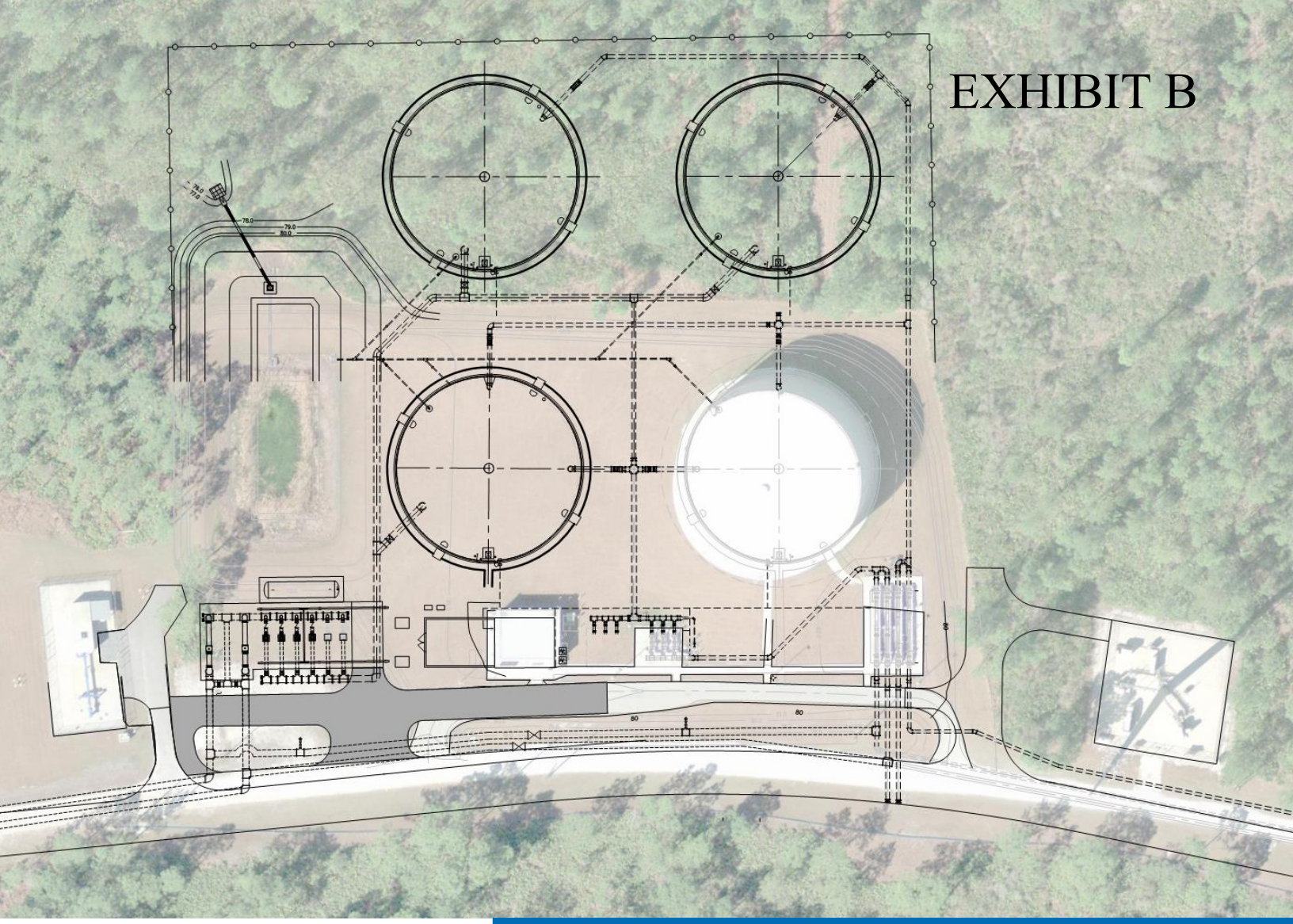
EXHIBIT B



Orange County Utilities

EWRF PHASE VI-A IMPROVEMENTS BASIS OF DESIGN REPORT

FINAL | March 2019

ORANGE COUNTY GOVERNMENT FLORIDA

carollo

Orange County Utilities

EWRF PHASE VI-A IMPROVEMENTS
BASIS OF DESIGN REPORT

FINAL | March 2019

This document is released for the purpose of information exchange review and planning only under the authority of William Marshall P.E., March 7th 2019, Florida License #66282

Table of Contents

Tables

Exhibits

Figures

Appendices

Abbreviations

AC	Acre
AFY	Acre-feet per year
AADF	Average Annual Daily Flow
Carollo	Carollo Engineers, Inc.
cf	cubic feet
cfs	cubic feet per second
CIP	Capital Improvement Program
F	Fahrenheit
ft	Feet
ft-msl	feet above sea level
gpcd	gallons per capita day
gpd/ac	gallons per day per acre
HGL	Hydraulic Grade Line
MDF	Max Day Flow
MG	million gallons
mg/L	milligrams per liter
mgd	million gallons per day
MinDD	Minimum Day Demand
MinMD	Minimum Month Demand
MMD	Maximum Month Demand
msl	Mean sea level
PHF	peak hour flow
PS	Pump Station
psi	pounds per square inch
RVSS	Reduced Voltage Soft Starter
SCADA	Supervisory Control and Data Acquisition
SWP	State Water Project
TDH	Total Dynamic Head
VFD	Variable Frequency Drive
WRF	Water Reclamation Facility
WTP	Water treatment plant

EWRF PHASE VI-A BASIS OF DESIGN REPORT

1 Executive Summary

The Phase VI-A Public Access Reuse (PAR) Improvements will expand the capacity of the existing EWRF Phase IV-B PAR facility. The existing Phase IV-B facility has 3.0 MG of storage, a total pump capacity of 6,000 gpm (8.64 MGD), and a firm pumping capacity of 4,000 gpm (5.76 MGD). The proposed Phase VI-A improvements will add 9.0 MG of storage and 16,000 gpm (23.04 MGD) of additional pumping capacity.

Following the Phase VI-A construction the EWRF PAR facility will consist of 12.0 MG of reclaimed water storage, a total pumping capacity of 22,000 gpm (31.68 MGD), and a firm pumping capacity of 18,000 gpm (25.92 MGD) with accommodations for an additional 8,000 gpm (11.52 MGD) of pumping capacity. The existing Phase IV-B improvements and proposed improvements to be constructed as part of Phase VI-A are as follows:

Existing Phase IV-B Improvements:

- One (1) 3.0 MG ground storage tank (fed by existing Phase I/II transfer pumps).
- Three (3) vertical turbine reclaimed PAR distribution pumps; 4,000 gpm @ 196 feet TDH
- Flow meter station which measures flow:
    - Ground storage tank fill from EWRF Phase I/II Effluent Transfer Pumps
    - To OCU PAR distribution system
    - Ground storage tank fill from City of Orlando ERRWDS system
    - Discharge into City of Orlando ERRWDS system
- Yard piping and valves
- Electrical building
- Stormwater pond, access drive, and site improvements.

Proposed Phase VI-A Improvements:

- Replacement of the existing Phase I/II Effluent Pumps with higher head pumps to feed the PAR facility at higher flow rates.
- Three (3) 3.0 MG reclaimed water storage tanks
- New vertical turbine PAR high service pump station - Four (4) 4,000 gpm, 350 HP pumps initially with provisions for two additional 4,000 gpm pumps. Pumps to be VFD driven with RVSS backup.
- New 5 ton bridge crane for pump station maintenance.
- New electrical equipment and expansion of the existing electrical building.
- Connection to emergency power generator system
- A new reclaimed water flow meter station (OCU & City of Orlando meters) to serve the new high service pump station
- Civil site improvements to accommodate new access road to Curry Ford Road with reference to new Utilities Operations Center-East
- Piping and valves to interconnect the new pump station discharge with existing OCU and City of Orlando piping.
- 30" valve and pipe stub out for future 30" OCU reclaimed water pipeline.

- Piping and valve modifications to allow the Phase III effluent pump station to feed the PAR facility.

The Class IV opinion of probable construction (OPCC) for the Phase VI-A PAR improvements is estimated at **$18,267,445.94**. The Phase VI-A PAR expansion project will need to phased and coordinated with the upcoming EWRF access road project (at 90 percent design by Pegasus Engineering) and the upcoming Utilities Operations Center-East (UOC-E) project (Rhodes + Brito design team selected, not yet under contract).

2 Background and Objectives

2.1 Project Scope

The Phase VI-A Improvements include the construction of additional reclaimed water storage and pumping facilities at the County's existing EWRF reclaimed water storage and pumping facility (constructed as Phase IV-B). This basis of design report will outline the future reclaimed water demands, required storage capacity, required pumping capacity, and the necessary electrical, instrumentation, civil, and other ancillary improvements necessary to serve the increased reclaimed water demand in Orange County's reclaimed water Eastern Service Area (ESA).

3 Project Background

The Eastern Water Reclamation Facility (EWRF) provides advanced wastewater treatment for residential, commercial, and industrial customers in Orange County's Eastern Service Area. The facility is located at 1621 South Alafaya Trail, Orlando, Florida 32828. EWRF is currently permitted, under FDEP Permit No. 0038849, for 19.0 MGD annual average daily flow (AADF) of total treatment capacity. Substantial completion for the recent Phase V construction improvements was reached on March 1st, 2019. The substantial completion of the Phase V construction provides a capacity increase of the facility to 24.0 MGD AADF.

Based on the increasing influent wastewater flows to EWRF Orange County Utilities has retained Carollo Engineers, Inc. to develop a facilities plan for the facility. The facilities plan will provide preliminary planning level design to expand the capacity of EWRF to 31.0 MGD AADF (7 MGD AADF increase). The facilities plan also includes an asset management evaluation of existing equipment. Equipment will be scored based on an established asset management criteria and based on the scoring recommendations for replacement will be provided for ongoing CIP replacement projects. The Draft EWRF Asset Management Program and Condition Assessment Report was submitted by Carollo Engineers, Inc. in November of 2018.

EWRF is permitted for reuse land application and surface water discharge per the latest FDEP permit associated with the Phase V improvements currently under construction. The four effluent discharge site with FDEP permitted capacities are as follows:

1. Rapid Infiltration Basins - 2.5 MGD
2. Wetlands System - 12.2 MGD
3. OUC's Stanton Energy Center - 13 MGD
4. Slow Rate Public Access Reuse - 5.75 MGD

The existing slow rate public access reuse (PAR) system serves the County's Reclaimed Water East Service Area (ESA). This reclaimed water distribution system has previously been served by the existing EWRF reclaimed water ground storage tank and pump station and augmented by

the City of Orlando's Eastern Regional Reclaimed Water Distribution System (ERRWDS). The existing EWRF reclaimed water storage and pumping facilities were constructed as part of the EWRF Phase IV-B Improvements in 2010 (Boyle Engineering, Corp.). Due to ongoing development within southeastern Orange County and the County's desire to directly serve more of their existing customers' additional reclaimed water storage and pumping capacity is necessary.

OCU currently manages reclaimed water according to the Phase IV-B Public Access Reuse System Monitoring and Operating Protocol (effective February 2010, revised March 2011). This operating protocol outlines the following operating principles:

- Reclaimed water from the Phase I/II trains will be pumped to the Phase IV-B PAR storage tanks via the Phase I/II effluent pumps.
- Off specification reclaimed water (chlorine residual below 1.25 mg/L or turbidity exceeding 3 NTUs) will disable the Phase I/II discharge to PAR storage and Phase I/II reclaimed water will flow to the Phase III effluent pump station for discharge to the RIBs, Stanton Energy Center, or Wetlands.
- The Phase III effluent pump station receives all flow from the Phase III & IV treatment trains as well as overflow from Phases I/II which is not pumped to PAR storage. All reclaimed water flowing to the Phase III effluent pump station is normally discharged to the RIBs, Stanton Energy Center, or Wetlands. An overall site plan showing the existing reclaimed water management options from the Phase IV-B Public Access Reuse System Monitoring and Operating Protocol has been included in **Figure 1** below for reference.

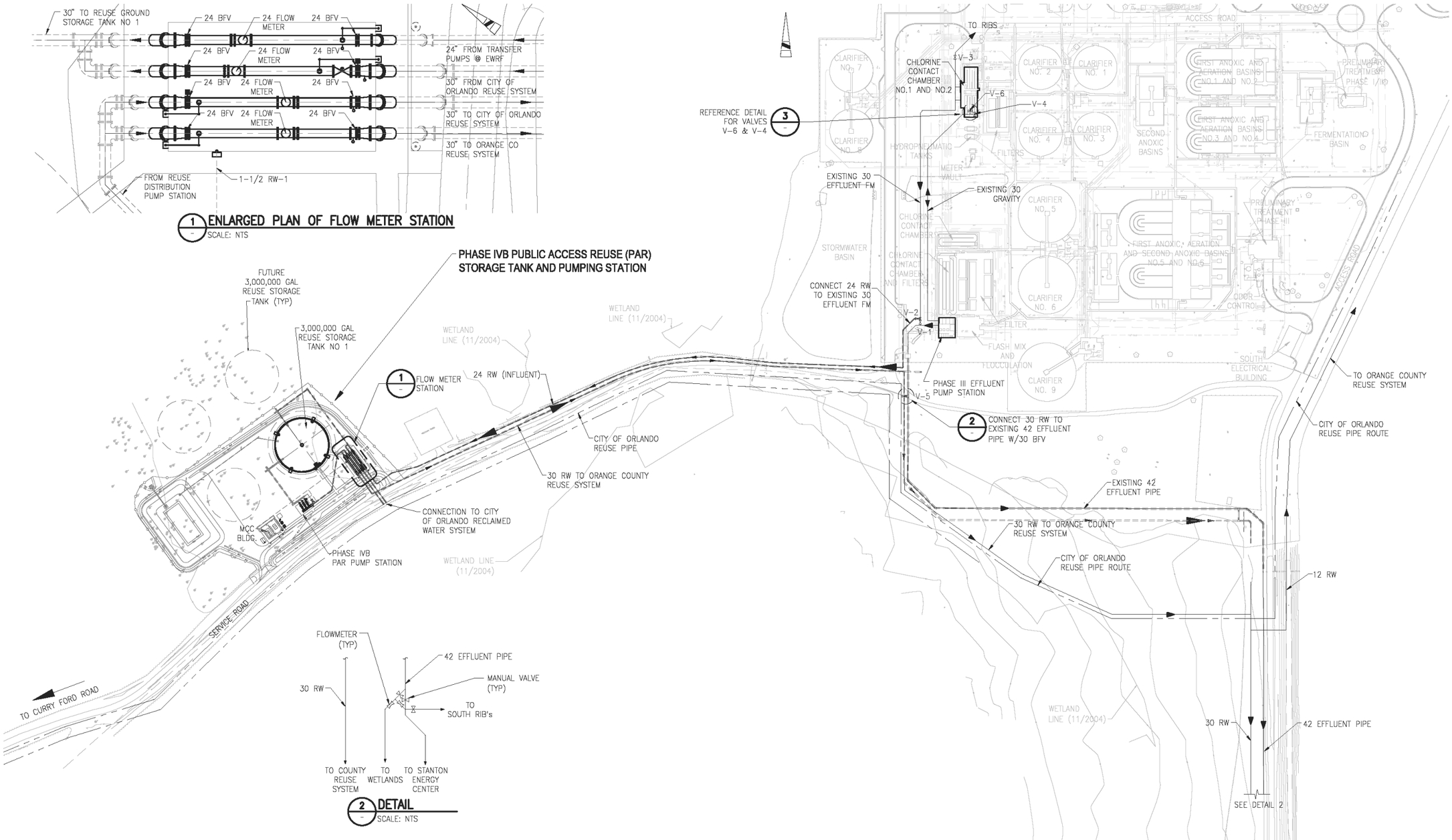


Figure 1 Existing Reclaimed Water Overall Site Plan

4 Reclaimed Water Demands

Existing (2016) ESA reclaimed water demands are 3.50 MGD per **Table 1** in the attached "EWRF Reclaimed Water Management" report by WSP USA, Inc. (**Appendix A**). It should be noted that only 1.5 MGD is currently be served directly from EWRF. This demand is largely based on the OCU's existing PAR storage and pumping capacity. Additional demand within the ESA system is served indirectly via the City of Orlando's Eastern Regional Reclaimed Water Distribution System (ERRWDS). The goal of EWRF Phase VI-A and future PAR improvements is to directly serve a larger portion of the ESA system demand.

As shown in **Table 2** of **Appendix A** the estimated future PAR demand for the East Service Area is 18.69 MGD AADF at buildout conditions. Reclaimed water for the ESA will be supplied from the EWRF and SWRF facilities with additional storage and repump facilities serving to meet the peak demands. As shown in **Table 2** of **Appendix A**, 5.63 MGD AADF of ESA demand is to be served directly from EWRF, 11.28 MGD will be served from the ESA Storage and Repump Facility (ESA SRF) on Wewahootee Road and 1.78 MGD will be served by the Lake Picket Storage and Repump Facility. This basis of design report is based upon those improvements to provide reclaimed water capacity to serve the direct EWRF demand of 5.63 MGD AADF.

4.1 Summary of Design Demands & Peaking Factors

Per the attached "EWRF Reclaimed Water Management" (**Appendix A**) report, the design average annual daily flow for the initial Phase VI-A PAR expansion is 2.5 MGD AADF with a maximum day factor of 2.0 and a peak hour factor of 10.5. This peak hour factor was provided by OCU based on their previous experience operating the system. This results in a required firm high service pumping capacity of approximately 18,000 gpm. This will be the design peak flow for the EWRF PAR pumping facilities for Phase VI-A.

Per the attached "EWRF Reclaimed Water Management" (**Appendix A**) report, a design peak hour factor of 6.0 will be used at buildout conditions (i.e. next phase of ESA PAR storage and pumping expansion). This buildout peaking factor was also established based on discussions with OCU. Per *Table 2 Estimated ESA PAR Irrigation Supply Served Directly at Buildout* in **Appendix A**, the total buildout ESA PAR demand is estimated at 18.69 MGD AADF. 5.63 MGD AADF is anticipated to be served directly from EWRF (at buildout) with the remainder of the PAR demand served directly from the East Service Area (ESA) Storage and Repump Facility (SRF) and the Lake Pickett SRF. **Table 1** below summarizes the peaking factors and design flows for the Phase VI-A project and buildout conditions (expansion of Phase VI-A). Table 1 Peaking Factors and Design Flows

	Phase VI-A	Buildout Conditions
Average Annual Daily Flow	2.5 MGD[1]	5.63 MGD
Max. Day Factor	2.0	2.0
Maximum Day Flow	5.0 MGD	11.26 MGD
Peak Hour Factor	10.5	6.0
Peak Hour Flow	26.25 MGD	33.78 MGD

1 -Total existing ESA AADF demand is 3.5 MGD with 1.5 MGD being served directly from EWRF.

5 Existing Facilities

5.1 Existing Phase I/II Effluent Pump Station

The existing Phase I/II effluent pump station is located at the existing Phase I/II chlorine contact tanks within the treatment facility. The existing Phase I & II effluent pumps were manufactured by Goulds and Peerless and originally constructed in 1982 to convey treated effluent to the rapid infiltration basins. The existing pumps were observed to be in poor condition due to their age and are recommended for replacement in 2019 in the Draft EWRF Asset Management Program and Condition Assessment Report which was submitted by Carollo Engineers, Inc. in November of 2018. The existing pump station pumps reclaimed water to the existing Phase IV-B PAR 3.0 MG ground storage tank (GST) via a 30 inch pump station discharge and a 24 inch ductile iron pipe located along the existing Phase IV-B access road. With the construction of the Phase IV-B public access reuse improvements, the existing Phase I/II pump station was dedicated to supply the PAR system. Any additional flow beyond the demand of the PAR system overflows the Phase I/II chlorine contact tank and flows by gravity to the existing Phase III effluent pump station for discharge to one of the other three effluent discharge sites. Photos of the existing Phase I/II effluent pumps are shown below. The existing effluent pump information is shown below in **Table 2.**

Exhibit 1 Existing Phase I/II Effluent Pump Station

Exhibit 2 Existing Phase I Effluent Pump

Exhibit 3 Existing Phase I/II Effluent Pump Nameplate

Table 2 EWRF Existing Phase I/II Effluent Pump Station Information

Number of Existing Pumps(1)	7
Pumps Capacity	1,750 gpm each
Design Head	40 ft. TDH
Horsepower	25 HP
Type	Vertical Turbine
Max. Speed	1760 RPM
Motor Control	Constant Speed
Existing Total Pump Capacity	12,250 gpm (17.64 MGD)
Existing Firm Pump Capacity	10,500 gpm (15.12 MGD)

Note:
(1) Four pumps currently removed from service.

5.2 Existing Phase IV-B Public Access Reclaimed Storage & Pumping Facilities

The existing Phase VI-B reclaimed water improvements was constructed in 2010 and consist of one 3.0 MG ground storage tank, three 2,000 gpm reclaimed water distribution pumps, flow metering station, and associated electrical building. Photos of the existing Phase IV-B reclaimed water facility are shown below. The existing meter station consists of four above ground flow meter assemblies (two tank fill, two reclaimed water pump station discharge). The existing 3.0 MG tank can be filled by the existing Phase I/II pump station and City of Orlando ERRWDS system. Similarly, there are two meters on the discharge of the reclaimed water pump station to monitor flow to the Orange County Eastern Service Area and the City of Orlando's ERRWDS system. The existing OCU Aquifer Storage and Recovery (ASR) well located directly west of the PAR facility can also be used to augment the reclaimed water supply using the existing ASR fill piping at the existing ground storage tank exterior standpipe with air gap.

Exhibit 4 Existing Phase IV E-B PAR High Service Pump Station

Exhibit 5 Existing Phase IV-B Meter Station

Exhibit 6 Existing Phase IV-B Ground Storage Tank with ASR Fill Piping

The Phase IV-B improvements provided space and piping/valves to accommodate three additional 3.0 MG ground storage tanks and three additional vertical turbine pumps of similar capacity to the existing 2,000 gpm pumps. A summary of the existing Phase IV-B improvements is provided below in **Table 3.** The existing high service pumps will remain in place and will serve as a jockey pump station for low flows.

Table 3 EWRF ESA Existing High Service Pump Station

Number of Existing Pumps	3
Pumps Capacity	2,000 gpm each
Design Head	196 ft. TDH
Horsepower	125 HP
Type	Vertical Turbine in Cans
Max. Speed	1770 RPM
Motor Control	VFD
Existing Total Pump Capacity	6,000 gpm (8.64 MGD)
Existing Firm Pump Capacity	4,000 gpm (5.76 MGD)

6 Proposed Improvements

6.1 Phase I/II Effluent Pump Station Modifications

As shown in **Table 1** the maximum daily demand of the ESA PAR system is 11.26 MGD, based upon an average daily flow of 5.63 and a peaking factor of 2.0. This maximum daily demand will serve as the basis of design for the minimum required fill capacity into the existing and proposed ground storage tanks. In order to maintain consistency with the current operating protocol, it is recommended that the Phase I/II effluent pump station continue to be used to fill the existing and proposed EWRF PAR ground storage tanks. As shown in **Section 1.5.1** the firm capacity of the Phase I/II pump station with all seven pumps in service is 15.12 MGD at 40 feet TDH.

A hydraulic model of the existing 30 inch and 24 inch PAR fill piping was utilized to evaluate the hydraulic capacity of the pipeline and the existing pump station. A maximum daily flow rate of 12 MGD was routed through the existing piping to determine the required pump head at the existing Phase I/II pump station. Therefore the estimated maximum head conditions at the Phase I/II pump station will be approximately 60 feet TDH at 12 MGD. Based on the results of this evaluation, it is recommended that the existing pumps be replaced with higher head pumps capable of conveying the ESA PAR maximum daily flow at the maximum head condition. A summary of the proposed Phase I/II effluent pumps is provided in **Table 4** below.

Table 4 Proposed EWRF Phase I/II Effluent Pump Station

Number of Proposed Pumps	7
Pumps Capacity	1400
Design Head	60 ft. TDH
Horsepower	30
Type	Vertical Turbine
Max. Speed	1800 RPM
Motor Control	VFD
Total Pump Capacity	9,800 gpm (14.11 MGD)
Firm Pump Capacity	8,400 gpm (12.10 MGD)

The existing Phase I/II pumps are installed in a wet well connected to the chlorine contact tanks. It is recommended that the existing configuration of the pump wet well be evaluated against current hydraulic institute guidelines. Each new pump discharge will include an expansion joint, check valve, air release valve, high pressure switch, and butterfly isolation valve. The new Phase I/II pumps will be driven by variable frequency drives (VFD) in a lead/lag arrangement to maintain level within the wet well. The pump station will be activated by low level in the ESA PAR ground storage tanks. When the setpoint high level is reached in the PAR ground storage tanks the Phase I/II pump station will turn off all pumps and the Phase I/II chlorine contact tanks will flow via gravity to the Phase III effluent pump station for discharge at one of the remaining effluent discharge sites.

6.2 Phase III Effluent Pump & PAR Fill Modifications

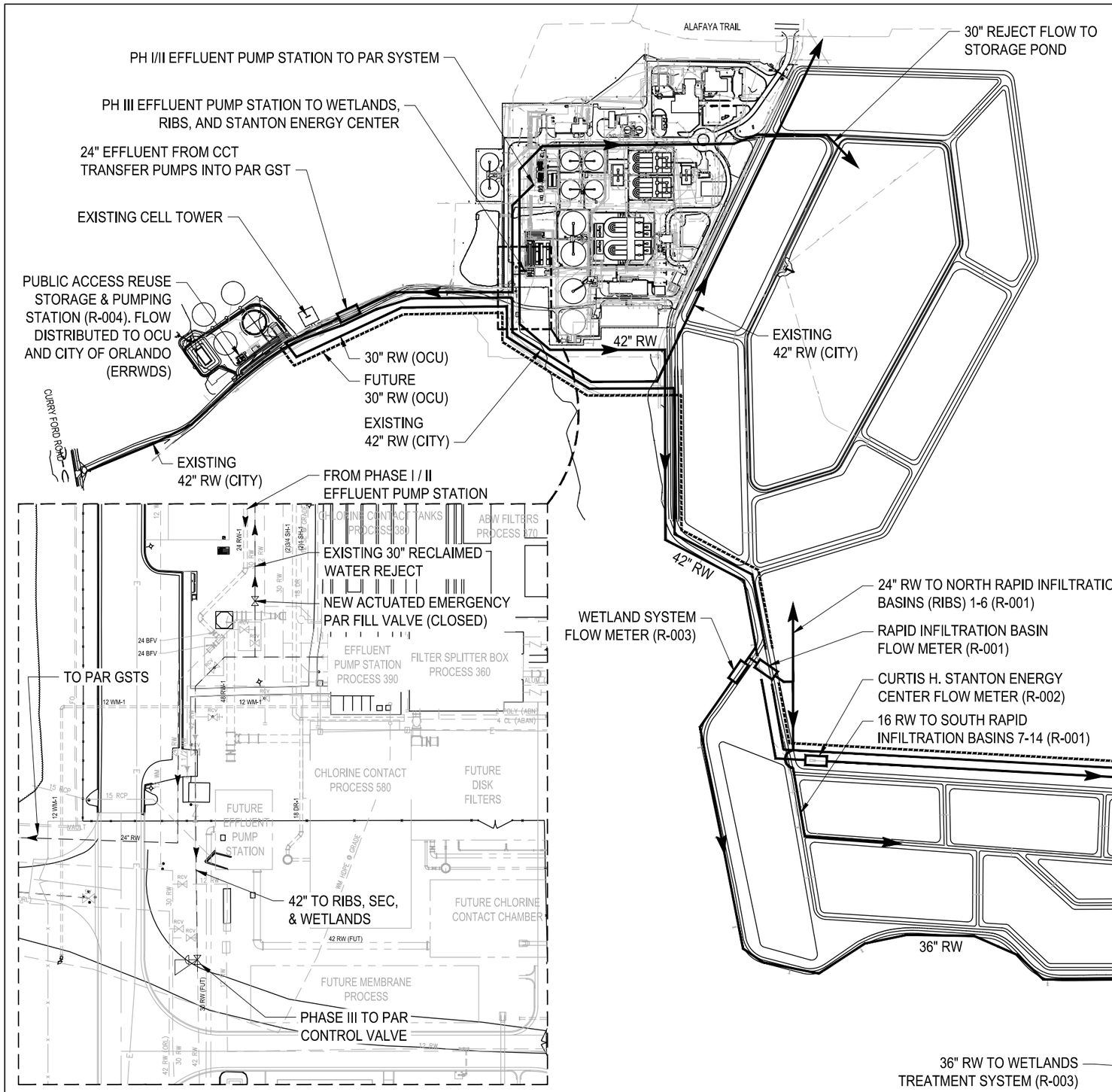
An alternative PAR ground storage tank fill method will be provided by utilizing the Phase III effluent pumps (Process 390) which were recently installed in the Phase V construction. Electric actuated valves (YP-V-1, VP-V-2, YP-V-3, & YP-V-4) were installed near the discharge of the Phase III effluent pump station in order to control reclaimed water reject events and direct reject water to the reject pond. The addition of one new actuated valve on the 30 inch reject piping as shown in **Figure 2** below would allow a flow path to be provided from the Phase III effluent pump station to the ESA PAR ground storage tanks. The design point of the existing Phase III effluent pumps is 9,000 gpm at 51 feet TDH which is lower than the maximum head condition with 12 MGD flowing to the PAR ground storage tanks. A control valve is recommended on the 42 inch RIB/SEC/Wetland discharge piping to control the flow split between PAR and the other discharge locations when utilizing the Phase III effluent pump station.

6.3 Fill Piping to Reclaimed Water GSTs

The existing Phase I/II effluent pumps deliver reclaimed water to the EWRF PAR facility via an existing 30 inch and 24 inch ductile iron pipe. The velocity at the target maximum design flow of 12 MGD is 5.4 feet per second at buildout conditions which is only slightly over typical design velocities. Based on the recommended higher head Phase I/II pumps, cost of new fill piping, and constructability issues for a new pipeline (planned new road construction, new duct bank being run from WRF to PAR facility) no new fill piping is proposed.

6.4 Proposed Reclaimed Water Storage

Per **Figure 1** in the attached report titled "EWRF Reclaimed Water Management," the historical maximum day peaking factor has been 2.0 or less with the exception of abnormal events (1.5 percent statistically). Based on the 5.63 MGD AADF buildout capacity of the EWRF PAR facility and a maximum day factor of 2.0, a total volume of 11.26 MG is recommended. The existing Phase IV-B improvements constructed one 3.0 MG ground storage tank. In order to provide sufficient reclaimed water storage three new 3.0 MG ground storage tanks are recommended to provide a total EWRF storage capacity of 12.0 MG. A summary of the existing and proposed EWRF PAR ground storage tanks is provided in **Table 5** below. The location of the new ground storage tanks for Phase VI-A are shown on the Phase VI-A site plan **Figure 3** below.



EFFLUENT DISPOSAL SYSTEM - EXISTING PERMIT LIMITS		
DISCHARGE POINT		FINAL FLOW LIMITS (MGD)
R-001	RIBS	2.5
R-002	STANTON ENERGY CENTER	13
R-003	WETLANDS	12.2
R-004	PUBIC ACCESS REUSE (PAR)	5.75

PHASE III EFFLUENT PUMP STATION PIPING MODIFICATIONS

FIGURE 2
EWRF PHASE VI-A
PHASE III EFFLUENT PUMP STATION PIPING MODIFICATIONS
ORANGE COUNTY UTILITIES

carollo
Engineers...Working Wonders With Water

3.0 MG
REUSE STORAGE TANK
120'-0" I.D.
35'-6" SWD

3.0 MG
REUSE STORAGE TANK
120'-0" I.D.
35'-6" SWD

3.0 MG
REUSE STORAGE TANK
120'-0" I.D.
35'-6" SWD

EXISTING
REUSE STORAGE
TANK NO. 1

36" DI

48" DI

30" DI

NEW 6'-0" CHAIN
LINK FENCE

76.0
77.0
78.0
79.0
80.0

0 25' 50' 100'

36" FILL

EXISTING
30" FILL

NEW 30" DI
SUCTION

EXISTING
STORMWATER POND
TO BE EXPANDED

48" DI SUCTION TO
PUMP STATION

5 TON BRIDGE
CRANE

REUSE PUMP STATION
4 VERTICAL TURBINE
PUMPS IN CANS, 2 FUTURE
4,000 GPM (350 HP)

30,000 GAL
SURGE TANK

EXISTING 36"
PUMP
SUCTION

EXISTING
REUSE
METER
STATION

A/C UNITS

EXISTING
ELECTRICAL
BUILDING

EXISTING
REUSE PUMP
STATION

EXISTING ASR
WELL SITE

ONE STORY
MASONRY BUILDING

45'-0" LONG EXTENSION
OF ELECTRICAL BUILDING

EXISTING
ACCESS DRIVE

ACCESS DRIVE

ELECTRICAL
TRANSFORMERS

42" GV

FH

42" RW (OCU)

30" GV

EXISTING
36" FM

30" RW (OCU)

FUTURE ROAD
EXPANSION
(BY OTHERS)

42" RW (ORL)

EXISTING
42" RW (ORL)

FUTURE
30" RW (OCU)

TO CURRY FORD ROAD

CELL TOWER SIT
OFFICIAL RECORDS BOO
PAGE 6468

Figure No. 3
EWRF PHASE VI-A
SITE PLAN
ORANGE COUNTY UTILITIES

carollo
Engineers...Working Wonders With Water

Last Saved By: ggonzalez 3-05-19 05:56pm

C:\Users\GGONZALEZ\appdata\local\temp\AcPublish_9780\9640W00_Figure 03 3-05-19 05:57pm ggonzalez

Table 5 EWRF ESA PAR Existing & Proposed Ground Storage Tanks

EWRF ESA PAR Ground Storage Tanks	
Number of Existing Tanks	1
Type of Existing Tanks	Pre-stressed Concrete
Capacity	3.0 MG
Number of Proposed Tanks	3
Type of Proposed Tanks	Pre-stressed Concrete
Capacity	3.0 MG
Total Proposed Storage Capacity	12.0 MG
Inside Diameter	120'-0"
Side Wall Depth	35'-6"
Accessories	Grounding and Lighting Protection Exterior and Interior Ladder Full Perimeter Handrail with Safety Harness Fall Protection System Visual Liquid Level Indicator Radar Level Transmitter

A geotechnical engineering evaluation was performed for the Phase IV-B construction by Geotechnical and Environmental Consultants, Inc. (GEC) in 2003. The following geotechnical information is provided as a historical reference to indicate the general conditions and recommendations that could be expected. The GEC report has been provided in **Appendix B**.

The 2003 GEC geotechnical report indicated that the general soil conditions onsite consisted of interbedded layers of loose to dense fine sand with silt and silty fine sand. Surficial organic soils, such as peat, were not encountered. Groundwater levels were encountered at 1.5 to 2.1 feet below existing grade. GEC estimated that total settlement of the Phase IV-B tank would be 3 inches (at tank center).

The GEC report recommended that clean non-plastic sands (less than 12 percent fines) be imported as structural fill for the ground storage tank and a minimum compaction of 95 percent of the soils modified Proctor maximum dry density be achieved. A maximum net soil bearing pressure of 3,000 pounds per square foot was recommended.

It is recommended that a new geotechnical investigation be performed for the new Phase VI-A construction with borings performed directly under the planned locations of the Phase VI-A structures.

6.5 Proposed Reclaimed Water Distribution Pump Station

As shown in **Table 1** the peak hour demand for the initial Phase VI-A phase of the ESA expansion is 26.25 MGD (approximately 18,000 gpm). The existing Phase VI-B reclaimed water pumps are rated at 2,000 gpm for an installed capacity of 6,000 gpm. An additional 16,000 gpm of reclaimed water capacity will be provided by installing four (4) 4,000 gpm pumps which, along with the existing pumps, in order to provide a firm pumping capacity of 18,000 gpm. The proposed pumps information is summarized in **Table 5** below.

Table 6 ESA PAR Proposed High Service Pump Station Design Criteria

Number of Pumps	4
Pumps Capacity	4,000 gpm each
Design Head	196 ft. TDH
Horsepower	300 HP
Type	Vertical Turbine in Cans
Efficiency	83%
Max. Speed	1800 RPM
Motor Control	VFD w/ RVSS Bypass
New Total Pump Capacity	16,000 gpm
Existing Pump Capacity	6,000 gpm
Firm Pump Capacity (Existing & Proposed)	18,000 gpm
Proposed Pump Manufacturers	Flowserve, Peerless, Pentair Fairbanks Nijhuis, Xylem Goulds Water Technology, Pentair Layne

As shown in **Table 1** the buildout peak hour flow is 33.78 MGD (23,458 gpm). In order to accommodate the future buildout flow the Phase VI-A pump station will be constructed with two additional empty pump cans which can be installed as peak flows approach the Phase VI-A firm pumping capacity of 18,000 gpm.

The proposed PAR high service pump station is shown in **Figure 4**. The pump station will receive water from all four PAR ground storage tanks. Suction and discharge headers are anticipated to be 48 inch cement lined ductile iron. The suction and discharge of each pump will be 24 inches and 18 inches, respectively. The pumps will be can mounted vertical turbine pumps with the pump discharge head and motor mounted on a slab one grade. Each can will be concrete encased epoxy coated steel, 30 inches in diameter, and approximately 15 feet deep. The discharge of each pump will include an expansion joint, air release valve, slanted disc air cushioned check valve, and isolation butterfly valve. An elevated aluminum walkway will be provided to access the 300 HP motors. A 5 ton underhung bridge crane will be provided to perform preventative maintenance. A new flow meter station will be constructed adjacent to the new PAR high service pumps to meter flow into OCU's ESA. A second flow meter and actuated valve will also be provided for a connection to the City of Orlando's ERRWDS system similar to the existing Phase IV-B pump station.

6.6 Surge Protection

A new 30,000 gallon hydro-pneumatic surge tank with dual air compressors will be connected to the transmission pipelines for transient suppression. The compressors will be installed within the existing building. There is a vacant generator room with louvers that can accommodate the compressors in the proximity to the new hydro tank.

6.7 Proposed Reclaimed Water Transmission Pipeline

The existing Phase IV-B reclaimed water pump station discharges to the east via a 30 inch pipeline to OCU's ESA and a 42 inch pipeline to the City of Orlando's ERRWDS system. The new

Phase VI-A PAR high service pumps will also discharge to both the OCU and City. The proposed firm capacity of the PAR high service pump station will be 26,000 gpm (37.44 MGD) at buildout. Discharge pipe sizes were selected with a target velocity of 5 fps at buildout flows. A 42" ductile iron discharge is proposed from the Phase VI-A PAR high service pump station. At the buildout flow of 26,000 gpm the velocity within this pipeline will be 5.6 fps. The proposed 42" reclaimed water pipeline will connect to the existing 30" reclaimed water pipeline which runs east through EWRF to Alafaya Trail. A second 30" ductile iron reclaimed water pipeline will be necessary to provide transmission capacity for the buildout pumping capacity of 26,000 gpm. The buildout flow of 26,000 gpm split between two 30" ductile iron pipelines yields and approximate velocity of 5.4 fps. A 30" valve and piping stub out will be provided in the Phase VI-A construction to accommodate the future pipeline. It is anticipated that the future pipeline will be constructed as reclaimed water demands increase. The Master Site Plan**, Figure 5** shows the routing of the proposed Phase VI-A pump station discharge piping.

EXISTING STORMWATER POND

30,000 GAL
SURGE TANK

0 5' 10' 20'

48" DI SUCTION TO
PUMP STATION

POLE MOUNTED
LIGHT (TYP)

20'-0" WIDE
CONCRETE
DRIVEWAY

36" GV
(TYP)

ELEVATED
ALUMINUM
GRATING
WALKWAY

15'

18" GV
(TYP)

18" GV

18" CV
(TYP)

18" FUTURE CV

CONCRETE
SLAB

36" RW
BYPASS
(TYP)

FUTURE VERTICAL
TURBINE PUMPS
(INSTALL EMPTY
PUMP CANS)

36" MAGNETIC
FLOW METER
(TYP)

VERTICAL
TURBINE
PUMPS
4,000 GPM
(350 HP)
(TYP)

ELECTRICAL
TANSFORMERS

5 TON BRIDGE
CRANE

9'

24" GV
(TYP)

36" GV
(TYP)

48" RW
(TYP)

OCU

ORL

Figure No. 4
EWRF PHASE VI-A
HIGH SERVICE PUMP STATION PLAN
ORANGE COUNTY UTILITIES

carollo
Engineers...Working Wonders With Water

Last Saved By: ggonzalez 1-18-19 11:28am

H:\OCU\EWRF Phase VI Facilities Plan\CAD\Phase VI-A CAD\Figures\9640W00_Figure 04 1-18-19 11:28am ggonzalez

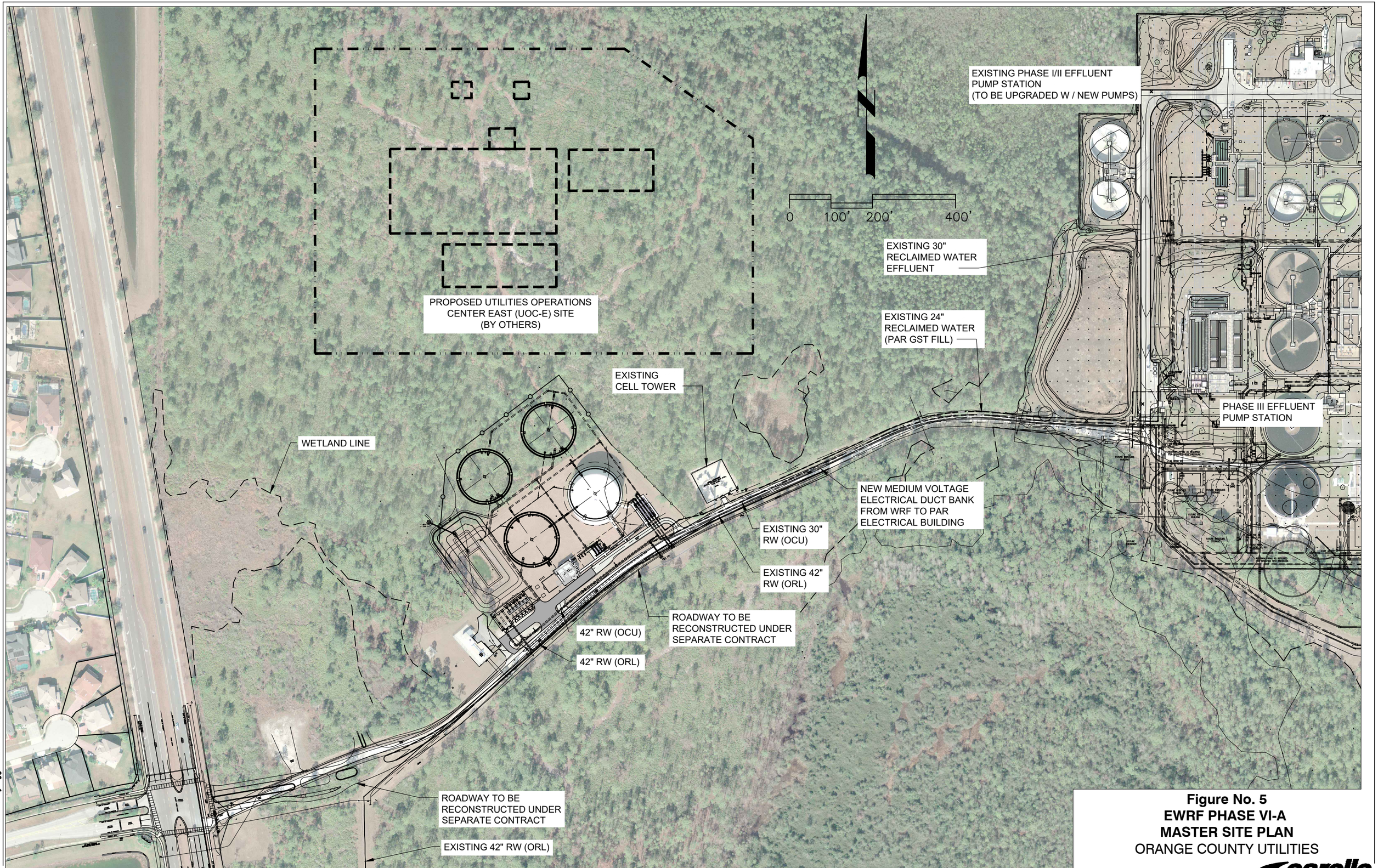


Figure No. 5
EWRF PHASE VI-A
MASTER SITE PLAN
ORANGE COUNTY UTILITIES

carollo
Engineers...Working Wonders With Water

Last Saved By: ggonzalez 3-06-19 08:37am

H:\OCU\EWRF Phase VI Facilities Plan\CAD\Phase VI-A CAD\Figures\9640W00_Figure 05 3-06-19 08:37am ggonzalez

The existing access roadway which connects Curry Ford Road, the PAR facility, and the WRF is scheduled to be reconstructed in the near future. The roadway reconstruction project is currently at the 90 percent design phase. The project will relocate the main access to EWRF off of Curry Ford Road. The project will construct a new signalized intersection. It will also serve to access the OCU's new Utilities Operations Center-East Facilities. **Figure 5** shows the 90 percent roadway alignment in relation to the proposed reclaimed water mains within the right of way. It is recommended that the roadway construction project and the Phase VI-A project be coordinated such that the reclaimed water pipelines and electrical duct bank within the right of way are constructed in conjunction with the roadway construction or a sufficient corridor is provided for their future installation.

6.8 Fire Protection

Fire protection for the existing Phase IV-B facility was provided by supplying reclaimed water from the existing ground storage tank using a fire department connection to the suction side of the Phase IV-B high service pump station. The Phase IV-C improvements at the WRF also utilized reclaimed water as the method of fire protection as the existing 8 inch water main piping looped around the WRF was unable to provide sufficient flow to meet the required NFPA fire flow for the new structures. Based on the lack of availability of potable water in the vicinity of the PAR facility and the historical precedent of the Fire Marshall to allow reclaimed water for fire protection it is proposed that reclaimed water will be used to serve the expanded Phase VI-A facility.

In order to provide a more reliable fire protection system two reclaimed water fire hydrants will be connected to the discharge of the new PAR high service pump station. The existing Phase IV-B ground storage tank fire department connection will be left in place as an alternate means of fire protection. Based on the planned construction materials and the expanded area of the electrical building the anticipated fire flow requirements per the 2017 Florida Building Code (FBC) and NFPA 1 are as follows:

- Building Area - 2,720 square feet
- Building Classification - Factory Industrial F-1 - per FBC 206.2
- Construction Type - II-B - per FBC 602.2
- Fire Resistance rating Requirements for Building Elements - Per FBC Table 601
  - Primary Structural Frame - 0 Hours
  - Exterior Bearing Walls - 0 Hours
  - Interior Bearing Walls - 0 Hours
  - Non-Bearing Walls and Partitions - 0 Hours
  - Floor Construction - 0 Hours
  - Roof Construction - 0 Hours
- Fire Flow Requirements - Per NFPA-1 Table 18.4.5.2.1
  - Fire Flow - 1,500 gpm
  - Flow Duration - 2 hours
- Total Fire Flow Volume Required - 180,000 gallons

6.9 Architectural Basis of Design

6.9.1 Electrical Building Expansion

The new 45 foot-0 inch long extension of the existing electrical building will match the architectural features of the existing building. The existing building includes a future generator room. As emergency power will now be provided from EWRF this room will be repurposed and retrofitted to house the compressors and receiver tank serving the proposed hydro-pneumatic tank. The building expansion will be constructed of concrete masonry unit exterior walls with a two part stucco system. The roof will be constructed from hollow core panels and will be sloped, using grout topping, to scuppers with downspouts to direct rainwater to grade along the north side of the building similar to the existing building. The new roof will include rigid roof insulation, multiple ply modified bitumen roof membrane. Additional exterior wall mounted lights will be added at the new exterior doorway and along the extensions to the north and south exterior walls. Metal fascia matching the existing building will be provided along the extended perimeter of the building. The new doorway at the western wall of the extended electrical building will be a double door with removable transom to allow sufficient access for removal of electrical equipment.

6.10 Structural Improvements/Considerations

Building Codes and Standards:

- 2017 Florida Building Code, Sixth Edition
- ACI 318-14 Building Code Requirements For Structural Concrete
- AISC 360-10 Specification for Structural Steel Buildings
- TMS 402/602-16 Building Code Requirements and Specification for Masonry Structures

Design Criteria:

Wind Loads:

The wind design for the facility is based on ASCE 7-10 analysis method per the FBC.

Table 7 2017 Florida Building Code Wind Design Parameters

Ultimate Wind Speed, Vult (Vasd)	146 mph (113 mph)
Exposure	C
Risk Category	III
Topographic Factor	1.0

Live Loads:

Minimum design live load criteria will be as follows:

- Equipment Access Areas – 100 psf (pounds per square foot).
- Equipment Loads – Use actual equipment loads as provided by process, mechanical, and electrical engineers.
- Electrical Equipment Areas – 250 psf.
- Crane Loads – Per ASCE 7-10, Section 4.9.

6.10.1 Electrical Building Improvements

The proposed improvements/modifications to the electrical building will include of a new 15 foot-0 inch expansion to the west end of the building. The expansion will be constructed using similar structural systems as the existing building, which consists of masonry walls with shallow concrete footings and a slab-on-grade floor. The new expansion will have hollow core roof planks, similar to what is provided at the existing building. New door openings will need to be sawcut into the existing masonry wall along the west side of the building to allow access between electrical rooms. The existing west wall is a load bearing wall that received load from the hollow core roof planks. New lintels will need to be installed over the openings to provide continuous support across the new opening. The lintel could either consist of exposed steel members that are anchor to the wall or by installing a new concrete or precast concrete beams. Upgrades to the building's lateral system are not anticipated if new openings are limited to a double door and single man door. The hollow core planks along the new portion of the building will span to the north and south walls and impose minimal new gravity loading to the existing wall.

6.10.2 Existing Phase I/II Effluent Pumps

The replacement of the pumps will require new concrete pump pedestals to be constructed.. It is also recommended to repair any locations of spalling or exposed reinforcing at the existing concrete pipe supports. For budgeting, provisions (baffle walls and hydrocones) have been estimated for improvements to the existing wet well based upon design hydraulic institute recommendations. It is anticipated that repairs will consist of cleaning exposed reinforcing and coating with a corrosion inhibitor bond agent and building back spalled surfaces with repair mortar.

6.10.3 New Reclaimed Water High Service Pump Station

The proposed reclaimed water high service pump station will consist of concrete encased steel pump canisters that are supported at their bases below grade by a common cast-in-place concrete mat footing. The piping and equipment will be supported on a concrete-slab-on-grade. The proposed 5-ton bridge crane is to be provided over the pump station to allow for removal and maintenance of the pumps. The bridge crane will be a free-standing uncovered structure. It is anticipated that bridge crane and steel runways will be supported on either cast-in-place concrete or steel columns. Steel frames will require vertical cross-bracing member between frames which could obstruct access to the area while cantilevered concrete columns allow for an open configuration with less long-term maintenance costs. It is anticipated that crane can be supported on concrete spread footings. The crane's supports will be designed to limit vertical and lateral deflections and the applicable impact loading conditions. It is anticipated that the operation of the crane will be infrequent. Bollard protection is to be provided around the columns where vehicular traffic is expected.

6.11 Electrical Improvements

6.11.1 Existing Electrical Distribution

6.11.1.1 Utility Supply

Power distribution for the existing Reclaimed Pump Station is provided by Duke Energy via a 480 Volt pad mounted transformer.

Power distribution for the plant is delivered to the facility at 12,470 volts via two separate feeders from a single overhead distribution line located at Alafaya Trail. Both service A and B terminate within the Generator Building at 12,470-volt distribution switchgear which distributes power via distribution loops to numerous pad mount transformers/switches.

6.11.1.2 Distribution Overview

Power at the existing Reclaimed Pump Station is a single ended radial distribution via a 1600 amp main breaker and 1600 amp switchboard which is subject to common mode failures. On the switchboard, a 400 amp portable generator connection was provided for standby power but the typical loads in operation exceed this capacity, refer to the EWRF Standby Power Generation TM dated August 2018 for additional information.

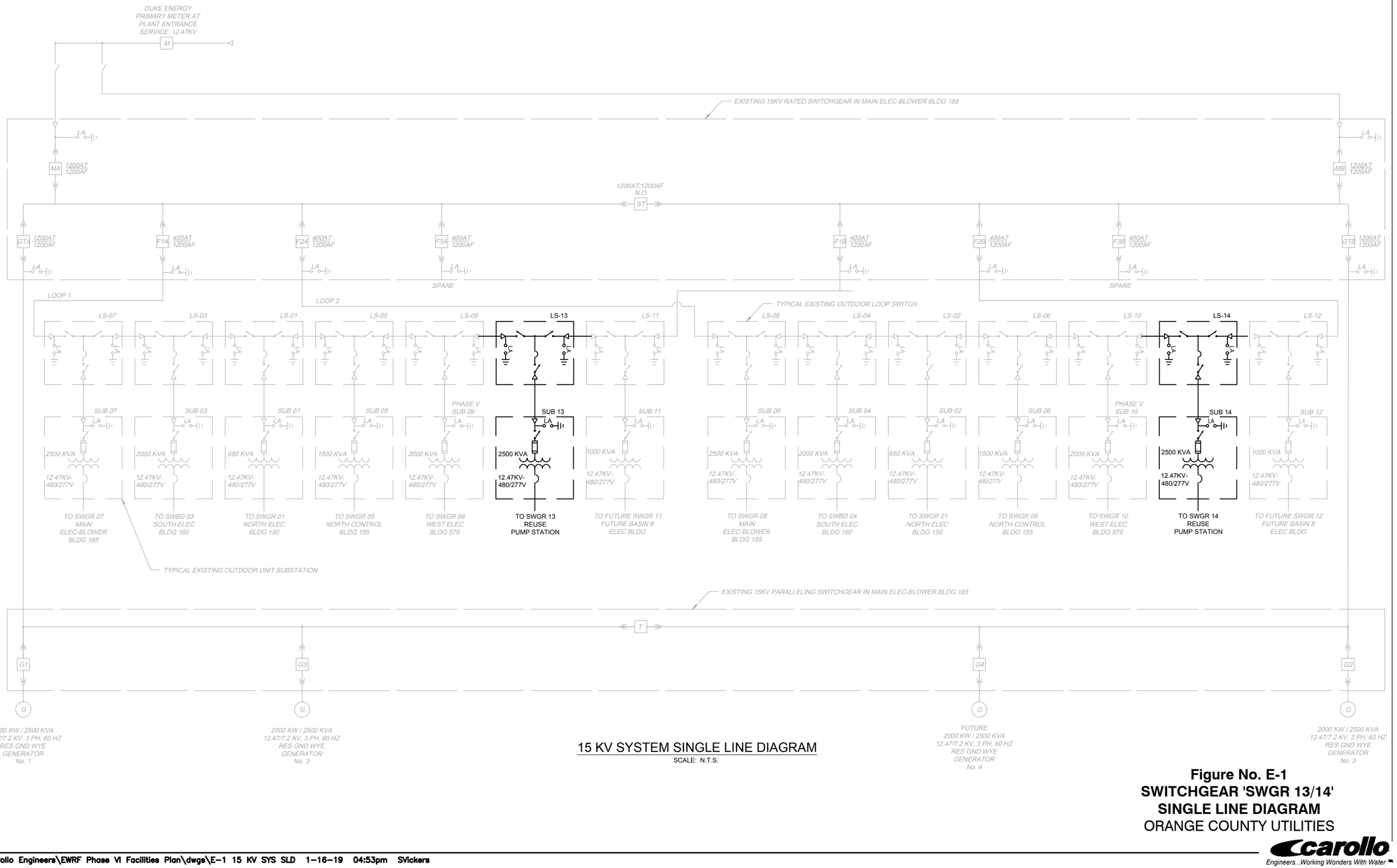
Power at the EWRF plant is distributed via two loops, each of which are capable of being fed from either the A side or B side of the electrical system. Each loop has six medium voltage double ended switches which feed fused transformers sized from 500 KVA to 2500 KVA. These transformers provide 480 volt, 3 phase power for local utilization.

6.11.2 Distribution Recommendations

It is recommended that power for this expanded reclaimed facility be provided via the plant distribution. The existing 480 volt Duke Energy service would be removed. To increase the reliability for this facility and provide standby power the existing plant loop feeders will be extended to this site as shown on **Figure E-1**. Two new loop switches (LS-13 and LS-14) will be provided to serve two new 2500 KVA transformers. These transformers will serve 480 volts to the new dual ended 3,200 amp draw-out switchgear that will serve the new pump VFDs (four installed with space for two future) and dual ended 1200 amp switchboard, refer to **Figure E-2**. The new switchboard will refeed the existing switchboard. The new switchgear, switchboard, VFDs, and other miscellaneous equipment will be housed in a new Electrical Building located adjacent to the existing building as shown on **Figure E-3**.

Per the EWRF Standby Power Generation TM dated August 2018, approximately 66 amps of standby power was available at 12,470 volts. This facility with three of the four installed pumps in operation with miscellaneous loads could utilize this capacity. If the loads increase or if the capacity is used elsewhere an additional generator would be required as outlined in the TM.

For the new Phase I/II Effluent Pumps, the existing 25 HP starters in MCC-1A1 and MCC-1A2 will be replaced with circuit breakers to feed the new VFDs for each 30 HP pump. The new VFDs will be located in the old MCC-1A Room of the North Control Building.

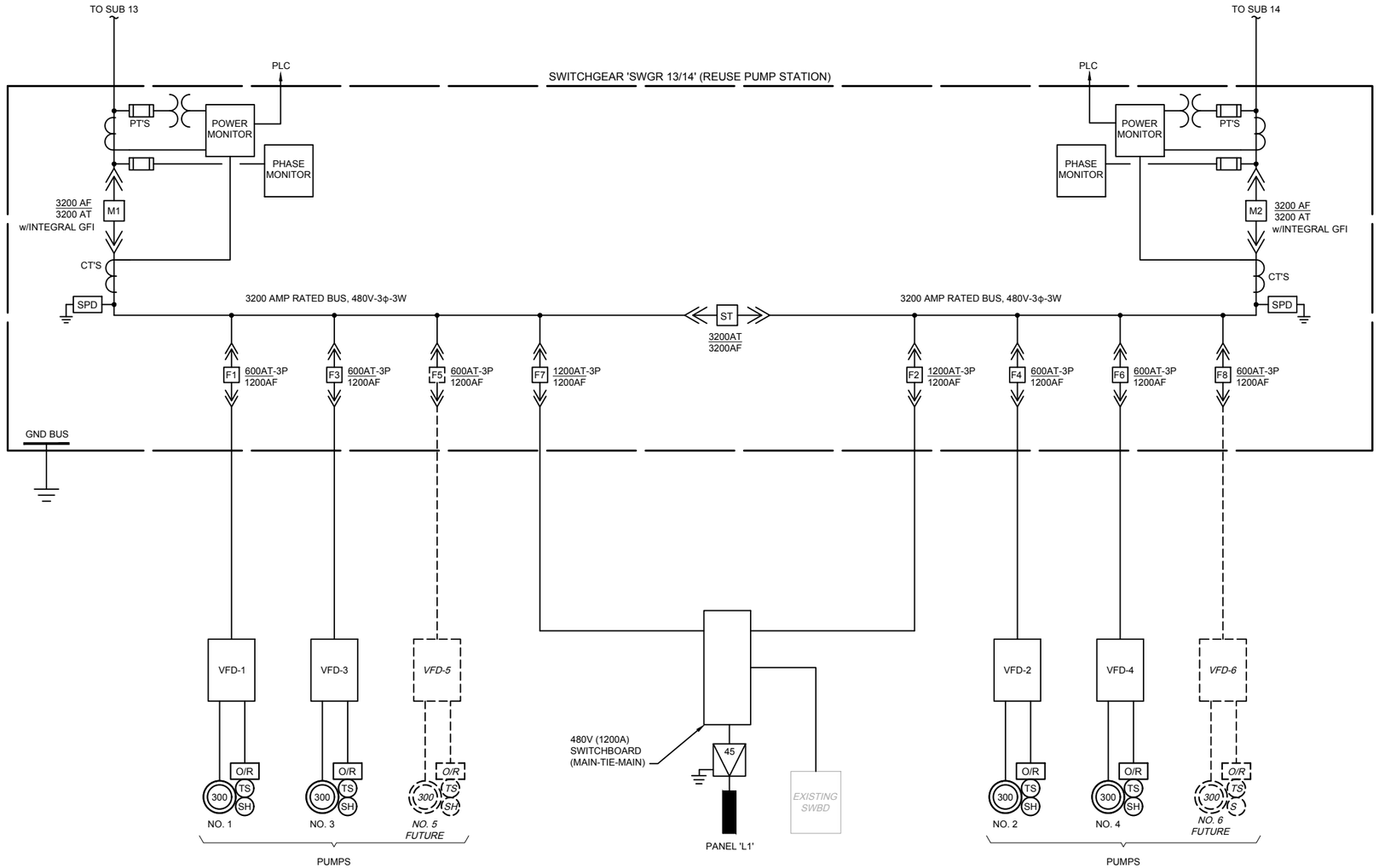


15 KV SYSTEM SINGLE LINE DIAGRAM

SCALE: N.T.S.

Figure No. E-1
SWITCHGEAR 'SWGR 13/14'
SINGLE LINE DIAGRAM
ORANGE COUNTY UTILITIES

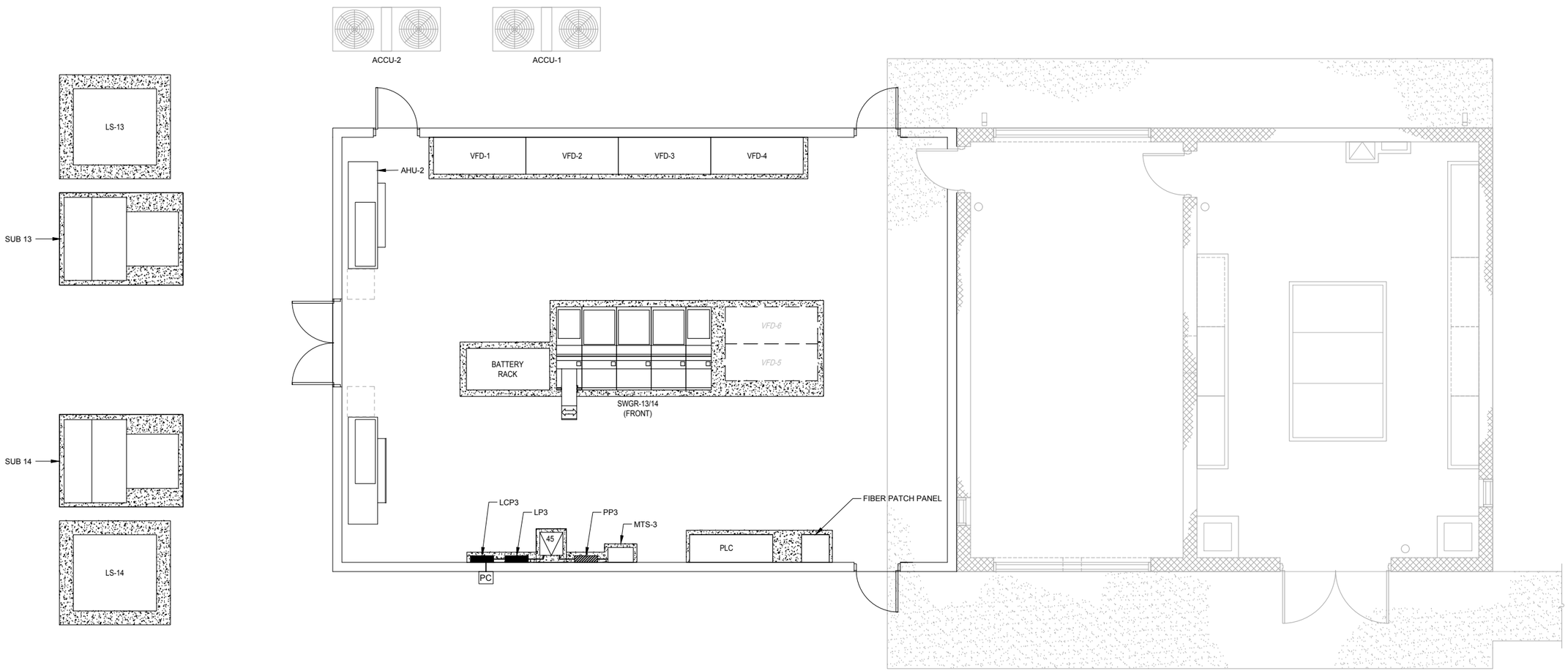
carollo
Engineers...Working Wonders With Water



SWITCHGEAR 'SWGR 13/14' SINGLE LINE DIAGRAM

Figure No. E-2
15 KV SYSTEM
SINGLE LINE DIAGRAM
ORANGE COUNTY UTILITIES

carollo
Engineers...Working Wonders With Water



RECLAIMED PUMP STATION ELECTRICAL BUILDING-PLAN

SCALE: 1/4"=1'-0"

0 1 2 3 7'

Figure No. E-3
RECLAIMED PUMP STATION
ELECTRICAL BUILDING PLAN
ORANGE COUNTY UTILITIES

carollo
Engineers...Working Wonders With Water

6.12 Instrumentation & Control Improvements

It is recommended that security provisions for this project be integrated within OCU's security improvements at EWRF being addressed within the facilities plan.

6.12.1 SCADA Overview

The SCADA system will continue to be based on the Siemens S7 PLCs with new PLCs being S7 1500 series as an upgrade from the current S7 300 series. The existing PLC-4A at the Reclaimed Pump Station and existing PLC-05B at the North Control Building will be replaced with a new PLCs. Fiber was previously extended to the Reclaimed Pump Station so both PLCs already reside on the SCADA network.

To the extent possible, new equipment including VFDs, starters, power monitors, etc. will be digitally connected to a PLC via Ethernet (Profinet) similar to the IRP Improvements project. New graphic screens will be developed or modified for the new equipment utilizing WinCC HMI software.

New PAR instrumentation including tank level transmitters, magnetic flow meters, and pump protection instrumentation will be incorporated into the new PLC. The new PLC will integrate the existing and new high service pump stations to allow the existing pump station to serve as a jockey during low flows.

6.13 Site/Civil Improvements

The existing grade of the PAR site was raised by approximately 4.5 feet to accommodate the Phase IV-B ground storage tank and pump station. The Phase IV-B improvements permitted and constructed a wet detention stormwater pond which was designed to accommodate three future 3.0 MG ground storage tanks. Based on the additional proposed impervious area of the electrical building expansion and new pump station (which was not accounted for in the previous permit) it is anticipated that the existing stormwater pond will need to be expanded to the north as shown on **Figure 3**.

The proposed area for the two northern 3.0 MG storage tanks is in a natural wooded upland condition with an approximate elevation of 77 feet. Construction of the new ground storage tanks will require clearing and grubbing an area of approximately 3 acres to a depth of 18 inch. Following clearing and grubbing it is anticipated that 5-6 feet of structural fill will need to be imported to raise the finished floor elevation of the new storage tanks to 81.5 (to match the existing tank). A portion of the fill can be obtained from the stormwater pond expansion however the majority will likely be imported fill. These assumptions have been used for budgetary purposes. It is recommended that a final design engineering and geotechnical evaluation be performed.

6.14 Stormwater Improvements and Environmental Resource Permitting

An Environmental Resource Permit (ERP) was issued for the existing Phase IV-B Improvements by the FDEP Central District on February 28, 2006 (Permit #ERP48-0254537-001). As shown in the previous figure, the ERP was issued based upon a wetlands line in 2004. All subsequent projects since then, Phase IV-C and Phase V, have been based upon the 2004 wetlands line. It is anticipated this project will impact existing wetlands and should accommodate for the necessary permitting required. The existing permit included a total site area of approximately 4.1 acres with 1.2 acres of impervious area and authorized the construction of one wet retention pond for

stormwater treatment and attenuation. The 1.24 acres of impervious area in the existing permit includes the impervious area of three future ground storage tanks similar in size to the existing Phase IV-B tank.

The proposed improvements for Phase VI-A include the impervious area of the expanded electrical building, new PAR high service pump station, ancillary paving and sidewalks, and new meter station which were not accounted for in the previous ERP permit. In order to permit the proposed Phase VI-A improvements the existing stormwater pond would need to be expanded to accommodate the treatment volume for the impervious are not accounted for in the existing ERP permit.

Alternatively the new ground storage tanks will be equipped with parapet walls to capture stormwater in order to augment reclaimed water storage. The permitted impervious tank area could then be applied to the Phase VI-A additional impervious areas.

7 Phasing and Master Site Planning

The Phase VI-A improvements are one of three projects planned in the County owned land between Curry Ford Road and EWRF. OCU is also planning the Utilities Operations Center-East (UOC-East) on a portion of land north of the PAR facility and plans to rebuild the existing access road from Curry Ford Road. These three projects require a phased approach to properly coordinate their construction. It is anticipated the Curry Ford Access Road improvements will be constructed first, followed by Phase VI-A, and finally the UOC-East.

7.1 Utilities Operations Center-East

As part of a separate project OCU is planning to construct the Utilities Operations Center-East (UOC-East) facility to the north of the existing EWRF PAR facility as shown on **Figure 5**. The facility will include a building of approximately 81,000 square feet to accommodate Utilities staff from multiple divisions including Fiscal, Operations Support, Field Services, Customer Service, and Water Divisions. The site will also include two separate outdoor covered storage structures. It is estimated that the facility will accommodate 230 employees at buildout conditions. The County has selected an architect led (Rhodes + Brito) design team for the project and is in contract negotiations to begin the design phase for the facility.

The site layout for the UOC-East project will be established by the UOC-East design team. The approximate location for the UOC-East facility has been shown on **Figure 5** to illustrate the proximity to the proposed PAR and roadway improvements. It is recommended that all three projects are properly coordinated. This is for the most economical and logical placement of medium voltage duct banks, water, sewer, 480V duct banks, power, communications, and other utilities.

7.2 Access Roadway Construction

The existing access roadway connects Curry Ford Road, the existing PAR facility, and the WRF. Orange County has initiated a project to rebuild the existing road to serve as a common roadways serving the UOC-East, existing aquifer storage and recovery well, the EWRF PAR facility, and the new main entrance to EWRF. Orange County has retained Pegasus Engineering as the roadway design engineer who is progressing toward bid documents for the proposed roadway. Figure **5** shows the limits of the planned new access roadway in relation to the PAR improvements. As shown in **Figures 3 & 5** there is significant work for the PAR improvements

which will be performed within the roadway right of way (new reclaimed water piping & PAR pump station electrical duct bank). It is recommended that these projects be phased such that the improvements within the roadway right of way are constructed prior to the construction of the new roadway. Depending on the projected access roadway construction schedule this may require the PAR roadway improvements to be bid and constructed as a separate project. Alternatively a corridor along the southern side of roadway and within the proposed stormwater pond embankment could be provided to allow future construction of the Phase VI-A electrical duct bank and future 30" reclaimed water pipeline.

8 Opinion of Probable Construction Costs

Below is the Opinion of Probable Construction Cost (OPCC) for the EWRF Phase VI-A PAR improvements. The total construction cost is estimated to be **$18,267,445.94**. The OPCC is a Class IV estimate as defined by AACE international guidelines. The OPCC assumes that the work within the access road right of way (PAR pipelines and electrical duct banks) will be completed at the time of roadway construction and therefore demolition and reconstruction of an existing roadway will not be required. The anticipated range of accuracy of a Class IV estimate is from -30 percent to +50 percent of the actual cost of construction. A contingency of 30% has been used in this Class IV OPCC. It is anticipated that the OPCC will be updated based on final design engineering, or as the scope of work changes.

EWRF Phase VI-A PAR Improvements				
Opinion of Probable Construction Cost - Class IV Estimate				
Item	Estimated Quantity	Unit	Unit Price	Cost
PAR High Service Pump Station				
4,000 gpm Vertical Turbine Reclaimed Water Pumps - Includes 350 HP motor and epoxy coated steel pump suction cans	4	EA	$240,000.00	$960,000.00
Future Vertical Turbine Pump Cans	2	EA	$35,000.00	$70,000.00
Pump Station Piping, Valves, & Fittings	1	LS	$978,139.50	$978,139.50
36" Magnetic Flow Meter	2	EA	$45,000.00	$90,000.00
30,000 gallon Hydropneumatic Tank	1	EA	$150,000.00	$150,000.00
Dual Air Compressor w/ Receiver Tank	1	EA	$25,000.00	$25,000.00
Reclaimed Water Ground Storage Tanks				
3.0 MG Prestressed Concrete Tank (Includes accessories, internal piping, & ultrasonic level transmitter	3	EA	$1,220,000.00	$3,660,000.00
Phase I/II Effluent Pump Replacement				
Demolition of Existing Vertical Turbine Pumps	7	EA	$3,500.00	$24,500.00
New Phase I/II 30 HP Vertical Turbine Effluent Pumps	7	EA	$40,000.00	$280,000.00
Yard Piping & Access Roadway Pipelines (includes valves & fittings)				
Phase VI-A Site Yard Piping	1	LS	$934,392.40	$934,392.40
42" Gate Valve	1	EA	$68,000.00	$68,000.00
42" DI Reclaimed Water Piping Along Access Roadway	440	LF	$245.00	$107,800.00
30" DI Reclaimed Water Piping Along Access Roadway	50	LF	$130.00	$6,500.00
30" Gate Valve	2	EA	$27,600.00	$55,200.00
30" Phase III Effluent Pump Station Actuated Valve	1	EA	$45,000.00	$45,000.00
42" Phase III Effluent Pump Station Control Valve	1	EA	$70,000.00	$70,000.00
Civil Improvements				
Clearing & Grubbing	1	LS	$20,000.00	$20,000.00
Import Fill	26620	CY	$25.75	$685,465.00
Asphalt Access Drive	825	SY	$25.00	$20,625.00
6' High Chain Link Fence	895	LF	$27.00	$24,165.00
Expansion of Existing Stormwater System	1	LS	$50,000.00	$50,000.00
Structural Improvements				
Electrical Building Expansion	1	LS	$205,000.00	$205,000.00
High Service Pump Station Slab	1	LS	$115,000.00	$115,000.00
High Service Pump Can Concrete Encasement & Base Slab	1	LS	$80,000.00	$80,000.00
5-Ton Bridge Crane at High Service Pump Station	1	LS	$85,000.00	$85,000.00
Structural Repairs at Phase I/II Effluent Pump Station	1	LS	$7,500.00	$7,500.00
Electrical Improvements				
Switchgear and Switchboard	1	LS	$710,000.00	$710,000.00
Variable Frequency Drives	1	LS	$350,000.00	$350,000.00
15 KV Feeders, Loop Switches and Transformers	1	LS	$525,000.00	$525,000.00
Instrumentation (PLC/SCADA)	1	LS	$275,000.00	$275,000.00
Electrical & Instrumentation Wiring	1	LS	$210,000.00	$210,000.00
Low Voltage Improvements (Panelboards, Disconnects, Lighting, etc.)	1	LS	$165,000.00	$165,000.00
HVAC				
Electrical Building Split System Air Conditioning	1		$100,000.00	$100,000.00
Subtotal				**$11,152,286.90**
Contingency (30%)				$3,345,686.07
Total				**$14,497,972.97**
Contractor - General Conditions at 7% of Total				$1,014,858.11
Contractor - Mobilization/Demobilization at 3% of Total				$434,939.19
Contractor - Overhead and Profit at 15% of Total				$2,174,695.95
Bonds at 1% of Total				$144,979.73
				$18,267,445.94

Notes: The OPCC is a Class IV estimate, as defined by AACE International guidelines. The anticipated rage of accuracy of a Class IV estimate is from -30% to +50% of the actual cost of construction.

Appendix A

EWRF PHASE VI-A FACILITIES EXPANSION PLAN RECLAIMED WATER MANAGEMENT REPORT (WSP USA, INC.)

TECHNICAL MEMORANDUM

EWRF PHASE VI-A FACILITIES EXPANSION PLAN RECLAIMED WATER MANAGEMENT

To: Orange County Utilities

From: Carollo Engineers, Inc. and WSP USA Inc.

EXECUTIVE SUMMARY

Orange County Utilities (OCU) is planning a 7.0-million gallon per day (MGD) upgrade as part of the next phase (Phase VI) of treatment expansion at the Eastern Water Reclamation Facility (EWRF). The Phase VI expansion for EWRF has been split into two separate and successive projects: Phase VI-A, for reclaimed water management infrastructure and improvements, and Phase VI-B, for EWRF treatment facility infrastructure upgrades. This technical memorandum provides a basis for determining the storage and pumping needs for the East Service Area (ESA) for Phase VI-A conditions and a high-level assessment of the various reclaimed water management alternatives for Phase VI and projected build-out conditions for the ESA.

The public access reuse (PAR) demands in the ESA were estimated to be approximately 3.5 MGD on annual average daily flow (AADF) basis in 2016. OCU provided build-out estimates of reclaimed water demands associated with the major planned developments (PDs) in the ESA to be approximately 18.69 MGD AADF. Capacities for future reclaimed water facilities (storage and pumping) were evaluated based on peak hour and maximum day demands. Historical data from actual public access reuse (PAR) demands measured in the ESA were used to compute observed daily peaking factors. A maximum day peaking factor of 2.0 was considered a conservative estimate for future design and therefore was selected for this analysis. Per OCU guidance, for evaluation of reclaimed water facilities for Phase VI conditions, a maximum peak hour factor of 10.5 was selected, with the peak hour factor approaching 6.0 by build-out conditions.

A significant portion of the existing ESA PAR demand is currently met through the City of Orlando's Eastern Regional Reclaimed Water Distribution System (ERRWDS). In 2016, approximately 1.5 MGD of the 3.5 MGD AADF total ESA PAR demand was served directly from EWRF, while the remaining was served from the ERRWDS. The existing EWRF PAR pump station has a firm pumping capacity (estimated as the pumping capacity with the largest pump out of service) of 4,000 gallons per minute (gpm). For the target peak hour factors of 10.5 (Phase VI) and 6.0 (build-out), the reliable, firm capacity of the existing PAR pump station at EWRF is estimated to be approximately 0.5 MGD and 1.0 MGD, respectively, which is lower than the existing PAR demand served directly from EWRF. Therefore, the existing PAR pump station in insufficient to meet the existing demand at the targeted level-of-service

peaking factors (e.g., 10.5 peak hour/annual average ratio, in the near-term). To improve reliability of the EWRF PAR system to meet the OCU-targeted level-of-service peak hour factors, based on discussion with OCU staff, the following storage and pumping improvements are recommended for the next phase of expansion in the ESA:

- EASTERN WATER RECLAMATION FACILITY - (PHASE VI-A)
  - **Storage**: Three (3) new 3-MG ground storage tanks (9-MG increase)
  - **Pumping**: Four (4) new 4,000- gpm pumps (16,000-gpm increase); with space for two (2) additional 4,000-gpm future pumps
- EAST SERVICE AREA STORAGE AND REPUMP FACILITY (ESA SRF) - (PHASE II)
  - **Storage**: Two (2) new 5-MG ground storage tanks (10-MG increase)
  - **Pumping**: Four (4) new 6,000-gpm pumps (24,000-gpm increase); with space for 4 to 5 additional 6,000-gpm future pumps
- LAKE PICKETT STORAGE AND REPUMP FACILITY - (PHASE I)
  - **Storage**: One (1) new 2-MG ground storage tank (2-MG increase)
  - **Pumping**: Two (2) new 4,400-gpm pumps (8,800-gpm increase); with space for two (2) additional 4,400-gpm future pumps

Table ES-1 provides a summary of desired level-of-service peaking factors and existing and future PAR irrigation demand in the ESA.

Table ES-1. Summary of Peak Hour Factors and Existing and Future PAR Irrigation Demand in the ESA

Description	Existing Condition – 2016 [1]	Estimated Next Phase of Expansion [2]	Estimated Build-out
Maximum Day Factor	N/A [3]	2.0	2.0
Peak Hour Factor	N/A [3]	10.5	6.0
PAR Demands, served directly by			
EWRF (MGD AADF)	1.5	2.5	5.6
ESA SRF (MGD AADF)	-	2.5	11.3
Lake Pickett SRF (MGD AADF)	-	0.6	1.8
ERRWDS [4] (MGD AADF)	2.0	-	-
Total PAR Demand (MGD AADF)	3.5	5.6	18.7

NOTES

1 Based on customer billing data
2 Phase VI-A for EWRF; Phase II for ESA Storage and Repump Facility (SRF); Phase I for Lake Pickett SRF
3 Not available
4 City of Orlando's Eastern Regional Reclaimed Water Distribution System (ERRWDS) currently serves a portion of OCU's ESA PAR demand. The ERRWDS likely may be used to serve some portion of next phase and build-out ESA PAR demands; however, for conservatism, sizing of OCU-operated pump stations was selected assuming no flow coming from ERRWDS.