 $Ls = 0'$   
 $Ea = 0.00''$   
 $Eu = 1.09''$

CURVE DATA 01AML15  
 $\Delta = 12^\circ 58' 34''$  (LT)  
 $D$  (ARC) = 202.20  
 $L = 402.66$   
 $R = 1,777.95$   
 $V = 45/45$   
 $Ls = 623'$   
 $Ea = 3.25''$   
 $Eu = 1.32''$

CURVE DATA 01AML22  
 $\Delta = 12^\circ 53' 24''$  (LT)  
 $D$  (ARC) = 199.15  
 $L = 396.61$   
 $R = 1,762.95$   
 $V = 45/45$   
 $Ls = 620'$   
 $Ea = 3.25''$   
 $Eu = 1.36''$

MATCH LINE SEE SHEET 7

MATCH LINE SEE SHEET 9



20 HORIZONTAL  
1 VERTICAL

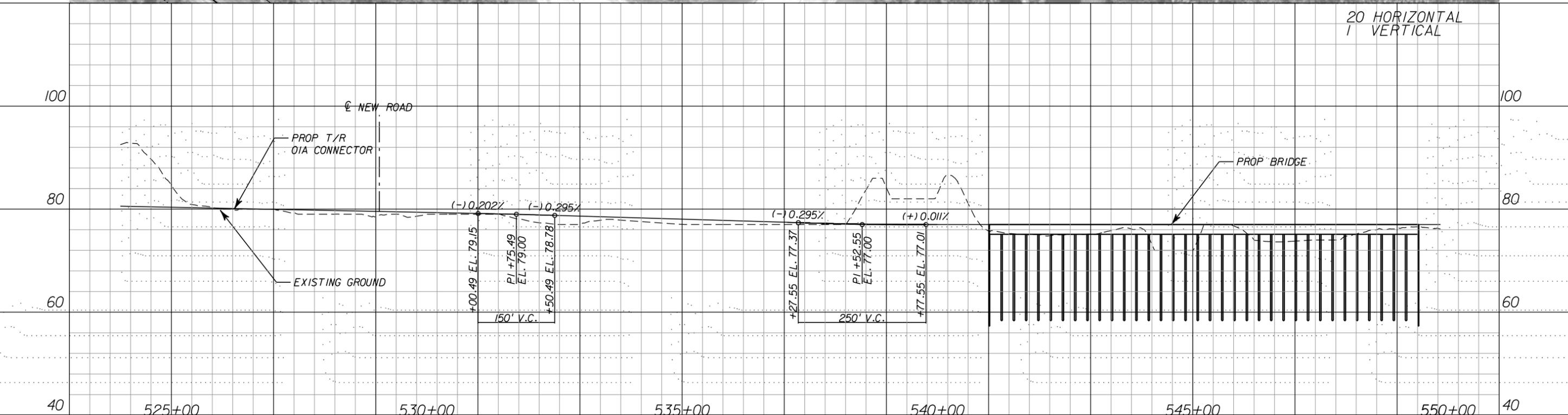
| REVISIONS |             |
|-----------|-------------|
| DATE      | DESCRIPTION |
|           |             |

TRANSPORTATION  
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| STATE OF FLORIDA<br>DEPARTMENT OF TRANSPORTATION |        |                      |
|--|--------|----------------------|
| ROAD NO.   | COUNTY | FINANCIAL PROJECT ID |
| CFRC P3  | ORANGE | 429215-2-22-01       |

**CENTRAL FLORIDA COMMUTER RAIL TRANSIT (CFCRT) PHASE 3**  
**OIA CONNECTOR**  
**PLAN AND PROFILE**

SHEET NO.  
8



|   |  |   |   |  |  |                   |
|---|--|---|---|--|--|-------------------|
| REVISIONS<br>DATE DESCRIPTION DATE DESCRIPTION  |  | TRANSPORTATION<br><b>AECOM TECHNICAL SERVICES, Inc.</b><br>315 East Robinson Street<br>Suite 245<br>Orlando, FL 32801-1949, USA<br>T: +1-407-422-0353<br>Certificate of Authorization No. 8115<br>www.aecom.com | STATE OF FLORIDA<br>DEPARTMENT OF TRANSPORTATION                      |  | CENTRAL FLORIDA COMMUTER RAIL TRANSIT (CFCRT) PHASE 3<br><b>OIA CONNECTOR</b><br><b>PLAN AND PROFILE</b> | SHEET<br>NO.<br>9 |
| CONCEPTUAL DESIGN PLANS<br>NOT FOR CONSTRUCTION |  |   | ROAD NO. COUNTY FINANCIAL PROJECT ID<br>CFRC P3 ORANGE 429215-2-22-01 |  |  |                   |

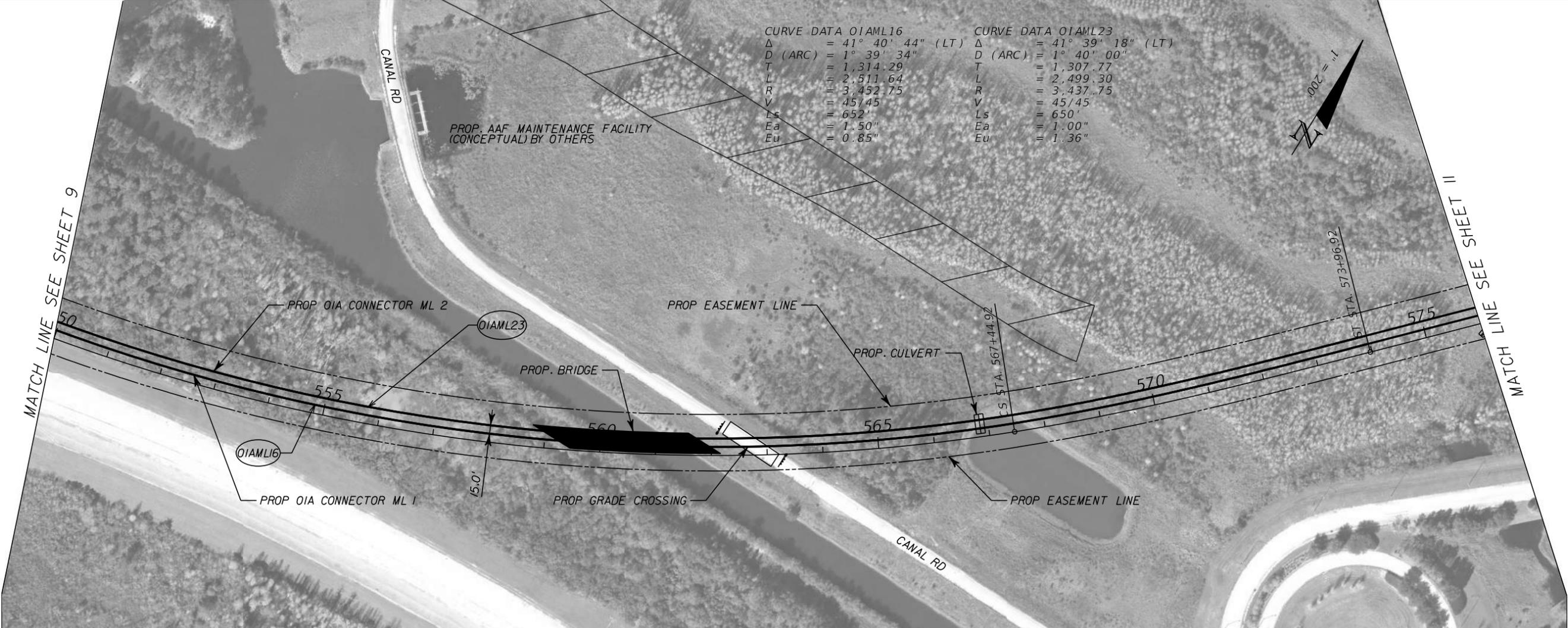
CURVE DATA 01AML16  
 $\Delta$  = 41° 40' 44" (LT)  
D (ARC) = 1° 39' 34"  
T = 1,314.29  
L = 2,511.64  
R = 3,452.75  
V = 45/45  
Ls = 652'  
Ea = 1.50"  
Eu = 0.85"

CURVE DATA 01AML23  
 $\Delta$  = 41° 39' 18" (LT)  
D (ARC) = 1° 40' 00"  
T = 1,307.77  
L = 2,499.30  
R = 3,437.75  
V = 45/45  
Ls = 650'  
Ea = 1.00"  
Eu = 1.36"

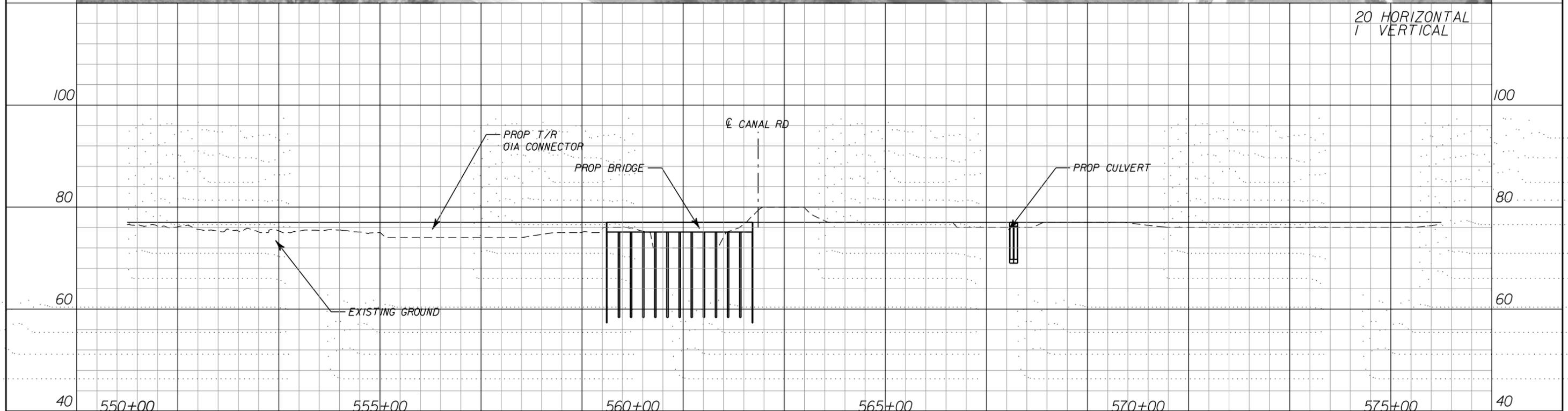


MATCH LINE SEE SHEET 9

MATCH LINE SEE SHEET 11



20 HORIZONTAL  
1 VERTICAL



| REVISIONS |             | DESCRIPTION |   |
|-----------|-------------|-------------|---|
| DATE      | DESCRIPTION | DATE        | DESCRIPTION                                     |
|           |             |             | CONCEPTUAL DESIGN PLANS<br>NOT FOR CONSTRUCTION |

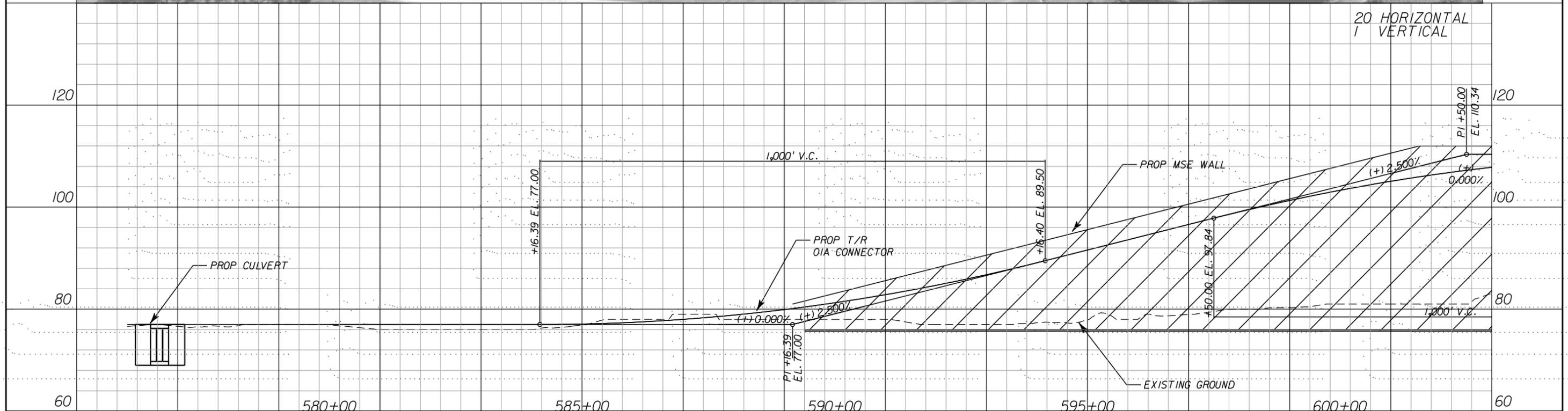
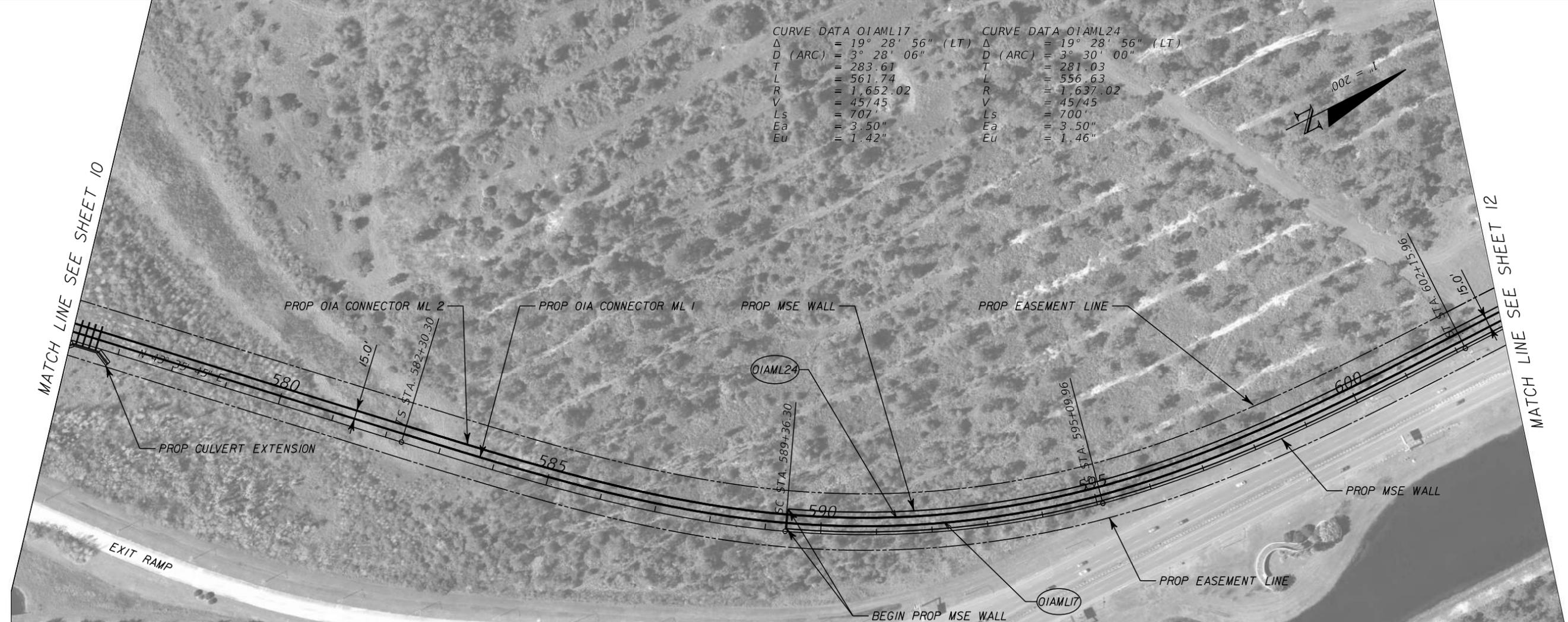
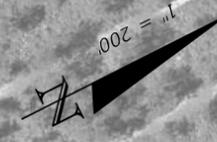
TRANSPORTATION  
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|--|--------|----------------------|
| ROAD NO.   | COUNTY | FINANCIAL PROJECT ID |
| CFRC P3  | ORANGE | 429215-2-22-01       |

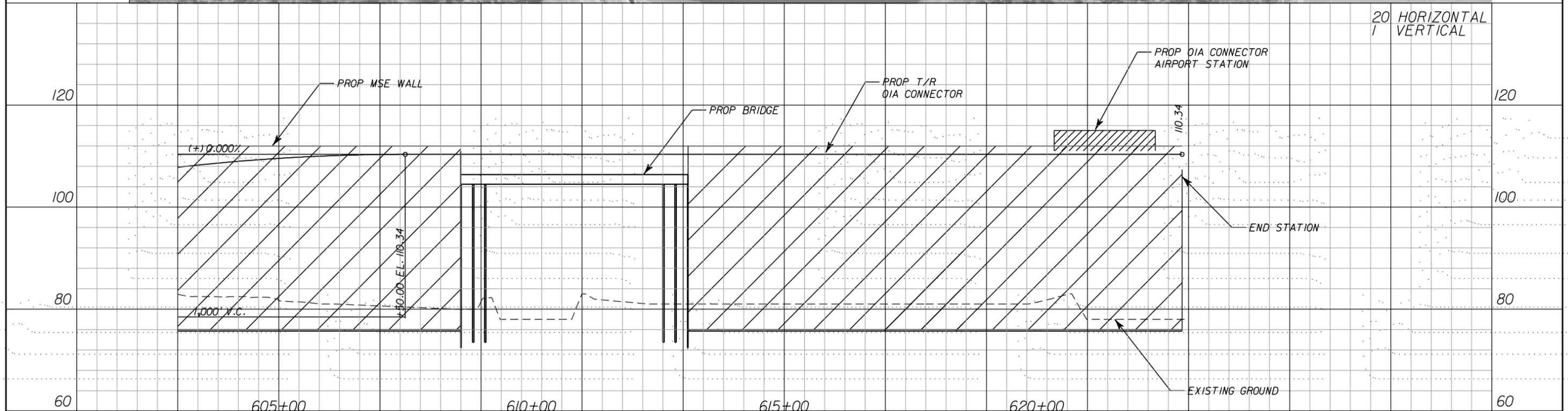
| CENTRAL FLORIDA COMMUTER RAIL TRANSIT (CFCRT) PHASE 3<br>OIA CONNECTOR<br>PLAN AND PROFILE |  | SHEET NO. |
|--|--|-----------|
|  |  | 10        |

CURVE DATA 01AML17  
 $\Delta$  = 19° 28' 56" (LT)  
D (ARC) = 3° 28' 06"  
T = 283.61  
L = 561.74  
R = 1,652.02  
V = 45/45  
Ls = 707'  
Ea = 3.50"  
Eu = 1.42"

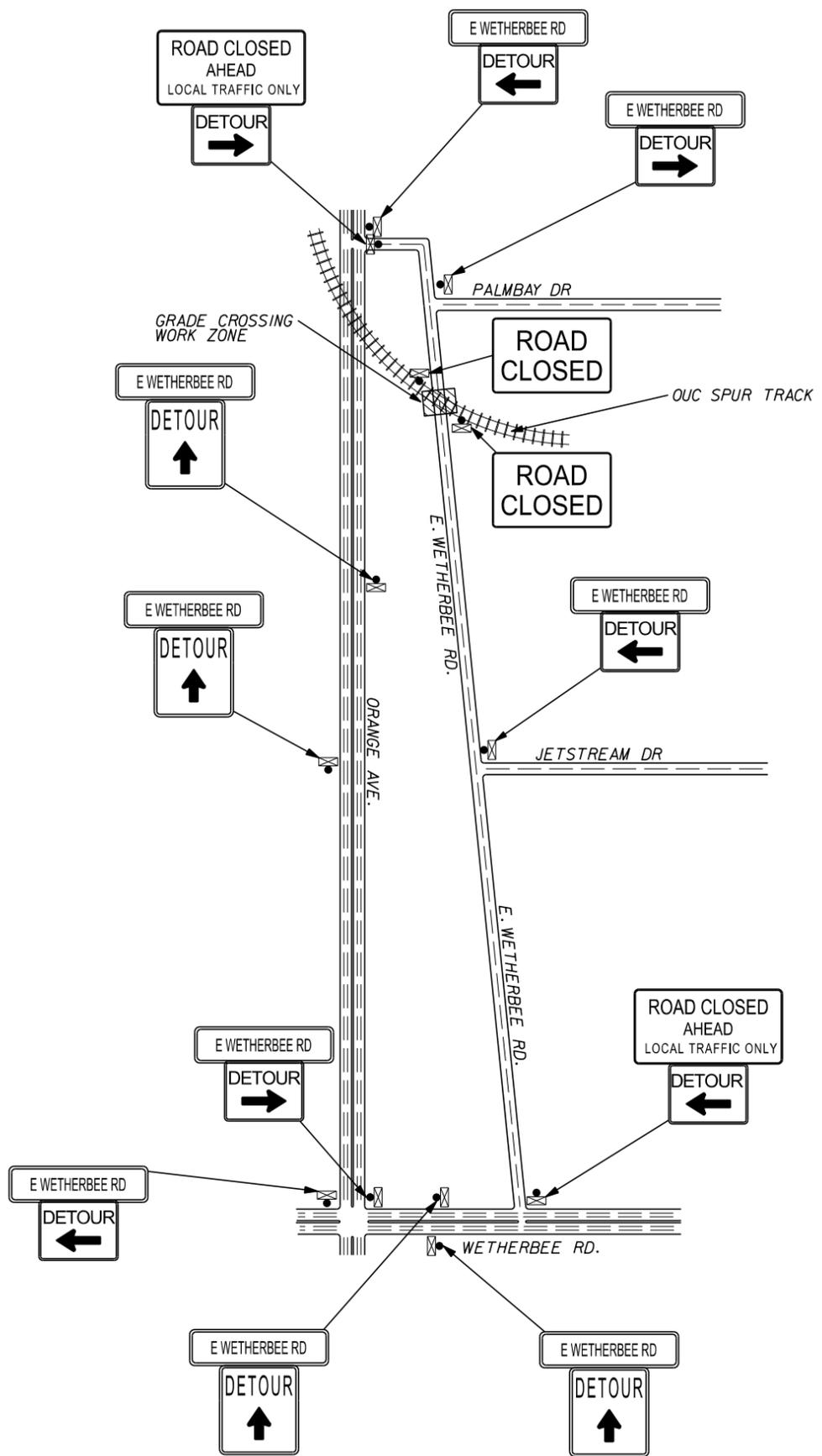
CURVE DATA 01AML24  
 $\Delta$  = 19° 28' 56" (LT)  
D (ARC) = 3° 30' 00"  
T = 281.03  
L = 556.63  
R = 1,637.02  
V = 45/45  
Ls = 700'  
Ea = 3.50"  
Eu = 1.46"



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|-----------|-------------|-------------|---|--|--|--------|----------------------|--|--------------------|
| DATE      | DESCRIPTION | DATE        | DESCRIPTION                                     |  | ROAD NO.   | COUNTY | FINANCIAL PROJECT ID |  |                    |
|           |             |             | CONCEPTUAL DESIGN PLANS<br>NOT FOR CONSTRUCTION |  | CFRC P3  | ORANGE | 429215-2-22-01       |  |                    |



| DATE   |  | DESCRIPTION |  | REVISIONS  |  | DESCRIPTION                          |  |
|--|--|-------------|--|--|--|--------------------------------------|--|
| CONCEPTUAL DESIGN PLANS<br>NOT FOR CONSTRUCTION  |  |             |  |  |  |                                      |  |
| TRANSPORTATION<br>AECOM TECHNICAL SERVICES, Inc.<br>315 East Robinson Street<br>Suite 245<br>Orlando, FL 32801-1949, USA<br>T: +1-407-422-0353<br>Certificate of Authorization No. 8115<br>www.aecom.com |  |             |  | STATE OF FLORIDA<br>DEPARTMENT OF TRANSPORTATION |  | ROAD NO. COUNTY FINANCIAL PROJECT ID |  |
|  |  |             |  | CFRC P3 ORANGE                                   |  | 429215-2-22-01                       |  |
| CENTRAL FLORIDA COMMUTER RAIL TRANSIT (CFCRT) PHASE 3<br>OIA CONNECTOR<br>PLAN AND PROFILE   |  |             |  |  |  | SHEET NO.<br>12                      |  |



TRAFFIC CONTROL SHALL BE IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND THE 600 SERIES OF THE FDOT STANDARD INDEX

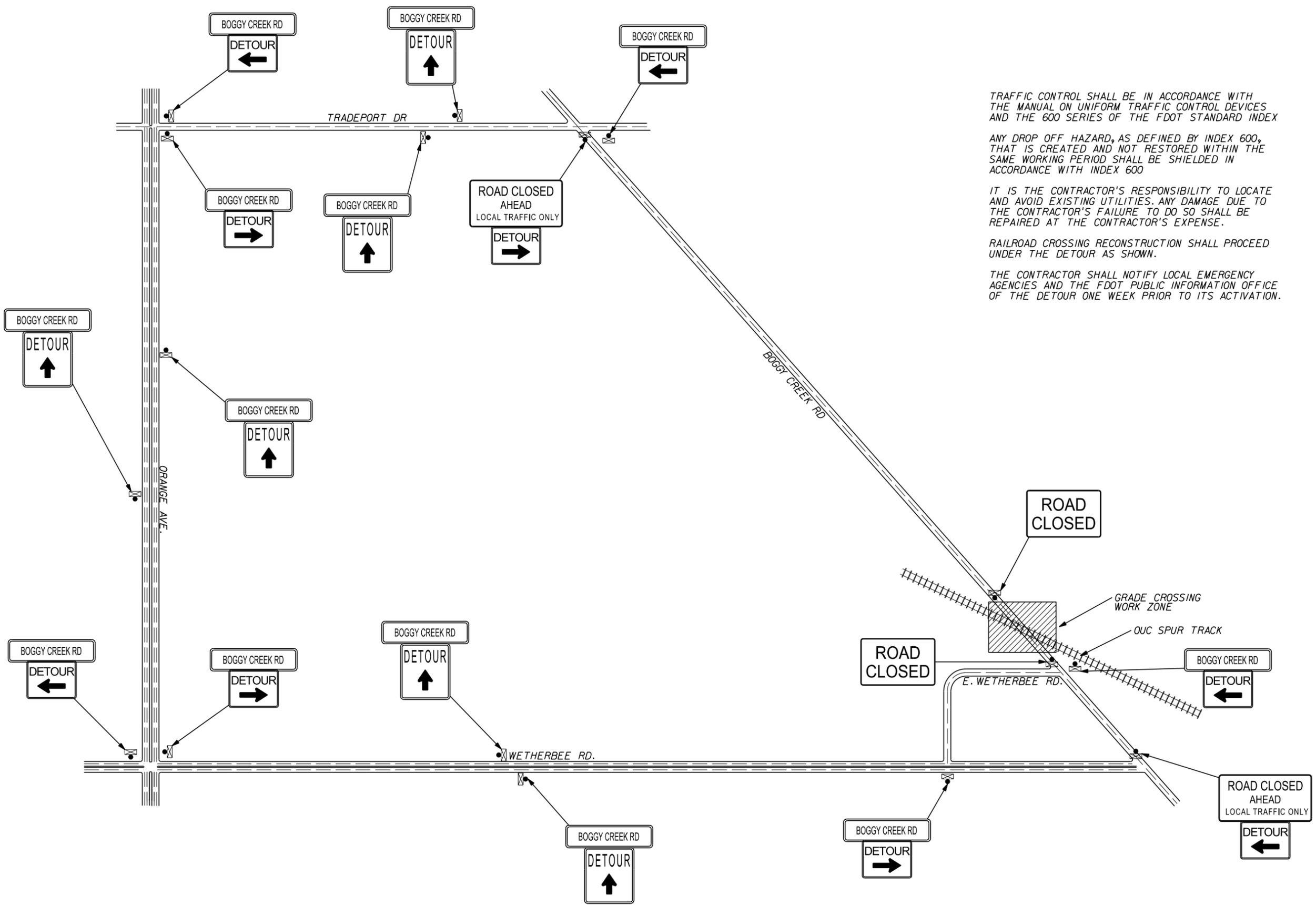
ANY DROP OFF HAZARD, AS DEFINED BY INDEX 600, THAT IS CREATED AND NOT RESTORED WITHIN THE SAME WORKING PERIOD SHALL BE SHIELDED IN ACCORDANCE WITH INDEX 600

IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE AND AVOID EXISTING UTILITIES. ANY DAMAGE DUE TO THE CONTRACTOR'S FAILURE TO DO SO SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

RAILROAD CROSSING RECONSTRUCTION SHALL PROCEED UNDER THE DETOUR AS SHOWN.

THE CONTRACTOR SHALL NOTIFY LOCAL EMERGENCY AGENCIES AND THE FDOT PUBLIC INFORMATION OFFICE OF THE DETOUR ONE WEEK PRIOR TO ITS ACTIVATION.

| REVISIONS |             |      |   | TRANSPORTATION<br>AECOM TECHNICAL SERVICES, Inc.<br>315 East Robinson Street<br>Suite 245<br>Orlando, FL 32801-1949, USA<br>T +1-407-422-0353<br>Certificate of Authorization No. 8115<br>www.aecom.com | STATE OF FLORIDA<br>DEPARTMENT OF TRANSPORTATION |        |                      | CENTRAL FLORIDA COMMUTER RAIL TRANSIT (CFCRT) PHASE 3<br>TRAFFIC CONTROL PLAN<br>E WETHERBEE RD | SHEET<br>NO.<br><br>TCP-01 |
|-----------|-------------|------|---|---|--|--------|----------------------|---|----------------------------|
| DATE      | DESCRIPTION | DATE | DESCRIPTION                                     |   | ROAD NO.   | COUNTY | FINANCIAL PROJECT ID |   |                            |
|           |             |      | CONCEPTUAL DESIGN PLANS<br>NOT FOR CONSTRUCTION |   | CFRC P3  | ORANGE | 429215-2-22-01       |   |                            |



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|-----------|-------------|-------------|---|---|--|--------|----------------------|---|---------------------|
| DATE      | DESCRIPTION | DATE        | DESCRIPTION                                     |   | ROAD NO.   | COUNTY | FINANCIAL PROJECT ID |   |                     |
|           |             |             | CONCEPTUAL DESIGN PLANS<br>NOT FOR CONSTRUCTION |   | CFRC P3  | ORANGE | 429215-2-22-01       |   |                     |