EXHIBIT A

CONTROLPOINT
ENGINEERING

September 21, 2023

Mr. Jim Fletter
Senior Engineer
Wood Rodgers, Inc.
jfletter@WoodRodgers.com

RE: Proposal for City of Colfax WWTP SCADA Upgrade

Mr. Fletter:

This proposal for Professional Services with ControlPoint Engineering provides for an all-new Supervisory Control and Data Acquisition (SCADA) system at the City of Colfax Wastewater Treatment Plant (WWTP).

The WWTP presently has two SCADA systems providing process visualization, local alarming, and data acquisition. The first system is an older, outdated Citect software application running on an aging PC. The second is a HT3 software application running on proprietary hardware from Data Flow Systems (DFS). Both systems provide similar functions; however, neither is an all-in-one solution for the plant and the collections system. There are some functions the Citect system has that the HT3 system does not; however, the HT3 system is the most complete and the major difference is that it provides process visualization and control for the off-site sewage lift stations. Operations staff must use a combination of both systems to perform supervisory control and data acquisition functions at the plant.

The system we are offering replaces both existing SCADA systems with a single solution developed within Ignition® from Inductive Automation. Ignition® is an industry-leading, non-proprietary software product that is flexible, scalable, and runs on any operating system. The City's new Ignition® system will connect to every PLC at the plant and the City's lift stations. It will be developed in close coordination with City staff to ensure the system meets Operational needs. As part of this project, we will write code for the new Programmable Logic Controllers (PLCs) provided by the Algae Removal Project.

Our core business is designing and installing industrial automation solutions for municipal water and wastewater systems throughout Northern California and Nevada. Our systems are non-proprietary, meaning any system integrator can maintain or expand the system. We will always be available for support, but the City will have the flexibility to have others work on the system. The City will not be beholden or locked in with ControlPoint in any way.

We maintain $2,000,000 general liability, $2,000,000 professional liability, $1,000,000 motor vehicle, and $5,000,000 umbrella insurance policies and have a long list of clients who are happy with the Ignition® systems that we have designed and installed. We've included a client list in the appendix of this proposal and encourage the City to reach out to anyone in that list for their opinions on Ignition® software or our integration and engineering services.

Scope of Work

Our offer includes the following:

1. Project Management
2. Control Strategies
3. SCADA Architecture Diagrams
4. Control Panel Factory Testing
5. Hardware Configuration & Installation
6. PLC Programming
7. SCADA Application Development

8. Software Testing
9. System Commissioning
10. Training
11. Equipment & Materials

1. Project Management

We have included time for project update meetings and ongoing project-related correspondence and coordination throughout the 12-month duration of the project. Update meetings, correspondence, and coordination will be required with City staff, the Algae Removal Project Contractor, and the Design Engineers. We will provide monthly progress reports, track action items, and log decisions made throughout the project.

2. Control Strategies

A detailed Control Strategy document provides an Operational handbook for the plant. For this project, it will also serve as the baseline for the PLC programming and SCADA application development activities required for the Algae Removal Project.

We will provide a comprehensive Control Strategy document for the entire plant. All existing and new plant equipment, instruments, process variables, and control options will be detailed within this document.

An example Control Strategy document is provided as an attachment.

3. SCADA Architecture Diagrams

ControlPoint staff will visit the plant to capture details for the existing equipment, including model numbers, existing IP addresses, media type, and physical connections. In collaboration with City staff, each network switch, radio, protocol converter, communications appliance, and PLC will be given a unique name. Printed labels will be created and applied to each device. Labels will also be created and applied on each end of every communication cable throughout the plant.

Detailed SCADA Architecture Diagrams will be developed for the plant showing each of the plant's connected devices and their descriptions, model numbers, IP addresses, port assignments, and communication media.

Example SCADA Architecture Diagrams are provided as an attachment.

4. Control Panel Factory Testing

Three of the four new Control Panels provided by the Algae Removal Project will contain Contractor-provided PLCs programmed by ControlPoint staff:

- Main Plant Control Panel
- Pond 3 Irrigation Booster Pump Station Control Panel
- Chlorine Contact Basin Pump Station Control Panel

We will participate in Factory Testing activities at the Contractor's system supplier panel shop for these Control Panels by installing our new PLC programs into the Contractor-provided PLCs and working with the Contractor's system supplier to test that the panels have been fabricated properly and the internal panel wiring interfaces properly with the PLC.

The Air Flotation System Control Panel will contain a PLC programmed by the Air Flotation system supplier and as such will not undergo Factory Testing by ControlPoint staff.

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5. PLC Programming

Three (3) new PLC programs will be written for the Algae Removal Project in accordance with the Control Strategies developed in Task 2:

- Main Plant PLC
- Pond 3 Irrigation Booster Pump Station PLC
- Chlorine Contact Basin Pump Station PLC

The existing Belt Press Control Panel will be reverse-engineered in the field in order to provide a PLC memory map for the undocumented PLC code. A memory map (i.e. documented ladder logic) is required in order to provide process visualization and alarming of the Belt Press system on SCADA.

6. Hardware Configuration

We will install and configure the base operating system (OS) and all required Ignition® software modules on the new SCADA server provided by the Algae Removal Project Contractor. We will set up server diagnostics and provide configuration to automatically backup the critical software elements to a City-provided offsite location.

We will setup, configure, and field test all equipment provided by ControlPoint, including:

- Base Radio (1)
- Directional Radios (4)
- WiFi Access Points (6)
- Communications Router (1)
- SMS Alarm Modem (1)
- Surface Pro Tablets (2)
- MicroLogix 1400 PLC (1) (replaces the serial-only MicroLogix 1000 PLC at the Headworks)

The tablets and hotspots provide a mobile SCADA solution for Operations staff while at the plant. The communications router provides a secure connection to the plant for outside remote access and handles all of the on-plant data traffic. The SMS alarm modem delivers alarms generated by the SCADA software to the Operator's phones.

7. SCADA System Development

Ignition® tags and graphics will be developed to visualize and control a total of ten (10) PLCs:

- Main Plant PLC Processes (Influent Pumps, Plant Water Pumps, Analyticals)
- Pond 3 Irrigation Booster Pump Station
- Chlorine Contact Basin Pump Station
- Air Flotation System
- UV System
- Belt Press
- Headworks
- Lift Station 1
- Lift Station 2
- Lift Station 3
- Lift Station 5

Additional elements of the new SCADA application include the following:

- Plant Overview

- Lift Station Communications (configurable polling engine page with statistics)
- Alarm Configuration Pages
- Alarm Summary & History
- Historical Trends
- Daily & Monthly Reports

8. Software Testing

We will bench test all of the new PLC code against the new SCADA application, field test the Air Flotation system's vendor-provided PLC code with the new SCADA application, and field test the existing PLCs with the new SCADA application. We have included 24 hours of additional PLC code and SCADA application development time in this task for additional requests from the City.

9. System Commissioning

Each I/O point coming into the Main Plant PLC, Pond 3 Irrigation Booster Pump Station PLC, and Chlorine Contact Basin Pump Station PLC will be loop checked to/from the corresponding field device or motor controls, into the PLC, and into the SCADA application. Once loop checks are completed, the functionality of the PLC code and SCADA application will be tested. We will demonstrate the system to Operations staff for Acceptance Testing. We anticipate minor punchlist items and small iterations until the City provides a formal acceptance of the system.

10. Training

We will provide onsite SCADA application training sessions for Operations staff. The training sessions will focus on the capabilities and features of the new SCADA application components. A training schedule will syllabus will be provided.

11. Materials

We will provide all of the equipment listed in the attached Materials List.

Fee Schedule
(see Attachment 1 for more detail)

Task 1	Project Management	$9,360
Task 2	Control Strategies	$11,700
Task 3	SCADA Architecture Diagrams	$9,360
Task 4	Control Panel Factory Testing	$6,000
Task 5	Hardware Configuration & Installation	$26,900
Task 6	PLC Programming	$53,900
Task 7	SCADA Application Development	$123,700
Task 8	Software Testing	$27,680
Task 9	System Commissioning	$38,900
Task 10	Training	$3,900
Materials	Materials	$8,200
Direct Costs	Mileage & Expenses	included
Total		**$319,600**

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Notes

1. SCADA software and SCADA server hardware will be provided to the City by the Algae Removal Project Contractor. ControlPoint will provide all configuration, programming, and application development for a complete and functional system.
2. The SMS alarm modem will require a City-provided cellular service plan in order for alarms to reach the Operator's cell phones. This is a two-way system in that the alarms can also be cleared by the Operator through texts. The typical monthly fees for a data plan to support an SMS alarm modem is $30/month and varies by the cellular provider.
3. We recommend that the City purchase the annual Ignition® Software BasicCare Support Plan from Inductive Automation. This Support Plan will provide the City with unlimited upgrades to Ignition modules. The BasicCare Support Plan is 16% of the original purchase price and is estimated at approximately $2500. This yearly investment future-proofs the City's software investment and helps keeps the system protected from malware, viruses and zero-day exploits.

Total Cost

Our total fees for the **WWTP SCADA Upgrade** will not exceed **$319,600** and will be billed on a time and expense basis.

Attachments

1. Fee Summary
2. 2024 Rate Sheet
3. Project Schedule
4. Communications Site Plan
5. Materials List & Product Cutsheets
6. Example Control Strategy
7. Example SCADA Architecture Diagrams
8. ControlPoint Engineering Ignition® Installation Locations
9. ControlPoint Engineering Ignition® Project References
10. ControlPoint Engineering Key Staff Resumes

ControlPoint Engineering, Inc.

Jeremy Pollet, P.E.
Principal Engineer
3941 Park Drive, Unit 20-652
El Dorado Hills, CA 95762
Phone: 916.337.9697
jeremy.pollet@controlpointeng.com

EXHIBIT A

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Fee Summary

EXHIBIT A

City of Colfax
WWTP SCADA Upgrade Fee Summary

	Description	PM, EE, SCADA Developer	Lead SCADA Developer	SCADA Developer	Senior Field Engineer	Cost
Task 1	**Project Management**	**32**	**16**			**$9,360**
1.1	Project Update Meetings	16				$3,120
1.2	Project Correspondence and Coordination	16	16			$6,240
Task 2	**Control Strategies**	**30**	**30**			**$11,700**
2.1	Control Strategy Development Meetings with the City	10	10			$3,900
2.2	Control Strategy Document (Draft, 90%, 100% Submittals)	20	20			$7,800
Task 3	**SCADA Architecture Diagrams**	**24**	**24**			**$9,360**
3.1	Existing Architecture Discovery (model numbers, IP addresses, etc.)	8	8			$3,120
3.2	SCADA Architecture Diagrams (Draft, 90%, 100% Submittals)	16	16			$6,240
Task 4	**Control Panel Factory Testing**				**30**	**$6,000**
4.1	Main Plant PLC Control Panel				10	$2,000
4.2	Pond 3 Irrigation Booster Pump Station Control Panel				10	$2,000
4.3	Chlorine Contact Basin Pump Station Control Panel				10	$2,000
4.4	Air Flotation System Control Panel (Vendor PLC)					$0
Task 5	**Hardware Configuration & Installation**		**54**	**54**	**40**	**$26,900**
5.1	SCADA Server Setup and Configuration		20	20		$7,000
5.2	Base and Directional Radios (installed by Contractor)		16	16		$5,600
5.3	WiFi Access Points (installed by ControlPoint)		8	8	40	$10,800
5.4	Communications Router		4	4		$1,400
5.5	Surface Pro Tablets		4	4		$1,400
5.6	SMS Alarm Modem		2	2		$700
Task 6	**PLC Programming**	**40**	**100**	**120**	**40**	**$53,900**
6.1	Main Plant PLC	20	40	40		$17,900
6.2	Pond 3 Irrigation Booster Pump Station PLC	10	30	30		$12,450
6.3	Chlorine Contact Basin Pump Station PLC	10	30	30		$12,450
6.4	Air Flotation System PLC (Vendor)					$0
6.5	UV System PLC (Existing)					$0
6.6	Belt Press PLC (Existing) (reverse engineer wiring)			10	30	$7,550
6.7	Headworks PLC (Existing) (replace with Ethernet-based model)			10	10	$3,550
6.8	Lift Station 1 PLC (Existing)					$0
6.9	Lift Station 2 PLC (Existing)					$0
6.10	Lift Station 3 PLC (Existing)					$0
6.11	Lift Station 5 PLC (Existing)					$0
Task 7	**SCADA Application Development**	**64**	**316**	**320**		**$123,700**
7.1	Main Plant PLC Processes (Influent Pumps, Plant Water Pumps, Analyticals)	8	32	32		$12,760
7.2	Pond 3 Irrigation Booster Pump Station	4	20	20		$7,780
7.3	Chlorine Contact Basin Pump Station	4	20	20		$7,780
7.4	Air Flotation System	4	16	20		$7,000
7.5	UV System	4	16	20		$7,000
7.6	Belt Press	4	16	20		$7,000
7.7	Headworks	4	16	20		$7,000
7.8	Lift Station 1	4	12	16		$5,600
7.9	Lift Station 2	4	12	16		$5,600
7.10	Lift Station 3	4	12	16		$5,600
7.11	Lift Station 5	4	20	24		$8,400
7.12	Lift Station Polling Engine, Configuration, and Statistics Screen	4	16	16		$6,380
7.13	Plant Overview	4	16	20		$7,000
7.14	Alarm Configuration, Summary, and History Pages	4	16	20		$7,000
7.15	Historical Trends	4	16	20		$7,000
7.16	Daily / Monthy Reports		60	20		$14,800
Task 8	**Software Testing**	**36**	**36**	**88**		**$27,680**
8.1	Bench Test New PLC Code with New SCADA Screens	16	16	40		$12,440
8.2	Field Test Air Flotation System Vendor PLC with New SCADA Screens	4	4	12		$3,420
8.3	Field Test Exsiting PLCs with New SCADA Screens	8	8	20		$6,220
8.4	Additional PLC Code Requests from the City	4	4	8		$2,800
8.5	Additional SCADA Application Requests from the City	4	4	8		$2,800
Task 9	**System Commissioning**	**60**	**60**	**100**		**$38,900**
9.1	Loopchecks with the Contractor (Main PLC, Pond 3 PS, CCB PS)	20	20	40		$14,000
9.2	Function Testing with the Contractor and the City	16	16	24		$9,960
9.3	Acceptance Testing with the Contractor and the City	16	16	24		$9,960
9.4	Post-commissioning Punchlist	8	8	12		$4,980
Task 10	**Training**	**4**	**16**			**$3,900**
10.1	SCADA Training for Plant Operators	4	16			$3,900
Materials	**Materials**					**$8,200**
11.1	Base Radio (1)					$250
11.2	Directional Radios (4)					$1,000
11.3	WiFi Access Points (6)					$1,800
11.4	Communications Router (1)					$500
11.5	Surface Pro Tablets (2)					$2,250
11.6	SMS Alarm Modem (1)					$1,000
11.7	MicroLogix 1400 PLC (1)					$1,400
	Total	**290 Hours**	**652 Hours**	**682 Hours**	**110 Hours**	**$319,600**

EXHIBIT A

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2024 Rate Sheet

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2024
Hourly Rate Schedule

Services will be billed on a time and expense or lump sum basis dependent upon each task order. Labor will be at the specified hourly rates. Expenses incurred will be at the listed rates.

Labor

Classification	Hourly Rate
Principal Engineer	$195
Project Manager	$195
Professional Engineer (PE)	$195
Lead SCADA Developer	$195
Associate Engineer	$155
SCADA Developer	$155
Designer/Drafter	$120
Technical Assistant	$90

Expenses

Description	Rate
Auto Mileage	Current IRS Rate
Direct & Travel Expenses	Actual
Equipment & Materials	Actual + 10%
Subcontractor & Outside Services	Actual + 10%

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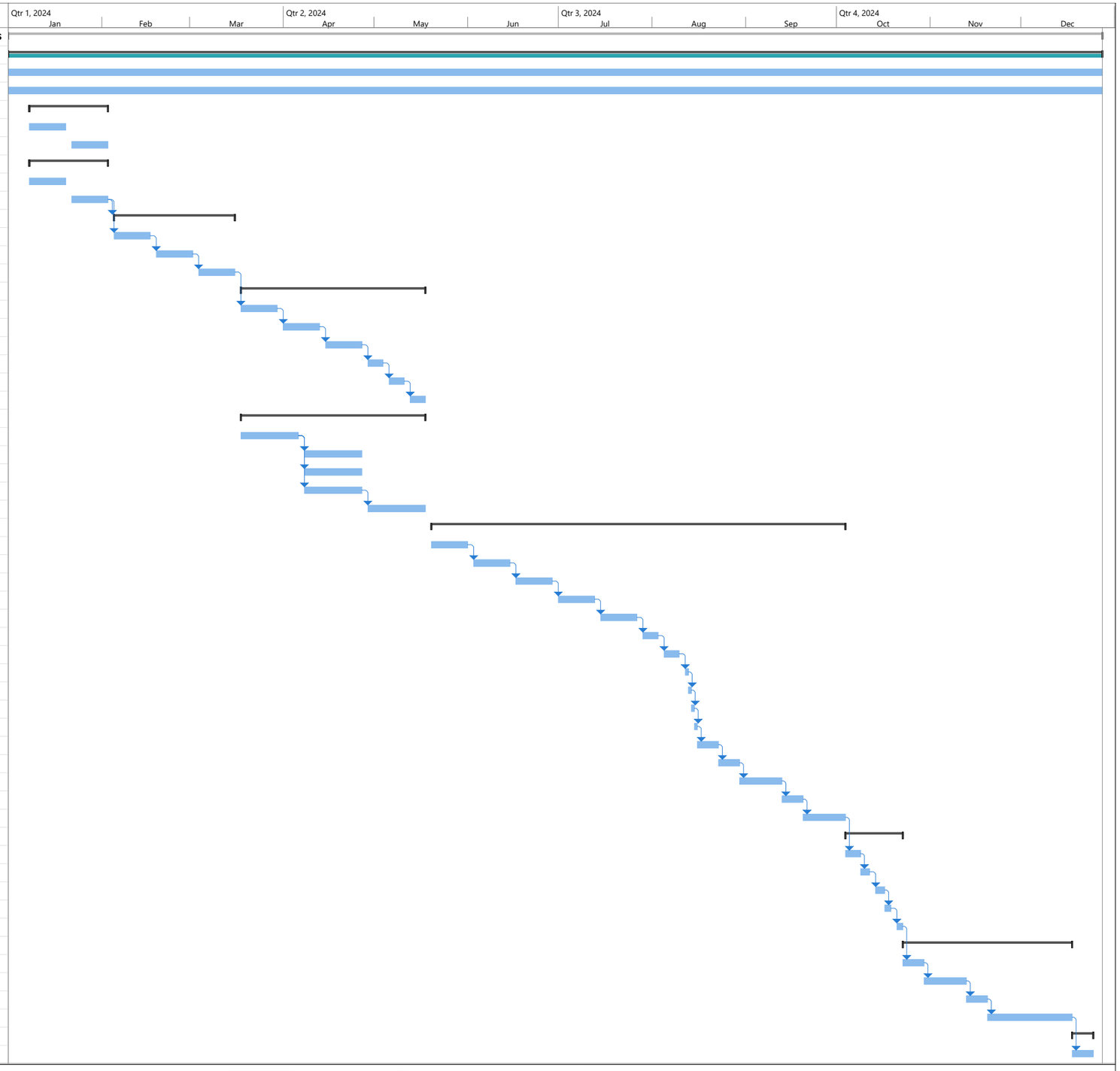
Project Schedule

EXHIBIT A

ID	Task Mode	Task Name	Duration	Start	Finish	Duration
0		**City of Colfax WWTP SCADA Upgrade Project Schedule**	**260 days**	**Mon 1/1/24**	**Fri 12/27/24**	**260 days**
1		**Project Management**	**260 days**	**Mon 1/1/24**	**Fri 12/27/24**	**260 days**
2		Update Meetings	260 days	Mon 1/1/24	Fri 12/27/24	260 days
3		Correspondence and Coordination	260 days	Mon 1/1/24	Fri 12/27/24	260 days
4		**Control Strategies**	**20 days**	**Mon 1/8/24**	**Fri 2/2/24**	**20 days**
5		Control Strategy Development Meetings with the City	10 days	Mon 1/8/24	Fri 1/19/24	10 days
6		Control Strategy Document (Draft, 90%, 100% Submittals)	10 days	Mon 1/22/24	Fri 2/2/24	10 days
7		**SCADA Architecture Diagrams**	**20 days**	**Mon 1/8/24**	**Fri 2/2/24**	**20 days**
8		Existing Architecture Discovery	10 days	Mon 1/8/24	Fri 1/19/24	10 days
9		SCADA Architecture Diagrams (Draft, 90%, 100% Submittals)	10 days	Mon 1/22/24	Fri 2/2/24	10 days
10		**Control Panel Factory Testing**	**30 days**	**Mon 2/5/24**	**Fri 3/15/24**	**30 days**
11		Main Plant PLC Control Panel	10 days	Mon 2/5/24	Fri 2/16/24	10 days
12		Pond 3 Irrigation Booster Pump Station Control Panel	10 days	Mon 2/19/24	Fri 3/1/24	10 days
13		Chlorine Contact Basin Pump Station Control Panel	10 days	Mon 3/4/24	Fri 3/15/24	10 days
14		**Hardware Configuration & Installation**	**45 days**	**Mon 3/18/24**	**Fri 5/17/24**	**45 days**
15		SCADA Server Setup and Configuration	10 days	Mon 3/18/24	Fri 3/29/24	10 days
16		Base and Directional Radios (installed by Contractor)	10 days	Mon 4/1/24	Fri 4/12/24	10 days
17		WiFi Access Points (installed by ControlPoint)	10 days	Mon 4/15/24	Fri 4/26/24	10 days
18		Communications Router	5 days	Mon 4/29/24	Fri 5/3/24	5 days
19		Surface Pro Tablets	5 days	Mon 5/6/24	Fri 5/10/24	5 days
20		SMS Alarm Modem	5 days	Mon 5/13/24	Fri 5/17/24	5 days
21		**PLC Programming**	**45 days**	**Mon 3/18/24**	**Fri 5/17/24**	**45 days**
22		Main Plant PLC	15 days	Mon 3/18/24	Fri 4/5/24	15 days
23		Pond 3 Irrigation Booster Pump Station PLC	15 days	Mon 4/8/24	Fri 4/26/24	15 days
24		Chlorine Contact Basin Pump Station PLC	15 days	Mon 4/8/24	Fri 4/26/24	15 days
25		Belt Press PLC (Existing) (reverse engineer wiring)	15 days	Mon 4/8/24	Fri 4/26/24	15 days
26		Headworks PLC (Existing)	15 days	Mon 4/29/24	Fri 5/17/24	15 days
27		**SCADA Application Development**	**99 days**	**Mon 5/20/24**	**Thu 10/3/24**	**99 days**
28		Main Plant PLC Processes	10 days	Mon 5/20/24	Fri 5/31/24	10 days
29		Pond 3 Irrigation Booster Pump Station	10 days	Mon 6/3/24	Fri 6/14/24	10 days
30		Chlorine Contact Basin Pump Station	10 days	Mon 6/17/24	Fri 6/28/24	10 days
31		Air Flotation System	10 days	Mon 7/1/24	Fri 7/12/24	10 days
32		UV System	10 days	Mon 7/15/24	Fri 7/26/24	10 days
33		Belt Press	5 days	Mon 7/29/24	Fri 8/2/24	5 days
34		Headworks	5 days	Mon 8/5/24	Fri 8/9/24	5 days
35		Lift Station 1	1 day	Mon 8/12/24	Mon 8/12/24	1 day
36		Lift Station 2	1 day	Tue 8/13/24	Tue 8/13/24	1 day
37		Lift Station 3	1 day	Wed 8/14/24	Wed 8/14/24	1 day
38		Lift Station 5	1 day	Thu 8/15/24	Thu 8/15/24	1 day
39		Lift Station Polling Engine, Configuration, and Statistics Screen	5 days	Fri 8/16/24	Thu 8/22/24	5 days
40		Plant Overview	5 days	Fri 8/23/24	Thu 8/29/24	5 days
41		Alarm Configuration, Summary, and History Pages	10 days	Fri 8/30/24	Thu 9/12/24	10 days
42		Historical Trends	5 days	Fri 9/13/24	Thu 9/19/24	5 days
43		Daily / Monthy Reports	10 days	Fri 9/20/24	Thu 10/3/24	10 days
44		**Software Testing**	**13 days**	**Fri 10/4/24**	**Tue 10/22/24**	**13 days**
45		Bench Test New PLC Code with New SCADA Screens	3 days	Fri 10/4/24	Tue 10/8/24	3 days
46		Field Test Air Flotation System Vendor PLC with New SCADA Screens	3 days	Wed 10/9/24	Fri 10/11/24	3 days
47		Field Test Exsiting PLCs with New SCADA Screens	3 days	Mon 10/14/24	Wed 10/16/24	3 days
48		Additional PLC Code Requests from the City	2 days	Thu 10/17/24	Fri 10/18/24	2 days
49		Additional SCADA Application Requests from the City	2 days	Mon 10/21/24	Tue 10/22/24	2 days
50		**System Commissioning**	**40 days**	**Wed 10/23/24**	**Tue 12/17/24**	**40 days**
51		Loopchecks with the Contractor (Main PLC, Pond 3 PS, CCB PS)	5 days	Wed 10/23/24	Tue 10/29/24	5 days
52		Function Testing with the Contractor and the City	10 days	Wed 10/30/24	Tue 11/12/24	10 days
53		Acceptance Testing with the Contractor and the City	5 days	Wed 11/13/24	Tue 11/19/24	5 days
54		Post-commissioning Punchlist	20 days	Wed 11/20/24	Tue 12/17/24	20 days
55		**Training**	**5 days**	**Wed 12/18/24**	**Tue 12/24/24**	**5 days**
56		SCADA Training for Plant Operators	5 days	Wed 12/18/24	Tue 12/24/24	5 days



Project: City of Colfax WWTP SCADA Upgrade Project Schedule
Date: Tue 9/19/23

Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Progress
Manual Progress

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Communications Site Plan

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(N) ETHERNET BASE RADIO MOUNTED ON (E) ANTENNA TOWER BY CONTRACTOR

(N) WIFI ACCESS POINT IN CONTROL ROOM FOR INSIDE COVERAGE

(N) WIFI ACCESS POINT ON BUILDING FOR OUTSIDE COVERAGE

(E) BFP DEV

(N) INDOOR WIFI ACCESS POINT TO CONNECT (E) BELT PRESS PLC TO (N) SCADA

(E) BIOLOGICAL TREATMENT BUILDING

(E) CLOTH FILTERS

ESTIMATED WIFI COVERAGE ZONE (TYPICAL)

(E) INFLUENT PS

(E) POND No.2 EQ RETURN PS

2" 3W

4" SLG

2" 3W

4" SLG

(E) POND No.2 EFFLUENT PS

(E) POND No. 2

(E) CHLORINE CONTACT BASIN

ACCESS ROAD

GRAND VIEW WAY

AREA AVAILABLE FOR CONTRACTOR STAGING

INSTALL (N) ALGAE DEWATERING SYSTEM, SEE DWG C30

(N) DIRECTIONAL RADIO ON (N) CONTRACTOR-INSTALLED ANTENNA TOWER

(N) WIFI ACCESS POINT

4" D

INSTALL (N) ALGAE REMOVAL PROCESS AND SITE IMPROVEMENTS. SEE DWG C10

(N) 4" AFE, 2" 3W AND ELECTRICAL. SEE DWG C40

(N) DIRECTIONAL RADIO

(N) WIFI ACCESS POINT

(E) CHEMICAL STORAGE BUILDING

(N) 4" AFE, 2" 3W AND ELECTRICAL. SEE DWG C40

(E) CONTROL BUILDING

AREA AVAILABLE FOR CONTRACTOR STAGING

(E) POND No.1 EQ

CONNECT TO (E) 2" 3W AT (E) HB

(E) MANHOLE No. 2

(E) STANDBY GENERATOR AND SWITCHBOARD

(E) STANDBY GENERATOR AND SWITCHBOARD

(E) POND No. 1

(N) DIRECTIONAL RADIO TO PICK UP HEADWORKS PLC

(E) BRIDGE DECK PROTECT IN PLACE

ACCESS ROAD

(E) POND No. 3

DIRECTIONAL RADIO PATH (TYPICAL)

DAM ACCESS ROAD

ACCESS ROAD

(N) DIRECTIONAL RADIO ON (N) CONTRACTOR-INSTALLED ANTENNA TOWER

(N) WIFI ACCESS POINT

(E) POND 3 EQ RETURN PUMP STATION BUILDING

REPLACE (E) PUMPS AND PUMP STATION, SEE DWG C20

CONTROLPOINT PROVIDED EQUPMENT

(1) BASE RADIO
(3) DIRECTIONAL RADIOS
(6) WIFI ACCESS POINTS
(1) COMMUNICATIONS ROUTER
(2) SURFACE PRO TABLETS
(1) MICROLOGIX 1100 PLC TO REPLACE (E) HEADWORKS PLC (ETHERNET)

ALL EQUIPMENT SHOWN PROVIDED AND CONFIGURED BY CONTROLPOINT. INSTALLATION BY CONTROLPOINT UNLESS NOTED OTHERWISE.

N

0 30 60 120 180
1"=60'

BAR IS ONE INCH
AT FULL SCALE

	APR'L	REVISIONS	DATE
5			
4			
3			
2			
1			

NEXGEN UTILITY MANAGEMENT
4010 LENNANE DRIVE
SACRAMENTO, CA 95834
916.564.8000
NEXGEN

REGISTERED PROFESSIONAL ENGINEER JOSEPH B. D'ODORICO No. 051439 CIVIL STATE OF CALIFORNIA Exp 6-30-2024

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

SITE PLAN AND KEY MAP

DATE: 1/6/23
SCALE: 1"=60'
DRAWN BY: JA
DESIGNED BY: JR
CHECKED BY: JD
G04
JOB NO: ·

DRAWING NO:
G04
4 OF 62 SHEETS

C:\Drawings_Colfax\COLFAXWWTP_COVER SHEET.dwg 1/06/23 12:54pm contractor01

EXHIBIT A

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Materials List & Product Cutsheets

- Base Radio (1)
- Directional Radios (4)
- WiFi Access Points (6)
- Communications Router (1)
- Surface Pro Tablets (2)
- SMS Alarm Modem (1)
- MicroLogix 1400 PLC (1)

EXHIBIT A

CONTROLPOINT
ENGINEERING

Materials List & Product Cutsheets

Base Radio

EXHIBIT A

DATASHEET

LiteAP™ ac

5 GHz airMAX® AC AP

Models: LAP-120, LAP-GPS

High-Performance Sector AP

Up To 450+ Mbps Real TCP/IP Throughput

Lightweight, Low-Cost Solution

UBIQUITI®
NETWORKS

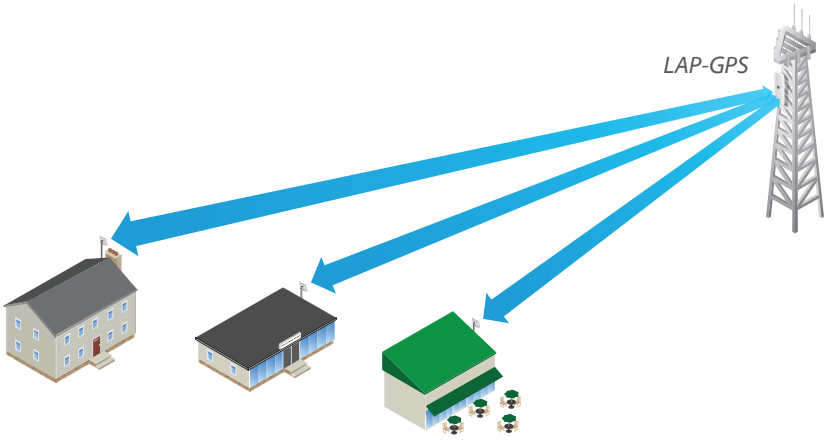
EXHIBIT A

LiteAP ac

Introducing the airMAX® LiteAP™ AC, the latest high-performance access point with disruptive pricing from Ubiquiti Networks. Featuring an ultra-lightweight form factor, the LiteAP AC was designed to be an affordable cost/performance solution for long-distance, wireless broadband bridging. Each of these models operates in the worldwide, license-free 5 GHz frequency range with high-performance speeds.

The LiteAP AC combines proprietary hardware and software technologies to deliver its breakthrough combination of throughput and range with cost-effective value.

Application Examples

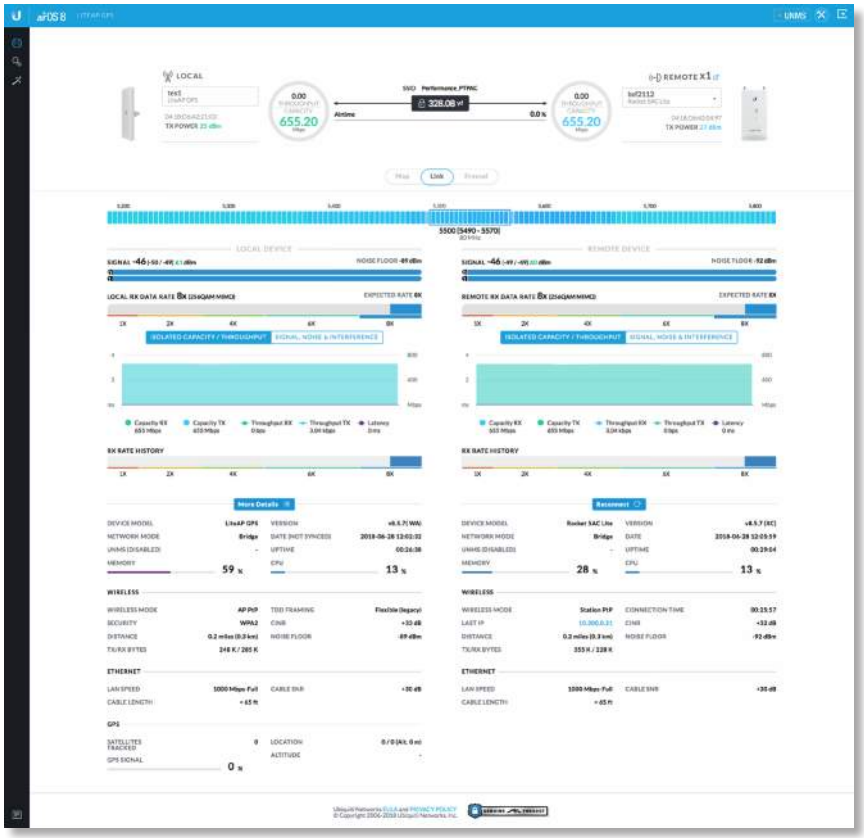


In a cost-effective WISP deployment, the LAP-GPS is used as an Access Point in an airMAX ac Point-to-MultiPoint network.

Software

airOS 8

airOS® v8 is the revolutionary operating system for Ubiquiti® airMAX ac products.



Powerful Wireless Features

- Access Point PtMP airMAX Mixed Mode
- airMAX ac Protocol Support
- Long-Range Point-to-Point (PtP) Link Mode
- Selectable Channel Width
  - PtP: 10/20/30/40/50/60/80 MHz
  - PtMP: 10/20/30/40 MHz
- Automatic Channel Selection
- Transmit Power Control: Automatic/Manual
- Automatic Distance Selection (ACK Timing)
- Strongest WPA2 Security

Usability Enhancements

- airMagic® Channel Selection Tool
- Redesigned User Interface
- Dynamic Configuration Changes
- Instant Input Validation
- HTML5 Technology
- Optimization for Mobile Devices
- Detailed Device Statistics
- Comprehensive Array of Diagnostic Tools, including RF Diagnostics and airView® Spectrum Analyzer

EXHIBIT A

Hardware Overview

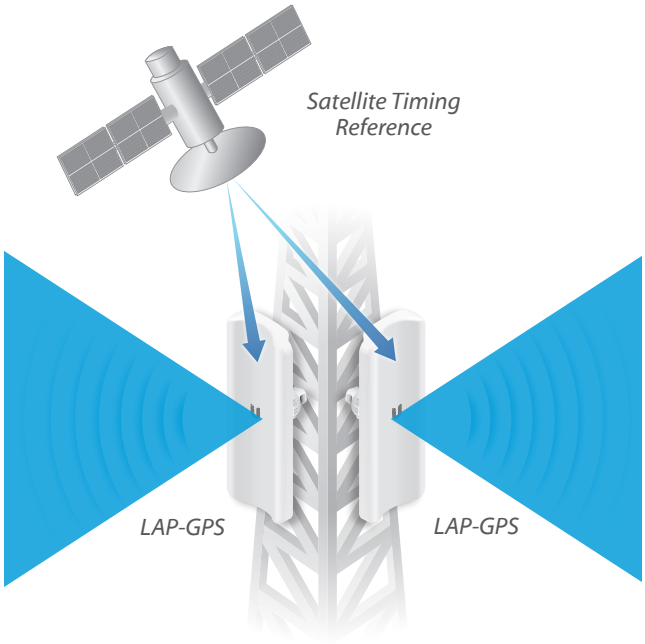
The LiteAP AC delivers up to 450+ Mbps real TCP/IP throughput and features an efficient form factor.

Quick Installation Minimal fasteners simplify installation. No tools are needed; only a single wrench is required for pole-mounting.

Versatile Mounting The ball-joint mount of the LiteAP AC provides adjustment flexibility for versatile mounting options.

Efficient Design The LiteAP AC features a lightweight antenna with an integrated radio in a sleek design.

Gigabit Ethernet The LiteAP AC delivers high throughput over its wired connection.



Two LAP-GPS devices transmitting simultaneously

LAP-120 mounted on a pole

GPS Sync Support

Precise GPS frame synchronization enables co-located LAP-GPS devices to transmit and receive data without interfering with each other, allowing for better frequency reuse and increased network stability.

Mobile App Support

The LAP-GPS integrates a separate Wi-Fi radio for fast and easy setup using your mobile device.

Accessing airOS via Wi-Fi

The Ubiquiti Network Management System (UNMS™) app* provides instant accessibility to the airOS configuration interface and can be downloaded from the App Store® (iOS) or Google Play™ (Android™). UNMS allows you to set up, configure, and manage your device, and offers various configuration options once you're connected or logged in.

* *UNMS app support for the LAP-120 requires the U-Installer, sold separately.*

EXHIBIT A

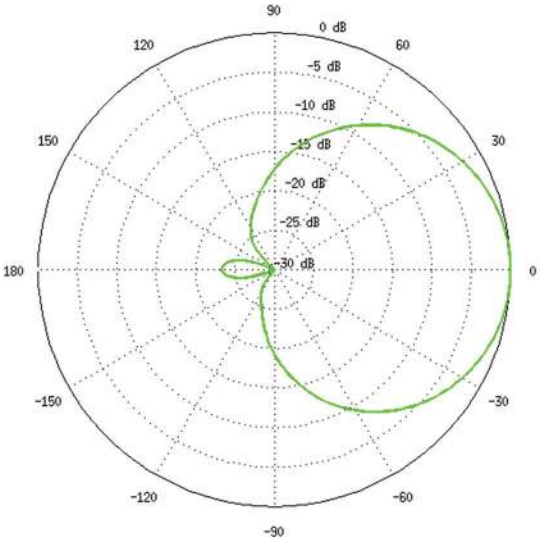
LiteAP ac

LAP-120	
Dimensions (Mount Not Included)	452.3 x 78.7 x 54.4 mm (17.81 x 3.10 x 2.14")
Weight (No Mount)	420 g (14.82 oz)
Mounting Kit	Pole Mounting Kit (Included)
Networking Interface	(1) 10/100/1000 Ethernet Port
Memory	64 MB
Max. Power Consumption	7W
Max. TX Power	25 dBm
Antenna Gain	16 dBi
Power Supply	24V, 0.5A Gigabit PoE Adapter (Included)
Power Method	Passive PoE (Pairs 4, 5+; 7, 8 Return)
Processor Specs	Atheros MIPS 74Kc, 533 MHz
Shock and Vibration	ETSI300-019-1.4
ETSI Specification	EN 302 326 DN2
ESD/EMP Protection	± 24 kV Contact / Air
RoHS Compliance	Yes
Operating Temperature	-40 to 70° C (-40 to 158° F)
Operating Humidity	5 to 95% Noncondensing
Certifications	FCC, IC, CE

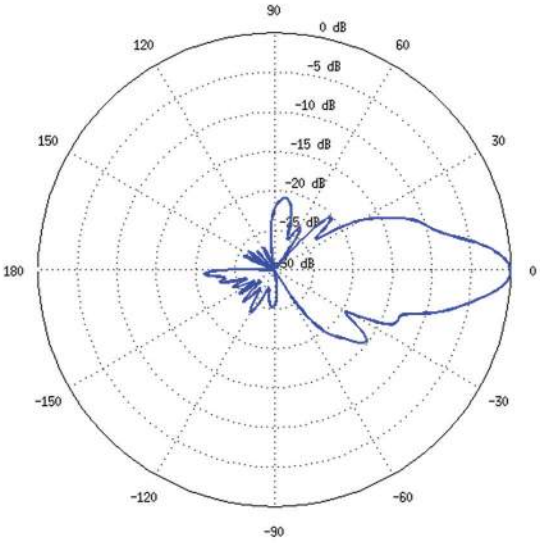
Output Power: 25 dBm							
TX Power Specifications				**RX Power Specifications**			
Modulation	Data Rate	Avg. TX	Tolerance	Modulation	Data Rate	Sensitivity	Tolerance
airMAX ac	1x BPSK (½)	25 dBm	± 2 dB	**airMAX ac**	1x BPSK (½)	-96 dBm	± 2 dB
	2x QPSK (½)	25 dBm	± 2 dB		2x QPSK (½)	-95 dBm	± 2 dB
	2x QPSK (¾)	25 dBm	± 2 dB		2x QPSK (¾)	-92 dBm	± 2 dB
	4x 16QAM (½)	25 dBm	± 2 dB		4x 16QAM (½)	-90 dBm	± 2 dB
	4x 16QAM (¾)	25 dBm	± 2 dB		4x 16QAM (¾)	-86 dBm	± 2 dB
	6x 64QAM (⅔)	25 dBm	± 2 dB		6x 64QAM (⅔)	-83 dBm	± 2 dB
	6x 64QAM (¾)	24 dBm	± 2 dB		6x 64QAM (¾)	-77 dBm	± 2 dB
	6x 64QAM (⅚)	23 dBm	± 2 dB		6x 64QAM (⅚)	-74 dBm	± 2 dB
	8x 256QAM (¾)	21 dBm	± 2 dB		8x 256QAM (¾)	-69 dBm	± 2 dB
	8x 256QAM (⅚)	21 dBm	± 2 dB		8x 256QAM (⅚)	-65 dBm	± 2 dB

Operating Frequency (MHz)	
Worldwide	5150 - 5875
USA	5150 - 5850

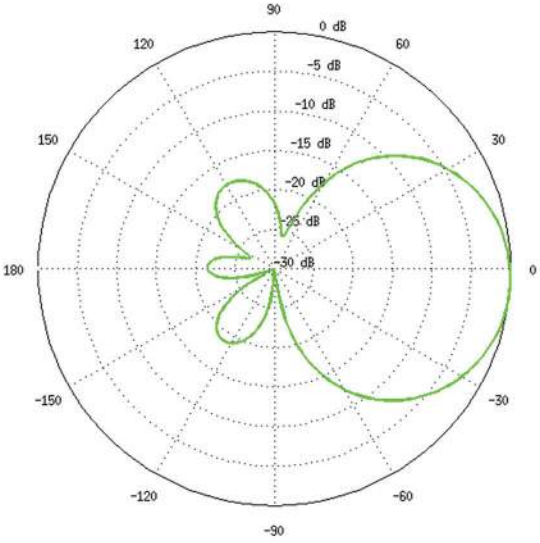
Vertical Azimuth



Vertical Elevation



Horizontal Azimuth



Horizontal Elevation

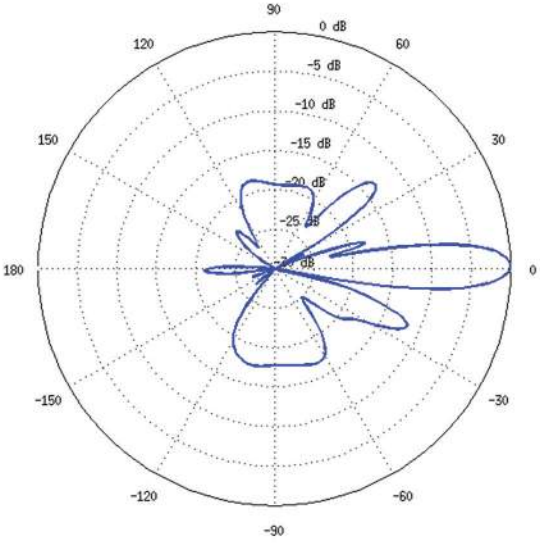


EXHIBIT A

LiteAP GPS

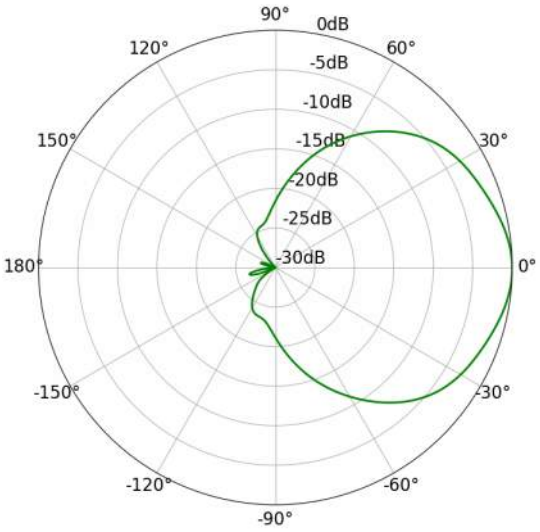
LAP-GPS	
Dimensions (Mount Not Included)	360.98 x 124.57 x 71.28 mm (14.21 x 4.90 x 2.81")
Weight (No Mount)	752 g (1.66 lb)
Mounting Kit	Pole Mounting Kit (Included)
Networking Interface	(1) 10/100/1000 Ethernet Port
Memory	DDR2 64 MB
Max. Power Consumption	7.1W
Max. TX Power	25 dBm
Antenna Gain	17 dBi
Power Supply	24V, 0.3A PoE Adapter (Included)
Power Method	Passive PoE (Pairs 4, 5+; 7, 8 Return)
Processor Specs	Atheros MIPS 74Kc, 533 MHz
Shock and Vibration	ETSI300-019-1.4
ETSI Specification	EN 302 326 DN2
ESD/EMP Protection	± 24 kV Contact / Air
RoHS Compliance	Yes
Operating Temperature	-40 to 70° C (-40 to 158° F)
Operating Humidity	5 to 95% Noncondensing
Certifications	FCC, IC, CE

Output Power: 25 dBm							
TX Power Specifications				**RX Power Specifications**			
Modulation	Data Rate	Avg. TX	Tolerance	Modulation	Data Rate	Sensitivity	Tolerance
airMAX ac	1x BPSK (½)	25 dBm	± 2 dB	**airMAX ac**	1x BPSK (½)	-96 dBm	± 2 dB
	2x QPSK (½)	25 dBm	± 2 dB		2x QPSK (½)	-95 dBm	± 2 dB
	2x QPSK (¾)	25 dBm	± 2 dB		2x QPSK (¾)	-92 dBm	± 2 dB
	4x 16QAM (½)	25 dBm	± 2 dB		4x 16QAM (½)	-90 dBm	± 2 dB
	4x 16QAM (¾)	25 dBm	± 2 dB		4x 16QAM (¾)	-86 dBm	± 2 dB
	6x 64QAM (⅔)	25 dBm	± 2 dB		6x 64QAM (⅔)	-83 dBm	± 2 dB
	6x 64QAM (¾)	24 dBm	± 2 dB		6x 64QAM (¾)	-77 dBm	± 2 dB
	6x 64QAM (⅚)	23 dBm	± 2 dB		6x 64QAM (⅚)	-74 dBm	± 2 dB
	8x 256QAM (¾)	21 dBm	± 2 dB		8x 256QAM (¾)	-69 dBm	± 2 dB
	8x 256QAM (⅚)	21 dBm	± 2 dB		8x 256QAM (⅚)	-65 dBm	± 2 dB

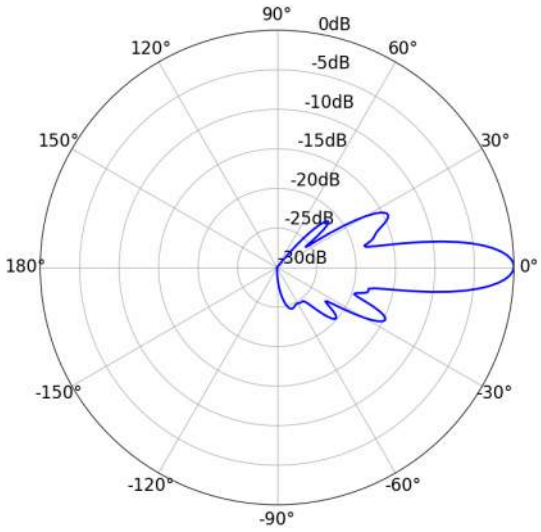
Operating Frequency (MHz)		
Worldwide	5150 - 5875	
USA	U-NII-1 5150 - 5250	U-NII-3 5725 - 5850

Management Radio (MHz)	
Worldwide	2412 - 2472
USA	2412 - 2462

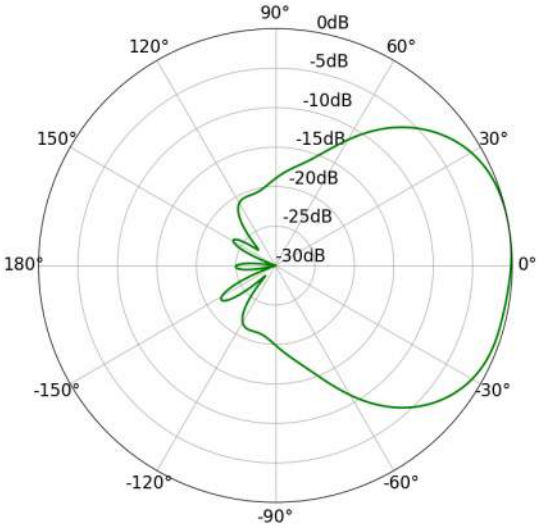
Vertical Azimuth



Vertical Elevation



Horizontal Azimuth



Horizontal Elevation

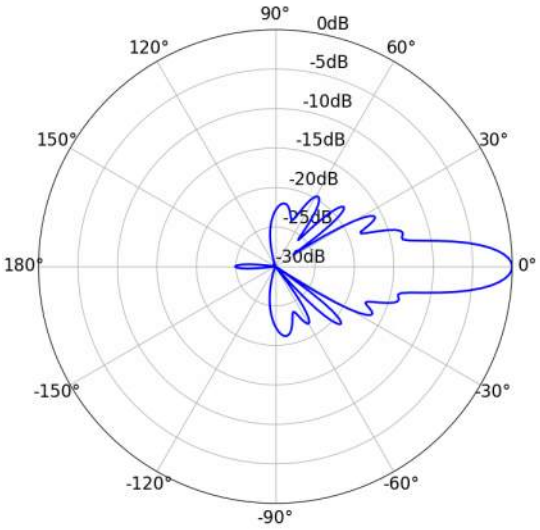


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EXHIBIT A

CONTROLPOINT
ENGINEERING

Materials List & Product Cutsheets

Directional Radios
(and Surge Protectors)

EXHIBIT A

DATASHEET

NanoStation® AC
NanoStation® AC loco

5 GHz airMAX® AC Radio

Models: NS-5AC, Loco5AC

Ubiquiti® airMAX AC Processor

Up to 450+ Mbps Real TCP/IP Throughput

Dedicated Wi-Fi Radio for Management

UBIQUITI® NETWORKS

EXHIBIT A

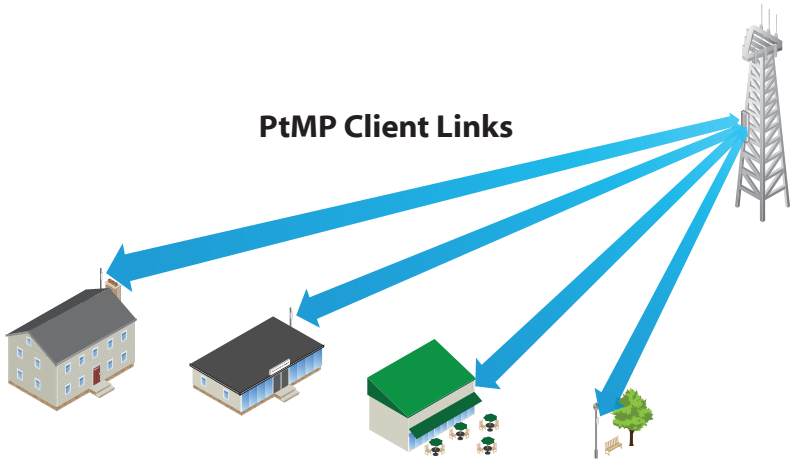
Overview

Ubiquiti Networks set the bar for the world's first low-cost and efficient broadband Customer Premises Equipment (CPE) with the NanoStation® M.

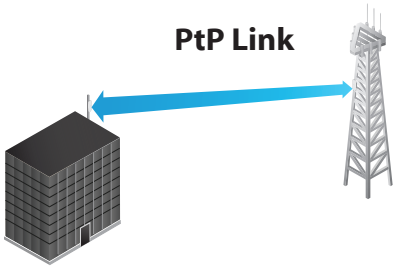
The NanoStation AC and NanoStation AC loco take the same concept to the future with sleek form factors, along with integrated airMAX (MIMO TDMA protocol) technology and dedicated Wi-Fi management.

The radio and antenna are combined to create a more efficient and compact CPE. The NanoStation AC and NanoStation AC loco get maximum gain out of the smallest footprint.

The low cost, high performance, and small form factor of the NanoStation AC and NanoStation AC loco make them extremely versatile and economical to deploy.



NanoStation AC devices used as powerful clients in an airMAX PtMP (Point-to-Multi-Point) network setup.



Use two NanoStation AC radios to create a PtP link.

Software

airOS® 8

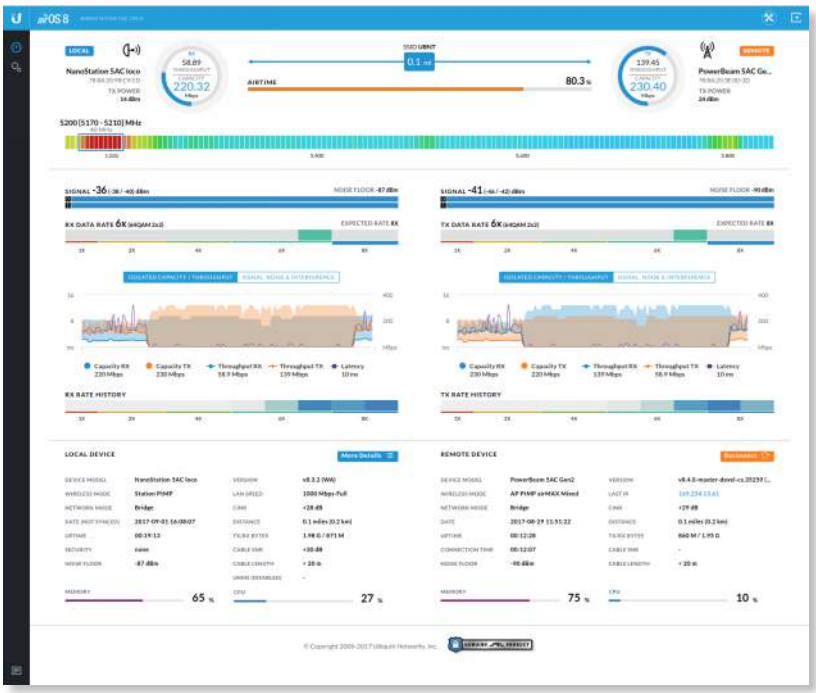
airOS® 8 is the revolutionary operating system for Ubiquiti airMAX ac products.

Powerful Wireless Features

- Access Point PtMP airMAX Mixed Mode
- airMAX ac Protocol Support
- Long-Range Point-to-Point (PtP) Link Mode
- Selectable Channel Width
  - PtP: 10/20/30/40/50/60/80 MHz
  - PtMP: 10/20/30/40 MHz
- Automatic Channel Selection
- Transmit Power Control: Automatic/Manual
- Automatic Distance Selection (ACK Timing)
- Strongest WPA2 Security

Usability Enhancements

- airMagic® Channel Selection Tool
- Dynamic Configuration Changes
- Instant Input Validation
- HTML5 Technology
- Optimization for Mobile Devices
- Detailed Device Statistics
- Comprehensive Array of Diagnostic Tools, including RF Diagnostics and airView® Spectrum Analyzer



Advanced RF Analytics

airMAX ac devices feature a multi-radio architecture to power a revolutionary RF analytics engine.

An independent processor on the PCBA powers a second, dedicated radio, which persistently analyzes the full 5 GHz spectrum and every received symbol to provide you with the most advanced RF analytics in the industry.

Real-Time Reporting

airOS 8 displays the following RF information:

- Persistent RF Error Vector Magnitude (EVM) constellation diagrams
- Signal, Noise, and Interference (SNI) diagrams
- Carrier to Interference-plus-Noise Ratio (CINR) histograms

Spectral Analysis

airView allows you to identify noise signatures and plan your networks to minimize noise interference. airView performs the following functions:

- Constantly monitors environmental noise
- Collects energy data points in real-time spectral views
- Helps optimize channel selection, network design, and wireless performance

airView runs in the background without disabling the wireless link, so there is no disruption to the network.

In airView, there are three spectral views, each of which represents different data: waveform, waterfall, and ambient noise level.

airView provides powerful spectrum analyzer functionality, eliminating the need to rent or purchase additional equipment for conducting site surveys.

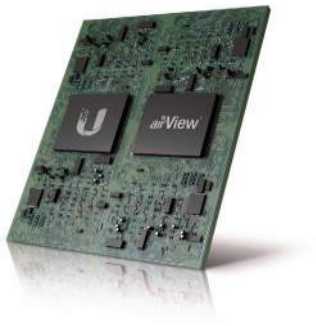
UNMS App

The NanoStation AC and NanoStation AC loco both integrate a separate Wi-Fi radio for fast and easy setup using your mobile device.

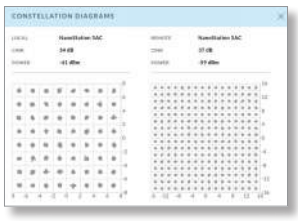
Accessing airOS via Wi-Fi

The UNMS™ app provides instant accessibility to the airOS configuration interface and can be downloaded from the App Store® (iOS) or Google Play™ (Android). UNMS allows you to set up, configure, and manage your device, and offers various configuration options once you're connected or logged in.

Multi-Radio Architecture



Constellation Diagrams



SNI Diagram and CINR Histogram

Dedicated Spectral Analysis

UNMS Configuration Screen

EXHIBIT A

Technology

airMAX ac

Unlike standard Wi-Fi protocol, Ubiquiti's Time Division Multiple Access (TDMA) airMAX protocol allows each client to send and receive data using pre-designated time slots scheduled by an intelligent AP controller.

This time slot method eliminates hidden node collisions and maximizes airtime efficiency, so airMAX technology provides performance improvements in latency, noise immunity, scalability, and throughput compared to other outdoor systems in its class.

Intelligent QoS Priority assigned to voice/video for seamless streaming.

Scalability High capacity and scalability.

Long Distance Capable of high-speed, carrier-class links.

Superior Performance

The next-generation airMAX ac technology boosts the advantages of our proprietary TDMA protocol.

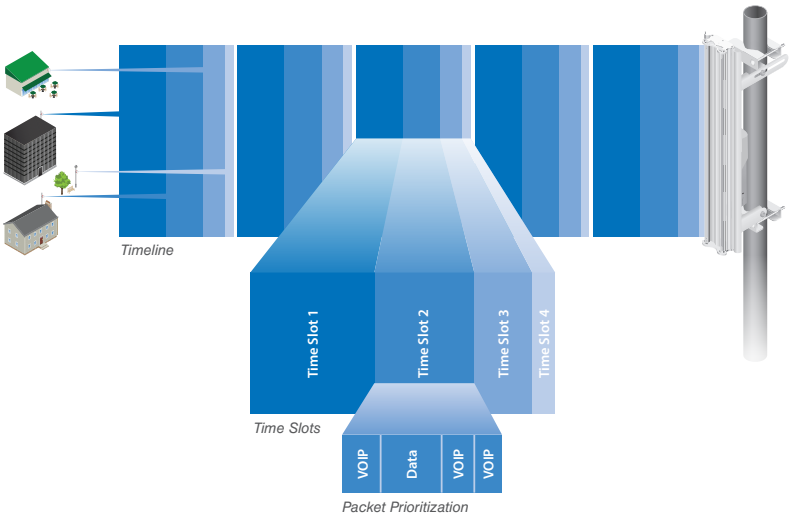
Ubiquiti's airMAX engine with custom IC dramatically improves TDMA latency and network scalability. The custom silicon provides hardware acceleration capabilities to the airMAX scheduler, to support the high data rates and dense modulation used in airMAX ac technology.

Throughput Breakthrough

airMAX ac supports high data rates, which require dense modulation: 256QAM – a significant increase from 64QAM, which is used in airMAX.

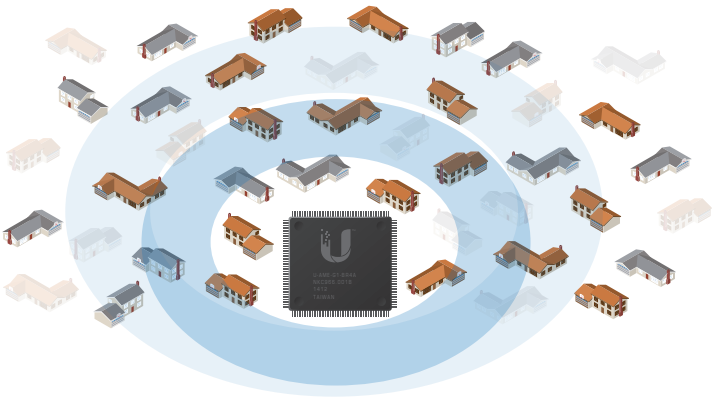
With their use of proprietary airMAX ac technology, airMAX ac products supports up to 450+ Mbps real TCP/IP throughput – up to triple the throughput of standard airMAX products.

airMAX ac TDMA Technology

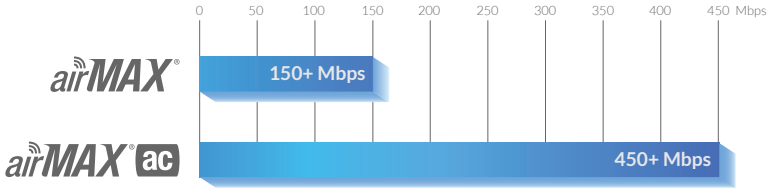


Up to 100 airMAX ac stations can be connected to an airMAX ac Sector; four airMAX ac stations are shown to illustrate the general concept.

airMAX Network Scalability



Superior Throughput Performance



Hardware Overview

The NanoStation AC and NanoStation AC loco feature airMAX technology and a dedicated Wi-Fi radio for management.

- **Versatile Mounting** Both models are suitable for indoor and outdoor installations
- **Improved Surge Protection** The NanoStation AC and NanoStation AC loco utilize the latest ESD Protection to help protect against power surges.
- **Efficient Footprint** The radio and antenna are combined into a single body that takes up minimal space.
- **Quick Installation** No fasteners are required for pole-mounting, and a single wall fastener (not included) is required for wall-mounting (NS-5AC only).

NS-5AC Port View

Loco5AC Port View

NS-5AC Powering a UVC-G3

The NanoStation AC (NS-5AC) provides a secondary Ethernet port with software-enabled PoE. Use this port to conveniently power an external device, such as a PoE security camera, for seamless IP video integration.

EXHIBIT A

Specifications

NS-5AC	
Dimensions With Mount Without Mount	 257 x 84 x 41 mm (10.12 x 3.31 x 1.61") 257 x 84 x 30 mm (10.12 x 3.31 x 1.18")
Weight	233 g (8.22) oz
Power Supply	24V, 0.5A Gigabit PoE Supply (Included)
Max. Power Consumption	9W
Power Method	802.3af Alternative A (Pairs 1, 2+; 3, 6 Return) 24V Passive PoE (Pairs 4, 5+; 7, 8 Return)
Gain	16 dBi
Networking Interface	(2) 10/100/1000 Mbps Ethernet Ports
Channel Bandwidths	10/20/30/40/50/60/80 MHz
Processor Specs	Atheros MIPS 74Kc, 560 MHz
Memory	64 MB DDR2
Cross-pol Isolation	20 dB Minimum
Max. VSWR	1.6:1
Beamwidth	45° (H-pol) / 45° (V-pol) / 45° (Elevation)
Polarization	Dual Linear
Enclosure	UV Resistant Polycarbonate
LEDs	(1) Power, Eth1, Eth2; (1) Signal Strength
Mounting	Pole-Mount (Kit Included)
Operating Temperature	-40 to 70° C (-40 to 158° F)
Operating Humidity	5 to 95% Noncondensing
RoHS Compliance	Yes
ESD/EMP Protection	±24kV Contact/Air
Shock & Vibration	ETSI300-019-1.4
Certifications	CE, FCC, IC

Operating Frequency (MHz)				
Worldwide	5150 - 5875			
USA	U-NII-1: 5150 - 5250	U-NII-2A: 5250 - 5350 MHz	U-NII-2C: 5470 - 5725 MHz	U-NII-3: 5725 - 5850

Management Radio (MHz)	
Worldwide	2412 - 2472
USA	2412 - 2462

Output Power: 25 dBm							
5 GHz TX Power Specifications				5 GHz RX Power Specifications			
Modulation	Data Rate	Avg. TX	Tolerance	Modulation	Data Rate	Sensitivity	Tolerance
airMAX ac	1x BPSK (½)	25 dBm	± 2 dB	airMAX ac	1x BPSK (½)	-96 dBm	± 2 dB
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	2x QPSK (¾)	25 dBm	± 2 dB		2x QPSK (¾)	-92 dBm	± 2 dB
	4x 16QAM (½)	25 dBm	± 2 dB		4x 16QAM (½)	-90 dBm	± 2 dB
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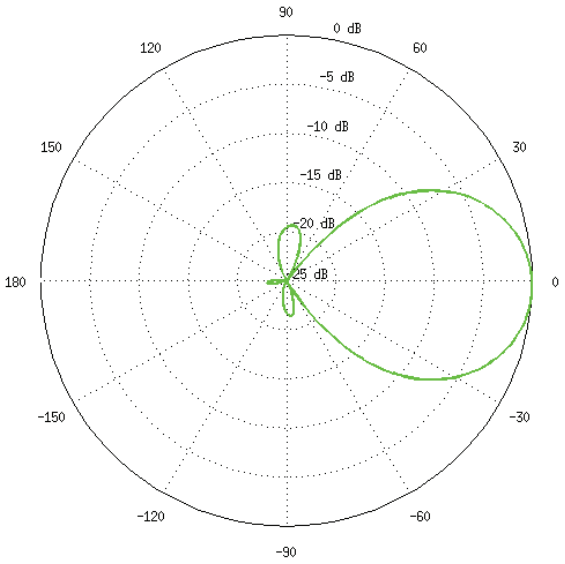
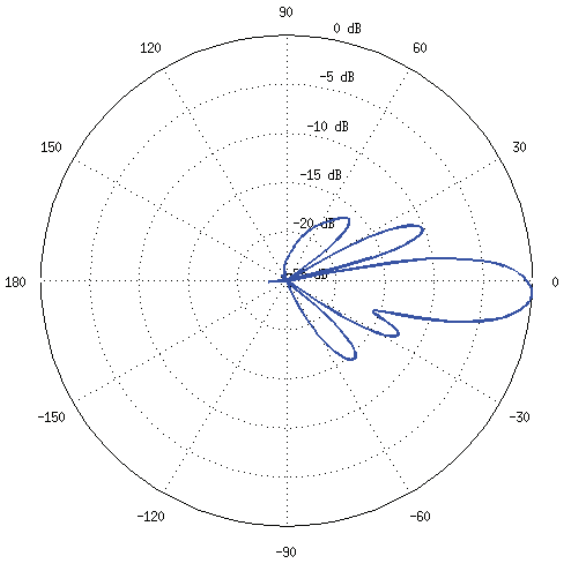
EXHIBIT A

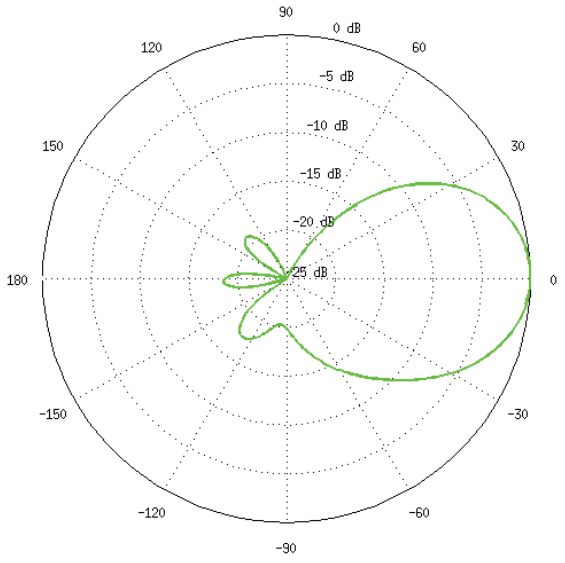
Vertical Azimuth



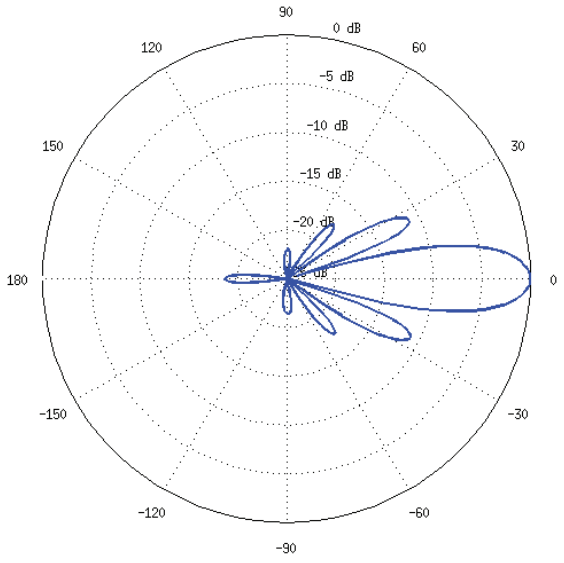
Vertical Elevation



Horizontal Azimuth



Horizontal Elevation



Return Loss

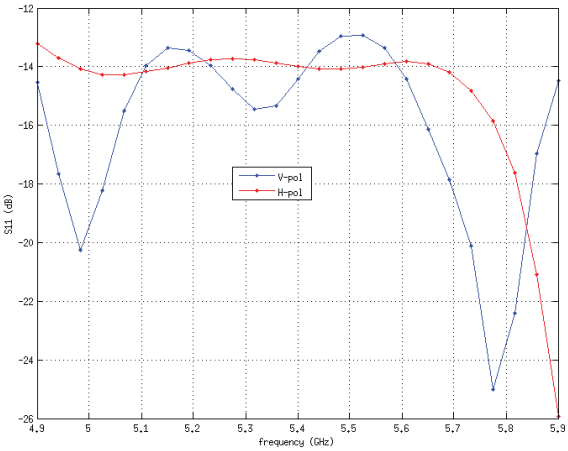


EXHIBIT A

Specifications

Loco5AC	
Dimensions	179 x 77.5 x 59.1 mm (7.05 x 3.05 x 2.33")
Weight	180 g (6.35 oz)
Power Supply	24V, 0.3A Gigabit PoE Supply*
Max. Power Consumption	7W
Power Method	Passive PoE 2-Pair (Pairs 4, 5+; 7, 8 Return)
Gain	13 dBi
Networking Interface	10/100/1000 Mbps Ethernet Port
Channel Bandwidths	10/20/30/40/50/60/80 MHz
Processor Specs	Atheros MIPS 74Kc, 560 MHz
Memory	64 MB DDR2
Cross-pol Isolation	20 dB Minimum
Max. VSWR	1.8:1
Beamwidth	45° (H-pol) / 45° (V-pol) / 45° (Elevation)
Polarization	Dual Linear
Enclosure	Outdoor UV Stabilized Plastic
LEDs	(1) Power
Mounting	Pole-Mount (Kit Included)
Operating Temperature	-40 to 70° C (-40 to 158° F)
Operating Humidity	5 to 95% Noncondensing
RoHS Compliance	Yes
ESD/EMP Protection	±24kV Contact/Air
Shock & Vibration	ETSI300-019-1.4
Certifications	CE, FCC, IC

** Not included. Recommended PoE Adapter: POE-24-12W-G.*

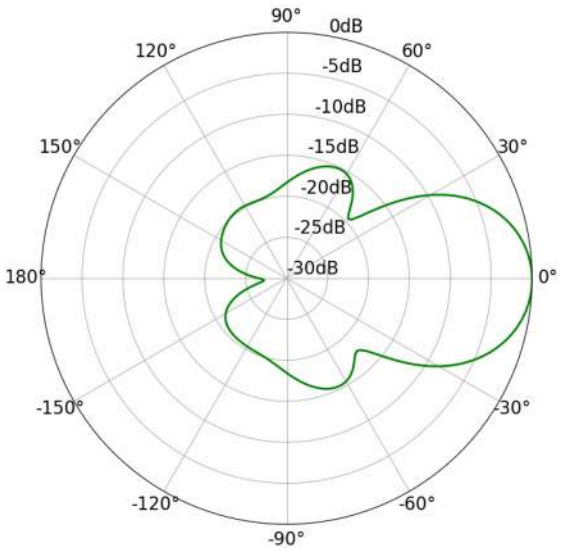
Operating Frequency (MHz)				
Worldwide				5150 - 5875
USA	U-NII-1: 5150 - 5250	U-NII-2A: 5250 - 5350 MHz	U-NII-2C: 5470 - 5725 MHz	U-NII-3: 5725 - 5850

Management Radio (MHz)	
Worldwide	2412 - 2472
USA	2412 - 2462

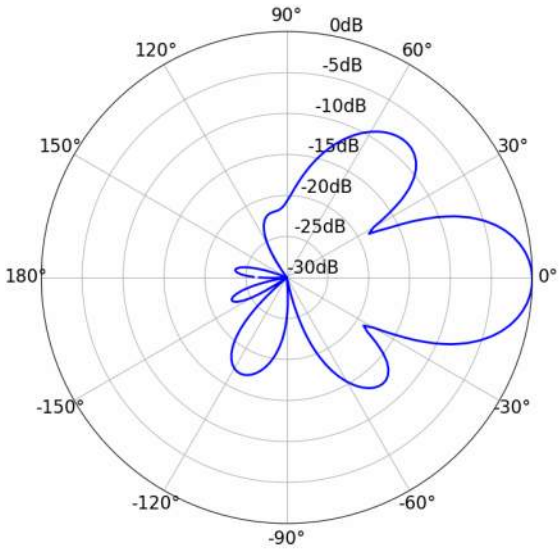
Output Power: 25 dBm							
5 GHz TX Power Specifications				5 GHz RX Power Specifications			
Modulation	Data Rate	Avg. TX	Tolerance	Modulation	Data Rate	Sensitivity	Tolerance
airMAX ac	1x BPSK (½)	25 dBm	± 2 dB	airMAX ac	1x BPSK (½)	-96 dBm	± 2 dB
	2x QPSK (½)	25 dBm	± 2 dB		2x QPSK (½)	-95 dBm	± 2 dB
	2x QPSK (¾)	25 dBm	± 2 dB		2x QPSK (¾)	-92 dBm	± 2 dB
	4x 16QAM (½)	25 dBm	± 2 dB		4x 16QAM (½)	-90 dBm	± 2 dB
	4x 16QAM (¾)	25 dBm	± 2 dB		4x 16QAM (¾)	-86 dBm	± 2 dB
	6x 64QAM (⅔)	25 dBm	± 2 dB		6x 64QAM (⅔)	-83 dBm	± 2 dB
	6x 64QAM (¾)	24 dBm	± 2 dB		6x 64QAM (¾)	-77 dBm	± 2 dB
	6x 64QAM (⅚)	23 dBm	± 2 dB		6x 64QAM (⅚)	-74 dBm	± 2 dB
	8x 256QAM (¾)	21 dBm	± 2 dB		8x 256QAM (¾)	-69 dBm	± 2 dB
	8x 256QAM (⅚)	21 dBm	± 2 dB		8x 256QAM (⅚)	-65 dBm	± 2 dB

EXHIBIT A

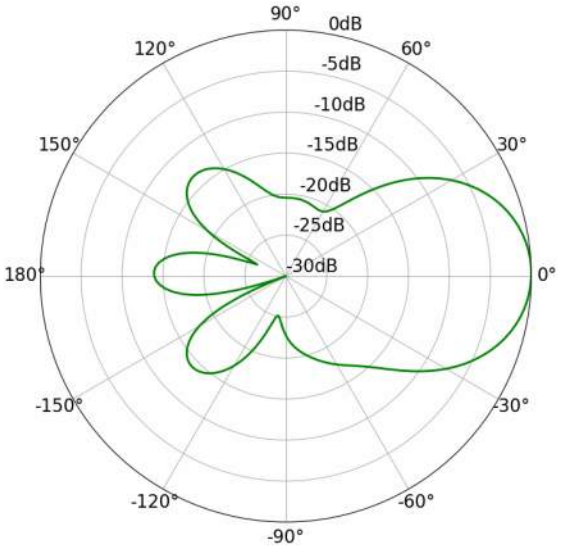
Vertical Azimuth



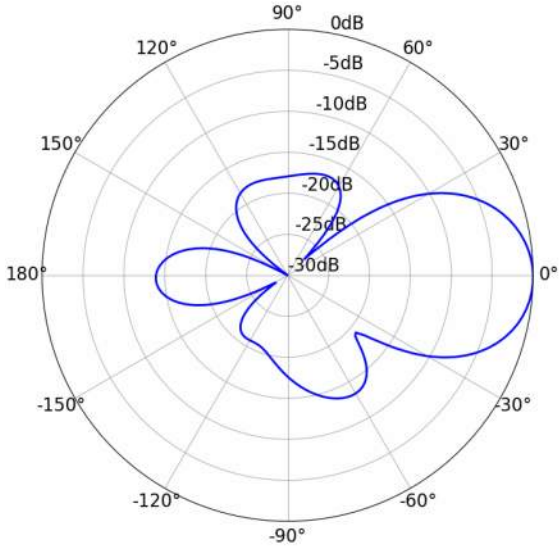
Vertical Elevation



Horizontal Azimuth



Horizontal Elevation



Return Loss

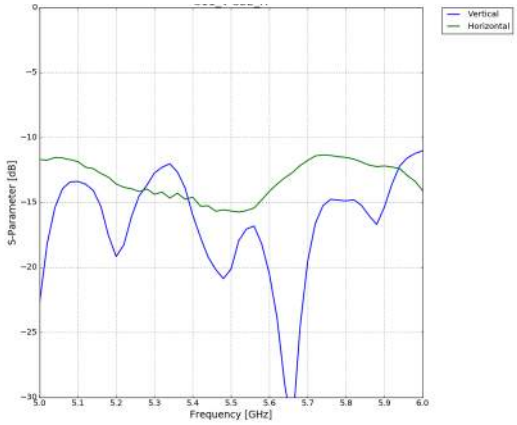


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EXHIBIT A

DATASHEET

Ethernet Surge Protector

Model: ETH-SP-G2

- Low-Cost Protection and Fast Installation
- Protects Outdoor Ethernet Devices
- Compatible with 10/100/1000 Mbps Networks

UBIQUITI®
NETWORKS

EXHIBIT A

Ethernet Surge Protector

ESD Protection for Outdoor High-Speed Networks

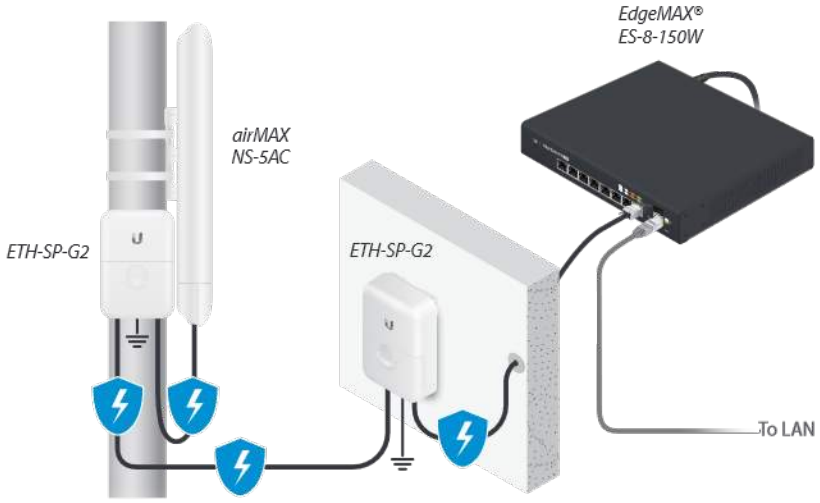
Introducing the next generation Ethernet Surge Protector, model ETH-SP-G2, from Ubiquiti Networks. The ETH-SP-G2 is a cost-effective solution for protecting outdoor Ethernet devices from damaging electrostatic discharge and surges. Since all Ubiquiti® airMAX® devices already have robust ESD protection built in, adding the ETH-SP-G2 to the installation provides an additional layer of protection to the network.

The ETH-SP-G2 is engineered to protect Power-over-Ethernet (PoE) or non-PoE devices with connection speeds of up to 1 Gbps. Two passive, surge-protected RJ45 connections provide maximum equipment compatibility.

Ideal for WISP Networks

All Ubiquiti airMAX devices are equipped with ESD protection. However, to protect outdoor devices, and to meet certain local code requirements, installing the ETH-SP-G2 is essential.

For example, to guard against costly service calls, and to help your subscriber installations meet code requirements, install two ETH-SP-G2 devices: one near the CPE, and the other at the entry point to the building. Damaging ESD attacks and surges will be absorbed by the ETH-SP-G2 devices and safely discharged into the ground.



Fast Installation

The ETH-SP-G2 was designed for easy, plug and play installation:

1. Attach the ETH-SP-G2 to a grounded pole.

2. Drill a pilot hole into the pole.

3. Fasten the ground screw.

4. Connect the Ethernet cables.

EXHIBIT A

Specifications

ETH-SP-G2	
Dimensions	91 x 61 x 32.5 mm (3.58 x 2.4 x 1.28")
Weight	80 g (2.82 oz)
Interface Connections	(2) RJ45 Female Connectors
ESD/EMP Protection	Absorbing Transient Current with Response to Surge Voltage from 100V/s to 1kV/µs
DC Spark-Over Voltage	90V @ 100V/s
Maximum Impulse Spark-Over Voltage	700V @ 1kV/µs
Discharge Current	10kA+
Maximum Insulation Resistance	1G ohm @ 50V
Maximum Capacitance	1.0 pF @ 1 MHz
Data Line Protection	RJ45 10/100/1000 Ethernet
IEEE 802.3af PoE Support	Yes
Shock and Vibration Certification	ETSI300-019-1.4 Standard
Operating Temperature	-30 to 65° C (-22 to 149° F)
Operating Humidity	10 to 90% Noncondensing

www.ubnt.com

EXHIBIT A

CONTROLPOINT
ENGINEERING

Materials List & Product Cutsheets

WiFi Access Points

EXHIBIT A

DATASHEET

UniFi® AC MESH

802.11AC AP with Plug & Play Mesh

Models: UAP-AC-M, UAP-AC-M-PRO

High-Performance Wide-Area Wi-Fi with UniFi® Mesh Technology

Breakthrough Speeds up to 1300 Mbps in the 5 GHz Band

802.3af PoE Compatibility

UBIQUITI® NETWORKS

EXHIBIT A

UniFi®

Scalable Enterprise Wi-Fi Management

UniFi® is the revolutionary Wi-Fi system that combines enterprise performance, unlimited scalability, and a central management controller. The UniFi AC Mesh APs have a refined industrial design and can be easily installed using the included mounting hardware.

Easily accessible through any standard web browser and the UniFi mobile app (iOS or Android), the UniFi Controller software is a powerful software engine ideal for high-density client deployments requiring low latency and high uptime performance.

Use the UniFi Controller software to quickly configure and administer an enterprise Wi-Fi network – no special training required. RF map and performance features, real-time status, automatic UAP device detection, and advanced security options are all seamlessly integrated.

Features

Save Money and Save Time UniFi comes bundled with a non-dedicated software controller that can be deployed on an on-site PC, Mac, or Linux machine; in a private cloud; or using a public cloud service. You also have the option of using the UniFi Cloud Key with built-in software.

Powerful Hardware The UniFi AC Mesh APs feature Wi-Fi 802.11AC with Plug & Play Mesh technology.

Intuitive UniFi Controller Software Configure and manage your APs with the easy-to-learn user interface.

Expandable Unlimited scalability: build wireless networks as big or small as needed. Start with one and expand to thousands while maintaining a single unified management system.

Extend Your Coverage

With the UniFi Controller software running in a NOC or in the cloud, administrators can manage multiple sites: multiple distributed deployments and multi-tenancy for managed service providers. Below are some deployment examples.

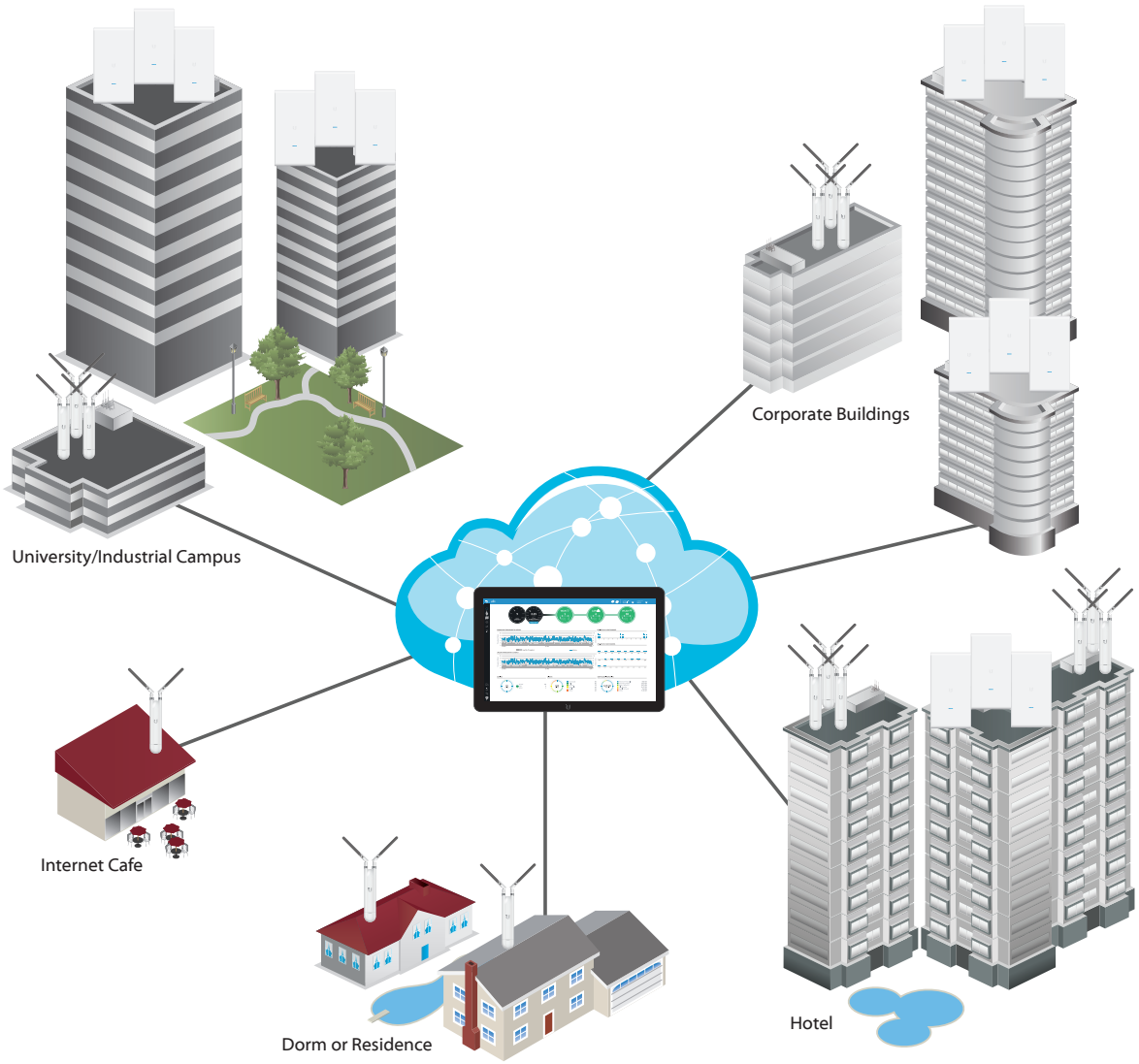


EXHIBIT A

UniFi Controller

Packed with Features

Use the UniFi Controller to provision thousands of UniFi APs, map out networks, quickly manage system traffic, and provision additional UniFi APs.

Breakthrough RF Map

Use the RF map to monitor and analyze radio frequencies for optimal AP placement, configuration, and troubleshooting.

Powerful RF Performance Features

Advanced RF performance and configuration features include spectral analysis, airtime fairness, and band steering.

Detailed Analytics

Use the configurable reporting and analytics to manage large user populations and expedite troubleshooting.

Wireless Uplink

Wireless Uplink functionality enables wireless connectivity between APs for extended range. One wired UniFi AP uplink supports up to four wireless downlinks on a single operating band, allowing wireless adoption of devices in their default state and real-time changes to network topology.

For devices that support Plug & Play Mesh, this functionality is extended to allow multi-hop wireless uplink – so wirelessly uplinked APs can support uplink to other wirelessly uplinked APs.

Guest Portal/Hotspot Support

Easy customization options for Guest Portals include authentication, Hotspot setup, and the ability to use your own external portal server. Use UniFi's rate limiting for your Guest Portal/Hotspot package offerings. Apply different bandwidth rates (download/upload), limit total data usage, and limit duration of use.

All UniFi APs include Hotspot functionality:

- Built-in support for billing integration using major credit cards.
- Built-in support for voucher-based authentication.
- Built-in Hotspot Manager for voucher creation, guest management, and payment refunds.
- Full customization and branding of Hotspot portal pages.

Multi-Site Management

A single cloud-based UniFi Controller can manage multiple sites: multiple, distributed deployments and multi-tenancy for managed service providers. Each site is logically separated and has its own configuration, maps, statistics, guest portal, and admin read/write and read-only accounts.

WLAN Groups

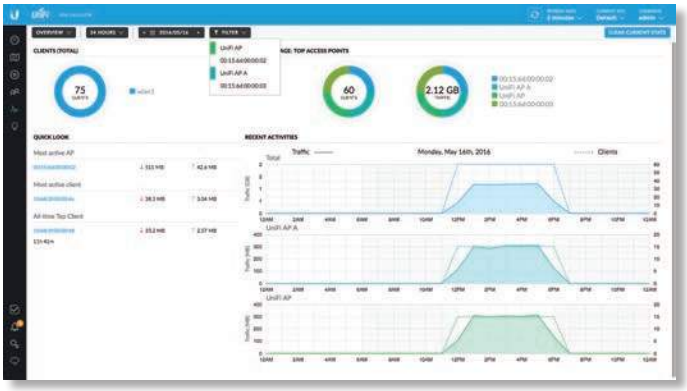
Manage flexible configurations of large deployments. Create multiple WLAN groups and assign them to an AP's radio.

Dashboard

UniFi provides a visual representation of your network's status and delivers basic information about each network segment.

RF Map

Monitor UniFi APs and analyze the surrounding RF environment.



Statistics

UniFi visualizes network traffic in clear and easy-to-read graphs.

UniFi Mobile App

Manage your UniFi devices from your smartphone or tablet.

EXHIBIT A

Model Comparison

	UAP-AC-M	UAP-AC-M-PRO
Environment	Indoor/Outdoor	Outdoor
Simultaneous Dual-Band	✓	✓
2.4 GHz Radio Rate	300 Mbps	450 Mbps
2.4 GHz MIMO	2x2	3 x 3
5 GHz Radio Rate	867 Mbps	1300 Mbps
5 GHz MIMO	2x2	3 x 3
Secondary Ethernet Port		✓
PoE Mode	24V Passive PoE 802.3af PoE: Alternative A	802.3af PoE
Wall Mount	✓	✓
Pole Mount	✓	✓
Fast Mount	✓	

Use Cases

Mesh Multi-Hop A large outdoor area, such as a park with minimal infrastructure, can take advantage of a mesh network comprised of the UniFi AC Mesh models.

Omnidirectional Coverage, Indoors or Outdoors The UAP-AC-M includes adjustable dual-band omni antennas.

You have the option to use a 5 GHz omni antenna[1] for spot-beam coverage in high-density locations with numerous APs and clients, like a conference hall or event center.

Directional Coverage, Outdoors The UAP-AC-M is versatile.

You have the option to use a 5 GHz sector antenna[2] (wide beam in the azimuth plane and narrow in the elevation plane) for broad outdoor coverage.

Maximum Coverage, Outdoors The UAP-AC-M-PRO is ideal for applications requiring 3x3 MIMO data rates for close-in omni coverage.

Temporary Installations Deploy the UniFi AC Mesh models for outdoor installations requiring quick setup and takedown, such as a street fair, music festival, or concert venue.

[1] Different antenna gains are allowed for each regulatory domain or country. It is the installer's responsibility to check local regulations.

Application Example

Both UniFi AC Mesh models provide wireless coverage for a street fair in a city plaza.

EXHIBIT A

Hardware Overview

Model: UAP-AC-M

The UAP-AC-M provides simultaneous, dual-band, 2x2 MIMO technology and is available in single- and five-packs[1].

Compact Form Factor The UAP-AC-M discreetly integrates into any environment.

Weather-Resistant Enclosure The UAP-AC-M can be used indoors or outdoors.

Versatile Mounting The UAP-AC-M can be mounted on a wall, pole, or fast-mount of an optional Ubiquiti® high-gain antenna[2]. (All accessories are included.)

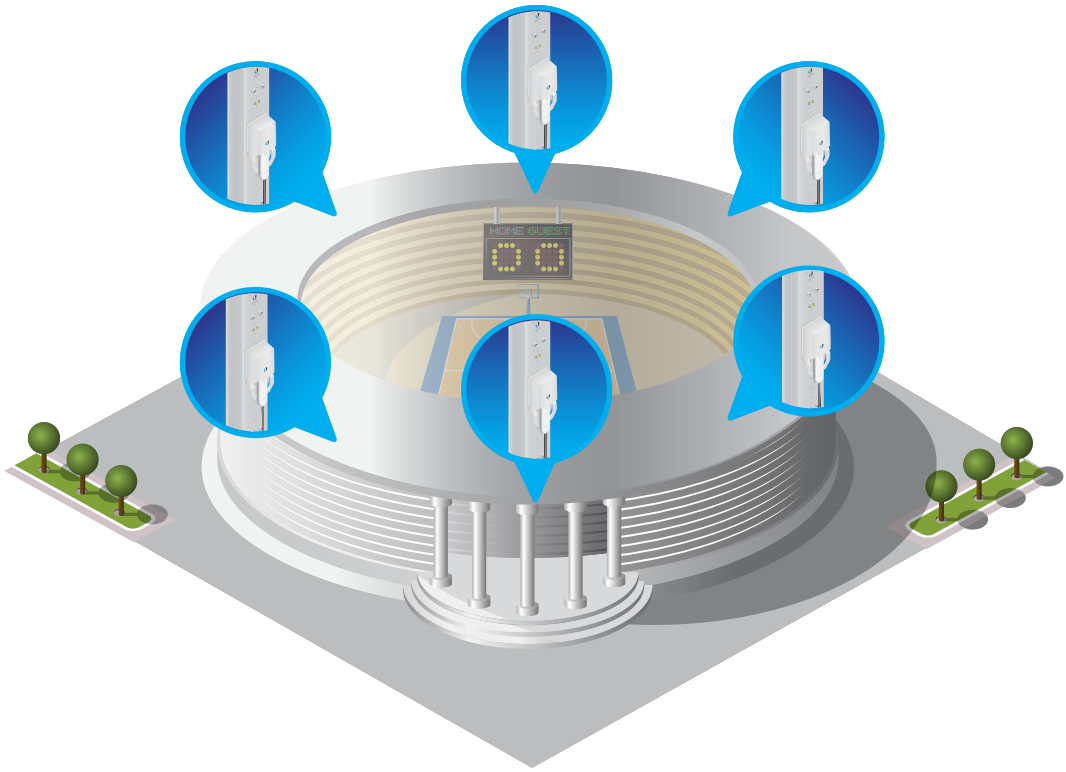
Multiple Power Options The UAP-AC-M is compatible with 802.3af PoE Alternative A and 24V passive PoE. You can power it with the included Gigabit PoE adapter[1] or an 802.3af Alternative A compatible switch, such as the UniFi PoE Switch or EdgePoint™ EP-R6.

Antenna Options Use the included omni antennas, or use the included fast-mount adapter to install the AP on an optional connectorized antenna[2] for expanded range coverage and customized pattern shaping.

[1] Five-packs do not ship with PoE adapters; we recommend powering the UniFi APs with the UniFi PoE Switch instead.

[2] Different antenna gains are allowed for each regulatory domain or country. It is the installer's responsibility to check local regulations.

Application Example



The UAP-AC-M utilizes the same antenna connector technology as airMAX® antennas.[2]

EXHIBIT A

Hardware Overview

Model: UAP-AC-M-PRO

The UAP-AC-M-PRO provides simultaneous, dual-band, 3x3 MIMO technology and is available in single- and five-packs*.

Weather-Resistant Form Factor The enclosure of the UAP-AC-M-PRO is designed to withstand the elements, making it ideal for outdoor deployment.

Powerful Coverage Built-in dual-band omnidirectional antennas deliver expanded range coverage outdoors.

Mounting Flexibility The UAP-AC-M-PRO can be mounted on a wall or pole. (All accessories are included.)

Dual Gigabit Ethernet Ports The primary port is for data and PoE; the secondary port is for bridging.

Multiple Power Options You can power the UAP-AC-M-PRO with an 802.3af compatible switch, UniFi PoE Switch, or the included Gigabit PoE adapter*.

* Five-packs do not ship with PoE adapters; we recommend powering the UniFi APs with the UniFi PoE Switch instead.

Application Example

The UniFi AC M Pro APs cover the quad and park on a university campus.

EXHIBIT A

UAP-AC-M Specifications

UAP-AC-M	
Dimensions	353 x 46 x 34.4 mm (13.9 x 1.81 x 1.35")
Weight	152 g (5.36 oz) with Antennas
Networking Interface	(1) 10/100/1000 Ethernet Port
Buttons	Reset
Power Method	24V Passive PoE (Pairs 4, 5+; 7, 8 Return); 802.3af Alternative A (Pairs 1, 2+; 3, 6 Return) (Supported Voltage Range: 44 to 57VDC)
Power Supply	24V, 0.5A Gigabit PoE Adapter*
Power Save	Supported
Maximum Power Consumption	8.5W
Maximum TX Power 2.4 GHz 5 GHz	 20 dBm 20 dBm
Antennas 2.4 GHz 5 GHz	(2) External Dual-Band Omni Antennas 3 dBi 4 dBi
Wi-Fi Standards	802.11 a/b/g/n/r/k/v/ac
Wireless Security	WEP, WPA-PSK, WPA-Enterprise (WPA/WPA2, TKIP/AES)
BSSID	Up to 8 per Radio
Mounting	Wall/Pole/Fast-Mount (Kits Included)
Operating Temperature	-30 to 70° C (-22 to 158° F)
Operating Humidity	5 to 95% Noncondensing
Certifications	CE, FCC, IC

* Only the single-pack of the UAP-AC-M includes a PoE adapter.

Advanced Traffic Management	
VLAN	802.1Q
Advanced QoS	Per-User Rate Limiting
Guest Traffic Isolation	Supported
WMM	Voice, Video, Best Effort, and Background
Concurrent Clients	250+

Supported Data Rates (Mbps)	
Standard	Data Rates
802.11ac	6.5 Mbps to 867 Mbps (MCS0 - MCS9 NSS1/2, VHT 20/40/80)
802.11n	6.5 Mbps to 300 Mbps (MCS0 - MCS15, HT 20/40)
802.11a	6, 9, 12, 18, 24, 36, 48, 54 Mbps
802.11g	6, 9, 12, 18, 24, 36, 48, 54 Mbps
802.11b	1, 2, 5.5, 11 Mbps

EXHIBIT A

UAP-AC-M-PRO Specifications

UAP-AC-M-PRO	
Dimensions	343.2 x 181.2 x 60.2 mm (13.51 x 7.13 x 2.37")
Weight	633 g (1.40 lb)
Networking Interface	(2) 10/100/1000 Ethernet Ports
Buttons	Reset
Power Method	802.3af PoE (Supported Voltage Range: 44 to 57VDC)
Power Supply	48V, 0.5A PoE Gigabit Adapter*
Power Save	Supported
Maximum Power Consumption	9W
Maximum TX Power 2.4 GHz 5 GHz	 22 dBm 22 dBm
Antennas	(3) Internal Dual-Band Antennas 8 dBi
Wi-Fi Standards	802.11 a/b/g/n/r/k/v/ac
Wireless Security	WEP, WPA-PSK, WPA-Enterprise (WPA/WPA2, TKIP/AES)
BSSID	Up to 8 per Radio
Mounting	Wall/Pole (Pole Kit Included)
Operating Temperature	-40 to 70° C (-40 to 158° F)
Operating Humidity	5 to 95% Noncondensing
Certifications	CE, FCC, IC

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Advanced Traffic Management	
VLAN	802.1Q
Advanced QoS	Per-User Rate Limiting
Guest Traffic Isolation	Supported
WMM	Voice, Video, Best Effort, and Background
Concurrent Clients	250+

Supported Data Rates (Mbps)	
Standard	Data Rates
802.11ac	6.5 Mbps to 1300 Mbps (MCS0 - MCS9 NSS1/2/3, VHT 20/40/80)
802.11n	6.5 Mbps to 450 Mbps (MCS0 - MCS23, HT 20/40)
802.11a	6, 9, 12, 18, 24, 36, 48, 54 Mbps
802.11g	6, 9, 12, 18, 24, 36, 48, 54 Mbps
802.11b	1, 2, 5.5, 11 Mbps

EXHIBIT A

UniFi Switch Compatibility

The UniFi switches are compatible with UniFi Access Points and UniFi G3 Video Cameras, as detailed below.

AP/Camera Model	US-8	US-8-60W	US-8-150W	US-16-150W	US-24-250W	US-24-500W	US-48-500W	US-48-750W
UVC-G3			✓	✓	✓	✓	✓	✓
UVC-G3-AF	✓	✓	✓	✓	✓	✓	✓	✓
UVC-G3-DOME	✓	✓	✓	✓	✓	✓	✓	✓
UAP			✓	✓	✓	✓	✓	✓
UAP-LR			✓	✓	✓	✓	✓	✓
UAP-PRO	✓	✓	✓	✓	✓	✓	✓	✓
UAP-AC-LITE	✓	✓	✓	✓	✓	✓	✓	✓
UAP-AC-LR	✓	✓	✓	✓	✓	✓	✓	✓
UAP-AC-PRO	✓	✓	✓	✓	✓	✓	✓	✓
UAP-AC-M	✓	✓	✓	✓	✓	✓	✓	✓
UAP-AC-M-PRO	✓	✓	✓	✓	✓	✓	✓	✓
UAP-AC-IW*	✓	✓	✓	✓	✓	✓	✓	✓
UAP-AC-IW-PRO*	✓	✓	✓	✓	✓	✓	✓	✓
UAP-AC-HD	–	–	✓	✓	✓	✓	✓	✓

✓ Compatible with the UniFi switch

 Requires an Instant 802.3af Gigabit PoE Converter: INS-3AF-I-G  or INS-3AF-O-G 

Note:

* For the UAP-AC-IW and UAP-AC-IW-PRO, PoE passthrough is supported by all of the switches listed above except for models US-8 and US-8-60W.

Related Product Datasheets

UniFi Switch 8, UniFi Switch 8-60W:

dl.ubnt.com/datasheets/unifi/UniFi_Switch_8_DS.pdf

UniFi PoE Switches:

dl.ubnt.com/datasheets/unifi/UniFi_PoE_Switch.pdf

www.ubnt.com

EXHIBIT A

CONTROLPOINT
ENGINEERING

Materials List &
Product Cutsheets

Communications Router

EXHIBIT A

UniFi® Dream Machine PRO

DATASHEET

Enterprise Security Gateway and Network Appliance with 10G SFP+

Embedded UniFi® Network Console Application

3.5" HDD Bay for NVR Storage

Dual WAN Ports for Redundancy

Model: UDM-Pro

Overview

The UniFi® Dream Machine Pro is an all-in-one network appliance for a scalable network in an office, retail, or hospitality environment. Powered by a fast 1.7 GHz quad-core processor, the UDM Pro combines multiple functions into a single device:

- Advanced Security Gateway with Built-in Switch
- Dual WAN Ports: One 10G SFP+ and One Gigabit RJ45
- One 10G SFP+ LAN Port
- Embedded Enterprise Application: UniFi Network
- 3.5" HDD Bay for NVR Storage (2.5" HDD also supported)

Software

The UDM Pro includes the UniFi Network Console so you can manage your UniFi Switches and APs. It can also run the UniFi Protect application for convenient monitoring and complete management of your camera surveillance system. Video recordings are stored on the built-in NVR (hard drive not included) and can be easily accessed using the UniFi Protect mobile app. Via remote access, you can securely view the recordings that are privately stored on the UDM Pro rather than a third-party server.

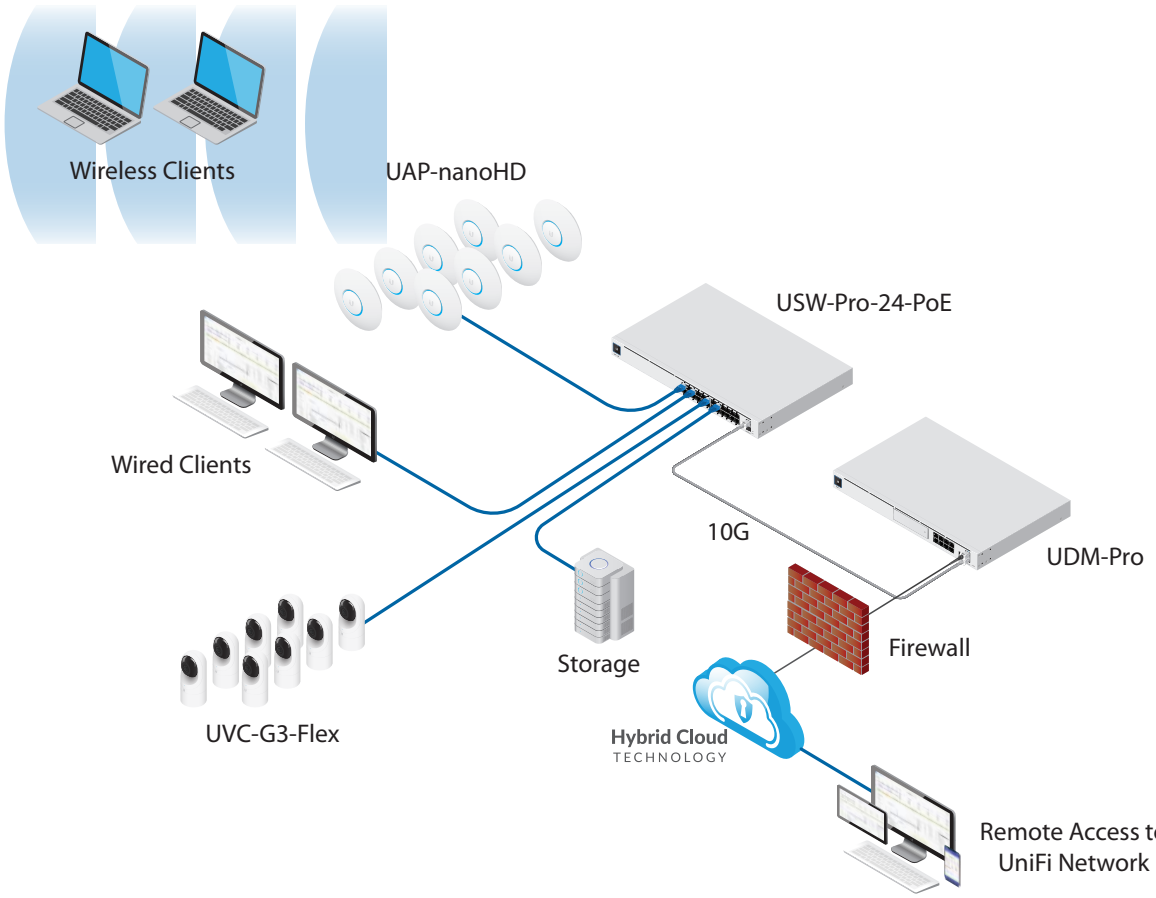
Redundancy

The UDM Pro supports multiple redundancy options to ensure your network remains operational:

- **Dual WAN with Failover** Supports dual internet/ISP connections with failover: if the primary WAN connection drops, it will automatically switch to the other WAN connection.
- **LTE Failover Redundancy** Supports the UniFi LTE device for automatic failover to the LTE cellular network. If the wired WAN fails, it will automatically switch to the UniFi LTE, keeping your network online[1].
- **Power Supply Redundancy and Failover** The UDM Pro supports our PSU failover system, the UniFi SmartPower RPS, model USP-RPS. If the internal power supply unit fails, the proprietary USP RPS interface acts to provide redundant power for backup[2].

[1] *Requires use of the U-LTE or U-LTE-Pro and active LTE account.*
[2] *Requires use of the USP-RPS .*

Deployment Example



The UniFi Network Console application runs on the UDM Pro, which also acts as a firewall and DHCP server for the local network. The UniFi Protect Console application, which manages the cameras, can also run on the UDM Pro (with an HDD installed).

UniFi Dream Machine Pro

- WAN ports
  - (1) 10G SFP+ port
  - (1) Gigabit RJ45 port
- LAN ports
  - (1) 10G SFP+ port
  - (8) Gigabit RJ45 ports
- 3.5" HDD Bay (also supports 2.5" HDD)
- 1U Rackmountable (hardware included)

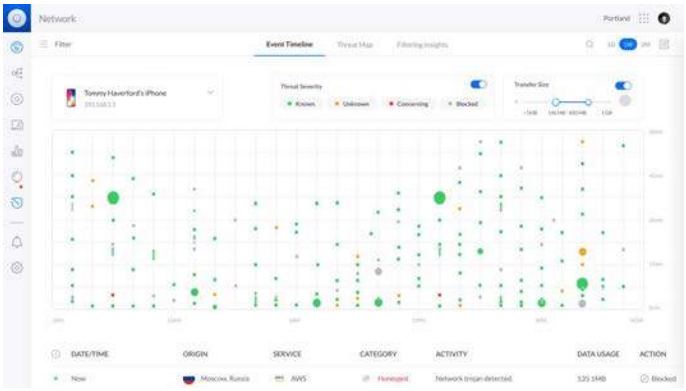
UDM-Pro

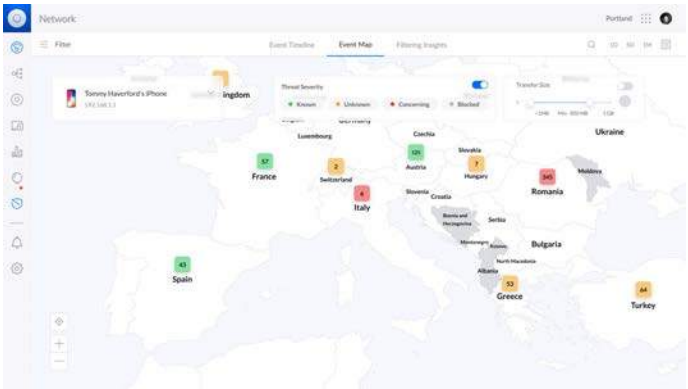
Powerful Security

The UDM Pro offers advanced firewall policies and persistent threat management* to act as an Intrusion Prevention System (IPS) and Intrusion Detection System (IDS).

- **Threat Management** Easily select and customize levels of security for viruses and malware, Point-to-Point (PtP) protection, hacking, internet traffic, and website reputation.
- **Honeypot** Embedded Honeypot functionality can detect malware, worms, and other types of malicious traffic trying to scan your network for vulnerabilities.
- **DNS Content Filtering** DNS filters block traffic from sites with malicious, phishing, or adult content. There are three levels of DNS filtering security, each adding more protection.
- **GeoIP Filtering** GeoIP filtering allows you to block outgoing, incoming, or bi-directional traffic designated by country. Use the UniFi threat map to select the countries you intend to block.

* *Requires UniFi software v5.12 or newer.*



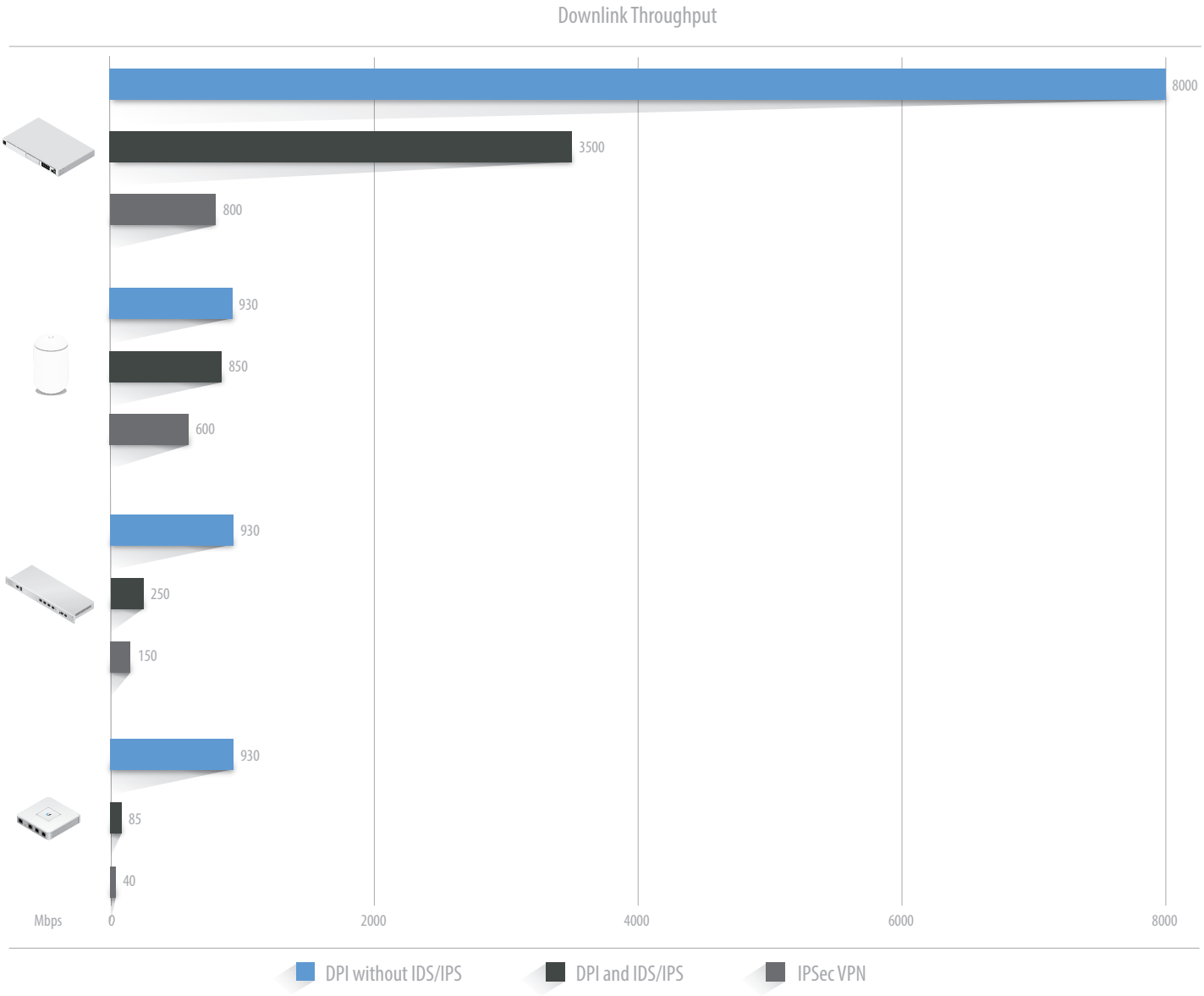


Additional Features

- **Automatic QoS** Top QoS priority is assigned to voice and video traffic.
- **VPN Server for Secure Communications** A site-to-site VPN secures and encrypts private data communications traveling over the internet.
- **Convenient VLAN Support** The UDM Pro can create virtual network segments for security and network traffic management.
- **Innovative Display** The 1.3" touchscreen displays status information for easy monitoring and quick troubleshooting.

Superior Performance

The UDM Pro offers significantly greater performance over the previous generation of UniFi Security Gateways.



Note: Typical values as measured with iPerf3.

Scalable UniFi Network Console

Management Capabilities

The UniFi Network Console can provision UniFi devices, map out networks, and quickly manage system traffic. Important network details are logically organized for a simplified, yet powerful, interface.

Network Overview

From a single pane of glass, view network topology and configuration, real-time statistics, and debugging metrics. Monitor your network's vitals and make on-the-fly adjustments as needed.

Deep Packet Inspection

Ubiquiti's proprietary Deep Packet Inspection (DPI) engine includes the latest application identification signatures to track which applications (and IP addresses) are using the most bandwidth.

Detailed Analytics

The UniFi Network Console provides configurable reporting and analytics to manage large user populations and expedite troubleshooting. Advanced search and sorting capabilities make network management more efficient.

Switch Port Configuration

You can configure the network/VLAN configuration and network settings on the UniFi Dream Machine Pro.

Switch Port Status

You can also view status information for each port of the UniFi Dream Machine Pro:

- Connection speed and duplex mode
- TX/RX data rates
- Network/VLAN setting

Application Features

The UniFi Network Console application offers the following features:

- Centralized configuration management (including configuration cloning)
- Auto-MDIX automatically adjusts as needed for straight through or crossover cable
- 802.1X (RADIUS) authentication and dynamic VLAN.

Download on the App Store

GET IT ON Google Play

UniFi Protect Application

Designed for convenient monitoring and complete management of your camera surveillance system, the UniFi Protect Console allows you to set up, configure, and monitor your UniFi cameras using a graphical user interface. You can install it on the UDM Pro, and there are no separate software, licensing, hosting, or support fees.

Features

Easy Setup Using a standard web browser or Bluetooth setup from your mobile device, deployment of your UniFi Protect console can be set up and configured in a matter of minutes.

Feature-Packed User Interface Accessible from a web browser, UniFi Protect was designed to be easy-to-use yet packed with advanced features. The UniFi Protect interface is incredibly intuitive and loaded with powerful features such as statistical reporting, multiple live views options, versatile camera settings, advanced analytics, and customizable event recordings.

Plug and Play Installation Automatic camera detection in UniFi Protect makes it easy to install and deploy cameras. All of the camera settings are integrated into the application. You can also configure, reboot, or upgrade the firmware on any camera from within the UniFi Protect interface.

Additional Live Views Playlists can be created with a configurable live camera feed rotation. Define the cameras you want included in the playlist and how long you want them to appear on the screen before moving on to the next live feed.

Cost-Effective Solution Shattering conventional industry thinking, UniFi Protect provides powerful IP surveillance software without the huge up-front costs or monthly subscription fees.

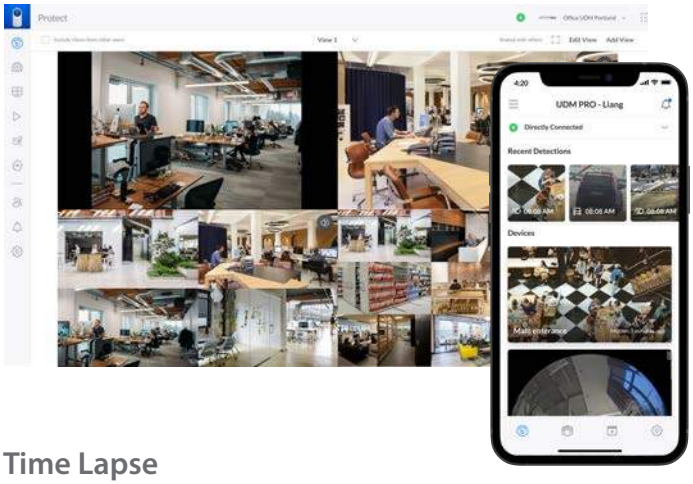
Mobile App The downloadable app provides free remote cloud access to your UniFi Protect system. It also allows you to securely access video recordings that are privately stored on the Cloud Key Gen2 Plus and not a third-party server or internet cloud.

Download on the App Store

GET IT ON Google Play

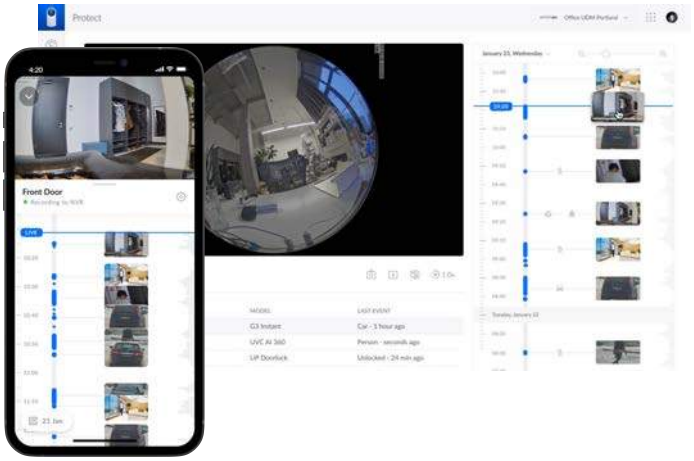
Live View

View up to 20 live camera feeds in a single window. With basic and advanced template options available, choose the live view template that's right for you.



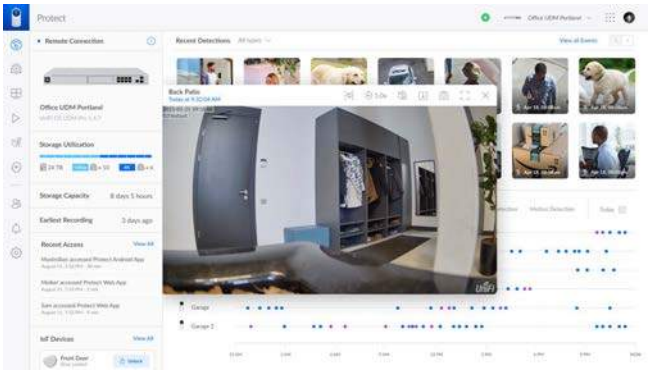
Time Lapse

The new *Time Lapse* feature allows you to scroll through video events and recordings quickly and efficiently. Now you can sift through hundreds of hours of video in just minutes.



Events

Video recordings are stored privately on the UDM Pro. Install the hard drive of your choice, and then you can retain hundreds of recording hours without third-party storage or online digital footprints.



UniFi® Dream Machine PRO

EXHIBIT A

SPECIFICATIONS

UDM-Pro	
Dimensions	442.4 x 43.7 x 285.6 mm (17.42 x 1.72 x 11.24")
Weight With Brackets	3.90 kg (8.60 lb) 3.99 kg (8.80 lb)
Interfaces Networking Management	 (8) 10/100/1000 RJ45 LAN Ports (1) 10/100/1000 RJ45 WAN Port (1) 1/10G SFP+ LAN Port (1) 1/10G SFP+ WAN Port Ethernet In-Band (1) Bluetooth BLE
IDS/IPS Throughput	3.5 Gbps*
Processor	Quad ARM Cortex-A57 Core at 1.7 GHz
System Memory	4 GB DDR4
On-Board Flash Storage	16 GB eMMC
Max Power Consumption	33W
Voltage Range	100 to 240VAC
Power Method	(1) Universal AC Input, 100-240VAC, 50/60 Hz (1) RPS DC Input
Power Supply	Internal 50W/12V
LEDs HDD RJ45 SFP+	 Activity Link/Speed/Activity Link/Speed/Activity
ESD/EMP Protection	Air: ± 16 kV, Contact: ± 12 kV
Operating Temperature	-10 to 40° C (14 to 104° F)
Operating Humidity	5 to 95% Noncondensing
Certifications	CE, FCC, IC

* *Measured with iPerf3.*

JL031720

EXHIBIT A

CONTROLPOINT
ENGINEERING

Materials List & Product Cutsheets

Surface Pro Tablets

EXHIBIT A

Surface Pro 8

Fact Sheet
October 2021

Meet Surface Pro 8, designed for a Pro like you.
Unlock more possibilities than ever with Surface Pro 8. Designed to light up the best of Windows 11, Surface Pro 8 combines the power of a laptop with the flexibility of a tablet, and every angle in between, with the iconic Kickstand and detachable Keyboard* with built-in Slim Pen storage and charging.[1] Do great things with a larger 13" touchscreen, faster connections with Thunderbolt™ 4 ports, and extra speed when you need it.

Top Features and Benefits

- **Our most powerful Pro ever.** Surface Pro 8 is over 2 times faster than Surface Pro 7. Delivering over 40% higher sustained CPU performance and 74% faster graphics sustained performance, Surface Pro 8 will handle it all…
- **Extend the ultimate desktop experience with Thunderbolt™ 4 ports.** Create your ultimate productivity setup with multiple 4K monitors, keep large creative files on hand with an external hard drive, or create a dream gaming setup with an external GPU.[2]
- **Our most advanced display in a Pro.** 11% larger, 10.8% higher resolution, 12.5% brighter, individually calibrated and virtually edge-to-edge, immerse yourself in the high-resolution 13" PixelSense™ Flow touch display. Now with up to 120Hz refresh rate (60hz default) for an even smoother pen experience and more responsive touch.
- **Video calls come to life in HD.** Full HD cameras with improved low-light performance and consistent brightness across different lighting conditions, Studio Mics, and optimized speakers for crystal-clear sound deliver an even better video calling experience. Capture and share that

precious moment, or effortlessly scan and sign a contract with the HD rear-facing camera with support for 4K video.

- **The most advanced digital pen experience on a Pro.** Unlock new experiences with Surface Slim Pen 2.[2] Tactile signals is a new digital pen experience that uses the built-in haptic motor in Surface Slim Pen 2 to give you the same feeling you get with pen on paper when notetaking and drawing. Surface Pro 8 with Surface Pen 2 has greater precision and lower latency when inking compared to Surface Slim Pen. Always charged, ready, and securely stored in Surface Pro Signature Keyboard,[2] take notes, sketch, and navigate in real time, any time.

Technical Specifications

Operating system	Surface Pro 8: Windows 11 Home Surface Pro 8 for Business: Windows 10 Pro or Windows 11 Pro
Exterior	Dimensions: 11.3" x 8.2" x 0.37" Weight: 1.96 lbs (891g) Mechanical features: anodized aluminum body, kickstand with full-friction multi-position hinge to 165 degrees, magnetic attach for keyboard fold stability Colors: Platinum, Graphite
Display	Screen: 13" PixelSense™ Flow Display Resolution: 2880 x 1920 (267 PPI) Up to 120Hz Refresh Rate (60Hz default) Aspect ratio: 3:2 Touch: 10-point multi-touch GPU Ink Acceleration
CPU	Consumer: Quad-core 11th Gen Intel® Core™ i5-1135G7 Processor Quad-core 11th Gen Intel® Core™ i7-1185G7 Processor Designed on the Intel® Evo™ platform Commercial: Dual-core 11th Gen Intel® Core™ i3-1115G4 Processor (Wi-Fi) Quad-core 11th Gen Intel® Core™ i5-1145G7 Processor (Wi-Fi or LTE[3]) Quad-core 11th Gen Intel® Core™ i7-1185G7 Processor (Wi-Fi or LTE[3]) Designed on the Intel® Evo™ platform (i5 and i7 processors only)
Graphics	Intel® UHD Graphics (i3) Intel® Iris® Xe Graphics (i5, i7)
Memory	8GB/16GB/32GB LPDDDR4x RAM
Storage	Removable solid-state drive (SSD) options: 128GB or 256GB (Wi-Fi or LTE[3]) SSD: 512GB or 1TB (Wi-Fi only)

EXHIBIT A

Security	TPM 2.0 chip for enterprise-grade security Enterprise-grade protection with Windows Hello face sign-in
Network	Wi-Fi 6: 802.11ax compatible Bluetooth Wireless 5.1 technology LTE[3]: LTE Advanced5 with removable SIM and eSIM support Qualcomm® Snapdragon™ X20 LTE Modem LTE bands supported: 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 19, 20, 25, 26, 28, 29, 30, 38, 39, 40, 41, 66
Battery	Up to 16 hours of battery life[4] Charge your Surface Pro 8 to 80% in just over an hour[5]
Cameras	Windows Hello face authentication camera (front-facing) 5.0MP front-facing camera with 1080p full HD video 10.0MP rear-facing autofocus camera with 1080p HD and 4k video
Audio	Dual far-field Studio Mics 2W stereo speakers with Dolby Atmos®[6] Dolby Vision® support[6]
Ports	2 x USB-C® with USB 4.0/Thunderbolt™ 4 3.5mm headphone jack 1 x Surface Connect port Surface Type Cover port Compatible with Surface Dial off-screen interaction[2]
Sensors	Accelerometer Gyroscope Magnetometer Ambient Color Sensor (brightness and color)
Software	Windows 11 Home Preloaded Microsoft 365 Apps[7] Microsoft 365 Family 30-day trial5[8] Preloaded Xbox App Xbox Game Pass Ultimate one month trial[9]
Power Supply	60W power supply with additional 5W USB A charging Port
In the Box	Surface Pro 8 Power Supply Quick Start Guide Safety and warranty documents
Surface Slim Pen 2[2]	4,096 pressure levels Zero force inking[10] Tactile signals with Surface Pro 8[11] and Surface Laptop Studio[9] on Windows 11 Rechargeable Lithium-Ion Battery

EXHIBIT A

	Wireless Charging and Storage on Surface Pro Signature Keyboard Up to 15 hours of typical usage[12]
Keyboard Compatibility	Surface Pro Signature Keyboard
Warranty[13]	1-year limited hardware warranty

Contact Information

For more information, press only:
Rapid Response Team, WE Communications, (425) 638-7777, rrt@we-worldwide.com

For more product information and images:
Visit the Surface Newsroom at https://news.microsoft.com/presskits/surface/.

For more information about Surface:
Visit Surface at http://www.microsoft.com/surface.

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[1] Pen storage and charging available on select Keyboards.
[2] Some accessories and software sold separately. Surface Slim Pen 2 sold separately. Surface Pro Signature Keyboard are sold separately. Only Surface Pro Signature Keyboard has Surface Slim Pen 2 storage and charging capabilities.
[3] Surface Pro 8 with LTE Advanced is coming in 2022. Visit Surface.com for updates on availability in your market. Availability may vary by market and configuration. Service availability and performance subject to service provider's network. Contact your service provider for details, compatibility, pricing, SIM card, and activation. See all specs and frequencies at surface.com.
[4] Up to 16 hours of battery life based on typical Surface device usage. Testing conducted by Microsoft in August 2021 using preproduction software and preproduction Intel® 11th Gen Core™ i5-1135G7, 256GB, 8GB RAM device. Testing consisted of full battery discharge with a mixture of active use and modern standby. The active use portion consists of (1) a web browsing test accessing 8 popular websites over multiple open tabs, (2) a productivity test utilizing Microsoft Word, PowerPoint, Excel and Outlook, and (3) a portion of time with the device in use with idle applications. All settings were default except screen brightness was set to 150nits with Auto-Brightness and Adaptive Color disabled. Wi-Fi was connected to a network. Tested with Windows Version 11.0.22000.9 (21H2). Battery life varies significantly with settings, usage and other factors.
[5] Testing conducted at Microsoft in August 2021 using pre-production devices and Software. Tested with the inbox 24W PSU under controlled conditions. Device was powered on to desktop screen with default display brightness settings. Actual charge time will vary based on operating conditions. Measured at typical office ambient temperature of 23C.
[6] Requires Dolby Atmos ® encoded content and audio.
[7] Subscription required (sold separately).
[8] Activation required.
[9] Activation required for Game Pass Ultimate.
[10] Zero force inking will only be work when Surface Slim Pen 2 is used with Surface Pro 8, Surface Pro X, Surface Laptop Studio, and Surface Duo 2. Additional compatibility details can be found at aka.ms/SurfaceSlimPenCompatiblity
[11] Chargers, software, accessories, and devices sold separately. Availability may vary by market.
[12] Battery life varies significantly based on usage, network and feature configuration, signal strength, settings and other factors. See aka.ms/SurfaceBatteryPerformance for details.
[13] Microsoft's Limited Warranty is in addition to your consumer law rights.

EXHIBIT A

CONTROLPOINT
ENGINEERING

Materials List & Product Cutsheets

SMS Alarm Modem

SIERRA WIRELESS

EXHIBIT A

DATASHEET

AirLink® RV55

Performance Series Routers

Compact, Rugged, Low power, LTE-A Pro or LTE-M/NB-IoT Router for Industrial IoT, SCADA and Field Service Fleets

RV55 Product Description

The AirLink® RV55 delivers LTE and Wi-Fi connectivity for vehicles and remote fixed assets operating in harsh environments. With ultra-low power consumption, the RV55 is ideal for solar/battery powered installations.

RV55 LTE

Rugged LTE router perfect for fixed and mobile utility applications, oil and gas, and precision agriculture.

RV55 LTE-A PRO

High speed data and video connectivity. Dual Wi-Fi option. FirstNet Ready for public safety applications.

RV55 LTE-M/NB-IOT

Certified to Cat-M1 and NB-IoT (LPWA) and perfect for IoT infrastructure. Designed for solar and battery use.

Ideal Applications

Ruggedized connectivity for fixed and mobile assets in:

- Utilities
- Oil & Gas
- Public Safety
- SCADA and Metering
- Agriculture
- Environmental monitoring
- Critical Infrastructure

Benefits

- Increase safety for first responders and utility workers
- Get up and running faster through simplified device connections
- Obtain access to previously inaccessible equipment
- Gain real-time remote connectivity for SCADA, distribution and metering
- Operate in remote and hazardous locations through battery and solar power

EXHIBIT A

AirLink RV55 – Router Specifications

CELLULAR	
Peak D/L	**RV55 LTE –** Up to 150 Mbps, Cat 4 (WP7610 | WP7607)
	RV55 LTE-A PRO – Up to 600 Mbps, Cat 12 (EM7511 | EM7565)
	RV55 LTE-M/NB-IOT – Cat M1/NB1 (WP7702), Cat-M1: 300kbps, Cat-NB1: 27kbps
Peak U/L	**RV55 LTE –** Up to 50 Mbps
	RV55 LTE-A PRO – Up to 150 Mbps
	RV55 LTE-M/NB-IOT – Cat-M1: 375kbps, Cat-NB1: 65kbps
4G LTE	
Frequency Bands	
North America	**RV55 LTE –** 1900(B2), AWS(B4), 850(B5), 700(B12), 700(B13), 700(B17), 1700(B66)
	RV55 LTE-A PRO – 2100(B1), 1900(B2),1800(B3), AWS(B4), 850(B5), 2600(B7), 900(B8), 1800(B9), 700(B12), 700(B13), 700(B14), 850(B18), 850(B19), 800(B20), 850(B26), 700(B29), 2300(B30), 1500(B32), TDD B41, TDD B42, TDD B43, TDD B46, CBRS B48,1700(B66)
EMEA	**RV55 LTE –** 2100(B1), 1800(B3), 2600(B7), 900(B8), 800(B20), 700(B28)
Global	**RV55 LTE-A PRO –** 2100(B1), 1900(B2), 1800(B3), AWS(B4), 850(B5), 2600(B7), 900(B8), 1800(B9), 700(B12), 700(B13), 850(B18), 850(B19), 800(B20), 850(B26), 700(B28), 700(B29), 2300(B30), 1500(B32), TDD B41, TDD B42, TDD B43, TDD B46, CBRS B48, 1700(B66)
	RV55 LTE-M/NB-IOT – 2100(B1), 1900(B2), 1800(B3), AWS(B4), 850(B5), 900(B8), 700(B12), 700(B13), 700(B17), 850 (B18), 850(B19), 800(B20), 850(B26), 700(B28)
3G WCDMA/HSPA+	
Frequency Bands*	
North America	**RV55 LTE –** 1900(B2), AWS(B4), 850(B5)
	RV55 LTE-A PRO – 2100(B1), 1900(B2), AWS(B4), 850(B5), 800(B6), 900(B8), 1700(B9), 850(B19)
EMEA	**RV55 LTE –** 2100(B1), 900(B8)
Global	**RV55 LTE-A PRO –** 2100(B1), 1900(B2), AWS(B4), 850(B5), 800(B6), 900(B8), 1700(B9), 850(B19)

2G EDGE/GSM/GPRS	
Frequency Bands	
EMEA	**RV55 LTE –** 900, 1800
Global	**RV55 LTE-A PRO –** 850, 900, 1800, 1900
APPROVALS	
Regulatory**	
North America	**RV55 LTE –** FCC, IC, PTCRB
	RV55 LTE-A PRO – FCC, IC, PTCRB
EMEA	**RV55 LTE –** GCF, CE
Global	**RV55 LTE-A PRO –** FCC, IC, PTCRB, GCF, CE, RCM, IFT, Anatel
	RV55 LTE-M/NB-IOT – FCC, IC, PTCRB, GCF, CE, RCM
Carrier**	
North America	**RV55 LTE –** Verizon, AT&T, T-Mobile
	RV55 LTE-A PRO – Verizon, AT&T/FirstNet, US Cellular, T-Mobile, Telus
Global	**RV55 LTE-A PRO –** Verizon, AT&T, Telstra (Planned)
	RV55 LTE-M/NB-IOT – Verizon (Cat-M), AT&T (Cat-M)
PART NUMBERS	
North America	**RV55 LTE –** 1104335
	RV55 LTE-A PRO – 1104303, 1104302 (Wi-Fi), 1104302 (Wi-Fi)
EMEA	**RV55 LTE –** 1104337
Global	**RV55 LTE-A PRO –** 1104332, 1104331 (Wi-Fi), 1104331 (Wi-Fi)
	RV55 LTE-M/NB-IOT – 1104333

**For carrier-specific band support please refer to the hardware user guide.*

***All approvals are either granted or in progress. Call for the latest approval status.*

EXHIBIT A

AirLink RV55 – Router Specifications

HOST INTERFACES

10/100/1000 Ethernet (RJ45)
RS-232 serial port (DB-9)
USB 2.0 Micro-B Connector
3 SMA antenna (cellular, diversity, GNSS)
2 RP-SMA antenna (1x1 Wi-Fi, Optional)
LTE-M/NB-IoT: 1 SMA (cellular) only, no GNSS or Wi-Fi
Active GPS antenna support

SECURITY

Remote Authentication (LDAP, RADIUS, TACACS+, DMZ)
Inbound and Outbound Port filtering
Inbound and Outbound Trusted IP
MAC Address Filtering
PCI compatible
Secure Firmware Update

WI-FI (Optional)

Dual Band 2.4/5GHz Wi-Fi
Dual Radio, 802.11 b/g/n/ac (Wave2 Client Mode)
Support for 10 clients, WPA2 Enterprise per radio
Output power 16dBm
Configurable as Dual Band Access Point (AP) or AP+Client Mode
Single SSID Support per radio
Captive Portal

SATELLITE NAVIGATION (GNSS)

LTE-A Pro Variant: 30 Channel GPS and GLONASS Receiver (Tracking Sensitivity: -160dBm)
LTE Variant: 48 Channel Dedicated GNSS Receiver (Tracking Sensitivity: -162 dBm)
Accuracy: <2 m (50%), <5 m (90%), <0.2 m/s
Acquisition Time: 1s Hot Start
Reports: NMEA 0183 V3.0, TAIP, RAP, XORA
Multiple Redundant Servers
Reliable Store and Forward

ENVIRONMENTAL

Temperature	**Operating Temperature:** -40°C to +70°C / -40°F to +158°F **Operating Temperature (Wi-Fi variant):** -30°C to +70°C / -22°F to +158°F **Storage Temperature:** -40°C to +85°C / -40°F to +185°F **Humidity:** 95% RH @ 60°C
	Military Spec MIL-STD-810G conformance to shock, vibration, thermal shock, and humidity IP64 rated ingress protection

POWER

Input/Operating Voltage	**Input Voltage:** 7 to 36 VDC Configurable I/O pin on power connector • Digital Input ON Voltage: 2.7 to 36 VDC • Configurable Pull-up for dry contact input • Digital Open Collector Output > sinking 500 mA • Analog Input: 0.5-36 VDC
Power modes	**LTE Idle Power:** 900mW (75 mA @ 12VDC) **Standby Mode Power:** 53 mW (4.4 mA @ 12 VDC) triggered on low voltage, I/O or periodic timer Low voltage disconnect to prevent battery drain Built-in protection against voltage transients including 5 VDC engine cranking and +200 VDC load dump Ignition Sense with time delay shutdown Configurable features and ports to optimize power consumption

NETWORK AND ROUTING

Network Address Translation (NAT) Reliable Static Route
Port Forwarding Dynamic DNS
Policy Routing Verizon PNTM
NEMO/DMNR IPV6 Gateway
VRRP

VPN***

IPsec, GRE, and OpenVPN Client
Up to 5 concurrent tunnels
Split Tunnel
Dead Peer Detection (DPD)
FIPS 140-2 compatible

INDUSTRY CERTIFICATIONS

Safety	IECEE Certification Bodies Scheme (CB Scheme), UL 60950****
Vehicle Usage	E-Mark (UN ECE Regulation 10.04)
Environmental	RoHS, REACH, WEEE **Hazardous Environments:** Class 1 Div 2– Ambient temperatures of -30°C to +60°C
Rail Usage	EN50155, ISO7637-2, SAE J1455 (Shock & Vibration)

SUPPORT AND WARRANTY

1 year standard warranty with up to 5 years extended warranty with current AirLink Complete subscription.
Unrestricted critical firmware updates.

*** *IPsec, GRE and OpenVPN Client are not available in the member states of the EAEU.*
**** *Ambient temperatures of -30C to +60C*

EXHIBIT A

AirLink RV55 – Router Specifications

LAN (ETHERNET/USB)

DHCP Server Host Interface Watchdog
IP Passthrough PPPoE
VLAN

SERIAL

TCP/U DP PAD Mode
Modbus (ASCII, RTU, Variable)
PPP
DNP3 Interoperability
Dual Serial option (with an accessory)

APPLICATION FRAMEWORK

ALEOS Application Framework (AAF)
LUA Scripting Language

NETWORK MANAGEMENT

Secure mobile network & asset management application available in the cloud or licensed platform in the enterprise data center
Fleet wide firmware upgrade delivery
Router configuration and template management
Router staging over the air and local Ethernet connection
Over-the-air software and radio module firmware updates
Device Configuration Templates
Configurable monitoring and alerting
Remote provisioning and airtime activation (where applicable)

ROUTER MANAGEMENT

ALMS
Local web user interface
AT Command Line Interface (Telnet/SSH/Serial)
SMS Commands
SNMP

EVENTS ENGINE

Custom event triggers and reports Configurable interface, no programming
Event Types: Digital Input, Network Parameters, Data Usage, Timer, Power, Device Temperature and Voltage
Report Types: RAP, SMS, Email, SNMP Trap, TCP (Binary, XML, CSV)
Event Actions: Drive Relay Output

ACCESSORIES

In the box

RV55, DC Power Cable, and Quick Start Guide
Other Accessories (sold separately):

- 2000579 AC Adapter, 12VDC
- 6000659 DIN Rail Bracket

For Antenna options visit: sierrawireless.com/antennas

DIMENSIONS

AirLink RV55 – Main Body

119 mm x 33 mm x 85 mm (102 mm including Wi-Fi connectors)
4.69 in x 1.34 in x 3.35 in (3.70 in including connectors)
Weight: 320 g

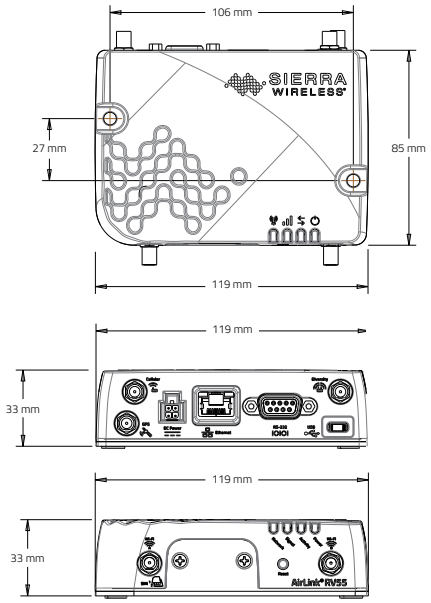

EXHIBIT A

RV55 Services and Support

AIRLINK COMPLETE

Maximize your AirLink RV55 hardware investment and ensure your applications operate at peak efficiency by subscribing to our best-in-class service and support including:

- AirLink Management Service (ALMS) network management
- Optional Advanced Mobility Reporting (AMR)
- 24/7/365 Tier 1 technical support from wireless experts via phone or online access
- Extended hardware warranty – up to 5 years
- For more information on AirLink Complete visit our *web page*

PROFESSIONAL SERVICES

Our *Professional Services* experts are well-versed in the latest enterprise networking and security standards. Harvesting experience and lessons-learned over thousands of customer deployments, our best practices are expertly tailored to help you architect and deploy your cutting-edge AirLink solutions.

AIRLINK CONNECTION MANAGER

- VPN appliance built from the ground up for AirLink routers & gateways
- Simplify deployment and management of your VPN solution, extending the enterprise to the network edge for fixed and mobile endpoints
- Carrier agnostic – ACM doesn't require fixed and/or public IP
- Compatible with FIPS 140-2, and always-on VPN capability

AIRLINK ANTENNAS

- Tested and certified to provide guaranteed performance with all AirLink routers and gateways
- Accelerate deployment with always-on, end-to-end connectivity
- For more information on antennas specific to the RV55 router visit our *web page*

About Sierra Wireless

Sierra Wireless (NASDAQ: SWIR) (TSX: SW) is a world leading IoT solutions provider that combines devices, network services, and software to unlock value in the connected economy. Companies globally are adopting 4G, 5G, and LPWA solutions to improve operational efficiency, create better customer experiences, improve their business models, and create new revenue streams. Sierra Wireless works with its customers to develop the right industry-specific solution for their IoT deployments, whether this is an integrated solution to help connect edge devices to the cloud, a software/API service to manage processes with billions of connected assets, or a platform to extract real-time data to improve business decisions. With more than 25 years of cellular IoT experience, Sierra Wireless is the global partner customers trust to deliver them their next IoT solution.

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EXHIBIT A

CONTROLPOINT
ENGINEERING

Materials List & Product Cutsheets

MicroLogix 1400 PLC

LISTEN. THINK. SOLVE.®

EXHIBIT A

PRODUCT PROFILE

MicroLogix™ 1400 / 1766

Small Programmable Logic Controller

Advantages

- Expand your application capabilities with up to 7 expansion I/O modules for a maximum of 144 discrete I/O
- Up to 6 embedded 100 kHz high-speed counters (on controllers with dc inputs)
- 2 Serial ports with DF1/ DH485/Modbus RTU/DNP3/ASCII protocol support
- Ethernet port provides you with peer-to-peer messaging, web server and email capabilities
- Built-in LCD with backlight allows you to view controller and I/O status, and provides a simple interface for messages, bit / integer monitoring and manipulation

Target Applications

- *General Industrial Machinery (Material Handling, Packaging, Assembly, etc.)*
- *HVAC/Building Automation*
- *SCADA (Oil & Gas, Water/Waste Water, and Electric Power)*
- *Food & Beverage*
- *Pharmaceutical*
- *Commercial Machinery (Vending, Industrial Washers & Dryers, etc.)*

Overview

The new Allen-Bradley® MicroLogix™ 1400 from Rockwell Automation complements the existing MicroLogix family of small programmable logic controllers. MicroLogix 1400 combines the features you demand from MicroLogix 1100, such as EtherNet/IP, online editing, and a built-in LCD, plus provides you with enhanced features, such as: higher I/O count, faster High Speed Counter/PTO and enhanced network capabilities

Take advantage of the built-in LCD with back lighting to set the Ethernet network configuration, display floating point values on a user configurable display, display OEM logos at startup and read or write any binary, integer and long file elements in the data table. Controllers without embedded analog come with 32 digital I/O count, while analog versions have 32 digital I/O and 6 analog I/O. All versions can be expanded using up to seven 1762 I/O modules - the same I/O modules that MicroLogix 1100 and 1200 utilize.

Three embedded communication ports provide you with superior communications capabilities. MicroLogix 1400 offers an isolated RS232C/RS485 combination port; a non-isolated RS232C port; and an RJ-45 port for 10/100 Mbps EtherNet/IP peer-to-peer messaging.

Similar to the rest of the MicroLogix family, MicroLogix 1400 is programmed with RSLogix 500 programming software (Version 8.1 and above) as well as new RSLogix Micro programming software.

EXHIBIT A

SPECIFICATIONS

MicroLogix	1766-L32BWA	1766-L32AWA	1766-L32BXB	1766-L32BWAA	1766-L32AWAA	1766-L32BXBA
Input Power	120/240 VAC		24 VDC	120/240 VAC		24 VDC
Memory	non-volatile battery backed RAM					
User Program / User Data Space	10 K / 10K configurable					
Data Logging / Recipe Storage	128 K (without Recipe) / up to 64 K (after subtracting Data Logging)					
Battery Back-up	Yes					
Back-up Memory Module	Yes					
Digital Inputs	(12) Fast 24VDC (8) Normal 24VDC	(20) 120VAC	(12) Fast 24VDC (8) Normal 24VDC	(12) Fast 24VDC (8) Normal 24VDC	(20) 120VAC	(12) Fast 24VDC (8) Normal 24VDC
Digital Outputs	(12) Relay	(12) Relay	(6) Relay (3) Fast DC (3) Normal DC	(12) Relay	(12) Relay	(6) Relay (3) Fast DC (3) Normal DC
Analog Inputs / Outputs	None			(4) Voltage Inputs / (2) Voltage Outputs		
Serial Ports	(1)RS232C/RS485*, (1)RS232C**					
Serial Protocols	DF1 Full Duplex, DF1 Half Duplex Master/Slave, DF1 Radio Modem, DH-485, Modbus RTU Master/Slave, ASCII, DNP 3 Slave					
Ethernet Ports	(1) 10/100 EtherNet/IP port					
Ethernet Protocols	EtherNet/IP messaging only					
Trim Potentiometers	2 Digital					
High-Speed Inputs	Up to 6 channels @ 100 kHz	N/A	Up to 6 channels @ 100 kHz	Up to 6 channels @ 100 kHz	N/A	Up to 6 channels @ 100 kHz
Real Time Clock	Yes, embedded					
PID	Yes (limited by loop and stack memory)					
PWM /PTO	N/A		3 channel PTO (100kHz)\PWM (40kHz)	N/A		3 channel PTO (100kHz)\PWM (40kHz)
Dual Axis Servo control	N/A		Through embedded PTO	N/A		Through embedded PTO
Embedded LCD	Yes					
Floating Point Math	Yes					
Online Editing	Yes					
Operating Temperature	-20 °C to +60 °C					
Storage Temperature	-40 °C (or -30 °C) to +85 °C					

* Isolated. RS232/RS485 combo port. Same as MicroLogix 1100 Comm 0

** Non-isolated RS232. standard D-sub connector.

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EXHIBIT A

CONTROLPOINT
ENGINEERING

Example Control Strategy

EXHIBIT A

Waste Water Treatment Plant

Control Systems Handbook

Revision 6

REV	DATE	DESCRIPTION	ORIG	CHK	APPR
6	12/20/2018	Post-Bid Revisions	JP		
5	8/21/2018	100% Design Level	JP		
4	6/29/2018	90% Design Level	JP		
3	1/29/2018	Notes added from Teleconference	JP		
2	12/19/2017	As-Built Workshop Comments Incorporated	JP		
1	11/20/2017	Issued for Review	JP		

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1. SCOPE

This document describes the PLC and SCADA operations of the XXXXXXXXX Waste Water Treatment Plant facility.

2. CONTROL DEFINITIONS

The following acronyms and common control functions are used throughout this document.

2.1 Acronyms

PLC ---------- Programmable Logic Controller
SCADA ------- Supervisory Control and Data Acquisition
PID ---------- Proportional, Integral and Derivative Control
P&ID ---------- Piping and Instrumentation Diagram
OIT ---------- Operator Interface Terminal
OOS ---------- Out of Service
HOA---------- Hand/Off/Auto is a selector switch with three positions (see below)
HMI ---------- Human Machine Interface (using icons and symbols)
DO---------- Dissolved Oxygen
TDS---------- Total Dissolved Solids
VFD---------- Variable Frequency Drive
GPM ---------- Gallons Per Minute
KGAL -------- 1,000 Gallons
SP---------- Setpoint

2.2 Motorized Valve Local/Remote Controls

Unless described otherwise, the motorized valves described in this document have a Local/Remote selector switch on them. In Local, the valve is operated manually from the valve operator. In Remote, the valve is controlled by the PLC.

2.3 Equipment Hand/Off/Auto (HOA) Controls

Unless described otherwise, the Hand/Off/Auto (HOA) switches described in this document are located at the MCC bucket. These are 3-position selector switches with the following available selections:

<u>Hand</u>

In the Hand position, the connected piece of equipment (pump, blower, etc.) runs continuously. If the equipment has a VFD, it will operator based on the manual speed control setting on the VFD keypad (also at the MCC). In Hand, the PLC does not have any control of the equipment.

<u>Off</u>

In the Off position, the equipment does not operate locally or remotely.

Auto

In the Auto position, the equipment will run as called by the PLC logic provided the Ready signal from the MCC is active. If the equipment has a VFD, it will run at the auto speed command provided by the PLC.

2.4 SCADA-Manual / SCADA-Auto

For each piece of equipment (pump, blower, etc.) with a field HOA that has an Auto status brought into the PLC, a SCADA-Manual/SCADA-Auto selection button is available on SCADA.

SCADA-Manual

In SCADA-Manual, the equipment can be started and stopped manually from SCADA with a set of start and stop software buttons.

SCADA-Auto

In SCADA-Auto, the equipment operates automatically based on the control descriptions written in this document and programmed into the PLCs.

2.5 Equipment Ready Status

A Ready indication from the MCC indicates that the equipment's HOA is in Auto and there are no shutdowns in the MCC. The equipment is ready to be operated by the PLC.

2.6 Instrumentation

Mag Meter

Electromagnetic flow meters, or "mag meters", are comprised of a transmitter and sensor that together measure flow. The magnetic flow meter's sensor is placed inline and measures an induced voltage generated by the fluid as it flows through a pipe. The transmitter takes the voltage generated by the sensor, converts the voltage into a flow measurement and transmits that flow measurement to a control system.

Parshall Flume

A Parshall Flume is a fixed hydraulic structure. It is used to measure volumetric flow rate in industrial discharges, municipal sewer lines, and influent/effluent flows in wastewater treatment plants. The Parshall Flume accelerates flow through a contraction of both the parallel sidewalls and a drop in the floor at the flume throat. Under free-flow conditions the depth of water at specified location upstream of the flume throat can be converted to a rate of flow.

3. PROCESS AREAS

3.1 Process Feed Pump Station

Process Area	Description
MOV1031	Bypass Valve
MOV1032	Sludge Valve
	Process Feed Pump Station Wetwell
PMP1011	Process Feed Pump 1
PMP1012	Process Feed Pump 2

3.2 Influent Sodium Hypochlorite (SHC) Feed System

Process Area	Description
TNK1510	Influent SHC Storage Tank
PMP1511	Influent SHC Feed Pump

3.3 Influent Sodium Hydroxide (Caustic) Feed System

Process Area	Description
TNK1520	Caustic Storage Tank
PMP1521	Caustic Feed Pump

3.4 Primary Clarifier

Process Area	Description
	Primary Clarifier
DRV2011	Primary Clarifier Drive
AER2012	Primary Clarifier Aerator
DRV2013	Primary Clarifier Scum Skimmer
PMP2021	Primary Sludge Pump
PMP2031	Primary Scum Pump

3.5 Trickling Filter

Process Area	Description
	Tricking Filter
PMP2111	Trickling Filter Pump
PMP2121	Trickling Filter Blower

3.6 Aeration Basins

Process Area	Description
	Aeration Basin 1
	Aeration Basin 2

Process Area	Description
BLR3511	Aeration Blower 1
BLR3512	Aeration Blower 2
BLR3513	Aeration Blower 3

3.7 Secondary Clarifier 2

Process Area	Description
DRV4011	Secondary Clarifier 2 Drive

3.8 RAS Pump Station

Process Area	Description
PMP4511	RAS Pump 1
PMP4512	RAS Pump 2
MOV4521	WAS Valve

3.9 WAS Pump Station

Process Area	Description
PMP4531	WAS Pump 1
PMP4532	WAS Pump 2

3.10 Scum/Drain Pump Station

Process Area	Description
	SC Scum Pump Station Wetwell
PMP4611	SC Scum Pump 1
PMP4612	SC Scum Pump 2

3.11 Coagulant Rapid Mixing and Flocculation Basins

Process Area	Description
	Coagulant Rapid Mixing Basin
MXR5011	Coagulant Rapid Mixer
	Flocculation Basin 1
MXR5012	Flocculator 1
	Flocculation Basin 2
MXR5013	Flocculator 2

3.12 Tertiary Filters

Process Area	Description
FLT5100	Filter 1

Process Area	Description
DRV5111	Filter 1 Disk Drive
PMP5121	Filter 1 Backwash/Waste Pump 1
PMP5122	Filter 1 Backwash/Waste Pump 2
MOV5131	Filter 1 Backwash Valve 1
MOV5132	Filter 1 Backwash Valve 2
MOV5133	Filter 1 Backwash Valve 3
MOV5141	Filter 1 Sludge Valve
FLT5200	Filter 2
DRV5211	Filter 2 Disk Drive
PMP5221	Filter 2 Backwash/Waste Pump 1
PMP5222	Filter 2 Backwash/Waste Pump 2
MOV5231	Filter 2 Backwash Valve 1
MOV5232	Filter 2 Backwash Valve 2
MOV5233	Filter 2 Backwash Valve 3
MOV5241	Filter 2 Sludge Valve

3.13 Sodium Hypochlorite (SHC) Rapid Mixing

Process Area	Description
	SHC Rapid Mix Basin
MXR5311	SHC Rapid Mixer

3.14 Sodium Bisulfite (SBS) Feed System

Process Area	Description
TNK5510	Sodium Bisulfite Storage Tank
PMP5511	Sodium Bisulfite Feed Pump 1
PMP5512	Sodium Bisulfite Feed Pump 2

3.15 Old Sodium Bisulfite (SBS) Feed System (Out of Service)

Process Area	Description
TNK5710	Old Sodium Bisulfite Storage Tank
PMP5711	Old Sodium Bisulfite Feed Pump 1

3.16 Effluent Sodium Hypochlorite (SHC) Feed System

Process Area	Description
TNK5610-1	Effluent SHC Storage Tank 1
PMP5611	Effluent SHC Feed Pump 1
TNK5610-2	Effluent SHC Storage Tank 2

Process Area	Description
PMP5612	Effluent SHC Feed Pump 2

3.17 Effluent Monitoring

Process Area	Description
	Chlorine Contact Tank (CCT)
PMP6211	Effluent Sample Pump
SMP6021	Effluent Sampler
	Distribution Structure
SOV6032	Diversion Valve

3.18 Plant Water Pump Station

Process Area	Description
	Chlorine Contact Tank (CCT)
PMP6111	Plant Water Pump 1
PMP6112	Plant Water Pump 2
PMP6113	CCT Effluent Sample Pump

3.19 Irrigation Pump Station

Process Area	Description
PMP9211	Irrigation Pump 1
PMP9212	Irrigation Pump 2
PMP9213	Irrigation Pump 3
PMP9214	Irrigation Pump 4
SOV9290	Irrigation Zone 1
SOV9291	Irrigation Zone 2
SOV9292	Irrigation Zone 3
SOV9293	Irrigation Zone 4
SOV9294	Irrigation Zone 5
SOV9295	Irrigation Zone 6
SOV9296	Irrigation Zone 7
SOV9297	Irrigation Zone 8
SOV9298	Irrigation Zone 9
SOV9299	Irrigation Zone 10
MOV9234	Return Flow Control Valve

3.20 Main Generator

Process Area	Description
SEG5803	Main Standby Engine Generator
ATS5803	Main Standby Engine Generator Automatic Transfer Switch

3.21 PLC2

Process Area	Description
PLC2	PLC2

3.22 PLC3

Process Area	Description
PLC3	PLC3

4. CONTROL SYSTEM ARCHITECTURE

The Plant relies on two physical computers located in the Admin Building. Services have been separated between these two systems. A Dell server (T3810) with RAID 5 hard drives acts as the Historian, while a standard Dell desktop serves as the data acquisition (DA) and alarming agent. An identical system to the DA machine is located in the Blower Building. This machine is used as a "Secondary" or "Failover" machine. The Failover machine is limited in function in that it does not call Operations staff for alarms.

4.1 SCADA Computers

Location	Computer Name	Operating System	Communications Used
Admin Building	Historian		Ethernet
Admin Building	Node 1		Ethernet
Blower Building	Node 2		Ethernet

The PLC architecture consists of Allen-Bradley Programmable Logic Controllers. Most of the plant utilizes the CompactLogix platform while the Filters use the SLC 5/05 32k series. The Lift Stations use the MicroLogix 1400 Series B platform.

4.2 Programmable Logic Controllers

Location	Processes Controlled	PLC Name	PLC Type	Communications Used
Blower Building (MCC2)	Aeration Basins Aeration Blowers Generator (Statuses)	PLC2	Allen-Bradley CompactLogix 5332E	Ethernet
MCC3 Building	Influent Flow Distribution Process Feed Pumps Secondary Clarifier 2 SC Scum Pumps RAS WAS Influent SHC Feed Sodium Bisulfite Feed Rapid Mixing Flocculation Effluent SHC Feed Plant Water Pumps	PLC3	Allen-Bradley CompactLogix 5335E	Ethernet
Aerobic Digester Building	Primary Clarifier Trickling Filter	PLC4	Allen-Bradley CompactLogix 5335E	Ethernet

Location	Processes Controlled	PLC Name	PLC Type	Communications Used
Aerobic Digester Building	Airlift Pump Blowers Anoxic Basin and Thickener Aerobic Digesters	PLC41	Allen-Bradley CompactLogix 5335E	Ethernet
Filter 1	Filter 1	PLCF1	Allen-Bradley SLC 5/05 32k	Ethernet
Filter 2	Filter 2	PLCF2	Allen-Bradley SLC 5/05 32k	Ethernet
Irrigation Pump Station	Irrigation Pumps	PLC5	Allen-Bradley CompactLogix 5332E	Ethernet Radios
Admin Building	Lift Station Comm Master	POLLER	Allen-Bradley MicroLogix 1100	Serial (to Lift Stations) Ethernet to SCADA
Sunset	Sunset	PLC93	Allen-Bradley MicroLogix 1100	Serial (to Master)
Lift Station 49	Lift Station 49	PLC94	Allen-Bradley MicroLogix 1400	Serial (to Master)
Oak Shadows	Oak Shadows	PLC95	Allen-Bradley MicroLogix 1400	Serial (to Master)
Mountain Oaks	Mountain Oaks	PLC96	Allen-Bradley MicroLogix 1400	Serial (to Master)
Treats Monitoring Station	Treats Monitoring Station	PLC97	Allen-Bradley MicroLogix 1400	Serial (to Master)

4.3 Communications

Ethernet

This network consists of Fiber and Ethernet cabling is used for communications from the HMIs to PLC2, PLC3, Filter 1, Filter 2, and the Lift Station Master.

Ethernet Radios

Communication between the Plant, the Lift Stations, and the Irrigation Pump Station is handled through Ethernet MDS INet-II 900 Mhz Radios.

PLC2 consists of the following modules:

Modules	Function
1769-L32E	CompactLogix 5332E Controller
1769-IF8/A	Voltage/Current Analog Input Module

1769-OF8/A	Current Output Analog Module
1769-IA16/A	120VAC Discrete Input Module
1769-IA16/A	120VAC Discrete Input Module
1769-OW8I/B	AC/DC Individually Isolated Relay Contact Module

PLC3 consists of the following modules:

Modules	Function
1769-L35E	CompactLogix 5335E Controller
1769-IF8/A	Voltage/Current Analog Input Module, 8-channel
1769-IF8/A	Voltage/Current Analog Input Module, 8-channel
1769-IF8/A	Voltage/Current Analog Input Module, 8-channel
1769-IF8/A	Voltage/Current Analog Input Module, 8-channel
1769-IF8/A	Voltage/Current Analog Input Module, 8-channel
1769-OF8/A	Current Output Analog Module, 8-channel
1769-OF8/A	Current Output Analog Module, 8-channel
1769-OF8/A	Current Output Analog Module, 8-channel
1769-IA16/A	120VAC Discrete Input Module, 16-channel
1769-IA16/A	120VAC Discrete Input Module, 16-channel
1769-IA16/A	120VAC Discrete Input Module, 16-channel
1769-IA16/A	120VAC Discrete Input Module, 16-channel
1769-IA16/A	120VAC Discrete Input Module, 16-channel
1769-IA16/A	120VAC Discrete Input Module, 16-channel
1769-IA16/A	120VAC Discrete Input Module, 16-channel
1769-IA16/A	120VAC Discrete Input Module, 16-channel
1769-IA16/A	120VAC Discrete Input Module, 16-channel
1769-OW8I/B	AC/DC Individually Isolated Relay Contact Module, 8-channel
1769-OW8I/B	AC/DC Individually Isolated Relay Contact Module, 8-channel
1769-OW8I/B	AC/DC Individually Isolated Relay Contact Module, 8-channel
1769-OW8I/B	AC/DC Individually Isolated Relay Contact Module, 8-channel

PLC4 consists of the following modules:

Modules	Function
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Modules	Function
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PLC41 consists of the following modules:

Modules	Function
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ADF1_PLC consists of the following modules:

Modules	Function
1747-L55C	SLC 5/05 Controller, 32K Memory
1746-IA16	120VAC Discrete Input Module, 16-channel
1746-IA16	120VAC Discrete Input Module, 16-channel
1746-OW16	120VAC Relay Output Module, 16-channel
1746-NO41	Current Analog Output Module, 4-channel
1746-NI8	Current Analog Input Module, 4-channel

ADF2_PLC consists of the following modules:

Modules	Function
1747-L55C	SLC 5/05 Controller, 32K Memory
1746-IA16	120VAC Discrete Input Module, 16-channel
1746-IA16	120VAC Discrete Input Module, 16-channel
1746-OW16	120VAC Relay Output Module, 16-channel
1746-NO41	Current Analog Output Module, 4-channel
1746-NI8	Current Analog Input Module, 4-channel

PLC5 consists of the following modules:

Modules	Function
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----------	----------

Modules	Function
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5. PROCESS FEED PUMP STATION

5.1 Process Description

The Process Feed Pump Station collects flows from several sources in the Plant and pumps this combination of flows into the Aeration Basin System. Sources of flow into the Process Feed Pump Station include raw sewage from the Plant Headworks, Primary Clarifier effluent, Trickling Filter and/or Secondary Clarifier 1 effluent, sludge from Secondary Clarifier 1, and return flow from the Belt Press. Excess flow is diverted by gravity to Pond D.

5.2 Reference Drawings

Drawing Number	Description
I100	Process Feed Pump Station P&ID

5.3 Equipment

Equipment Tag	Description
MOV1031	Bypass Valve
MOV1032	Sludge Valve (Obsolete & OOS)
PMP1011	Process Feed Pump 1
PMP1012	Process Feed Pump 2

5.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
F1071	Bypass Flow Meter (Parshall Flume)	0-2000 gpm
Q1071	Bypass Flow Meter (Parshall Flume) Flow Total Pulse	0-1,1=kgal
F1072	Pond D Flow Meter (Parshall Flume)	0-2000 gpm
Q1072	Pond D Flow Meter (Parshall Flume) Flow Total Pulse	0-1,1=kgal
F1073	Process Feed Flow (8” Magmeter)	0-2000 gpm
Q1073	Process Feed Flow (8” Magmeter) Flow Total Pulse	0-1,1=kgal
F1074	Process Flow (Parshall Flume)	0-1000 gpm
Q1074	Process Flow (Parshall Flume) Flow Total Pulse	0-1,1=kgal
L1052	Process Feed Pump Station Wetwell Level (Submersible)	0-23.1 ft
Y1011	Process Feed Pump 1 Ready	0-1,1=Ready
N1011	Process Feed Pump 1 Run	0-1,1=Run
UA1011	Process Feed Pump 1 Fail	0-1,1=Fail

MSH1011	Process Feed Pump 1 Overtemp/Moisture	0-1,1= Overtemp/Moisture
S1011	Process Feed Pump 1 Speed	0-100 %
Y1012	Process Feed Pump 2 Ready	0-1,1=Ready
N1012	Process Feed Pump 2 Run	0-1,1=Run
UA1012	Process Feed Pump 2 Fail	0-1,1=Fail
MSH1012	Process Feed Pump 2 Overtemp/Moisture	0-1,1= Overtemp/Moisture
S1012	Process Feed Pump 2 Speed	0-100 %
Y1031	Sludge Valve Local/Remote (Obsolete & OOS)	0-1,1=Remote
ZSC1031	Sludge Valve Closed (Obsolete & OOS)	0-1,1=Closed
ZSO1031	Sludge Valve Opened (Obsolete & OOS)	0-1,1=Opened
Y1032	Bypass Valve Local/Remote	0-1,1=Remote
ZSC1032	Bypass Valve Closed	0-1,1=Closed
ZSO1032	Bypass Valve Opened	0-1,1=Opened
ZT1032	Bypass Valve Feedback Position	0-100 %
LSHH1051	Process Feed Wetwell Hi Hi Level	0-1,1=Hi Hi Level
LSLL1051	Process Feed Wetwell Lo Lo Level	0-1,1=Lo Lo Level

5.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
PMP1011	Process Feed Pump 1	L1052	0-1,1=Start 0-100 %	X1011 SC1011
PMP1012	Process Feed Pump 2	L1052	0-1,1=Start 0-100 %	X1012 SC1012
MOV1031	Sludge Valve (OOS)	F1071	0-1,1=Open 0-1,1=Close	ZO1031 ZC1031
MOV1032	Bypass Valve	-	0-100 %	ZC1032

5.6 Control Description

5.6.1 Bypass Valve (MOV1032)

The Bypass Valve is normally closed. It is used to control flow to the Primary Clarifier by diverting excess flow into the Process Feed Pump Station. In automatic operation, it is used to divert headworks flow (Bypass Flow, F1071) in excess of 600 gpm to the Process Feed Station. Valve opened (ZSO1032), valve closed (ZSC1032), valve in remote (Y1032), and valve feedback position (ZT1032) are inputs to PLC3.

Local

In Local, the valve is operated manually in the field from the valve operator.

Remote

In Remote, the valve will follow the valve position command (ZC1032) signal from the PLC. The following control modes are available from SCADA:

Remote-Manual

In Remote-Manual, the valve can be opened, closed, or set to a position (0-100%) from SCADA.

Remote-Auto

In Remote-Auto, the valve position is set to maintain either a constant Bypass Flow (F1071) or a modulating flow as a percentage of the Process Flow (F1074) as set by the Operator. The Process Flow (F1074) serves as a proxy for raw influent flow.

The original design intention is as follows and, at the time of this writing (11/21/2017), still needs to be tested and potentially adjusted:

In the event of a Bypass Flow (F1071) transducer fail alarm, the Bypass Valve will automatically switch to a flowmeter fail position setpoint set by the Operator. In case of peak flow conditions, the Bypass Valve will open automatically to allow diversion of flow in excess of the existing plant capacity. The existing plant capacity is a set point entered by the Operator (approximately 650 gpm).

Setpoints

The following setpoints associated with the Bypass Valve are adjustable from SCADA:

Description	**Set Point**	**Comments**
PID Controller Flow Deadband	#### gpm	
PID Controller Derivative Term	0-10	
PID Controller Integral Term	0-10	
PID Controller Proportional Term	0-10	
PID Controller Flow Setpoint	0-2000 gpm	
Auto Mode Fixed Flow	0-2000 gpm	
Auto Mode % of Influent	0-2000 gpm	

Maximum Position	0-100 %	
Minimum Position	0-100 %	
Manual Position	0-100 %	

5.6.2 Sludge Valve (MOV1031)

This valve is obsolete and not needed for current process control.

The Sludge valve allows sludge flow from Secondary Clarifier 1 to bypass into the Process Feed Pump Station. Valve opened (ZSO1031), valve closed (ZSC1031), and valve remote (Y1031) are inputs to PLC3.

Local

In Local, the valve is operated manually in the field from the valve operator.

Remote

In Remote, the valve follows the open control (ZO1031) and close control (ZC1031) commands from the PLC. The following control modes are available from SCADA:

Remote-Manual

In Remote-Manual, the valve can be opened or closed from SCADA.

Remote-Auto

In Remote-Auto, the valve diverts an Operator-adjustable percentage of sludge into the Process Feed Pump Station. The valve follows open/close cycles with open time / total cycle time equal to the same percentage. For example, if 10% of the sludge needed to be diverted to the Process Feed Pump Station, the valve will open 6 minutes (10% * 60 min) each hour. The operator enters this percentage and the PLC determines the length of time the valve remains open or closed.

5.6.3 Process Feed Pumps (PMP1011, PMP1012)

The Process Feed Pump Station wetwell contains a high-high level float (LSHH1051), level transmitter (L1052), and a low-low level float (LSLL1051). The Process Feed Pumps are set to maintain the level in the wetwell. Pump running (N1011, N1012), pump ready (Y1011, Y1012), pump fail (UA1011, UA1012), and VFD speed feedback (S1011, S1012) are inputs to PLC3.

When the pump HOA is in the Auto position and the Ready status is active (Y1011, Y1012), it will run as called (X1011, X1012) by the PLC at its auto speed command (SC1011, SC1012). A set of Operator-adjustable start/stop setpoints calls the Lead pump. If the pumps assigned as Lead is taken out of Auto or fails, the other pump will be called in its place.

A level PID control loop maintains the wetwell level (L1052) by modulating pump speed. The Process Feed Flow (F1073) is metered and totalized.

A low-low level alarm locks out pump operation, unless the low-low level lockout bypass switch at the MCC is placed in the bypass position for maintenance and/or cleaning purposes.

SCADA Auto/Manual

When a pump HOA is in the Auto position and the Ready status is active, it can be operated in the following control modes from SCADA:

SCADA-Auto

In SCADA-Auto, the Lead pump is automatically called and its speed is automatically modulated based on wetwell level. The pump will turn on when level rises above an Operator-adjustable start setpoint and turn off when the level falls below an Operator-adjustable stop setpoint. A level PID control loop modulates the pump speed to maintain an Operator-adjustable level setpoint.

SCADA-Manual

In SCADA-Manual, the pump is started and stopped from SCADA and the speed command is manually set.

Backup Controls

In the event the automatic level control system fails, the pumps will operate from backup controls, cycling between the low-low and high-high floats. Excess flow is directed to Pond D and is metered (F1072) and totalized. The Pond D flow (F1072) is chlorinated. The amount of Sodium Hypochlorite injection can be flow paced with F1072 or manually controlled by the Operator.

Lock-Out Stop

Lockout stop switches and at the pump disable operation.

Disconnect Switch

Power disconnect switches at the pump isolate power from the pump motor.

Setpoints

The following setpoints associated with the Process Feed Pumps are adjustable from SCADA:

Description	Set Point	Comments
PID Controller Level Deadband	0.0 feet	
PID Controller Derivative Term	0-100	
PID Controller Integral Term	0-100	
PID Controller Proportional Term	0-100	
PID Controller Level Setpoint	0-23.1 feet	
Maximum Pump(s) Speed	0-100 %	
Minimum Pump(s) Speed	0-100 %	
Lead Start Level	4.5 feet	Start lead pump on falling level.
Lead Stop Level	3.0 feet	Start lead pump on falling level.
Lead Pump Assignment	0-2	0 = Alternate, 1 = Pump 1, 2 = Pump 2
Pump 1 Manual Speed	0-100 %	
Pump 2 Manual Speed	0-100 %	

5.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
PMP1011	AF1011	UA1011	0-1	# sec	Alarm, Shutdown Pump	Process Feed Pump 1 Fault
PMP1011	AO1011	MSH1011	0-1	# sec	Alarm, Shutdown Pump	Process Feed Pump 1 Overtemp / Moisture
PMP1011	AR1011	X1011 N1011	0-1 0-1	# sec	Alarm, Shutdown Pump	Process Feed Pump 1 Fail to Start

PMP1011	AIX1011	S1011	0-100%	# sec	Alarm	Process Feed Pump 1 Speed Transducer Failure
PMP1012	AF1012	UA1012	0-1	# sec	Alarm, Shutdown Pump	Process Feed Pump 2 Fault
PMP1012	AO1012	MSH1012	0-1	# sec	Alarm, Shutdown Pump	Process Feed Pump 2 Overtemp / Moisture
PMP1012	AR1012	X1012 N1012	0-1 0-1	# sec	Alarm, Shutdown Pump	Process Feed Pump 2 Fail to Start
PMP1012	AIX1012	S1012	0-100 %	# sec	Alarm	Process Feed Pump 2 Speed Transducer Failure
LSHH1051	AHL1051	LSHH1051	0-1	# sec	Alarm	Process Feed Wetwell Level High High
LSLL1051	ALL1051	LSLL1051	0-1	# sec	Alarm	Process Feed Wetwell Level Low Low
LIT1052	AHL1052	6.6 feet	0-23.1 feet	# sec	Alarm	Process Feed Wetwell Level High
LIT1052	ALL1052	3.0 feet	0-23.1 feet	# sec	Alarm	Process Feed Wetwell Level Low
LIT1052	AIX1052	L1052	0-23.1 feet	# sec	Alarm	Process Feed Wetwell Level Transducer Failure
FIT1071	AIX1071	F1071	0-2000 gpm	# sec	Alarm	Bypass Flow Transducer Failure
FIT1072	AIX1072	F1072	0-2000 gpm	# sec	Alarm	Pond D Flow Transducer Failure
FIT1073	AIX1073	F1073	0-2000 gpm	# sec	Alarm	Process Feed Flow Transducer Failure
FIT1074	AIX1074	F1074	0-1000 gpm	# sec	Alarm	Process Flow Transducer Failure
MOV1031	AFO1031	ZO1031 ZSO1031	0-1 0-1	# sec	Alarm	Sludge Valve Fail to Open
MOV1031	AFC1031	ZC1031 ZSC1031	0-1 0-1	# sec	Alarm	Sludge Valve Fail to Close
MOV1032	AIX1032	ZT1032	0-100 %	# sec	Alarm	Bypass Pinch Valve Position Transducer Failure

6. INFLUENT SODIUM HYPOCHLORITE (SHC) FEED SYSTEM

6.1 Process Description

Sodium Hypochlorite (SHC) provides disinfection for excess flow into Pond D from the Process Feed Wetwell. The Influent SHC Feed Pump runs during excess flow conditions and is paced on Pond D Flow (F1072).

6.2 Reference Drawings

Drawing Number	Description
I151	Influent Sodium Hypochlorite Feed System P&ID

6.3 Equipment

Equipment Tag	Description
TNK1510	Influent SHC Storage Tank
PMP1511	Influent SHC Feed Pump

6.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
Y1511	Influent SHC Feed Pump Auto	0-1,1=Auto
N1511	Influent SHC Feed Pump Run	0-1,1=Run
UA1511	Influent SHC Feed Pump Fail	0-1,1=Fail
S1511	Influent SHC Feed Pump Speed	0-100 %
FSH1571	Influent SHC Emergency Eyewash Flow	0-1,1=Flow

6.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
PMP1511	Influent SHC Feed Pump	-	0-1,1=Start 0-100 %	X1511 SC1511

6.6 Control Description

6.6.1 Influent SHC Feed Pump (PMP1511)

The Influent SHC Feed Pump doses the excess Process Feed Pump Station flow to Pond D. Pump run (N1511), pump auto (Y1511), pump fail (UA1511), and pump speed feedback (S1511) are inputs to PLC3. When the pump auto status (Y1511) is active, it runs as called (X1511) by the PLC at its auto speed command (SC1511).

SCADA Auto/Manual

In Auto mode, the pump can be operated in the following control modes from SCADA:

SCADA-Auto

In SCADA-Auto, the pump runs when called from the PLC at the pacing signal speed command. The pump call and speed command signals are based on measured overflow to Pond D (F1072) and an Operator-settable dose in mg/l.

SCADA-Manual

In SCADA-Manual, the pump is started and stopped from SCADA and the speed command is manually set.

Pacing Signal Calculation

The pacing signal speed command (SC1511) is calculated as follows:

$$Pacing\ Signal = \left(\frac{Pond\ D\ Flow\ (F1072)}{Max\ Flow\ x\ Proportional\ Gain\ x\ 100\%}\right) + Bias$$

Setpoints

The following setpoints associated with the Influent SHC Pump are adjustable from SCADA:

Description	Set Point	Comments
Bias	#.# %	+/- 20%, typically 5%
Proportional Gain	#.# %	0.01
Max Flow	#### gpm	2,000 gpm
Start Flow	#.# gpm	1.0 gpm
Stop Flow	#.# gpm	0.2 gpm
Start Flow Time Delay	# sec	0 sec
Stop Flow Time Delay	# sec	0 sec

6.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
PMP1511	AF1511	UA1511	0-1	# sec	Alarm, Shutdown Pump	Influent SHC Feed Pump Fault
PMP1511	AR1511	X1511 N1511	0-1 0-1	# sec	Alarm, Shutdown Pump	Influent SHC Feed Pump Fail to Start
PMP1511	AIX1511	S1511	0-100 %	# sec	Alarm	Influent SHC Feed Pump Speed Transducer Failure
FSH1571	AFD1571	FSH1571	0-1	# sec	Alarm	Influent SHC Emergency Eyewash In Use

7. INFLUENT SODIUM HYDROXIDE (CAUSTIC) FEED SYSTEM

7.1 Process Description

Sodium Hydroxide (Caustic) is added to the Process Feed Wetwell in order to maintain adequate alkalinity in the Aeration Basins for proper nitrification.

7.2 Reference Drawings

Drawing Number	Description
I152	Influent Sodium Hydroxide Feed System P&ID

7.3 Equipment

Equipment Tag	Description
TNK1520	Caustic Storage Tank
PMP1521	Caustic Feed Pump

7.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
Y1521	Caustic Pump Auto	0-1,1=Auto
N1521	Caustic Pump Run	0-1,1=Run
UA1521	Caustic Pump Fail	0-1,1=Fail
S1521	Caustic Pump Speed	0-100 %
L1551	Caustic Tank Level	0-8 feet
LSHH1552	Caustic Tank Leak	0-1,1=Leak

7.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
PMP1521	Caustic Feed Pump	-	0-1,1=Start 0-100 %	X1521 SC1521

7.6 Control Description

7.6.1 Caustic Feed Pump (PMP1521)

The Caustic Feed Pump doses the Headworks flow stream. Pump call and pump speed commands are based on influent flow as measured by the Process Feed Flow (P1074) with a flow trim bias. Pump run (N1521), pump auto (Y1521), pump fail (UA1521), and pump

speed feedback (S1521) are inputs to PLC3. When the pump auto status (Y1521) is active, it runs as called (X1521) by the PLC at its auto speed command (SC1521).

SCADA Auto/Manual

In Auto mode, the pump can be operated in the following control modes from SCADA:

SCADA-Manual

In SCADA-Manual, the pump is started and stopped from SCADA and the speed command is manually set.

SCADA-Auto

In SCADA-Auto, the pump runs when called from the PLC at the pacing signal speed command. The pump speed command signal is based on a calculation that includes the Process Feed Flow (F1072), an Operator-settable dose in mg/l, and a number of other variables (see Pacing Signal Calculation section below).

Pacing Signal Calculation

The pacing signal speed command (SC1521) is calculated as follows:

$$Pacing\ Signal = \frac{(Process\ Feed\ Flow\ x\ 60)\ gph\ x\ 0.000001\ x\ 130\ mg/l}{\frac{30}{54.0}}\ x\ Operator\ Bias\ x\ Flow\ Trim\ Bias$$

Setpoints

The following setpoints associated with the Influent Caustic Pump are adjustable from SCADA:

Description	Set Point	Comments
Target mg/l	### mg/l	130 mg/l
Pump Minimum Speed	#.# %	4.0 %
Operator Bias	#.##	1.1 = 10%
SHX lbs/gal	##.# lbs/gal	11.1 lbs/gal
SHX Concentration	## %	30 %
Gallons Per Hour @ 100% Speed	##.# gph	54.0 gph

Process Feed Flow # of Samples	# samples	60 samples
Time Between Samples	# seconds	10 seconds
Flow Trim Bias > 200 gpm	#.# %	0.8 %
Flow Trim Bias > 300 gpm	#.# %	0.7 %
Flow Trim Bias > 400 gpm	#.# %	0.6 %
Flow Trim Bias > 500 gpm	#.# %	0.5 %
Flow Trim Bias > 600 gpm	#.# %	0.2 %
Flow Trim Bias > 700 gpm	#.# %	0.2 %

7.6.2 Sodium Hydroxide Storage Tank (TNK1510)

The Sodium Hydroxide Tank is monitored for level (L1551), although the transmitter is not operational at the time of this writing. Leak detection (LSHH1552) is also brought into the PLC.

7.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
PMP1521	AF1521	UA1521	0-1	30 sec	Alarm, Shutdown Pump	Influent Caustic Feed Pump Fault
PMP1521	AR1521	X1521 N1521	0-1 0-1	5 sec	Alarm, Shutdown Pump	Influent Caustic Feed Pump Fail to Start
PMP1521	AIX1521	S1521	0-100 %	5 sec	Alarm	Influent Caustic Feed Pump Speed Transducer Failure
LIT1551	AHL1551	8.0 feet	0-8 feet	5 sec	Alarm	Influent Caustic Tank Level High
LIT1551	ALL1551	1.0 feet	0-8 feet	5 sec	Alarm	Influent Caustic Tank Level Low
LIT1551	AIX1551	L1551	0-8 feet	180 sec	Alarm	Influent Caustic Tank Level Transducer Failure
LSHH1552	ALD1552	LSHH1552	0-1	300 sec	Alarm	Influent Caustic Storage Tank Leak
FSH1571	AFD1571	FSH1571	0-1	5 sec	Alarm	Influent Caustic Emergency Eyewash In Use

8. PRIMARY CLARIFIER

8.1 Process Description

Process flow from the Headworks flows through a mechanical bar screen and enters the Primary Clarifier. The Primary Clarifier provides primary treatment (sedimentation and floatation) prior to the secondary treatment process. Settleable and floatable solids are removed from the process stream. The Primary Clarifier also takes return flow from the Scum/Drain Pump Station and the tertiary filtration system.

8.2 Reference Drawings

Drawing Number	Description
I200	Primary Clarifier P&ID

8.3 Equipment

Equipment Tag	Description
DRV2011	Primary Clarifier Drive
AER2012	Primary Clarifier Aerator
DRV2013	Primary Clarifier Scum Skimmer
PMP2021	Primary Sludge Pump
PMP2031	Primary Scum Pump

8.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
Y2011	Primary Clarifier Drive Ready	0-1,1=Ready
N2011	Primary Clarifier Drive Run	0-1,1=Run
UA2011	Primary Clarifier Drive Fail	0-1,1=Fail
Y2012	Primary Clarifier Aerator Ready	0-1,1=Ready
N2012	Primary Clarifier Aerator Run	0-1,1=Run
UA2012	Primary Clarifier Aerator Fail	0-1,1=Fail
Y2013	Primary Clarifier Scum Skimmer Ready	0-1,1=Ready
N2013	Primary Scum Skimmer Run	0-1,1=Run
UA2013	Primary Scum Skimmer Fail	0-1,1=Fail
Y2021	Primary Sludge Pump Ready	0-1,1=Ready
N2021	Primary Sludge Pump Run	0-1,1=Run
UA2021	Primary Sludge Pump Fail	0-1,1=Fail
PSH2021	Primary Sludge Pump High Discharge Pressure	0-1,1=PSH

Y2031	Primary Scum Pump Ready	0-1,1=Ready
N2031	Primary Scum Pump Run	0-1,1=Run
UA2031	Primary Scum Pump Fail	0-1,1=Fail
PSH2031	Primary Scum Pump High Discharge Pressure	0-1,1=PSH

8.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
DRV2011	Primary Clarifier Drive	-	0-1,1=Start	X2011
AER2012	Primary Clarifier Aerator	-	0-1,1=Start	X2012
DRV2013	Primary Clarifier Scum Skimmer	-	0-1,1=Start	X2013
PMP2021	Primary Sludge Pump	-	0-1,1=Start	X2021
PMP2031	Primary Scum Pump	-	0-1,1=Start	X2031

8.6 Control Description

8.6.1 Primary Clarifier Drive (DRV2011)

The Primary Clarifier Drive rotates a sprocket that drives a chain to move a series of horizontal flights that scrapes sludge into the sludge hopper and pushes scum into the scum trough. Drive running (N2011), drive ready (Y2011), and drive fail (UA2011) are inputs to PLC4.

When the drive HOA is in the Auto position, it will run as called (X2011) by the PLC.

SCADA Auto/Manual

When the drive is in Auto in the field, it can be operated in the following control modes from SCADA:

SCADA-Auto

In SCADA-Auto, the drive is called to run according to a schedule set by the operator. An example of such a schedule is as follows. The number of intervals, the start and stop times, and the rest and run times are all adjustable from SCADA. An example of a daily schedule is as follows:

Interval	Start Time	Stop Time	Pump Rest Time	Pump Run Time
1	6:00 a.m.	12:00 noon	15 minutes	5 minutes
2	12:00 noon	6:00 p.m.	20 minutes	10 minutes

3	6:00 p.m.	6:00 a.m.	30 minutes	15 minutes

Throughout Interval 1, the drive turns on every 15 minutes for 5 minutes.
Throughout Interval 2, the drive turns on every 20 minutes for 10 minutes.
Throughout Interval 3, the drive turns on every 30 minutes for 15 minutes.

SCADA-Manual

In SCADA-Manual, the drive is started and stopped from SCADA.

Lock-Out Stop

A lockout stop switch at the drive disables operation.

Disconnect Switch

A power disconnect switch at the drive isolates power from the drive motor.

Setpoints

The following setpoints associated with the Primary Clarifier Drive are adjustable from SCADA:

Description	**Set Point**	**Comments**
Interval 1 Start Time	HHMM	
Interval 1 Stop Time	HHMM	
Interval 1 Pump Cycle Frequency	0-60 minutes	
Interval 1 Pump Cycle Duration	0-60 minutes	
Interval 2 Start Time	HHMM	
Interval 2 Stop Time	HHMM	
Interval 2 Pump Cycle Frequency	0-60 minutes	
Interval 2 Pump Cycle Duration	0-60 minutes	
Interval 3 Start Time	HHMM	
Interval 3 Stop Time	HHMM	
Interval 3 Pump Cycle Frequency	0-60 minutes	
Interval 3 Pump Cycle Duration	0-60 minutes	

8.6.2 Primary Clarifier Aerator (AER2012)

The Primary Clarifier Aerator keeps solids in suspension and helps to separate grit from the waste stream. Aerator running (N2012), aerator ready (Y2012), and aerator fail (UA2012) are inputs to PLC4.

When the aerator HOA is in the Auto position, it will run as called (X2012) by the PLC.

SCADA Auto/Manual

When the aerator is in Auto in the field, it can be operated in the following control modes from SCADA:

SCADA-Auto

In SCADA-Auto, the aerator is called to run according to a set of run times and rest times setpoints in hours.

SCADA-Manual

In SCADA-Manual, the aerator is started and stopped from SCADA.

Lock-Out Stop

A lockout stop switch at the aerator disables operation.

Disconnect Switch

A power disconnect switch at the aerator isolates power from the aerator motor.

Setpoints

The following setpoints associated with the Primary Clarifier Aerator are adjustable from SCADA:

Description	Set Point	Comments
Primary Clarifier Aerator Run Time	0-24 hours	
Primary Clarifier Aerator Rest Time	0-24 hours	

8.6.3 Primary Clarifier Scum Skimmer (DRV2013)

The Primary Clarifier Scum Skimmer scrapes the clarifier skimmings into the scum trough. Skimmer running (N2013), skimmer ready (Y2013), and skimmer fail (UA2013) are inputs to PLC4.

When the skimmer HOA is in the Auto position, it will run as called (X2013) by the PLC.

SCADA Auto/Manual

When the skimmer is in Auto in the field, it can be operated in the following control modes from SCADA:

SCADA-Auto

In SCADA-Auto, the skimmer is called anytime the Primary Scum Pump (PMP2031) is called.

SCADA-Manual

In SCADA-Manual, the pump is started and stopped from SCADA.

Lock-Out Stop

A lockout stop switch at the skimmer disables operation.

Disconnect Switch

A power disconnect switch at the skimmer isolates power from the skimmer motor.

8.6.4 Primary Sludge Pump (PMP2021)

The Primary Sludge Pump sends primary sludge from the Primary Clarifier to the Aerobic Digester. Pump running (N2021), pump ready (Y2021), pump fail (UA2021), and a high discharge pressure switch (PSH2021) are inputs to PLC4.

When the pump HOA is in the Auto position, it will run as called (X2021) by the PLC.

SCADA Auto/Manual

When the pump is in Auto in the field, it can be operated in the following control modes from SCADA:

SCADA-Auto

In SCADA-Auto, the pump is called to run according to a schedule set by the operator. An example of such a schedule is as follows. The number of intervals, the start and stop times, and the rest and run times are all adjustable from SCADA. An example of a daily schedule is as follows:

Interval	Start Time	Stop Time	Pump Rest Time	Pump Run Time
1	6:00 a.m.	12:00 noon	15 minutes	1 minute
2	12:00 noon	6:00 p.m.	20 minutes	1.5 minutes
3	6:00 p.m.	6:00 a.m.	30 minutes	1 minute

Throughout Interval 1, the pump turns on every 15 minutes for 1 minute.
Throughout Interval 2, the pump turns on every 20 minutes for 1.5 minutes.
Throughout Interval 3, the pump turns on every 30 minutes for 1 minute.

SCADA-Manual

In SCADA-Manual, the pump is started and stopped from SCADA.

Pump Lockout

The pump is prevented from running at the MCC and through the PLC when its High Discharge Pressure Alarm is active. The pumps remain locked out until the high pressure condition is relieved.

Lock-Out Stop

A lockout stop switch at the pump disables operation.

Disconnect Switch

A power disconnect switch at the pump isolates power from the pump motor.

Setpoints

The following setpoints associated with the Primary Sludge Pump are adjustable from SCADA:

Description	Set Point	Comments
Interval 1 Start Time	HHMM	
Interval 1 Stop Time	HHMM	
Interval 1 Pump Cycle Frequency	0-60 minutes	
Interval 1 Pump Cycle Duration	0-60 minutes	
Interval 2 Start Time	HHMM	
Interval 2 Stop Time	HHMM	
Interval 2 Pump Cycle Frequency	0-60 minutes	
Interval 2 Pump Cycle Duration	0-60 minutes	
Interval 3 Start Time	HHMM	
Interval 3 Stop Time	HHMM	
Interval 3 Pump Cycle Frequency	0-60 minutes	
Interval 3 Pump Cycle Duration	0-60 minutes	

8.6.5 Primary Scum Pump (PMP2031)

The Primary Scum Pump sends primary scum from the Primary Clarifier to the Aerobic Digester. Pump running (N2031), pump ready (Y2031), pump fail (UA2031), and a high high discharge pressure switch (PSH2031) are inputs to PLC4.

When the pump HOA is in the Auto position, it will run as called (X2031) by the PLC.

SCADA Auto/Manual

When the pump is in Auto in the field, it can be operated in the following control modes from SCADA:

SCADA-Auto

In SCADA-Auto, the pump is called to according to a schedule set by the operator. An example of such a schedule is as follows. The number of intervals, the start and stop times, and the rest and run times are all adjustable from SCADA. An example of a daily schedule is as follows:

Interval	Start Time	Stop Time	Pump Rest Time	Pump Run Time
1	6:00 a.m.	12:00 noon	15 minutes	1 minute
2	12:00 noon	6:00 p.m.	20 minutes	1.5 minutes

3	6:00 p.m.	6:00 a.m.	30 minutes	1 minute

Throughout Interval 1, the pump turns on every 15 minutes for 1 minute.
Throughout Interval 2, the pump turns on every 20 minutes for 1.5 minutes.
Throughout Interval 3, the pump turns on every 30 minutes for 1 minute.

SCADA-Manual

In SCADA-Manual, the pump is started and stopped from SCADA.

Pump Lockout

The pump is locked out from running at the MCC and through the PLC when its High Discharge Pressure Alarm is active. The pumps remain locked out until the high-pressure condition is relieved.

Lock-Out Stop

Lockout stop switches and at the pump disable operation.

Disconnect Switch

Power disconnect switches at the pump isolate power from the pump motor.

Setpoints

The following setpoints associated with the Primary Scum Pump are adjustable from SCADA:

Description	**Set Point**	**Comments**
Interval 1 Start Time	HHMM	
Interval 1 Stop Time	HHMM	
Interval 1 Pump Cycle Frequency	0-60 minutes	
Interval 1 Pump Cycle Duration	0-60 minutes	
Interval 2 Start Time	HHMM	
Interval 2 Stop Time	HHMM	
Interval 2 Pump Cycle Frequency	0-60 minutes	
Interval 2 Pump Cycle Duration	0-60 minutes	

Interval 3 Start Time	HHMM	
Interval 3 Stop Time	HHMM	
Interval 3 Pump Cycle Frequency	0-60 minutes	
Interval 3 Pump Cycle Duration	0-60 minutes	

8.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
DRV2011	AF2011	UA2011	0-1	# sec	Alarm, Shutdown Drive	Primary Clarifier Drive Fault
DRV2011	AR2011	X2011 N2011	0-1 0-1	# sec	Alarm, Shutdown Drive	Primary Clarifier Drive Fail to Start
AER2012	AF2012	UA2012	0-1	# sec	Alarm, Shutdown Aerator	Primary Aerator Fault
AER2012	AR2012	X2012 N2012	0-1 0-1	# sec	Alarm, Shutdown Aerator	Primary Aerator Fail to Start
DRV2013	AF2013	UA2013	0-1	# sec	Alarm, Shutdown Skimmer	Primary Clarifier Scum Skimmer Fault
DRV2013	AR2013	X2013 N2013	0-1 0-1	# sec	Alarm, Shutdown Skimmer	Primary Clarifier Scum Skimmer Fail to Start
PMP2021	AF2021	UA2021	0-1	# sec	Alarm, Shutdown Pump	Primary Sludge Pump Fault
PMP2021	AR2021	X2021 N2021	0-1 0-1	# sec	Alarm, Shutdown Pump	Primary Sludge Pump Fail to Start
PMP2021	PAH2021	PSH2021	0-1	# sec	Alarm	Primary Sludge Pump High Discharge Pressure
PMP2031	AF2031	UA2031	0-1	# sec	Alarm, Shutdown Pump	Primary Scum Pump Fault
PMP2031	AR2031	X2031 N2031	0-1 0-1	# sec	Alarm, Shutdown Pump	Primary Scum Pump Fail to Start
PMP2031	PAH2031	PSH2031	0-1	# sec	Alarm	Primary Scum Pump High Discharge Pressure

9. TRICKLING FILTER

9.1 Process Description

The Trickling Filter is a biological treatment process. Effluent from the Primary Clarifier enters the Trickling Filter through the submersible Trickling Filter Pump, which directs primary effluent to the top of the filter through a distributor mechanism. The primary effluent trickles over the filter media where BOD is reduced by the biological growth on the media. The Trickling Filter effluent is either directed to the Process Feed Station or recirculated over the Trickling Filter media for further treatment. The recirculation rate is based on the influent flow. A blower (swamp cooler with no pads in it) supplies up-flow air for the biological growth.

9.2 Reference Drawings

Drawing Number	Description
I201	Trickling Filter P&ID

9.3 Equipment

Equipment Tag	Description
PMP2111	Trickling Filter Pump
PMP2112	Trickling Filter Blower

9.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
Y2111	Trickling Filter Pump Ready	0-1,1=Ready
N2111	Trickling Filter Pump Run	0-1,1=Run
UA2111	Trickling Filter Pump Fail	0-1,1=Fail
ZSHH2191	Trickling Filter Arm Rotation Proximity Sensor	0-1,1=Revolution

9.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
PMP2111	Trickling Filter Pump	-	0-1,1=Start	X2111

9.6 Control Description

9.6.1 Trickling Filter Pump (PMP2111)

Pump running (N2111), pump ready (Y2111), and pump fail (UA2111) are inputs to PLC4.

When the drive HOA is in the Auto position, it will run as called (X2111) by the PLC.

SCADA Auto/Manual

When the pump is in Auto in the field, it can be operated in the following control modes from SCADA:

SCADA-Auto

In SCADA-Auto, the pump is called continuously.

SCADA-Manual

In SCADA-Manual, the pump is started and stopped from SCADA.

Lock-Out Stop

A lockout stop switch at the pump disables operation.

Disconnect Switch

A power disconnect switch at the pump isolates power from the pump motor.

9.6.2 Trickling Filter Blower (BLR2112)

The blower is monitored and controlled locally.

9.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
PMP2111	AF2111	UA2111	0-1	# sec	Alarm, Shutdown Pump	Trickling Filter Pump Fault
PMP2111	AR2111	X2111 N2111	0-1 0-1	# sec	Alarm, Shutdown Pump	Trickling Filter Pump Fail to Start
ZSHH2191	ZAHH2191	# sec	0-999	# sec	Alarm	Trickling Filter Rotation Fail

10. AERATION BASINS

10.1 Process Description

Activated sludge process control is accomplished with two (2) Aeration Basins and three (3) Aeration Blowers.

10.2 Reference Drawings

Drawing Number	Description
I300	Aeration Basins P&ID
I350	Aeration Blowers P&ID

10.3 Equipment

Equipment Tag	Description
	Aeration Basin 1
	Aeration Basin 2
BLR3511	Aeration Blower 1
BLR3512	Aeration Blower 2
BLR3513	Aeration Blower 3

10.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
A3181	Aeration Basin 1 Dissolved Oxygen	0-10 mg./l
A3182	Aeration Basin 1 Total Suspended Solids	0-2000 mg./l
A3281	Aeration Basin 2 Dissolved Oxygen	0-10 mg./l
Y3511	Aeration Blower 1 Ready	0-1,1=Ready
N3511	Aeration Blower 1 Run	0-1,1=Run
UA3511	Aeration Blower 1 Fail	0-1,1=Fail
S3511	Aeration Blower 1 Speed	0-100 %
Y3512	Aeration Blower 2 Ready	0-1,1=Ready
N3512	Aeration Blower 2 Run	0-1,1=Run
UA3512	Aeration Blower 2 Fail	0-1,1=Fail
S3512	Aeration Blower 2 Speed	0-100 %
Y3513	Aeration Blower 3 Ready	0-1,1=Ready
N3513	Aeration Blower 3 Run	0-1,1=Run
UA3513	Aeration Blower 3 Fail	0-1,1=Fail

S3513	Aeration Blower 3 Speed	0-100 %

10.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
BLR3511	Aeration Blower 1	A3181 A3182	0-1,1=Start 0-100 %	X3511 SC3511
BLR3512	Aeration Blower 2	A3181. A3281 A3182, A3282	0-1,1=Start 0-100 %	X3512 SC3512
BLR3513	Aeration Blower 3	A3281 A3282	0-1,1=Start 0-100 %	X3513 SC3513
SOV3131	Aeration Basin 1 Spray Valve	-	0-1,1=Open	X3131
SOV3132	Aeration Basin 1 Vent Valve	-	0-1,1=Open	X3132
SOV3231	Aeration Basin 2 Spray Valve	-	0-1,1=Open	X3231
SOV3232	Aeration Basin 2 Vent Valve	-	0-1,1=Open	X3232

10.6 Control Description

10.6.1 Aeration Blowers 1, 2 & 3 (BLR3511, BLR3512, BLR3513)

The Aeration Blowers provide aeration and mixing in the Aeration Basins. Aeration Blower 1 supplies air to Aeration Basin 1. Aeration Blower 3 supplies air to Aeration Basin 2. Aeration Blower 2 serves as a manual standby for Aeration Blowers 1 and 3. Only one Aeration Blower is needed for each Aeration Basin.

Blower run (N3511, N3512, N3513), blower ready (Y3511, Y3512, Y3513), blower fail (UST3511, UST3512, UST3513), and blower speed feedback (S3511, S3512, S3513) are inputs to PLC2.

When the blower HOA is in the Auto position and the Ready status is active (Y3511, Y3512, Y3513), it will run as called (X3511, X3512, X3513) by the PLC at its auto speed command (SC3511, SC3512, SC3513).

Aeration Blower 1 is assigned to Aeration Basin 1 and Aeration Blower 3 is assigned to Aeration Basin 3. Aeration Blower 2 has manual valving for service into either Aeration Basin 1 or Aeration Basin 2. A SCADA selector for Aeration Blower 2 provides the Operator with the ability to assign Blower 2 to serve as Standby duty for either Blower 1 (Basin 1) or Blower 3 (Basin 2).

SCADA Auto/Manual

When a blower HOA is in the Auto position and the Ready status is active, it can be operated in the following control modes from SCADA:

SCADA-Auto

In SCADA-Auto, Blower 1 (Basin 1) and Blower 3 (Basin 2) run continuously and their speed commands modulate based on the Dissolved Oxygen in their respective Basins. If Blower 2 is set for Standby duty to Basin 1, it will be automatically called if Blower 1 stops running. If Blower 2 is set for Standby duty to Basin 2, it will be automatically called if Blower 3 stops running.

SCADA-Manual

In SCADA-Manual, the blower is started and stopped from SCADA and the speed command is manually set.

Lock-Out Stop

Lockout stop switches and at the blower disable operation.

Disconnect Switch

Power disconnect switches at the blower isolate power from the blower motor.

10.6.2 Aeration Basins 1 & 2

Dissolved Oxygen (D.O.) PID control loops for each Aeration Basin control the Blower speeds. The D.O. sensor in Aeration Basin 1 (A3181) provides the process variable for the Aeration Basin 1 PID loop. The output of this loop is sent to either Blower 1 or Blower 2 (depending on Blower 1 availability and Blower 2 assignment). The D.O. sensor in Aeration Basin 2 (A3281) provides the process variable for the Aeration Basin 2 PID loop. The output of this loop is sent to either Blower 3 or Blower 2 (depending on Blower 3 availability and Blower 2 assignment).

There is a minimum speed of 45% for the Blowers and it is not adjustable.

Setpoints

The following setpoints associated with Aeration Basin 1 are adjustable from SCADA:

Description	Set Point	Comments
PID Controller D.O. Deadband	0.0 mg/l	
PID Controller Derivative Term	0-100	
PID Controller Integral Term	0-100	

PID Controller Proportional Term	0-100	
PID Controller D.O. Setpoint	0-10 mg/l	
Maximum Speed	0-100 %	For Blower 1 or 2.
Minimum Speed	45 %	For Blower 1 or 2.

The following setpoints associated with Aeration Basin 2 are adjustable from SCADA:

Description	**Set Point**	**Comments**
PID Controller D.O. Deadband	0.0 mg/l	
PID Controller Derivative Term	0-100	
PID Controller Integral Term	0-100	
PID Controller Proportional Term	0-100	
PID Controller D.O. Setpoint	0-10 mg/l	
Maximum Speed	0-100 %	For Blower 2 or 3.
Minimum Speed	45 %	For Blower 2 or 3.

Aeration Basin 1 is outfitted with a Total Suspended Solids (TSS) analyzer. The Aeration Basin 1 TSS Analyzer (A3182) signal is displayed on SCADA and averaged throughout each day.

10.6.3 Aeration Basins Spray Valves 1 & 2 (SOV3131, SOV3231)

Each Aeration Basin has a solenoid-actuated Spray Valve that is manually operated from SCADA. The available modes from SCADA are Manual and Off.

Manual

In Manual, the Operator opens and closes the valve from SCADA.

Off

In Off, the valve closes.

10.6.4 Aeration Basins Vent Valves 1 & 2 (SOV3132, SOV3232)

Each Aeration Basin has a solenoid-actuated Vent Valve that is manually operated from SCADA. The available modes from SCADA are Manual, Time, and D.O..

Manual

In Manual mode, the operator opens and closes the valve from SCADA.

Time

In Time mode, the valve opens at an Operator-adjustable time of day and closes at an Operator-adjustable time of day.

D.O.

In D.O. mode, the valve opens on rising D.O. at an Operator-adjustable open setpoint (plus time delay) and closes on falling D.O. at an Operator-adjustable close setpoint (plus time delay).

Setpoints

The following setpoints associated with the Aeration Basin 1 Vent Valve (SOV3132) are adjustable from SCADA:

Description	**Set Point**	**Comments**
Time Mode Open Time of Day	HHMM	Valve opens at this clock time.
Time Mode Close Time of Day	HHMM	Valve closes at this clock time.
D.O. Mode Open Setpoint	0-10 mg/l	On rising D.O.
D.O. Mode Open Time Delay	0-60 sec	Buffer timer for D.O. Open Setpoint.
D.O. Mode Close Setpoint	0-10 mg/l	On falling D.O.
D.O. Mode Close Time Delay	0-60 sec	Buffer timer for D.O. Close Setpoint.

The following setpoints associated with the Aeration Basin 2 Vent Valve (SOV3232) are adjustable from SCADA:

Description	**Set Point**	**Comments**
Time Mode Open Time of Day	HHMM	Valve opens at this clock time.
Time Mode Close Time of Day	HHMM	Valve closes at this clock time.
D.O. Mode Open Setpoint	0-10 mg/l	On rising D.O.
D.O. Mode Open Time Delay	0-60 sec	Buffer timer for D.O. Open Setpoint.
D.O. Mode Close Setpoint	0-10 mg/l	On falling D.O.
D.O. Mode Close Time Delay	0-60 sec	Buffer timer for D.O. Close Setpoint.

10.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
BLR3511	AF3511	UST3511	0-1	# sec	Alarm, Shutdown Blower	Aeration Blower 1 Fault
BLR3511	AR3511	X3511 N3511	0-1 0-1	# sec	Alarm, Shutdown Blower	Aeration Blower 1 Fail to Start
BLR3511	AIX3511	S3511	0-100%	# sec	Alarm	Aeration Blower 1 Speed Transducer Failure
BLR3512	AF3512	UST3512	0-1	# sec	Alarm, Shutdown Blower	Aeration Blower 2 Fault
BLR3512	AR3512	X3512 N3512	0-1 0-1	# sec	Alarm, Shutdown Blower	Aeration Blower 2 Fail to Start
BLR3512	AIX3512	S3512	0-100 %	# sec	Alarm	Aeration Blower 2 Speed Transducer Failure
BLR3513	AF3513	UST3513	0-1	# sec	Alarm, Shutdown Blower	Aeration Blower 3 Fault
BLR3513	AR3513	X3513 N3513	0-1 0-1	# sec	Alarm, Shutdown Blower	Aeration Blower 3 Fail to Start
BLR3513	AIX3513	S3513	0-100 %	# sec	Alarm	Aeration Blower 3 Speed Transducer Failure
AE3181	AHL3181	10.0 mg/l	0-10.0 mg/l	# sec	Alarm	Aeration Basin 1 D.O. Level High
AE3181	ALL3181	0.5 mg/l	0-10.0 mg/l	# sec	Alarm	Aeration Basin 1 D.O. Level Low
AE3181	AIX3181	A3181	0-10.0 mg/l	# sec	Alarm	Aeration Basin 1 D.O. Level Transducer Failure
AE3281	AHL3281	10.0 mg/l	0-10.0 mg/l	# sec	Alarm	Aeration Basin 2 D.O. Level High
AE3281	ALL3281	0.5 mg/l	0-10.0 mg/l	# sec	Alarm	Aeration Basin 2 D.O. Level Low
AE3281	AIX3281	A3181	0-10.0 mg/l	# sec	Alarm	Aeration Basin 2 D.O. Level Transducer Failure

ZS3591	AID3591	ZS3591	0-1	# sec	Alarm	Blower/Electrical Building Intrusion
ZS3592	SmokeBlowerRoom	ZS3592	0-1	# sec	Alarm	Blower Room Smoke
ZS3593	SmokeMCC2	ZS3592	0-1	# sec	Alarm	MCC2 Room Smoke
BLR3511 BLR3512	ALM3181ALT	50 hrs	0-1000 hrs	-	Alarm	Aeration Basin 1 Blowers 1/2 Runtime Differential
BLR3512 BLR3513	ALM3281ALT	50 hrs	0-1000 hrs	-	Alarm	Aeration Basin 2 Blowers 2/3 Runtime Differential

11. SECONDARY CLARIFIER 2

11.1 Process Description

The Secondary Clarifier 2 is a circular basin in which effluent from the Aeration Basins is held for a period of time during which the heavier biomass (microorganisms) settle to the bottom for return to the Aeration Basin.

11.2 Reference Drawings

Drawing Number	Description
I400	Secondary Clarifier 2 P&ID

11.3 Equipment

Equipment Tag	Description
DRV4011	Secondary Clarifier 2 Drive

11.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
N4011	Secondary Clarifier 2 Run	0-1,1=Run
U4011	Secondary Clarifier 2 Fail	0-1,1=Fail
ZSH4011	Secondary Clarifier 2 Overtorque	0-1,1=Overtorque
ZSHH4011	Secondary Clarifier 2 Motor Cutout	0-1,1=Motor Cutout

11.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
DRV4011	Secondary Clarifier 2 Drive	-	0-1,1=Start	X4011

11.6 Control Description

11.6.1 Secondary Clarifier 2 (DRV4011)

The Secondary Clarifier 2 Drive rotates the clarifier sludge rake and surface skimming device. The surface skimming device collects floating matter into a hopper box. The hopper box discharges to the Scum Pump Station. The sludge blanket on the bottom of the clarifier is slowly moved to a center sludge sump by a sludge rake mechanism. The gentle rake action promotes the sludge thickening process by gently pushing the sludge to the center sump.

The Secondary Drive is operated locally at the Clarifier. PLC3 receives the drive run (N4011), drive fail (UA4011), drive overtorque (ZSH4011), and drive motor cutout (ZSHH4011) inputs for status and alarming.

Secondary effluent flows by gravity to the Tertiary Filter system and is measured by the Filter Influent Flow mag meter (F5071).

Sludge flow leaving Secondary Clarifier 2 is measured through the RAS Flow mag meter (F4571).

11.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
DRV4011	AF4011	UA4011	0-1	11 sec	Alarm	Secondary Clarifier 2 Fault
DRV4011	AR4011	N4011	0-1	5 sec	Alarm	Secondary Clarifier 2 Not Running
DRV4011	AQ4011	ZSH4011	0-1	5 sec	Alarm	Secondary Clarifier 2 Overtorque
DRV4011	AC4011	ZSHH4012	0-1	5 sec	Alarm	Secondary Clarifier 2 Motor Cutout

12. RAS PUMP STATION

12.1 Process Description

Sludge that has settled to the bottom of Secondary Clarifier 2 is either pumped as return activated sludge to the Aeration Basins or wasted to the Digester.

The RAS Pumps direct sludge to the Aeration Basins for further aerobic treatment.

12.2 Reference Drawings

Drawing Number	Description
I450	RAS Pump Station P&ID

12.3 Equipment

Equipment Tag	Description
PMP4511	RAS Pump 1
PMP4512	RAS Pump 2

12.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
A4581	RAS Total Suspended Solids	0-10000 mg/l
F4571	RAS Flow (Mag Meter)	0-1000 gpm
Q4571	RAS Flow Total Pulse	0-1, 1=kgal
F4572	WAS Flow Meter (Mag Meter)	0-200 gpm
Q4572	WAS Flow Meter (Mag Meter) Total Pulse	0-1,1=kgal
Y4511	RAS Pump 1 Ready	0-1,1=Ready
N4511	RAS Pump 1 Run	0-1,1=Run
UA4511	RAS Pump 1 Fail	0-1,1=Fail
S4511	RAS Pump 1 Speed	0-100 %
Y4512	RAS Pump 2 Ready	0-1,1=Ready
N4512	RAS Pump 2 Run	0-1,1=Run
UA4512	RAS Pump 2 Fail	0-1,1=Fail
S4512	RAS Pump 2 Speed	0-100 %

12.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
PMP4511	RAS Pump 1	F4571	0-1,1=Start 0-100 %	X4511 SC4511
PMP4512	RAS Pump 2	F4571	0-1,1=Start 0-100 %	X4512 SC4512

12.6 Control Description

12.6.1 RAS Pumps 1 & 2 (PMP4511, PMP4512)

The RAS Pumps are set to maintain a flow to the Aeration Basins. Pump running (N4511, N4512), pump ready (Y4511, Y4512), pump fail (UA4511, UA4512), and VFD speed feedback (S4511, S4512) are inputs to PLC3.

When a pump HOA is in the Auto position, it will run as called (X4511, X4512) by the PLC at auto speed commands (SC4511, SC4512). A Lead pump is assigned from SCADA. Only one pump is operated at a time.

A flow PID control loop modulates pump speed to maintain Secondary Clarifier 2 RAS Flow (F4571).

SCADA Auto/Manual

When a pump HOA is in the Auto position and the Ready status is active, it can be operated in the following control modes from SCADA:

SCADA-Auto

In SCADA-Auto, the Lead pump is called. One pump is called at all times, provided it is available. RAS Flow (F4571) measured on the suction of the RAS pumps is maintained by modulating the running pump's speed. The Operator can select a flow setpoint that is a Percentage (%) of the Process Feed Flow signal (F1073) or a Constant flow setpoint.

SCADA-Manual

In SCADA-Manual, the pump is started and stopped from SCADA and the speed command is manually set.

RAS Pump Lockout

The RAS pumps are locked out from PLC operation when the Chlorine Contact Basin Low Low Level Alarm is active. The pumps remain locked out until the Plant Water Flow (F6171) increases above 40 gpm.

Lock-Out Stop

Lockout stop switches and at the pump disable operation.

Disconnect Switch

Power disconnect switches at the pump isolate power from the pump motor.

Setpoints

The following setpoints associated with the RAS pumps are adjustable from SCADA:

Description	Set Point	Comments
PID Controller Flow Deadband	0.0 gpm	
PID Controller Derivative Term	0-100	
PID Controller Integral Term	0-100	
PID Controller Proportional Term	0-100	
PID Controller Flow Setpoint	0-200 gpm	Desired flow comes from % of Process Feed Flow or Constant Flow setpoint selection on pump popups.
Auto Mode Constant Flow	0-200 gpm	On RAS pumps popup.
Auto Mode % of Process Feed Flow	0-100 %	On RAS pumps popup.
Maximum Pump(s) Speed	0-100 %	
Minimum Pump(s) Speed	0-100 %	
Lead Pump Assignment	1-2	1 = Pump 1, 2 = Pump 2
Pump 1 Manual Speed	0-100 %	
Pump 2 Manual Speed	0-100 %	

12.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
PMP4511	AF4511	UA4511	0-1	# sec	Alarm, Shutdown Pump	RAS Pump 1 Fault
PMP4511	AR4511	X4511 N4511	0-1 0-1	# sec	Alarm, Shutdown Pump	RAS Pump 1 Fail to Start

PMP4511	AIX4511	S4511	0-100%	# sec	Alarm	RAS Pump 1 Speed Transducer Failure
PMP4512	AF4512	UA4512	0-1	# sec	Alarm, Shutdown Pump	RAS Pump 2 Fault
PMP4512	AR4512	X4512 N4512	0-1 0-1	# sec	Alarm, Shutdown Pump	RAS Pump 2 Fail to Start
PMP4512	AIX4512	S4512	0-100 %	# sec	Alarm	RAS Pump 2 Speed Transducer Failure
FIT4571	AHL4571	1000 gpm	0-1000 gpm	# sec	Alarm	RAS Flow High
FIT4571	ALL4571	15 gpm	0-1000 gpm	# sec	Alarm	RAS Flow Low
FIT4571	AIX4571	F4571	0-1000 gpm	# sec	Alarm	RAS Flow Transducer Failure

13. WAS PUMP STATION

13.1 Process Description

Sludge that has settled to the bottom of the Secondary Clarifier is either pumped as return activated sludge (RAS) to the Aeration Basins or wasted (WAS) to the Digester.

The WAS Pumps direct sludge to the Aerobic Digester's Anoxic Basin for further solids treatment.

13.2 Reference Drawings

Drawing Number	Description
I453	WAS Pump Station P&ID

13.3 Equipment

Equipment Tag	Description
PMP4531	WAS Pump 1
PMP4532	WAS Pump 2

13.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
Y4531	WAS Pump 1 Ready	0-1,1=Ready
N4531	WAS Pump 1 Run	0-1,1=Run
UA4531	WAS Pump 1 Fail	0-1,1=Fail
PSH4531	WAS Pump 1 High Discharge Pressure	0-1,1=PSH
Y4532	WAS Pump 2 Ready	0-1,1=Ready
N4532	WAS Pump 2 Run	0-1,1=Run
UA4532	WAS Pump 2 Fail	0-1,1=Fail
PSH4532	WAS Pump 2 High Discharge Pressure	0-1,1=PSH

13.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
PMP4531	WAS Pump 1	A7183 A7283 A4581	0-1,1=Start	X4531
PMP4532	WAS Pump 2	A7183	0-1,1=Start	X4532

		A7283 A4581		

13.6 Control Description

13.6.1 WAS Pumps 1 & 2 (PMP4531, PMP4532)

There are two WAS Pumps that send Waste Activated Sludge to the Anoxic Basin. Pump running (N4531, N4532), pump ready (Y4531, Y4532), pump fail (UA4531, UA4532), and high discharge pressure switches (PSH4531, PSH4532) are inputs to PLC3.

When a pump HOA is in the Auto position, it will run as called (X4531, X4532) by the PLC.

Pump calls to run are based on Operator selection. The pumps can be run in single-pump mode where a Duty pump is selected, or they can run in parallel (simultaneously) in order to shorten the waste duration.

SCADA Auto/Manual

When the pump is in Auto in the field, it can be operated in the following control modes from SCADA:

SCADA-Auto

In SCADA-Auto, the pump(s) are called to deliver the calculated Daily WAS Volume. The Daily WAS Volume (gal/day) is calculated as follows:

We will revisit the specifics for this wasting control strategy closer to startup. Figure on a few hours and have Akram present with us.

During winter, the plant will be wasting from the Aeration Basins. There should be an input on SCADA for the Operators to enter which basins are in service. 95,000 gallons per basin.

Add an operator input for the Secondary Overflow TSS. This value comes from the Operator in the lab. Ask Akram for a revised equation that includes this Secondary Overflow TSS value and associated plant flow.

MCRT = Mean Cell Residence Time in days (typical for activated sludge control)

Two Selection Modes:

1. MCRT Mode (only applies if Activated Sludge is In Service) Permissive for WAS Volume Calculations
    a. Nitrification Mode (removes ammonia)
    b. cBOD Mode (carbonaceous BOD)
2. Trickling Filter (if water quality objectives are met)

There won't be MCRT control if we are in "Trickling Filter only" operation.

Step 1: Solids Inventory

$$Solids\ Inventory\ (lbs) = MLSS\ (A3182)\ \frac{mg}{l}\ x\ Aeration\ Basin(s)\ in\ Service\ Volume\ (mgal)\ x\ 8.34\ \frac{lb}{gal}$$

Step 2: Daily Waste in Pounds

$$Waste\ \left(\frac{lbs}{day}\right) = \frac{Solids\ Inventory\ (lbs)}{Mean\ Cell\ Residence\ Time\ (days)}$$

Step 3: Daily WAS Volume

$$Daily\ WAS\ Volume\ \left(\frac{gal}{day}\right) = \frac{Waste\ \left(\frac{lbs}{day}\right)}{RAS\ Concentration\ (A4581)\ \frac{mg}{l}\ x\ 8.34\ \frac{lb}{gal}}\ x\ 1{,}000{,}000$$

The PLC will divide the calculated WAS Volume (gal/d) by 15 gpm (one WAS pump operating) to get how many minutes the pump needs to run per day.

The Operator has a choice of continuous pumping deliver all of the or hourly interval pumping.

For example, is the Daily WAS Volume is 10,000 gal per day, then the pump needs to run for 667 minutes per day (10,000 / 15). The Operator has the option to run the pump continuously for 667 minutes or schedule the waste over 24 hours (i.e, 28 minutes per hour x 24 hours). If both WAS pumps run together, the flow doubles and the time is reduced by 50%.

The calculation is continuous and we'll need to determine when we load the varying flow total into the waste volume controls.

SCADA-Manual

In SCADA-Manual, the pump is started and stopped from SCADA.

WAS Pump Lockout

Each WAS pump is locked out from running at the MCC and through the PLC when its High Discharge Pressure Alarm is active. The pumps remain locked out until the high-pressure condition is relieved.

Lock-Out Stop

Lockout stop switches and at the pump disable operation.

Disconnect Switch

Power disconnect switches at the pump isolate power from the pump motor.

Setpoints

The following setpoints associated with the WAS pumps are adjustable from SCADA:
Fill in rest of the table when wasting control scheme is finalized.

Description	Set Point	Comments
WAS Waste Process Cycles	0-24	
WAS Waste Process Start Time	HHMM	
WAS Pumps Wasting Operation Mode	0-1	0=Continuous, Hourly Interval
WAS Pumps	0-1	0 = 1 pump, 1 = 2 pumps
Mean Cell Resonance Time		

13.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
FIT4572	AIX4572	F4572	0-200 gpm	# sec	Alarm	WAS Flow Transducer Failure
FIT4572	AHL4572	F4572	0-200 gpm	# sec	Alarm	WAS Daily Wasting Total High
PMP4531	AF4531	UA4531	0-1	# sec	Alarm,	WAS Pump 1 Fault

					Shutdown Pump	
PMP4531	AR4531	X4531 N4531	0-1 0-1	# sec	Alarm, Shutdown Pump	WAS Pump 1 Fail to Start
PMP4531	PAH4531	PSH4531	0-1	# sec	Alarm	WAS Pump 1 High Discharge Pressure
PMP4532	AF4532	UA4532	0-1	# sec	Alarm, Shutdown Pump	WAS Pump 2 Fault
PMP4532	AR4532	X4532 N4532	0-1 0-1	# sec	Alarm, Shutdown Pump	WAS Pump 2 Fail to Start
PMP4532	PAH4532	PSH4532	0-1	# sec	Alarm	WAS Pump 2 High Discharge Pressure
PMP4531 PMP4532	-	-	0-1	# sec	Alarm	WAS Waste Volume High – Consider Running Both WAS Pumps
						Nitrification Mode Active – Minimum MCRT Target Days

14. SCUM/DRAIN PUMP STATION

14.1 Process Description

The Scum/Drain Pump Station receives Filter 1 & 2 drains, Secondary Clarifier 2 scum, RAS drains, Coagulant/Flocculant drains, and Effluent Sample Room drains.

14.2 Reference Drawings

Drawing Number	Description
I460	Scum/Drain Pump Station P&ID

14.3 Equipment

Equipment Tag	Description
PMP4611	SC Scum Pump 1
PMP4612	SC Scum Pump 2

14.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
F4671	Scum Flow (Mag Meter)	0-300 gpm
Q4671	Scum Flow Total Pulse	0-1, 1=kgal
Y4611	Scum/Drain Pump 1 Ready	0-1,1=Ready
N4611	Scum/Drain Pump 1 Run	0-1,1=Run
UA4611	Scum/Drain Pump 1 Fail	0-1,1=Fail
MSH4611	Scum/Drain Pump 1 Moisture	0-1,1=Moisture
Y4612	Scum/Drain Pump 2 Ready	0-1,1=Ready
N4612	Scum/Drain Pump 2 Run	0-1,1=Run
UA4612	Scum/Drain Pump 2 Fail	0-1,1=Fail
MSH4612	Scum/Drain Pump 2 Moisture	0-1,1=Moisture
LSHH4652	Scum/Drain Wetwell Hi Hi Level	0-1,1=Hi Hi Level
LSLL4651	Scum/Drain Wetwell Lo Lo Level	0-1,1=Lo Lo Level

14.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
PMP4611	Scum/Drain Pump 1	-	0-1,1=Start	-
PMP4612	Scum/Drain Pump 2	-	0-1,1=Start	-

14.6 Control Description

14.6.1 Scum/Drain Pumps 1 & 2 (PMP4611, PMP4612)

The Scum/Drain Pumps are operated locally at the pump station. PLC3 receives pump ready (Y4611, Y4612), pump run (N4611, N4612), pump fail (UA4611, UA412), and pump moisture (MSH4611, MSH4612) inputs for status and alarming.

The pumps turn on and off based on the level floats and operate in a lead/lag manner whereby if the level continues to rise, the lag pump starts.

Flow leaving the Scum/Drain Pump Station is sent to the Primary Clarifier and measured through the Scum Flow Mag Meter (F4671).

14.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
PMP4611	AF4611	UA4611	0-1	5 sec	Alarm	Scum/Drain Pump 1 Fault
PMP4611	AO4611	MSH4611	0-1	5 sec	Alarm	Scum/Drain Pump 1 Moisture
PMP4612	AF4612	UA4612	0-1	5 sec	Alarm	Scum/Drain Pump 2 Fault
PMP4612	AO4612	MSH4612	0-1	5 sec	Alarm	Scum/Drain Pump 2 Moisture
LSHH4652	AHL4652	LSHH4652	0-1	120 sec	Alarm	Scum/Drain Wetwell Level High High
LSLL4651	ALL4651	LSLL4651	0-1	30 sec	Alarm	Scum/Drain Wetwell Level Low Low
FIT4671	AIX4671	F4671	0-300 gpm	3 sec	Alarm	Scum Flow Transducer Failure

15. COAGULANT RAPID MIXING & FLOCCULATION BASINS

15.1 Process Description

The Flocculation Basins are inactive. Rapid Mixing and Flocculation functions are postponed indefinitely.

15.2 Reference Drawings

Drawing Number	Description
I500	Coagulant Rapid Mixing & Floc Basins P&ID

15.3 Equipment

Equipment Tag	Description
	Coagulant Rapid Mixing Basin
	Flocculation Basin 1
	Flocculation Basin 2
MXR5011	Coagulant Rapid Mixer
MXR5012	Flocculator 1
MXR5013	Flocculator 2

15.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
A5081	Secondary Clarifier Turbidity	0-20 NTU
N5011	Filter Influent Sample Pump Run	0-1,1=Run
F5071	Filter Influent Flow (Mag Meter)	0-2000 gpm
Q5071	Filter Influent Flow Total Pulse	0-1, 1=kgal
Y5011	Coagulant Rapid Mixer Ready	0-1,1=Ready
N5011	Coagulant Rapid Mixer Run	0-1,1=Run
UA5011	Coagulant Rapid Mixer Fail	0-1,1=Fail
S5011	Coagulant Rapid Mixer Speed	0-100 %
Y5012	Flocculator 1 Ready	0-1,1=Ready
N5012	Flocculator 1 Run	0-1,1=Run
UA5012	Flocculator 1 Fail	0-1,1=Fail
S5012	Flocculator 1 Speed	0-100 %
Y5013	Flocculator 2 Ready	0-1,1=Ready
N5013	Flocculator 2 Run	0-1,1=Run

UA5013	Flocculator 2 Fail	0-1,1=Fail
S5013	Flocculator 2 Speed	0-100 %

15.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
MXR5011	Coagulant Rapid Mixer	-	0-1,1=Start 0-100 %	X5011 SC5011
MXR5012	Flocculator 1	-	0-1,1=Start 0-100 %	X5012 SC5012
MXR5013	Flocculator 2	-	0-1,1=Start 0-100 %	X5013 SC5013

15.6 Control Description

15.6.1 Coagulant Rapid Mixer (MXR5011)

The Coagulant Rapid Mixer is inactive. Mixing function is postponed indefinitely.

15.6.2 Flocculators 1 & 2 (MXR5012, MXR5013)

The Flocculators are inactive. Flocculation function is postponed indefinitely.

15.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
MXR5011	AF5011	UST5011	0-1	5 sec	Alarm, Shutdown Mixer	Coagulant Rapid Mixer Fault
MXR5011	AR5011	X5011 N5011	0-1 0-1	5 sec	Alarm, Shutdown Mixer	Coagulant Rapid Mixer Fail to Start
MXR5011	AIX5011	S5011	0-100%	5 sec	Alarm	Coagulant Rapid Mixer Speed Transducer Failure
MXR5012	AF5012	UST5012	0-1	5 sec	Alarm, Shutdown Mixer	Flocculator Mixer 1 Fault
MXR5012	AR5012	X5012 N5012	0-1 0-1	5 sec	Alarm, Shutdown Mixer	Flocculator Mixer 1 Fail to Start

MXR5012	AIX5012	S5012	0-100 %	5 sec	Alarm	Flocculator Mixer 1 Speed Transducer Failure
MXR5013	AF5013	UST5013	0-1	5 sec	Alarm, Shutdown Mixer	Flocculator Mixer 2 Fault
MXR5013	AR5013	X5013 N5013	0-1 0-1	5 sec	Alarm, Shutdown Mixer	Flocculator Mixer 2 Fail to Start
MXR5013	AIX5013	S5013	0-100 %	5 sec	Alarm	Flocculator Mixer 2 Speed Transducer Failure
AE5081	AHL5081	10.0 ntu	0-20.0 ntu	120 sec	Alarm	Secondary Clarifier Turbidity High
AE5081	AIX5081	A5081	0-20.0 ntu	120 sec	Alarm	Secondary Clarifier Turbidity Transducer Failure
FIT5071	FIX5071	F5071	0-2000 gpm	120 sec	Alarm	Filter Influent Flow Transducer Failure
PMP5021	N5021	N5021	0-1	-	Alarm	Filter Influent Sample Pump Not Running

16. TERTIARY FILTERS

16.1 Process Description

Tertiary Filters 1 and 2 remove the suspended solids from the secondary effluent. The filtered effluent then flows to the Sodium Hypochlorite Rapid Mix Basin. Backwash waste from the Filters is pumped to the Primary Clarifier. Operator controls for the Filters are located at the local Filter control panels.

Each Tertiary Filter has a vendor-provided, PLC-based system from Aqua Aerobics. The PLC communicates via Ethernet to the SCADA system for monitoring only.

The control algorithms in the filters PLCs provide the overall sequence of operation.

16.2 Reference Drawings

Drawing Number	Description
I510	Tertiary Filter 1 P&ID
I520	Tertiary Filter 2 P&ID

16.3 Equipment

Equipment Tag	Description
FLT5100	Filter 1
DRV5111	Filter 1 Disk Drive
PMP5121	Filter 1 Backwash/Waste Pump 1
PMP5122	Filter 1 Backwash/Waste Pump 2
MOV5131	Filter 1 Backwash Valve 1
MOV5132	Filter 1 Backwash Valve 2
MOV5133	Filter 1 Backwash Valve 3
MOV5141	Filter 1 Sludge Valve
FLT5200	Filter 2
DRV5211	Filter 2 Disk Drive
PMP5221	Filter 2 Backwash/Waste Pump 1
PMP5222	Filter 2 Backwash/Waste Pump 2
MOV5231	Filter 2 Backwash Valve 1
MOV5232	Filter 2 Backwash Valve 2
MOV5233	Filter 2 Backwash Valve 3
MOV5241	Filter 2 Sludge Valve

16.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
A5180	Filter 1 Common Influent Turbidity (from A5081 via signal splitter)	0-10 ntu
A5181	Filter 1 Effluent Turbidity	0-10 ntu
L5151	Filter 1 Basin Level	0-10 feet
LHA5152	Filter 1 Basin High Level (Float)	0-1,1=High Level
MA5111	Filter 1 Main Disk Drive Auto	0-1,1=Auto
MR5111	Filter 1 Main Disk Drive Run	0-1,1=Run
MA5121	Filter 1 Backwash/Waste Pump 1 Auto	0-1,1=Auto
MR5121	Filter 1 Backwash/Waste Pump 1 Run	0-1,1=Run
MCP5121	Filter 1 Backwash/Waste Pump 1 Fail	0-1,1=Fail
MA5122	Filter 1 Backwash/Waste Pump 2 Auto	0-1,1=Auto
MR5122	Filter 1 Backwash/Waste Pump 2 Run	0-1,1=Run
MCP5122	Filter 1 Backwash/Waste Pump 2 Fail	0-1,1=Fail
ZSO5131	Filter 1 Backwash Valve 1 Opened	0-1,1=Opened
ZSC5131	Filter 1 Backwash Valve 1 Closed	0-1,1=Closed
ZSO5132	Filter 1 Backwash Valve 2 Opened	0-1,1=Opened
ZSC5132	Filter 1 Backwash Valve 2 Closed	0-1,1=Closed
ZSO5133	Filter 1 Backwash Valve 3 Opened	0-1,1=Opened
ZSC5133	Filter 1 Backwash Valve 3 Closed	0-1,1=Closed
ZSO5141	Filter 1 Sludge Valve Opened	0-1,1=Opened
ZSC5141	Filter 1 Sludge Valve Closed	0-1,1=Closed
A5280	Filter 2 Common Influent Turbidity (from A5081 via signal splitter)	0-10 ntu
A5281	Filter 2 Effluent Turbidity	0-10 ntu
L5251	Filter 2 Basin Level	0-10 feet
LHA5252	Filter 2 Basin High Level (Float)	0-1,1=High Level
MA5211	Filter 2 Main Disk Drive Auto	0-1,1=Auto
MR5211	Filter 2 Main Disk Drive Run	0-1,1=Run
MA5221	Filter 2 Backwash/Waste Pump 1 Auto	0-1,1=Auto
MR5221	Filter 2 Backwash/Waste Pump 1 Run	0-1,1=Run
MCP5221	Filter 2 Backwash/Waste Pump 1 Fail	0-1,1=Fail
MA5222	Filter 2 Backwash/Waste Pump 2 Auto	0-1,1=Auto
MR5222	Filter 2 Backwash/Waste Pump 2 Run	0-1,1=Run
MCP5222	Filter 2 Backwash/Waste Pump 2 Fail	0-1,1=Fail

ZSO5231	Filter 2 Backwash Valve 1 Opened	0-1,1=Opened
ZSC5231	Filter 2 Backwash Valve 1 Closed	0-1,1=Closed
ZSO5232	Filter 2 Backwash Valve 2 Opened	0-1,1=Opened
ZSC5232	Filter 2 Backwash Valve 2 Closed	0-1,1=Closed
ZSO5233	Filter 2 Backwash Valve 3 Opened	0-1,1=Opened
ZSC5233	Filter 2 Backwash Valve 3 Closed	0-1,1=Closed
ZSO5241	Filter 2 Sludge Valve Opened	0-1,1=Opened
ZSC5241	Filter 2 Sludge Valve Closed	0-1,1=Closed

16.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
DRV5111	Filter 1 Main Disk Drive	-	0-1,1=Start	HYS5111
PMP5121	Filter 1 Backwash/Waste Pump 1	-	0-1,1=Start	HYN5121
PMP5122	Filter 1 Backwash/Waste Pump 2	-	0-1,1=Start	HYN5122
MOV5131	Filter 1 Backwash Valve 1	-	0-1,1=Open	HYN5131
MOV5132	Filter 1 Backwash Valve 1	-	0-1,1=Open	HYN5132
MOV5133	Filter 1 Backwash Valve 1	-	0-1,1=Open	HYN5133
MOV5141	Filter 1 Sludge Valve	-	0-1,1=Open	HYN5141
DRV5211	Filter 2 Main Disk Drive	-	0-1,1=Start	HYS5211
PMP5221	Filter 2 Backwash/Waste Pump 1	-	0-1,1=Start	HYN5221
PMP5222	Filter 2 Backwash/Waste Pump 2	-	0-1,1=Start	HYN5222
MOV5231	Filter 2 Backwash Valve 2	-	0-1,1=Open	HYN5231
MOV5232	Filter 2 Backwash Valve 2	-	0-1,1=Open	HYN5232
MOV5233	Filter 2 Backwash Valve 2	-	0-1,1=Open	HYN5233
MOV5241	Filter 2 Sludge Valve	-	0-1,1=Open	HYN5241

16.6 Control Description

16.6.1 Filters 1 & 2

See vendor O&M Manual for detailed control description.

16.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
FLT5100	AB5100	-	0-1	-	Alarm	Filter 1 General Alarm (Beacon)

FLT5200	AB5200	-	0-1	-	Alarm	Filter 2 General Alarm (Beacon)

17. SODIUM HYPOCHLORITE (SHC) RAPID MIXING

17.1 Process Description

The disinfection Rapid Mixer provides the initial mixing energy to adequately disperse the Sodium Hypochlorite into the Filter effluent flow.

17.2 Reference Drawings

Drawing Number	Description
I530	SHC Rapid Mixing P&ID

17.3 Equipment

Equipment Tag	Description
	SHC Rapid Mix Basin
MXR5311	SHC Rapid Mixer

17.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
A5381	Dosing Chlorine Analyzer	0-100 mg/l
F5371	Tertiary Effluent Flow (Mag Meter)	0-2000 gpm
Q5371	Tertiary Effluent Flow Total Pulse	0-1, 1=kgal
Y5311	SHC Rapid Mixer Ready	0-1,1=Ready
N5311	SHC Rapid Mixer Run	0-1,1=Run
UA5311	SHC Rapid Mixer Fail	0-1,1=Fail

17.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
MXR5311	SHC Rapid Mixer	-	0-1,1=Start	X5311

17.6 Control Description

17.6.1 SHC Rapid Mixer (MXR5311)

The Rapid Mixer runs when either of the Effluent SHC Pumps (PMP5611, PMP5612) are running. Mixer run (N5311), mixer ready (Y5311), and mixer fail (UA5311) are inputs to PLC3. When the mixer ready status (Y5311) is active, it runs as called (X5311) by the PLC.

SCADA Auto/Manual

In Auto mode, the mixer can be operated in the following control modes from SCADA:

SCADA-Auto

In SCADA-Auto, the mixer runs when either of the Effluent SHC Pumps (PMP5611, PMP5612) are running.

SCADA-Manual

In SCADA-Manual, the mixer is started and stopped from SCADA.

17.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
MXR5311	AF5311	UST5311	0-1	# sec	Alarm, Shutdown Mixer	SHC Rapid Mixer Fault
MXR5311	AR5311	X5311 N5311	0-1 0-1	# sec	Alarm, Shutdown Mixer	SHC Rapid Mixer Fail to Start
FIT5371	FIX5371	F5371	0-2000 gpm	# sec	Alarm	Tertiary Effluent Flow Transducer Failure
AIT5381	AHL5381	10.0 mg/l	0-100 mg/l	# sec	Alarm	Effluent Chlorine Residual High
AIT5381	ALL5381	0.5 mg/l	0-100 mg/l	# sec	Alarm	Effluent Chlorine Residual Low
AIT5381	AIX5381	A5381	0-100 mg/l	# sec	Alarm	Effluent Chlorine Residual Transducer Failure

18. SODIUM BISULFITE (SBS) FEED SYSTEM

18.1 Process Description

Sodium Bisulfite is used to dechlorinate the effluent flow during the surface water discharge season.

18.2 Reference Drawings

Drawing Number	Description
I550	Sodium Bisulfite Feed System P&ID

18.3 Equipment

Equipment Tag	Description
TNK5510	Sodium Bisulfite Storage Tank
PMP5511	Sodium Bisulfite Feed Pump 1
PMP5512	Sodium Bisulfite Feed Pump 2

18.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
Y5511	Sodium Bisulfite Feed Pump 1 Auto	0-1,1=Auto
N5511	Sodium Bisulfite Feed Pump 1 Run	0-1,1=Run
UA5511	Sodium Bisulfite Feed Pump 1 Fail	0-1,1=Fail
S5511	Sodium Bisulfite Feed Pump 1 Speed	0-100 %
Y5512	Sodium Bisulfite Feed Pump 2 Auto	0-1,1=Auto
N5512	Sodium Bisulfite Feed Pump 2 Run	0-1,1=Run
UA5512	Sodium Bisulfite Feed Pump 2 Fail	0-1,1=Fail
S5512	Sodium Bisulfite Feed Pump 2 Speed	0-100 %

18.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
PMP5511	Sodium Bisulfite Feed Pump 1	-	0-1,1=Start 0-100 %	X5511 SC5511
PMP5512	Sodium Bisulfite Feed Pump 2	-	0-1,1=Start 0-100 %	X5512 SC5512

18.6 Control Description

18.6.1 Sodium Bisulfite Feed Pumps 1 & 2 (PMP5511, PMP5512)

The Sodium Bisulfite (SBS) Feed Pumps meter product to the Chlorine Contact Tank. Pump run (N5511, N5512), pump auto (Y5511, Y512), pump fail (UA5511, UA5512), and pump speed feedback (S5511, S5512) are inputs to PLC3. When the pump auto status (Y5511, Y5512) is active, it runs as called (X5511, X5512) by the PLC at its auto speed command (SC5511, SC5512).

Pump calls are based on Operator selection and operate in a Lead/Failover configuration, where the Failover pump picks up if the Lead pump fails. The Operator selects a Lead pump, the Pump Minimum Speed, the SBS Specific Gravity, the SBS Concentration, and the Gallons Per Hour @ 100% Speed. The setpoints along with running averages of the Effluent Flow (F6071) and the Chlorine Residual (A6181) are used in dosing (pump speed) control calculations. These Effluent Flow and Chlorine Residual values can be dampened by the Operator from SCADA by adjusting the number of samples.

SCADA Auto/Manual

When the pump is in Auto in the field, it can be operated in the following control modes from SCADA:

SCADA-Manual

In SCADA-Manual, the pump is started and stopped from SCADA and the speed command is manually set.

SCADA-Auto

In SCADA-Auto, the Lead pump is called continuously at the calculated dosing speed command (SC5511, SC5512). The dosing speed command is calculated as follows:

Step 1: Pounds of Chlorine Present

$$Chlorine\ Present\ (lbs) = \frac{\left(Effluent\ Flow\ (F6071)\frac{mgal}{day}\ x\ Chlorine\ Residual\ (A6181)\ \frac{mg}{l}\ x\ 8.34\frac{lb}{gal}\right)}{24\frac{hrs}{day}}$$

Step 2: Pounds of Bisulfite Required

$$Bisulfite\ Required\ (lbs) = Chlorine\ Preset\ (lbs)\ x\ 1.46$$

Step 3: Pounds of Bisulfite Desired

$$Bisulfite\ Desired\ (lbs) = Bisulfite\ Required\ (lbs)\ x\ Safety\ Factor\ (1.50)\ x\ Operator\ Bias$$

Step 4: Pounds of Bisulfite Per Gallon

$$Bisulfite\ Weight\ \frac{lbs}{gal} = Bisulfite\ Specific\ Gravity\ (sg)\ x\ 8.24\frac{lbs}{gal}$$

Step 5: Gallons of Bisulfite Desired

$$Bisulfite\ Desired\ (gallons) = \frac{Bisulfite\ Desired\ \frac{lbs}{gal}}{\frac{Bisulfite\ Concentration\ \%}{Bisulfite\ Weight\ per\ Gallon\ \frac{lbs}{gal}}}$$

Lastly, Step 6: SBS Dosing (Pump Speed Command) signal is a function of the Bisulfite gallons delivered at 100% pump speed (Operator setpoint) and the calculated Bisulfite Desired.

$$SBS\ Pump\ Speed\ Command\ (\%) = \left(\frac{(100-0)}{\left(\frac{gal}{hr}@\ 100\%\ Speed - 0\right)}\right)\ x\ Bisulfite\ Desired\ (lbs)$$

SBS Run & Hold and Pressure Pre-Ramp Functions

The SBS Dosing Pump Speed Command is increased by an Operator-adjustable SBS Run & Hold Speed Increase setpoint (%) after either of the Plant Water Pumps (PMP6111, PMP6112) have run for an Operator-adjustable duration.

There is an optional Plant Water Pressure (P6161) Pre-Ramp that increases the SBS Dosing Pump Speed Command by the Operator-adjustable SBS Run & Hold Speed Increase setpoint (%) if the Plant Water Pressure falls below the Operator-adjustable SBS Plant Water Pre-Ramp setpoint

Pump Minimum Speed

The SBS Dosing Pump Speed Command is limited on the low end to the Operator-adjustable Pump Minimum Speed setpoint.

The Gallons of Bisulfite Delivered is a function of the Bisulfite gallons delivered at 100% pump speed (Operator setpoint), the actual pump speed feedback signals, the SBS Concentration % (Operator setpoint), and the Bisulfite Weight:

$$Bisulfite\ Delivered\ (gallons) = \left(\frac{\left(\frac{gal}{hr}@\ 100\%\ Speed - 0\right)}{(100-0)}\right)\ x\ ((PMP5511\ Speed\ \% + PMP5512\ Speed\ \%)\ x\ SBS\ Concentration\ \%\ x\ Bisulfite\ Weight\ \frac{lbs}{gal})$$

Setpoints

The following setpoints associated with the Sodium Bisulfite Feed Pumps are adjustable from SCADA:

Description	Set Point	Comments
Bias	#.# %	+/- 40%, typically 40%
Lead Pump	0-2	0=Alternate, 1=Pump 1, 2=Pump 2
Pump Minimum Speed	#.# %	6%
SBS Specific Gravity	#.### sg	1.319 sg
SBS Concentration	#.### %	0.250 %
Gallons Per Hour @ 100% Speed	#.## gph	16.0 gph
Effluent Flow Filtered # of Samples	# samples	5 samples
CL Residual Filtered # of Samples	# samples	5 samples
SBS Run and Hold Speed Increase	#.# %	2.0 %
SBS Run and Hold Max Timer	# sec	240 sec
SBS Plant Water Off Delay Timer	# sec	30 sec

Residual Data

The following residual variables are presented on the Sodium Bisulfite Feed Pumps SCADA screen:

Instrument Tag	Description	Today	Yesterday
A6181	Effluent Chlorine Residual Max	##.# mg/l	##.# mg/l
A6181	Effluent Chlorine Residual Avg	##.# mg/l	##.# mg/l
A6181	Effluent Chlorine Residual Min	##.# mg/l	##.# mg/l

A5381	Dosing Chlorine Residual Max	##.# mg/l	##.# mg/l
A5381	Dosing Chlorine Residual Avg	##.# mg/l	##.# mg/l
A5381	Dosing Chlorine Residual Min	##.# mg/l	##.# mg/l
A6081	Bisulfite Residual Max	##.# mg/l	##.# mg/l
A6081	Bisulfite Residual Avg	##.# mg/l	##.# mg/l
A6081	Bisulfite Residual Min	##.# mg/l	##.# mg/l
Calculated	Sodium Hypochlorite Dosed	##.# gal	##.# gal
Calculated	Sodium Bisulfite Dosed	##.# gal	##.# gal

18.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
PMP5511	AF5511	UA5511	0-1	# sec	Alarm, Shutdown Pump	Sodium Bisulfite Feed Pump 1 Fault
PMP5511	AR5511	X5511 N5511	0-1 0-1	# sec	Alarm, Shutdown Pump	Sodium Bisulfite Feed Pump 1 Fail to Start
PMP5511	AFS5511	5.0 %	0-100 %	# sec	Alarm	Sodium Bisulfite Feed Pump 1 Speed Command vs. Feedback
PMP5511	AIX5511	S5511	0-100 %	# sec	Alarm	Sodium Bisulfite Feed Pump 1 Speed Transducer Failure
PMP5512	AF5512	UA5512	0-1	# sec	Alarm, Shutdown Pump	Sodium Bisulfite Feed Pump 2 Fault
PMP5512	AR5512	X5512 N5512	0-1 0-1	# sec	Alarm, Shutdown Pump	Sodium Bisulfite Feed Pump 2 Fail to Start
PMP5512	AFS5512	5.0 %	0-100 %	# sec	Alarm	Sodium Bisulfite Feed Pump 2 Speed Command vs. Feedback
PMP5512	AIX5512	S5512	0-100 %	# sec	Alarm	Sodium Bisulfite Feed Pump 2 Speed Transducer Failure
FSH5571	AFD5571	FSH5571	0-1	# sec	Alarm	Sodium Bisulfite Emergency Eyewash In Use

19. OLD SODIUM BISULFITE (SBS) FEED SYSTEM

19.1 Process Description

The Old Sodium Bisulfite Feed System is obsolete. The I/O listed below can be used for something else.

19.2 Reference Drawings

Drawing Number	Description
I570	Old Sodium Bisulfite Feed System P&ID

19.3 Equipment

Equipment Tag	Description
TNK5710	Old Sodium Bisulfite Storage Tank
PMP5711	Old Sodium Bisulfite Feed Pump 1

19.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
Y5711	Old Sodium Bisulfite Feed Pump 1 Auto	0-1,1=Auto
N5711	Old Sodium Bisulfite Feed Pump 1 Run	0-1,1=Run
UA5711	Old Sodium Bisulfite Feed Pump 1 Fail	0-1,1=Fail
S5711	Old Sodium Bisulfite Feed Pump 1 Speed	0-100 %
LS5751	Old Sodium Bisulfite Tank Low Level	0-1,1=Low Level

19.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
PMP5711	Old Sodium Bisulfite Feed Pump 1	-	0-1,1=Start 0-100 %	X5711 SC5711

19.6 Control Description

19.6.1 Old Sodium Bisulfite Feed Pump 1 (PMP5711)

The Old Sodium Bisulfite Feed System is obsolete.

19.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
PMP5711	AF5711	UA5511	0-1	# sec	Alarm, Shutdown Pump	Old Sodium Bisulfite Feed Pump 1 Fault
PMP5711	AR5711	X5511 N5511	0-1 0-1	# sec	Alarm, Shutdown Pump	Old Sodium Bisulfite Feed Pump 1 Fail to Start
PMP5711	AFS5711	5.0 %	0-100 %	# sec	Alarm	Old Sodium Bisulfite Feed Pump 1 Speed Transducer Failure
LS5751	ALL5571	LS5751	0-1	# sec	Alarm	Old Sodium Bisulfite Tank Low Level

20. EFFLUENT SODIUM HYPOCHLORITE (SHC) FEED SYSTEM

20.1 Process Description

The Effluent Sodium Hypochlorite Pumps meter product to the disinfection Rapid Mix Basin. Other discharge points that are available through manual valving are the RAS Pump Station and the Filter effluent bypass.

20.2 Reference Drawings

Drawing Number	Description
I560	Effluent Sodium Hypochlorite Feed System P&ID

20.3 Equipment

Equipment Tag	Description
TNK5610-1	Effluent SHC Storage Tank 1
PMP5611	Effluent SHC Feed Pump 1
TNK5610-2	Effluent SHC Storage Tank 2
PMP5612	Effluent SHC Feed Pump 2

20.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
Y5611	Effluent SHC Feed Pump 1 Auto	0-1,1=Auto
N5611	Effluent SHC Feed Pump 1 Run	0-1,1=Run
UA5611	Effluent SHC Feed Pump 1 Fail	0-1,1=Fail
S5611	Effluent SHC Feed Pump 1 Speed	0-100 %
Y5612	Effluent SHC Feed Pump 2 Auto	0-1,1=Auto
N5612	Effluent SHC Feed Pump 2 Run	0-1,1=Run
UA5612	Effluent SHC Feed Pump 2 Fail	0-1,1=Fail
S5612	Effluent SHC Feed Pump 2 Speed	0-100 %

20.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
PMP5611	Effluent SHC Feed Pump 1	-	0-1,1=Start 0-100 %	X5611 SC5611
PMP5612	Effluent SHC Feed Pump 2	-	0-1,1=Start 0-100 %	X5612 SC5612

20.6 Control Description

20.6.1 Effluent SHC Feed Pumps 1 & 2 (PMP5611, PMP5612)

The Effluent SHC Feed Pumps dose the Rapid Mix Basin (Filter Influent). Pump run (N5611, N5612), pump auto (Y5611, Y5612), pump fail (UA5611, UA5612), and pump speed feedback (S5611, S5612) are inputs to PLC3. When the pump auto status (Y5611, Y5612) is active, it runs as called (X5611, X5612) by the PLC at its auto speed command (SC5611, SC5612).

SCADA Auto/Manual

When the pump is in Auto in the field, it can be operated in the following control modes from SCADA:

SCADA-Manual

In SCADA-Manual, the pump is started and stopped from SCADA and the speed command is manually set.

SCADA-Auto

In SCADA-Auto, the pumps can be run in PID Control or Flow Pacing Mode. In PID Control Mode, the pump calls and speed command signals are based on the Dosing Chlorine Analyzer (A5381) located at the inlet of the Rapid Mix Basin. In Flow Pacing Mode, the pump call and speed command signals are based on Filter Influent Flow (F5071) and an Operator-settable bias.

Lead/Lag & Failover Controls

The following Lead/Lag & failover controls apply regardless of Control Mode (Flow Pacing or Chlorine PID).

The Operator assigns a Lead pump on the SCADA system and it runs whenever there is Filter Influent Flow (F5071).

The Lag pump is called to start when the Dosing Chlorine signal (A5381) falls below to an Operator-adjustable Lag Start Setpoint for an Operator-adjustable time delay. The Lag pump is stopped when the Dosing Chlorine signal (A5381) rises above an Operator-adjustable Lead Start Setpoint for an Operator-adjustable time delay.

The Lead pump will automatically failover to the Lag pump if the Lead pump is taken out of auto (Y5611, Y5612), fails (UA5611, UA5612), or fails to start (X5611, X5612 call to start given, but N5611, N5612 run status is not detected).

Lead/Lag Setpoints

The following setpoints associated with the Lead/Lag controls adjustable from SCADA:

Description	Set Point	Comments
Lead Pump	0-2	0=Alternate, 1=Pump 1, 2=Pump 2
Lag Start Setpoint (on falling level)	#.# mg/l	2.0 mg/l, Dosing Chorine (A5381)
Lag Start Time Delay	# sec	60 seconds
Lag Stop Setpoint (on rising level)	#.# mg/l	10.0 mg/l, Dosing Chorine (A5381)
Lag Stop Time Delay	# sec	60 seconds

PID Control Mode

In PID Control Mode, the pacing signal speed command (SC5611, SC5612) is the output of a Chlorine Residual PID loop, with the Dosing Chlorine Analyzer (A5381) as the process variable.

PID Control Mode Setpoints

The following setpoints associated with the Effluent SHC Feed Pumps PID Control Mode are adjustable from SCADA:

Description	Set Point	Comments
Dosing Chlorine Deadband	#.# mg/l	0.1 %
P Gain	#.### %	0.350 %
I Gain	#.### %	0.006 %
D Gain	#.### %	0.400 %
Dosing Chlorine Level to Maintain	##.# mg/l	12.0 mg/l
PID Maximum Speed	#.# %	8.0%
PID Minimum Speed	#.# %	3.0%
Loop Time	# sec	5 sec
Pump Minimum Speed	#.# %	3.0 %

Flow Pacing Mode

In Flow Pacing Mode, the pacing signal speed command (SC5611, SC5612) is calculated as follows:

$$Pacing\ Signal = \left(\frac{Filter\ Influent\ Flow\ (F5071)}{\frac{gal}{hr} @\ 100\%\ Speed\ x\ Proportional\ Gain\ x\ 100\%} \right) + Bias$$

Flow Pacing Mode Bias

Operations staff has six (6) Bias time windows. This allows modulation of the Bias setpoint based on the time of day in a HHMM format. Each of the six Bias windows can be enabled or disabled.

Flow Pacing Mode Setpoints

The following setpoints associated with the Effluent SHC Feed Pumps Flow Pacing Mode are adjustable from SCADA:

Description	Set Point	Comments
Proportional Gain	#.## %	0.75 %
Gallons Per Hour @ 100% Speed	#.# gph	16.0 gph
Bias Window 1 Start Time	HHMM	0030
Bias Window 1 Setpoint	#.### %	0.700 %
Bias Window 2 Start Time	HHMM	0630
Bias Window 2 Setpoint	#.### %	1.100 %
Bias Window 3 Start Time	HHMM	1030
Bias Window 3 Setpoint	#.### %	1.000 %
Bias Window 4 Start Time	HHMM	14000
Bias Window 4 Setpoint	#.### %	0.900 %
Bias Window 5 Start Time	HHMM	2100
Bias Window 5 Setpoint	#.### %	0.800 %
Bias Window 6 Start Time	HHMM	0000
Bias Window 6 Setpoint	#.### %	1.000 %

20.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description

PMP5611	AF5611	UA5611	0-1	30 sec	Alarm, Shutdown Pump	Effluent SHC Feed Pump 1 Fault
PMP5611	AR5611	X5611 N5611	0-1 0-1	5 sec	Alarm, Shutdown Pump	Effluent SHC Feed Pump 1 Fail to Start
PMP5611	AIX5611	S5611	0-100 %	5 sec	Alarm	Effluent SHC Feed Pump 1 Speed Transducer Failure
PMP5612	AF5612	UA5612	0-1	30 sec	Alarm, Shutdown Pump	Effluent SHC Feed Pump 2 Fault
PMP5612	AR5612	X5612 N5612	0-1 0-1	5 sec	Alarm, Shutdown Pump	Effluent SHC Feed Pump 2 Fail to Start
PMP5612	AIX5612	S5612	0-100 %	5 sec	Alarm	Effluent SHC Feed Pump 2 Speed Transducer Failure

21. EFFLUENT MONITORING

21.1 Process Description

The Effluent Monitoring Room serves as a point of compliance for the Plant's discharge permits. Final samples are taken here.

21.2 Reference Drawings

Drawing Number	Description
I600	Effluent Monitoring P&ID

21.3 Equipment

Equipment Tag	Description
	Chlorine Contact Basin
PMP6211	Effluent Sample Pump
SMP6021	Effluent Sampler
	Distribution Structure
SOV6032	Diversion Valve

21.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
F6071	Effluent Flow	0-2000 gpm
A6081	Effluent Sodium Bisulfite	-5-5 mg/l
A6082	Effluent pH	0-14 pH
A6084	Effluent Turbidity	0-10 ntu
F6073	Outfall Flow (PLC91)	0-2000 gpm
N6211	Effluent Sample Pump Run	0-1,1=Run
FSL6072	Effluent Sample Low Flow	0-1,1=Low FLow
N6211	Effluent Sample Pump Run	0-1,1=Run
Q6071	Effluent Flow Pulse	0-1, 1=kgal
Q6073	Outfall Flow Pulse (PLC91)	0-1, 1=kgal
FSH1571	Effluent Emergency Eyewash Flow	0-1,1=Flow
Y6031	Diversion Valve Remote (PLC91)	0-1,1=Remote

21.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
SMP6021	Effluent Sample Control Pacing Signal	-	0-100 %	SMP6021
PMP6211	Final Effluent Sample Pump	-	-	-
ECV6031	Final Effluent Sample Pump	-	-	-

21.6 Control Description

21.6.1 Final Effluent Sample Pump (PMP6211)

The Final Effluent Sample Pump provides effluent sample flow to the instrumentation tree. Pump run (N6011) and low sample flow (FSL6072) are inputs to PLC3. The pump runs continuously and is turned on or off locally at the pump.

21.6.2 Effluent Sampler (SMP6021)

The Effluent Sampler is setup to receive an Effluent Flow Pacing Signal (SMP6021) from PLC3; however, it is in manual operation based on a timer at the time of this writing.

21.6.3 Diversion Valve (ECV6031)

The Effluent Diversion Valve allows diversion of a portion of the final effluent flow to surface discharge. Valve open command (ZO6031) and valve close command (ZC6031) are outputs from PLC91, and valve remote (Y6031) is an input into PLC91. The flow discharged through the Diversion Valve is measured with the Outfall Flow (F6073) mag meter.

Local

In Local, the valve is operated manually in the field from the valve operator.

Remote

In Remote, the valve follows the valve open command (ZC6031) and valve close command (ZO6031) signals from the PLC. The following control modes are available from SCADA:

Remote-Manual

In Remote-Manual, the valve can be opened or closed from SCADA.

Remote-Auto

Remote-Auto is disabled in logic.

21.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
SMP6211	N6211	N6211	0-1	# sec	Alarm	Effluent Sample Pump Running
AIT6081	AFR6081	25 %	0-50 %	# sec	Alarm	Effluent Sodium Bisulfite Rate of Change
AIT6081	AHL6081	10.0 mg/l	-5-5 mg/l	# sec	Alarm	Effluent Sodium Bisulfite High
AIT6081	ALL6081	0.6 mg/l	-5-5 mg/l	# sec	Alarm	Effluent Sodium Bisulfite Low
AIT6081	AIX6081	A6081	-5-5 mg/l	# sec	Alarm	Effluent Sodium Bisulfite Transducer Failure
AIT6082	AHL6082	8.5 pH	0-14 pH	# sec	Alarm	Effluent pH High
AIT6082	ALL6082	6.5 pH	0-14 pH	# sec	Alarm	Effluent pH Low
AIT6082	AIX6082	A6082	0-14 pH	# sec	Alarm	Effluent pH Transducer Failure
AIT6084	AHL6084	10.0 ntu	0-10 ntu	# sec	Alarm	Effluent Turbidity High
AIT6084	AIX6084	A6084	0-10 ntu	# sec	Alarm	Effluent Turbidity Transducer Failure
FSH5571	AFD5571	FSH5571	0-1	# sec	Alarm (Reset Required)	Effluent Monitoring Eyewash In Use
FIT6071	AIX6071	F6071	0-2000 gpm	# sec	Alarm	Effluent Flow Transducer Failure
FIT6073	AIX6073	F6073	0-2000 gpm	# sec	Alarm	Outflow Flow Transducer Failure
FSL6072	AFD6072	FSL6072	0-1	# sec	Alarm	Effluent Sample Low Flow
	AF6031		0-1	# sec	Alarm	Plant In Diversion
FIT6073	AH6073	10.0 gpm	0-2000 gpm	# sec	Alarm	Outfall Flow Detected / Diversion Valve Closed
	ABR6081		0-1	# sec	Alarm	Sodium Bisulfite Low Dose

22. PLANT WATER PUMP STATION

22.1 Process Description

The Plant Water Pumps provide a source of treated effluent for internal Plant, non-potable uses such as seal water, tank cleaning, hose bibs, and Bar Screen operations.

22.2 Reference Drawings

Drawing Number	Description
I610	Plant Water Pump Station P&ID

22.3 Equipment

Equipment Tag	Description
	Chlorine Contact Tank
PMP6111	Plant Water Pump 1
PMP6112	Plant Water Pump 2
PMP6113	CCT Effluent Sample Pump

22.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
A6181	Effluent Chlorine Residual	0-20 mg/l
P6161	Plant Water Pressure	0-100 psi
F6171	Plant Water Flow (Mag Meter)	0-200 gpm
Q6171	Plant Water Flow Total Pulse	0-1, 1=kgal
Y6111	Plant Water Pump 1 Ready	0-1,1=Ready
N6111	Plant Water Pump 1 Run	0-1,1=Run
UA6111	Plant Water Pump 1 Fail	0-1,1=Fail
Y6112	Plant Water Pump 2 Ready	0-1,1=Ready
N6112	Plant Water Pump 2 Run	0-1,1=Run
UA6112	Plant Water Pump 2 Fail	0-1,1=Fail
LSL6151	Chlorine Contact Tank Lo Level	0-1,1=Lo Level
LSLL6151	Chlorine Contact Tank Lo Lo Level	0-1,1=Lo Lo Level
ZS6091	Chlorine Contact Tank Station Intrusion	0-1,1=Intrusion

22.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
PMP6111	Plant Water Pump 1	-	0-1,1=Start	X6111
PMP6112	Plant Water Pump 2	-	0-1,1=Start	X6112
PMP6113	CCT Effluent Sample Pump	-	-	-

22.6 Control Description

22.6.1 Plant Water Pumps 1 & 2 (PMP6111, PMP6112)

The Plant Water Pumps pull from the Chlorine Contact Tank. They operate to maintain pressure in the plant water system. Pump running (N6111, N6112), pump ready (Y6111, Y6112), and pump fail (UA6111, UA6112) signals are inputs to PLC3.

When the pump HOA is in the Auto position and the Ready status is active (Y6111, Y6112), it will run as called (X6111, X6112) by the PLC to maintain pressure. A low-low level float (LSLL6151) in the Chlorine Contact Tank (Plant Water Basin) disables pump operation. The pumps remain disabled until the float has cleared (level has risen above it) for more than 60 seconds.

SCADA Auto/Manual

When a pump HOA is in the Auto position and the Ready status is active, it can be operated in the following control modes from SCADA:

SCADA-Auto

In SCADA-Auto, a set of Operator-adjustable Start/Stop pressure setpoints calls the Lead pump. Similarly, a set of Operator-adjustable Start/Stop pressure setpoints calls the Lag pump. The pump assigned as Lead will be called first. If pressure continues to fall, the Lag pump will be called.

SCADA-Manual

In SCADA-Manual, the pump is started and stopped from SCADA.

Lock-Out Stop

Lockout stop switches and at the pump disable operation.

Disconnect Switch

Power disconnect switches at the pump isolate power from the pump motor.

Setpoints

The following setpoints associated with the Plant Water Pumps are adjustable from SCADA:

Description	Set Point	Comments
Lead Start Pressure	55.0 psi	
Lead Stop Pressure	80.0 psi	
Lag Start Pressure	45.0 psi	
Lag Stop Pressure	60.0 psi	
Lead Pump Assignment	0-2	0 = Alternate, 1 = Pump 1, 2 = Pump 2
Lead Start Pressure Time Delay	# sec	
Lead Stop Pressure Time Delay	# sec	
Lag Start Pressure Time Delay	# sec	
Lag Stop Pressure Time Delay	# sec	

22.6.2 CCT Effluent Sample Pump (PMP6113)

The Chlorine Contact Tank (CCT) Effluent Sample Pump provides sample flow for the Effluent Chlorine Residual Analyzer (A6181). The pump runs continuously and is turned on or off locally at the pump. There are no inputs to or outputs from a PLC for this pump.

22.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
AIT6181	AHL6181	17.0 mg/l	0-20 mg/l	# sec	Alarm	Effluent Chlorine Residual High
AIT6181	ALL6181	0.5 mg/l	0-20 mg/l	# sec	Alarm	Effluent Chlorine Residual Low
PMP6111	AF6111	UST6111	0-1	# sec	Alarm, Shutdown Pump	Plant Water Pump 1 Fault
PMP6111	AR6111	X6111 N6111	0-1 0-1	# sec	Alarm, Shutdown Pump	Plant Water Pump 1 Fail to Start
PMP6112	AF6112	UST6112	0-1	# sec	Alarm, Shutdown Pump	Plant Water Pump 2 Fault

PMP6112	AR6112	X6112 N6112	0-1 0-1	# sec	Alarm, Shutdown Pump	Plant Water Pump 2 Fail to Start
PIT6161	AHL6161	95.0 psi	0-100 psi	# sec	Alarm	Plant Water Pressure High
PIT6161	ALL6161	30.0 psi	0-100 psi	# sec	Alarm	Plant Water Pressure Low
PIT6171	AIX6161	P6161	0-100 psi	# sec	Alarm	Plant Water Pressure Transducer Failure
FIT6171	ALL6171	20 gpm	0-200 gpm	# sec	Alarm	Plant Water Flow Low Lockout (Requires Reset)
FIT6171	AIX6171	F6171	0-200 gpm	# sec	Alarm	Plant Water Flow Transducer Failure
LSL6151	AL6151	LSL6151	0-1	# sec	Alarm	Chlorine Contact Tank Level Low (Float)
LSLL6151	ALL6151	LSLL6151	0-1	# sec 60 sec Lockout Clear	Alarm, Lockout Pumps	Chlorine Contact Tank Level Low Low (Float)
ZS6091	AID6091	ZS6091	0-1	# sec	Alarm	Plant Water Pump Station Intrusion

23. IRRIGATION PUMP STATION (FUTURE)

23.1 Process Description

The Irrigation Pump Station moves treated water from Pond D to the Neilsen Property and/or In-Plant Irrigation.

23.2 Reference Drawings

Drawing Number	Description
I921	Irrigation Pump Station P&ID
I922	Nielsen Property & Miscellaneous P&ID
I923	In-Plant Irrigation P&ID

23.3 Equipment

Equipment Tag	Description
PMP9211	Irrigation Pump 1
PMP9212	Irrigation Pump 2
PMP9213	Irrigation Pump 3
PMP9214	Irrigation Pump 4
SOV9290	Irrigation Zone 1 Valve
SOV9291	Irrigation Zone 2 Valve
SOV9292	Irrigation Zone 3 Valve
SOV9293	Irrigation Zone 4 Valve
SOV9294	Irrigation Zone 5 Valve
SOV9295	Irrigation Zone 6 Valve
SOV9296	Irrigation Zone 7 Valve
SOV9297	Irrigation Zone 8 Valve
SOV9298	Irrigation Zone 9 Valve
SOV9299	Irrigation Zone 10 Valve
MOV9234	Return Flow Control Valve

23.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
L9251	Pond D Level	0-??? feet
L9252	Irrigation Pumps Station Hydropneumatic Tank Level	0-??? feet
P9261	Irrigation Pumps Suction Pressure (Vacuum)	-xx.x – xx.x inHG

P9262	Low Head Discharge Pressure	0-??? psi
P9263	Neilsen Property Pressure	0-??? psi
F9271	In-Plant Irrigation Flow Meter (Mag Meter)	0-???? gpm
Q9271	In-Plant Irrigation Flow Meter (Mag Meter) Total Pulse	0-1,1=kgal
F9273	Neilsen Property Flow Meter (Mag Meter)	0-???? gpm
Q9273	Neilsen Property Flow Meter (Mag Meter) Total Pulse	0-1,1=kgal
F9274	Pond D Return Flow Meter (Mag Meter)	0-???? gpm
Q9274	Pond D Return Flow Meter (Mag Meter) Total Pulse	0-1,1=kgal
Y9111	Irrigation Pump 1 Ready	0-1,1=Ready
N9111	Irrigation Pump 1 Run	0-1,1=Run
UA9111	Irrigation Pump 1 Fail	0-1,1=Fail
S9111	Irrigation Pump 1 Speed	0-100 %
Y9112	Irrigation Pump 2 Ready	0-1,1=Ready
N9112	Irrigation Pump 2 Run	0-1,1=Run
UA9112	Irrigation Pump 2 Fail	0-1,1=Fail
S9112	Irrigation Pump 2 Speed	0-100 %
Y9113	Irrigation Pump 3 Ready	0-1,1=Ready
N9113	Irrigation Pump 3 Run	0-1,1=Run
UA9113	Irrigation Pump 3 Fail	0-1,1=Fail
S9113	Irrigation Pump 3 Speed	0-100 %
Y9114	Irrigation Pump 4 Ready	0-1,1=Ready
N9114	Irrigation Pump 4 Run	0-1,1=Run
UA9114	Irrigation Pump 4 Fail	0-1,1=Fail
S9114	Irrigation Pump 4 Speed	0-100 %
ZSO9293	Pressure Relief Valve Opened	0-1,1=Opened
Y9234	Return Flow Control Valve Local/Remote	0-1,1=Remote
ZSC9234	Return Flow Control Valve Closed	0-1,1=Closed
ZSO9234	Return Flow Control Valve Opened	0-1,1=Opened
ZT9234	Return Flow Control Valve Position	0-100%

23.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
PMP9111	Irrigation Pump 1	P9263	0-1,1=Start 0-100 %	X9111 SC9111
PMP9112	Irrigation Pump 2	P9263	0-1,1=Start 0-100 %	X9112 SC9112

PMP9113	Irrigation Pump 3	P9262	0-1,1=Start 0-100 %	X9113 SC9113
PMP9114	Irrigation Pump 4	P9262	0-1,1=Start 0-100 %	X9114 SC9114
SOV9290	Irrigation Zone 1 Valve	-	0-1,1=Open	X9290
SOV9291	Irrigation Zone 2 Valve	-	0-1,1=Open	X9291
SOV9292	Irrigation Zone 3 Valve	-	0-1,1=Open	X9292
SOV9293	Irrigation Zone 4 Valve	-	0-1,1=Open	X9293
SOV9294	Irrigation Zone 5 Valve	-	0-1,1=Open	X9294
SOV9295	Irrigation Zone 6 Valve	-	0-1,1=Open	X9295
SOV9296	Irrigation Zone 7 Valve	-	0-1,1=Open	X9296
SOV9297	Irrigation Zone 8 Valve	-	0-1,1=Open	X9297
SOV9298	Irrigation Zone 9 Valve	-	0-1,1=Open	X9298
SOV9299	Irrigation Zone 10 Valve	-	0-1,1=Open	X9299
MOV9234	Return Flow Control Valve	F9274	0-1,1=Open 0-1,1=Close	ZO9234 ZC9234

23.6 Control Description

23.6.1 Irrigation Pumps 1, 2, 3, 4, 5 (PMP9111, PMP9112, PMP9113, PMP9114)

The Irrigation Pumps operate to maintain discharge pressure. Pump running (N9211, N9212, N9213, N9214), pump ready (Y9211, Y9212, Y9213, Y9214), pump fail (UA9211, UA9212, UA9213, UA9214), and VFD speed feedback (S9211, S9212, S9213, S9214) are inputs to PLC5.

Irrigation Pump 1 is dedicated to Neilsen Property. Irrigation Pump 2 can be manually valved to provide flow to the Neilsen Property or to In-Plant Disposal. Irrigation Pumps 3 and 4 are dedicated to In-Plant Disposal.

When a pump HOA is in the Auto position, it will run as called (X9211, X9212, X9213, X9214, X9215) by the PLC at auto speed commands (SC9211, SC9212, SC9213, SC9214).

Neilsen Property

Lead and Lag1 pumps are assigned to the Neilsen Property from SCADA. Irrigation Pump 1 is assigned to the Neilsen Property. Irrigation Pump 2 can be valved to supply the Neilsen Property or the In-Plant Disposal.

A pressure PID control loop modulates pump speed(s) to maintain the Neilsen Property Pressure (P9263).

SCADA Auto/Manual

When a pump HOA is in the Auto position and the Ready status is active, it can be operated in the following control modes from SCADA:

SCADA-Auto

In SCADA-Auto, the Lead pump is called when the pressure falls below a start pressure setpoint. The Lead pump modulates to maintain a pressure setpoint. If the Lead pump cannot maintain the pressure setpoint and the speed control signal (PID Output) rises above a high speed setpoint for an adjustable time, the Lag pump is called. The Lag pump is called only if the Irrigation Pump 2 is valved to provide the Neilsen Property with flow

SCADA-Manual

In SCADA-Manual, the pump is started and stopped from SCADA and the speed command is manually set.

In Plant Disposal

Lead, Lag1, and Lag2 pumps are assigned to the In Plant Disposal from SCADA. Irrigation Pump 3, Irrigation Pump 4 are assigned to In Plant Disposal. Irrigation Pump 2 is typically assigned to the In-Plant Disposal, but it can be valved to supply Irrigation flow to the Neilsen Property.

A pressure PID control loop modulates pump speed(s) to maintain the Low Head Discharge Pressure (P9262).

SCADA Auto/Manual

When a pump HOA is in the Auto position and the Ready status is active, it can be operated in the following control modes from SCADA:

SCADA-Auto

In SCADA-Auto, the Lead pump is called when the pressure falls below a start pressure setpoint. The Lead pump modulates to maintain a pressure setpoint. If the Lead pump cannot maintain the pressure setpoint and the speed control signal (PID Output) rises above a high speed setpoint for an adjustable time, the Lag1 pump is called. If the speed control signal continues to climb even higher for an adjustable time, the Lag2 pump is called. If the speed control signal continues to climb even higher for an adjustable time, the Lag3 pump is called.

SCADA-Manual

In SCADA-Manual, the pump is started and stopped from SCADA and the speed command is manually set.

Irrigation Pump Lockouts

The Irrigation pumps are locked out from PLC operation when the Pond D Low Low Level Alarm is active. The pumps remain locked out until the alarm clears (rises above a clear setpoint).

The Irrigation pumps are locked out from PLC operation when the Irrigation Suction Pressure Low Low Alarm is active. The pumps remain locked out until the alarm clears (rises above a clear setpoint).

Lock-Out Stop

Lockout stop switches and at the pump disable operation.

Disconnect Switch

Power disconnect switches at the pump isolate power from the pump motor.

Setpoints

The following setpoints associated with the Irrigation pumps are adjustable from SCADA:

Description	**Set Point**	**Comments**
Neilsen Property Pressure PID Controller Deadband	0.0 psi	
Neilsen Property Pressure PID Controller Derivative Term	0-100	
Neilsen Property Pressure PID Controller Integral Term	0-100	
Neilsen Property Pressure PID Controller Proportional Term	0-100	
Neilsen Property Pressure PID Controller Setpoint	0-??? psi	
Neilsen Property Pump Sequence Assignment	12	Lead, Lag

Neilsen Property Lead Pump Start Pressure Setpoint	0-?? psi	On falling pressure.
Neilsen Property Lead Pump Stop Pressure Setpoint	0-?? psi	On rising pressure.
Neilsen Property Lead Pump Start Time Delay	0-?? sec	
Neilsen Property Lead Pump Stop Time Delay	0-?? sec	
Neilsen Property Lag Pump Start Speed Setpoint	0-?? %	On rising Pressure PID output.
Neilsen Property Lag Pump Stop Speed Setpoint	0-?? %	On falling Pressure PID output.
Neilsen Property Lag Pump Start Time Delay	0-?? sec	
Neilsen Property Lag Pump Stop Time Delay	0-?? sec	
In Plant Disposal Pressure PID Controller Deadband	0.0 psi	
In Plant Disposal Pressure PID Controller Derivative Term	0-100	
In Plant Disposal Pressure PID Controller Integral Term	0-100	
In Plant Disposal Pressure PID Controller Proportional Term	0-100	
In Plant Disposal Pressure PID Controller Setpoint	0-??? psi	
In Plant Disposal Pump Sequence Assignment	2345	Lead, Lag1, Lag2, Lag3
In Plant Disposal Lead Pump Start Pressure Setpoint	0-?? psi	On falling pressure.
In Plant Disposal Lead Pump Stop Pressure Setpoint	0-?? psi	On rising pressure.
In Plant Disposal Lead Pump Start Time Delay	0-?? sec	
In Plant Disposal Lead Pump Stop Time Delay	0-?? sec	
In Plant Disposal Lag1 Pump Start Speed Setpoint	0-?? %	On rising Pressure PID output.
In Plant Disposal Lag1 Pump Stop Speed Setpoint	0-?? %	On falling Pressure PID output.
In Plant Disposal Lag1 Pump Start Time Delay	0-?? sec	
In Plant Disposal Lag1 Pump Stop Time Delay	0-?? sec	

In Plant Disposal Lag2 Pump Start Speed Setpoint	0-?? %	On rising Pressure PID output.
In Plant Disposal Lag2 Pump Stop Speed Setpoint	0-?? %	On falling Pressure PID output.
In Plant Disposal Lag2 Pump Start Time Delay	0-?? sec	
In Plant Disposal Lag2 Pump Stop Time Delay	0-?? sec	
Maximum Pump(s) Speed	0-100 %	
Minimum Pump(s) Speed	0-100 %	
Irrigation Pump 1 Manual Speed	0-100 %	
Irrigation Pump 2 Manual Speed	0-100 %	
Irrigation Pump 3 Manual Speed	0-100 %	
Irrigation Pump 4 Manual Speed	0-100 %	

23.6.2 Return Flow Valve (MOV9234)

Valve opened (ZSO9234), valve closed (ZSC9234), valve position (ZT9234), and valve in Remote (Y9234) are inputs to PLC5.

Local

In Local, the valve is operated manually in the field from the valve operator.

Remote

In Remote, the valve follows the open control (ZO9234) and close control (ZC9234) commands from the PLC. The following control modes are available from SCADA:

Remote-Manual

In Remote-Manual, the valve can be opened or closed from SCADA.

Remote-Auto

In Remote-Auto, the valve opens to send Pond D Storage flow back to the plant. The Operator sets a flow rate and volume and the valve modulates to control flow at the flow setpoint until the volume is met.

Setpoints

The following setpoints associated with the Irrigation Return Flow valve are adjustable from SCADA:

Description	Set Point	Comments
Irrigation Return Flow Setpoint	0-??? gpm	
Irrigation Return Volume	0-??? mgal	

23.6.3 In Plant Disposal Valves (SOV9290~9299)

The ten (10) In Plant Disposal Solenoid Operated Valves feed two different Plant Zones as follows:

Description	Tag	Plant Zone
In Plant Disposal Zone 1 Valve	SOV9290	A
In Plant Disposal Zone 2 Valve	SOV9291	A
In Plant Disposal Zone 3 Valve	SOV9292	A
In Plant Disposal Zone 4 Valve	SOV9293	A
In Plant Disposal Zone 5 Valve	SOV9294	B
In Plant Disposal Zone 6 Valve	SOV9295	B
In Plant Disposal Zone 7 Valve	SOV9296	B
In Plant Disposal Zone 8 Valve	SOV9297	A
In Plant Disposal Zone 9 Valve	SOV9298	A
In Plant Disposal Zone 10 Valve	SOV9299	A

There are no field controls for these solenoid valves.

Remote-Manual

In SCADA-Manual, the valve can be opened or closed from SCADA.

Remote-Auto

In Remote-Auto, the valves open to operator-adjustable cycle start times and durations.

Setpoints

The following setpoints associated with the Irrigation Return Flow valve are adjustable from SCADA:

Description	Set Point	Comments
In Plant Disposal Zone 1 Valve Enable/Disable	0-1	
In Plant Disposal Zone 1 Valve Cycle Start Time	HHMM	
In Plant Disposal Zone 1 Valve Cycle Duration	0-999 minutes	
In Plant Disposal Zone 2 Valve Enable/Disable	0-1	
In Plant Disposal Zone 2 Valve Cycle Start Time	HHMM	
In Plant Disposal Zone 2 Valve Cycle Duration	0-999 minutes	
In Plant Disposal Zone 3 Valve Enable/Disable	0-1	
In Plant Disposal Zone 3 Valve Cycle Start Time	HHMM	
In Plant Disposal Zone 3 Valve Cycle Duration	0-999 minutes	
In Plant Disposal Zone 4 Valve Enable/Disable	0-1	
In Plant Disposal Zone 4 Valve Cycle Start Time	HHMM	
In Plant Disposal Zone 4 Valve Cycle Duration	0-999 minutes	
In Plant Disposal Zone 5 Valve Enable/Disable	0-1	
In Plant Disposal Zone 5 Valve Cycle Start Time	HHMM	
In Plant Disposal Zone 5 Valve Cycle Duration	0-999 minutes	
In Plant Disposal Zone 6 Valve Enable/Disable	0-1	
In Plant Disposal Zone 6 Valve Cycle Start Time	HHMM	
In Plant Disposal Zone 6 Valve Cycle Duration	0-999 minutes	
In Plant Disposal Zone 7 Valve Enable/Disable	0-1	
In Plant Disposal Zone 7 Valve Cycle Start Time	HHMM	
In Plant Disposal Zone 7 Valve Cycle Duration	0-999 minutes	
In Plant Disposal Zone 8 Valve Enable/Disable	0-1	
In Plant Disposal Zone 8 Valve Cycle Start Time	HHMM	
In Plant Disposal Zone 8 Valve Cycle Duration	0-999 minutes	
In Plant Disposal Zone 9 Valve Enable/Disable	0-1	
In Plant Disposal Zone 9 Valve Cycle Start Time	HHMM	
In Plant Disposal Zone 9 Valve Cycle Duration	0-999 minutes	
In Plant Disposal Zone 10 Valve Enable/Disable	0-1	
In Plant Disposal Zone 10 Valve Cycle Start Time	HHMM	
In Plant Disposal Zone 10 Valve Cycle Duration	0-999 minutes	

23.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description

PMP9211	AF9211	UA9211	0-1	# sec	Alarm, Shutdown Pump	Irrigation Pump 1 Fault
PMP9211	AR9211	X9211 N9211	0-1 0-1	# sec	Alarm, Shutdown Pump	Irrigation Pump 1 Fail to Start
PMP9211	PAH9211	PSH9211	0-1	# sec	Alarm, Shutdown Pump	Irrigation Pump 1 High Pressure Lockout
PMP9211	AIX9211	S9211	0-100%	# sec	Alarm	Irrigation Pump 1 Speed Transducer Failure
PMP9212	AF9212	UA9212	0-1	# sec	Alarm, Shutdown Pump	Irrigation Pump 2 Fault
PMP9212	AR9212	X9212 N9212	0-1 0-1	# sec	Alarm, Shutdown Pump	Irrigation Pump 2 Fail to Start
PMP9212	PAH9212	PSH9212	0-1	# sec	Alarm, Shutdown Pump	Irrigation Pump 2 High Pressure Lockout
PMP9212	AIX9212	S9212	0-100%	# sec	Alarm	Irrigation Pump 2 Speed Transducer Failure
PMP9213	AF9213	UA9213	0-1	# sec	Alarm, Shutdown Pump	Irrigation Pump 3 Fault
PMP9213	AR9213	X9213 N9213	0-1 0-1	# sec	Alarm, Shutdown Pump	Irrigation Pump 3 Fail to Start
PMP9213	PAH9213	PSH9213	0-1	# sec	Alarm, Shutdown Pump	Irrigation Pump 3 High Pressure Lockout
PMP9213	AIX9213	S9213	0-100%	# sec	Alarm	Irrigation Pump 3 Speed Transducer Failure
PMP9214	AF9214	UA9214	0-1	# sec	Alarm, Shutdown Pump	Irrigation Pump 4 Fault
PMP9214	AR9214	X9214 N9214	0-1 0-1	# sec	Alarm, Shutdown Pump	Irrigation Pump 4 Fail to Start
PMP9214	PAH9214	PSH9214	0-1	# sec	Alarm, Shutdown Pump	Irrigation Pump 4 High Pressure Lockout

PMP9214	AIX9214	S9214	0-100%	# sec	Alarm	Irrigation Pump 4 Speed Transducer Failure
LIT9251	AHL9251	?? feet	0-?? feet	# sec	Alarm	Pond D Level High
LIT9251	ALL9251	?? feet	0-?? feet	# sec	Alarm	Pond D Level Low
LIT9251	ALL9251	?? feet	0-?? feet	# sec	Alarm, Shutdown Irrigation Pumps	Pond D Level Low Low
LIT9251	AIX9251	L9251	0-?? feet	# sec	Alarm	Pond D Level Transducer Failure
LIT9252	AHL9252	?? feet	0-?? feet	# sec	Alarm	Irrigation Pump Station Hydropneumatic Tank Level High
LIT9252	ALL9252	?? feet	0-?? feet	# sec	Alarm	Irrigation Pump Station Hydropneumatic Tank Level Low
LIT9252	AIX9252	L9252	0-?? feet	# sec	Alarm	Irrigation Pump Station Hydropneumatic Tank Level Transducer Failure
PIT9261	AHL9261	??? psi	0-??? psi	# sec	Alarm	Irrigation Pumps Suction Pressure High
PIT9261	ALL9261	??? psi	0-??? psi	# sec	Alarm	Irrigation Pumps Suction Pressure Low
PIT9261	AIX9261	P9261	0-??? psi	# sec	Alarm	Irrigation Pumps Suction Pressure Transducer Failure
PIT9262	AHL9262	??? psi	0-??? psi	# sec	Alarm	Low Head Discharge Pressure High
PIT9262	ALL9262	??? psi	0-??? psi	# sec	Alarm	Low Head Discharge Pressure Low
PIT9262	AIX9262	P9262	0-??? psi	# sec	Alarm	Low Head Discharge Pressure Transducer Failure
PIT9263	AHL9263	??? psi	0-??? psi	# sec	Alarm	Neilsen Property Pressure High
PIT9263	ALL9263	??? psi	0-??? psi	# sec	Alarm	Neilsen Property Pressure Low

PIT9263	AIX9263	P9263	0-??? psi	# sec	Alarm	Neilsen Property Pressure Transducer Failure
FIT9271	AIX9271	F9271	0-???? gpm	# sec	Alarm	In Plant Disposal Flow Transducer Failure
FIT9273	AIX9273	F9273	0-???? gpm	# sec	Alarm	Neilsen Property Flow Transducer Failure
FIT9274	AIX9274	F9272	0-???? gpm	# sec	Alarm	Return Flow Transducer Failure
MOV9234	AFO9234	ZO9234 ZSO9234	0-1 0-1	# sec	Alarm	Neilsen Field Valve Fail to Open
MOV9234	AFC9234	ZC9234 ZSC9234	0-1 0-1	# sec	Alarm	Neilsen Field Valve Fail to Close
PMP9211 PMP9212 PMP9213 PMP9214	-	-	0-1	# sec	Alarm	Too Many Irrigation Pumps Running

24. MAIN GENERATOR

24.1 Process Description

A 400 kW generator provides backup power to the activated sludge and tertiary processes and the Administration Building.

24.2 Reference Drawings

Drawing Number	Description
I590	Miscellaneous P&ID

24.3 Equipment

Equipment Tag	Description
SEG5803	Standby Generator

24.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
N5803	Generator Run	0-1,1=Run
UA5803	Generator Trouble	0-1,1=Trouble
NU5803	ATS Utility Source	0-1,1=Utility
NE5803	ATS Emergency Source	0-1,1=Emergency

24.5 Final Control Element(s) Description

n/a

24.6 Control Description

n/a

24.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
SEG5803	N5803	N5803	0-1	5 sec	Alarm	Generator Trouble
SEG5803	AF5803	UA5803	0-1	5 sec	Alarm	Generator Running

25. PLC2

25.1 Process Description

PLC2 controls the Aeration Basins, Aeration Blowers, receives the Generator statuses, and receives the RAS Total Suspended Solids signal.

25.2 Reference Drawings

Drawing Number	Description
I590	Miscellaneous P&ID

25.3 Equipment

Equipment Tag	Description
PLC2	PLC3

25.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
NO3592	PLC2 UPS Run	0-1,1=Run
UA3592	PLC2 UPS Low Battery or Fail	0-1,1=Fail
RC3500	PLC2 Alarm Reset	0-1,1=Reset

25.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
PLC2 Panel Light	PLC2 Fault / Fail to Acknowledge	-	0-1,1=On	UAX3500

25.6 Control Description

n/a

25.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
PLC2 UPS	NO3592	NO3592	0-1	# sec	Alarm	PLC2 UPS Running
PLC2 UPS	ALL3592	UA3592	0-1	# sec	Alarm	PLC2 UPS Low Battery / Fail

26. PLC3

26.1 Process Description

PLC3 controls the rest of the plant outside of the Aeration Basins and Blowers.

26.2 Reference Drawings

Drawing Number	Description
I590	Miscellaneous P&ID

26.3 Equipment

Equipment Tag	Description
PLC3	PLC3

26.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
NO5500	PLC3 UPS Run	0-1,1=Run
UA5500	PLC3 UPS Low Battery or Fail	0-1,1=Fail
RC5500	PLC3 Alarm Reset	0-1,1=Reset

26.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
PLC3 Panel Light	PLC3 Fault / Fail to Acknowledge	-	0-1,1=On	UAX5500

26.6 Control Description

n/a

26.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
PLC3 UPS	NO5500	NO5500	0-1	# sec	Alarm	PLC3 UPS Running
PLC3 UPS	ALL5500	UA5500	0-1	# sec	Alarm	PLC3 UPS Low Battery / Fail

27. PLC4

27.1 Process Description

PLC4 controls the Primary Clarifier, WAS Pumps, and Trickling Filter Pump.

27.2 Reference Drawings

Drawing Number	Description
I710B	Airlift Pump Blowers P&ID

27.3 Equipment

Equipment Tag	Description
PLC4	PLC4

27.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
NSH4100	PLC4 UPS Run	0-1,1=Run
UST4100	PLC4 UPS Low Battery or Fail	0-1,1=Fail

27.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
-	-	-	--	-

27.6 Control Description

n/a

27.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
PLC4 UPS	NAH4100	NSH4100	0-1	# sec	Alarm	PLC5 UPS Running
PLC4 UPS	UAT4100	UST4100	0-1	# sec	Alarm	PLC5 UPS Low Battery / Fail

28. PLC5 (FUTURE)

28.1 Process Description

PLC5 controls the Irrigation Pump Station.

28.2 Reference Drawings

Drawing Number	Description
I922	Neilsen Property & Miscellaneous P&ID

28.3 Equipment

Equipment Tag	Description
PLC5	PLC5

28.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
NSH9100	PLC5 UPS Run	0-1,1=Run
UST9100	PLC5 UPS Low Battery or Fail	0-1,1=Fail

28.5 Final Control Element(s) Description

Equipment	Description	PV Tag(s)	Range	CV Tag(s)
-	-	-	-	-

28.6 Control Description

n/a

28.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
PLC5 UPS	NAH9100	NSH9100	0-1	# sec	Alarm	PLC5 UPS Running
PLC5 UPS	UAT9100	UST9100	0-1	# sec	Alarm	PLC5 UPS Low Battery / Fail

29. MCC4

29.1 Process Description

MCC4 powers the Primary Clarifier, WAS Pumps, and Trickling Filter Pump.

29.2 Reference Drawings

Drawing Number	Description
I710B	Airlift Pump Blowers P&ID

29.3 Equipment

Equipment Tag	Description
MCC4	MCC4

29.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
ZS9101	MCC4 Intrusion	0-1,1=Intrusion
UST9101	MCC4 SPD Trouble	0-1,1=Trouble

29.5 Final Control Element(s) Description

n/a

29.6 Control Description

n/a

29.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
MCC4	ZA9101	ZS9101	0-1	# sec	Alarm	MCC4 Intrusion
MCC4	UAT9101	UST9101	0-1	# sec	Alarm	MCC4 SPD Trouble

30. MCC5 (FUTURE)

30.1 Process Description

MCC5 powers the Irrigation Pump Station.

30.2 Reference Drawings

Drawing Number	Description
I922	Neilsen Property & Miscellaneous P&ID

30.3 Equipment

Equipment Tag	Description
MCC5	MCC5

30.4 Instrumentation (Sensing)

Instrument Tag	Name	Scaling
ZS9101	MCC5 Intrusion	0-1,1=Intrusion
UST9101	MCC5 SPD Trouble	0-1,1=Trouble

30.5 Final Control Element(s) Description

n/a

30.6 Control Description

n/a

30.7 Alarms Description

Device	Alarm (HMI Tag)	Set Point	Range	Delay	Action	Description
MCC5	ZA9101	ZS9101	0-1	# sec	Alarm	MCC5 Intrusion
MCC5	UAT9101	UST9101	0-1	# sec	Alarm	MCC5 SPD Trouble

31. IMPROVEMENT OPPORTUNITIES

31.1 Control System Architecture

Item	Date	Description
1	12/17/2017	Find copies of the Sunset and Treat Monitoring Station PLC Programs.
2	12/17/2017	Consider updating Lift Station PLCs with unique PLC (controller) names.
3	12/17/2017	Populate the PLC91 module listing table during the WWTP expansion project.

31.2 Process Feed Pump Station

Item	Date	Description
1	12/17/2017	Add AR1011 and AR1012 Fail to Start alarm configurations to SCADA.
2	12/17/2017	Add AIX1031 Bypass Valve Position Transducer Failure Alarm to SCADA.
3	12/17/2017	Add the word (Float) to the High High and Low Low Level alarms so operations knows those alarms are not coming from the transmitter.
4	12/17/2017	Delete Lag pump setpoints from SCADA.

31.3 Influent Sodium Hypochlorite (SHC) Feed System

Item	Date	Description
1	12/17/2017	Add AR1511 Fail to Start alarm configuration to SCADA.

31.4 Influent Sodium Hydroxide (Caustic) Feed System

Item	Date	Description
1	12/17/2017	Add AR1521 Fail to Start alarm configuration to SCADA.

31.5 Aeration Basins

Item	Date	Description
1	12/17/2017	Give SmokeBlowerRoom and SmokeMCC2 appropriate SCADA tagnames.
2	12/17/2017	Add transducer fail alarm for TSS.

31.6 RAS/WAS Pump Station

Item	Date	Description
1	12/17/2017	Add A4571 RAS TSS Failure Alarm to SCADA.
2	12/17/2017	Add AR4511 and AR4512 RAS Pumps Fail to Start Alarm configuration to SCADA.
3	12/17/2017	Clarify Daily Wasting Flow alarm setpoints on SCADA (“High High” and “Daily Wasting Total High”. InTouch file differs from screenshots.

31.7 Scum/Drain Pump Station

Item	Date	Description
1	12/17/2017	Add Not Ready Alarms for Pumps 1 & 2 onto SCADA.
2	12/17/2017	Add the word (Float) to the High High and Low Low Level alarms so operations knows those alarms are not coming from the transmitter.

31.8 Coagulant Rapid Mixing & Flocculation Basins

Item	Date	Description
1	12/17/2017	Add AR5011, AR5012, and AR5013 Fail to Start alarms configuration on SCADA.
2	12/17/2017	Add and Enable/Disable and a time delay for the Filter Influent Sample Pump Not Running alarm to SCADA.

31.9 Filters

Item	Date	Description
1	12/17/2017	Get commented copy of PLC programs. The programs we have are blank.
2	12/17/2017	Ensure the District has Panelview backup files from the vendor.
3	12/17/2017	Build alarms on SCADA that match the Filter Alarms on the Panelview.

31.10 Sodium Hypochlorite (SHC) Rapid Mixing

Item	Date	Description
1	12/17/2017	Change “Effluent” to “Dosing" in Chlorine Analyzer alarm descriptions.
2	12/17/2017	Add Tertiary Effluent (Dosing) Chlorine Analyzer fail alarm.
3	12/17/2017	Add AR3511 Fail to Start alarm configuration on SCADA.
4	12/17/2017	In Auto, the mixer runs continuously (Effluent SHC Pump Run qualifiers are bypassed in logic).

31.11 Sodium Bisulfite (SBS) Feed System

Item	Date	Description
1	12/17/2017	Add AR5511 amd AR5512 Fail to Start alarms configuration on SCADA.
2	12/17/2017	Fix Wonderware and PLC program documentation so that “PAC” pumps are described as “SBS” pumps.

31.12 Old Sodium Bisulfite (SBS) Feed System

Item	Date	Description
1	12/17/2017	Remove Old Sodium Bisulfite (SBS) Feed System from SCADA.

31.13 Effluent Sodium Hypochlorite (SHC) Feed System

Item	Date	Description
1	12/17/2017	Add AR5611 amd AR5612 Fail to Start alarms configuration on SCADA.

31.14 Effluent Monitoring

Item	Date	Description
1	12/17/2017	Clarify AF6031, AH6073, ABR6081 alarms.
2	12/17/2017	Add Effluent Flow Transducer Failure to SCADA setpoint page.
3	12/17/2017	There is no flow pacing in the PLC for the Sampler Pacing Signal (SMP6021).
4	12/17/2017	Remove the “Diversion Permissives” from the SCADA setpoints screen since Remote-Auto control is disabled in logic. Those permissives are not active in logic even if the Remote-Auto control were to be restored.

31.15 Plant Water Pump Station

Item	Date	Description
1	12/17/2017	Add Effluent Chlorine Residual (A6181) Transducer Failure alarm.
2	12/17/2017	Add AR6111 and AR6112 Fail to Start alarms configuration on SCADA.
3	12/17/2017	Add Plant Water Pumps Eyewash In Use Alarm to SCADA.
4	12/17/2017	Change “Plant Water Basin” to “Chlorine Contact Tank” in Wonderware tags and in the PLC program (multiple tags).

31.16 Main Generator

Item	Date	Description
1	12/17/2017	Consider alarming when the ATS is in Emergency Source position.
2	1/20/2018	Add the ATS positions to SCADA (NU5803, NE5803), drawing I590.

31.17 PLC2

Item	Date	Description
1	12/17/2017	Add “PLC2” to the front of the UPS alarm descriptions.
2	12/17/2017	Add a PLC2 comm fail alarm to SCADA.
3	12/17/2017	Consider PLC to PLC alarms (messaging). Alarm from both sides (source and destination PLC).

31.18 PLC3

Item	Date	Description
1	12/17/2017	Add “PLC3” to the front of the UPS alarm descriptions.
2	12/17/2017	Add a PLC3 comm fail alarm to SCADA.
3	12/17/2017	Consider PLC to PLC alarms (messaging). Alarm from both sides (source and destination PLC).

31.19 Notes from P&ID Review Meeting with Hugh on 1/20/2018

Item	Date	Description
1	1/20/2018	I711: We see “From WAS and Primary Sludge”, but we need to show where this comes from on the WAS P&ID.
2	1/20/2018	I714: We will need permissive logic from the Belt Filter Press for the sludge pumps. This could be a button (permissive) from SCADA. Why do we need two pumps? Hugh will discuss that with Stantec. Belt Process will be continuous once it starts and runs a few days a month. The trains will be batch processes. Add a connection/link to I100 from I714.
3	1/20/2018	It would be nice to have better controls on the primary sludge pump. In particular, a way to adjust the timing for them from SCADA.
4	1/20/2018	The District would like to get the run status from the Primary collector drive.
5	1/20/2018	I921: Consider a sensor on the hydropneumatic tank. If we need a hydropneumatic tank, we probably need confirmation that it is available before the pumps run.

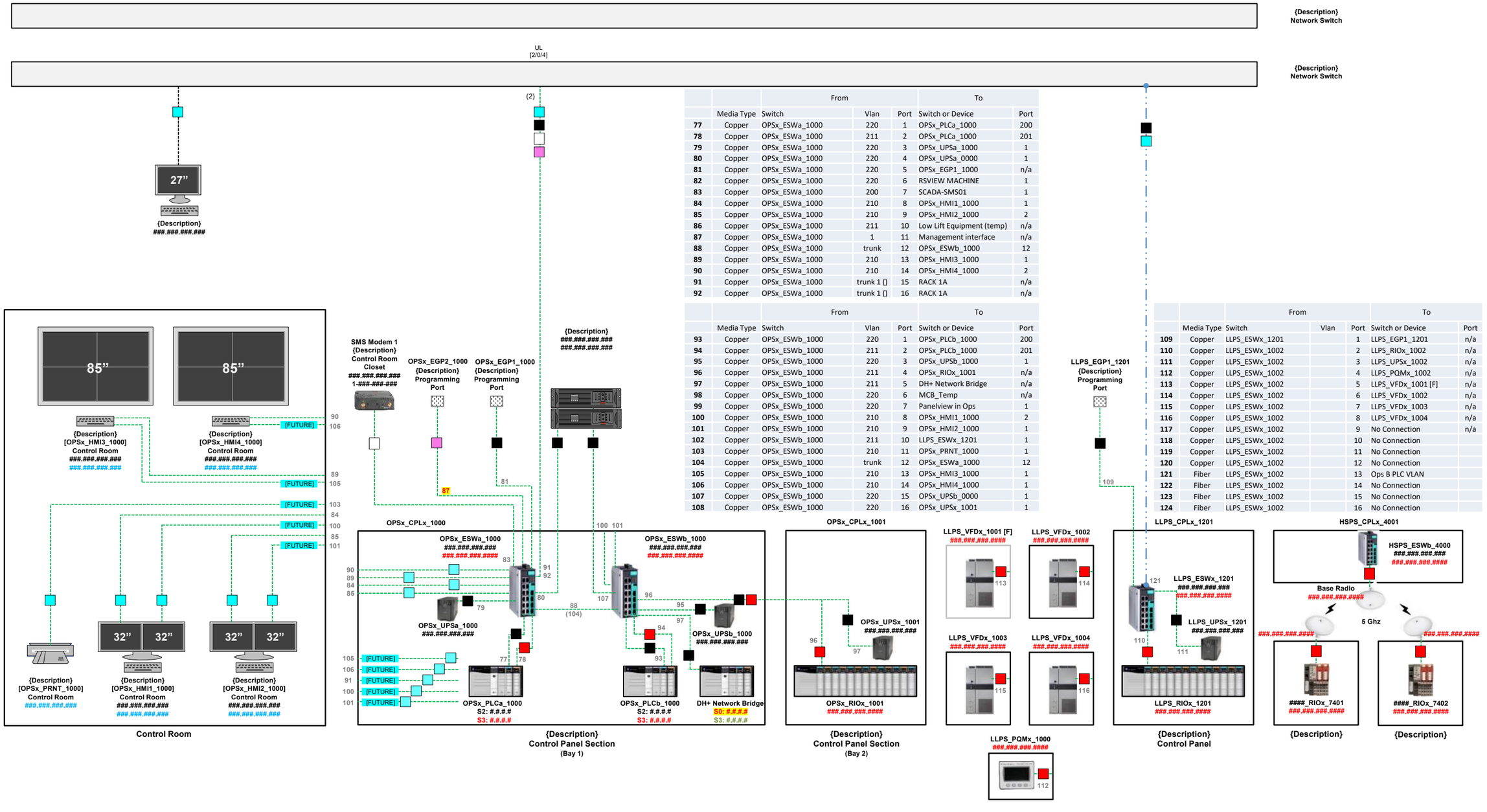
EXHIBIT A

CONTROLPOINT
ENGINEERING

Example SCADA Architecture Diagrams

EXHIBIT A

Example SCADA Architecture Diagram



		From			To	
	Media Type	Switch	Vlan	Port	Switch or Device	Port
77	Copper	OPSx_ESWa_1000	220	1	OPSx_PLCa_1000	200
78	Copper	OPSx_ESWa_1000	211	2	OPSx_PLCa_1000	201
79	Copper	OPSx_ESWa_1000	220	3	OPSx_UPSa_1000	1
80	Copper	OPSx_ESWa_1000	220	4	OPSx_UPSa_0000	1
81	Copper	OPSx_ESWa_1000	220	5	OPSx_EGP1_1000	n/a
82	Copper	OPSx_ESWa_1000	220	6	RSVIEW MACHINE	1
83	Copper	OPSx_ESWa_1000	200	7	SCADA-SMS01	1
84	Copper	OPSx_ESWa_1000	210	8	OPSx_HMI1_1000	1
85	Copper	OPSx_ESWa_1000	210	9	OPSx_HMI2_1000	2
86	Copper	OPSx_ESWa_1000	211	10	Low Lift Equipment (temp)	n/a
87	Copper	OPSx_ESWa_1000	1	11	Management interface	n/a
88	Copper	OPSx_ESWa_1000	trunk	12	OPSx_ESWb_1000	12
89	Copper	OPSx_ESWa_1000	210	13	OPSx_HMI3_1000	1
90	Copper	OPSx_ESWa_1000	210	14	OPSx_HMI4_1000	2
91	Copper	OPSx_ESWa_1000	trunk 1 ()	15	RACK 1A	n/a
92	Copper	OPSx_ESWa_1000	trunk 1 ()	16	RACK 1A	n/a

		From			To	
	Media Type	Switch	Vlan	Port	Switch or Device	Port
93	Copper	OPSx_ESWb_1000	220	1	OPSx_PLCb_1000	200
94	Copper	OPSx_ESWb_1000	211	2	OPSx_PLCb_1000	201
95	Copper	OPSx_ESWb_1000	220	3	OPSx_UPSb_1000	1
96	Copper	OPSx_ESWb_1000	211	4	OPSx_RIOx_1001	n/a
97	Copper	OPSx_ESWb_1000	211	5	DH+ Network Bridge	n/a
98	Copper	OPSx_ESWb_1000	220	6	MCB_Temp	n/a
99	Copper	OPSx_ESWb_1000	220	7	Panelview in Ops	1
100	Copper	OPSx_ESWb_1000	210	8	OPSx_HMI1_1000	2
101	Copper	OPSx_ESWb_1000	210	9	OPSx_HMI2_1000	1
102	Copper	OPSx_ESWb_1000	211	10	LLPS_ESWx_1201	1
103	Copper	OPSx_ESWb_1000	210	11	OPSx_PRNT_1000	1
104	Copper	OPSx_ESWb_1000	trunk	12	OPSx_ESWa_1000	12
105	Copper	OPSx_ESWb_1000	210	13	OPSx_HMI3_1000	1
106	Copper	OPSx_ESWb_1000	210	14	OPSx_HMI4_1000	1
107	Copper	OPSx_ESWb_1000	220	15	OPSx_UPSb_0000	1
108	Copper	OPSx_ESWb_1000	220	16	OPSx_UPSx_1001	1

		From			To	
	Media Type	Switch	Vlan	Port	Switch or Device	Port
109	Copper	LLPS_ESWx_1201		1	LLPS_EGP1_1201	n/a
110	Copper	LLPS_ESWx_1002		2	LLPS_RIOx_1002	n/a
111	Copper	LLPS_ESWx_1002		3	LLPS_UPSx_1002	n/a
112	Copper	LLPS_ESWx_1002		4	LLPS_PQMx_1002	n/a
113	Copper	LLPS_ESWx_1002		5	LLPS_VFDx_1001 [F]	n/a
114	Copper	LLPS_ESWx_1002		6	LLPS_VFDx_1002	n/a
115	Copper	LLPS_ESWx_1002		7	LLPS_VFDx_1003	n/a
116	Copper	LLPS_ESWx_1002		8	LLPS_VFDx_1004	n/a
117	Copper	LLPS_ESWx_1002		9	No Connection	n/a
118	Copper	LLPS_ESWx_1002		10	No Connection	
119	Copper	LLPS_ESWx_1002		11	No Connection	
120	Copper	LLPS_ESWx_1002		12	No Connection	
121	Fiber	LLPS_ESWx_1002		13	Ops B PLC VLAN	
122	Fiber	LLPS_ESWx_1002		14	No Connection	
123	Fiber	LLPS_ESWx_1002		15	No Connection	
124	Fiber	LLPS_ESWx_1002		16	No Connection	

PLC Architecture Diagram

Designer: Jason Foster	Revision: 6.0
Reviewer: Jeremy Pollet	Date: 01/04/2023
Job No: #####	Sheet: 1 of 5

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EXHIBIT A

CONTROLPOINT
ENGINEERING

ControlPoint Engineering Ignition® Installation Locations

EXHIBIT A

Ignition SCADA Software Installations by ControlPoint Engineering Staff

	Client	System	Address	Contact Name	Contact Title	Contact Phone	Contact Email	Number and Types of PLCs
1	City of Davis	Water System, Waste Water Collections, Storm Drain Stations	1717 5th St Davis, CA 95616	Robin Whiting	SCADA Manager	530-908-7800	RWhiting@cityofdavis.org	40+ Allen-Bradley MicroLogix 1100/1400s, SLC5/05s
2	City of Merced	Water System	1776 Grogan Ave Merced, CA 95341	Johnnie Baptista	Public Works Manager	209-384-4180	baptistaj@cityofmerced.org	30+ Allen-Bradley MicroLogix 1400/1500s, SLC5/05s
3	City of Reno	Waste Water Collections System	1 E 1st St #800 Reno, NV 89501	Dustin Water	City Engineer	775-321-8352	dwaters@reno.gov	30+ Allen-Bradley Micrologix 1400s
4	Northstar Community Services District	Water and Wastewater Collection & Treatment	900 Northstar Dr Truckee, CA 96161	Eric Martin	Engineering Manager	530-550-6133	ericm@northstarcsd.org	25+ Allen-Bradley ControlLogix, CompactLogix, Micrologix 1100/1500s, SLC5/05s
5	City of Lincoln	Waste Water Treatment Plant	1245 Fiddyment Rd Lincoln, CA 95648	Gary Hengst	Operations Supervisor	916-540-6591	gary.hengst@stantec.com	20+ Allen-Bradley ControlLogix, Micrologix 1100/1400s, SLC5/05s
6	City of Williams	Waste Water Treatment Plant	735 7th St Williams, CA 95987	Pete Garcia	Chief Plant Operator	530-723-0034	pgarcia@cityofwilliams.org	10 Allen-Bradley CompactLogix/MicroLogix 1100/1400s
7	City of Bishop	Water System, Waste Water Collections, Storm Drain Stations	377 W Line St Bishop, CA 93514	Deston Dishion	Public Works Superintendent	760-937-1335	ddishion@cityofbishop.com	8 Allen-Bradley MicroLogix 1100/1400s
8	City of Dinuba	Waste Water Treatment Plant	6675 Avenue 412 Dinuba, CA 93618	Ray Walker	Facilities Supervisor	559-591-5905	rwalker@dinuba.ca.gov	7 Allen-Bradley CompactLogix, MicroLogix 1100/1400s
9	City of Jackson	Waste Water Treatment Plant	39 North Highway 49-88 Jackson, CA 95642	Eric Neuschmid	Chief Plant Operator	209-223-1607	neuschmid.jackson.city@gmail.com	5 Allen-Bradley CompactLogix, Micrologix 1400
10	Graton Resort & Casino	Waste Water Treatment Plant	Golf Course Drive West Rohnert Park, CA	Josh Brown	Operations Manager	916-420-1966	jbrown@aqualitywm.com	5 Allen-Bradley CompactLogix, Micrologix 1100/1400s
11	City of Auburn	Waste Water Treatment Plant	10441 Ophir Rd Auburn, CA 95603	Gregory Wiltfong	Plant Supervisor	530-889-0624	Gregory.Wiltfong@CH2M.com	4 Allen-Bradley CompactLogix
12	Placer County Sewer Maintenance District 1	Waste Water Treatment Plant	Joeger / Meadow Glen Roads Auburn, CA	Gary Hengst	Operations Supervisor	916-540-6591	gary.hengst@stantec.com	2 Allen-Bradley CompactLogix, SLC5/05
13	Las Cumbres Water Company	Water Treatment Plant	18240 Las Cumbres Road Los Gatos, CA 95033	Beverly Politzer	Vice President	408-406-6366	beverly10@aol.com	2 Allen-Bradley CompactLogix, Micrologix 1400s
14	City of Dixon	Waste Water Treatment Plant	600 E A St Dixon, CA 95620	Sandy Jones	Chief Plant Operator	707-678-7059	sjones@ci.dixon.ca.us	3 Allen-Bradley CompactLogix, MicroLogix 1100s
15	Donner Summit WWTP	Waste Water Treatment Plant	53823 Sherritt Ln Soda Springs, CA 95728	Tom Skjelstad	General Manager	530-426-3456	TSkjelstad@dspud.com	2 Allen-Bradley MicroLogix 1400s
16	Donner Summit WTP	Water Treatment Plant	53823 Sherritt Ln Soda Springs, CA 95728	Tom Skjelstad	General Manager	530-426-3456	TSkjelstad@dspud.com	2 Allen-Bradley MicroLogix 1400s
17	City of Biggs	Waste Water Treatment Plant	2895 W Biggs Gridley Rd Biggs, CA 95917	Mark Sorensen	City Administrator	530-868-0100	mark@biggs-ca.gov	2 Allen-Bradley CompactLogix
18	City of Woodlake	Water and Wastewater Collection & Treatment	350 N Valencia Ave Woodlake, CA 93286	Shane Headrick	Chief Operator	559-564-8055	sheadrick@ci.woodlake.ca.us	10+ Allen-Bradley ControlLogix, MicroLogix 1100/1400s
19	Weimar Water Company	Water Treatment Plant	21540 Snooks Road Colfax, CA 95713	Gerry Labudde	General Manager	530-637-4441	glabudde@hydros-engineering.com	1 Allen-Bradley MicroLogix 1100

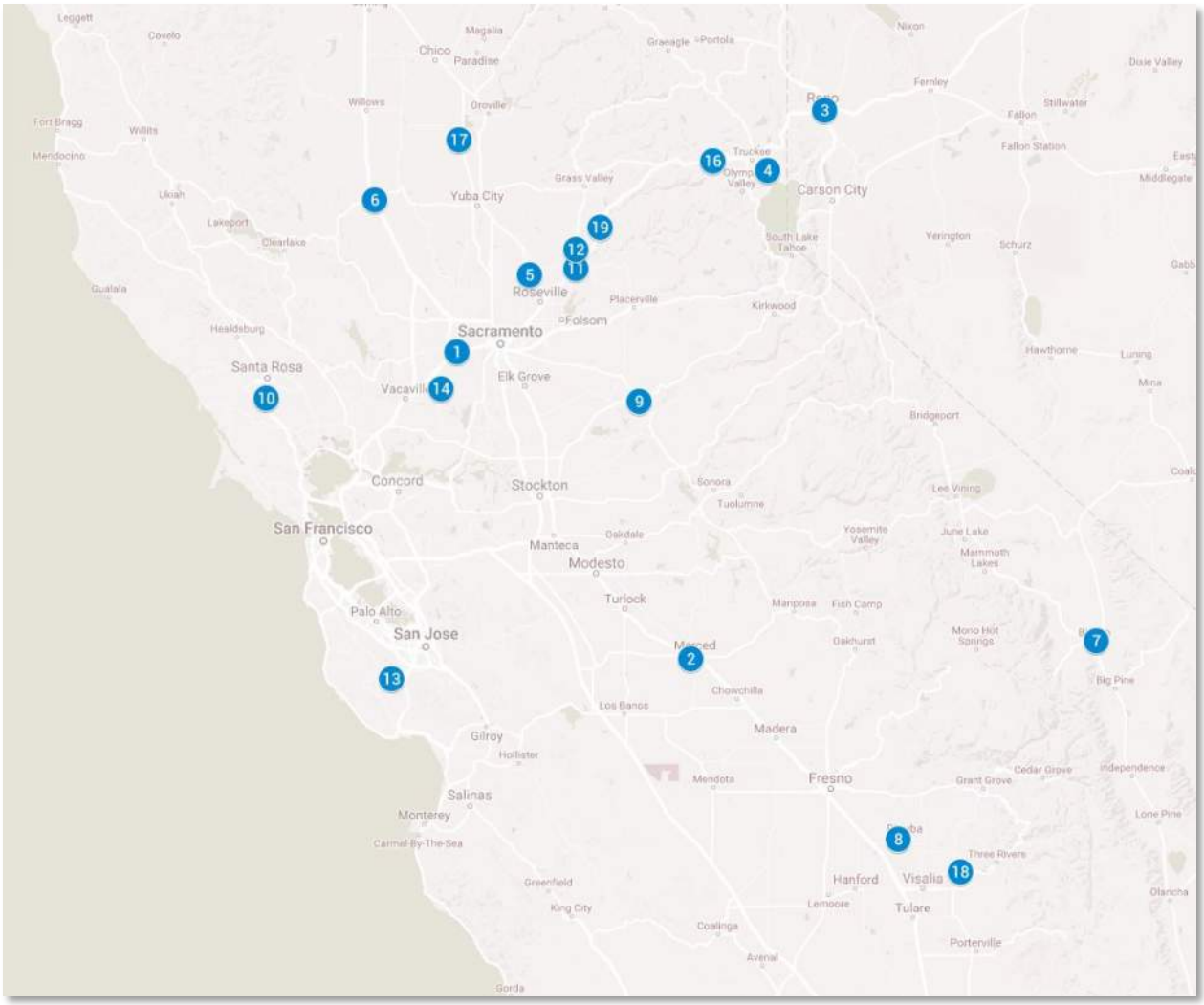
EXHIBIT A

CONTROLPOINT
ENGINEERING

ControlPoint Engineering Ignition® Project References

EXHIBIT A

Ignition SCADA Software Installation Locations by ControlPoint Engineering Staff



Legend

1. City of Davis
2. City of Merced
3. City of Reno
4. Northstar Community Services District
5. City of Lincoln
6. City of Williams
7. City of Bishop
8. City of Dinuba
9. City of Jackson
10. Graton Resort & Casino
11. City of Auburn
12. Placer County Sewer Maintenance District 1
13. Las Cumbres Water Company
14. City of Dixon
15. Donner Summit WWTP
16. Donner Summit WTP
17. City of Biggs
18. City of Woodlake
19. Weimar Water Company

EXHIBIT A

CONTROLPOINT
ENGINEERING

ControlPoint Engineering
Key Staff Resumes

EXHIBIT A

Jeremy J. Pollet, P.E., CAP

(Principal Engineer)

Summary

Jeremy has 20 years of electrical engineering consulting experience specializing in process controls and industrial automation, SCADA systems, electrical power engineering, and project management.

Jeremy's industrial sector experience includes water and wastewater treatment plants, pipelines, pump stations, electric power generation, cogeneration, discrete manufacturing, food processing, oil and gas production and refining.

Areas of Expertise

Electrical Design Engineering

- *Electrical power distribution design and analysis*
- *Electrical system modeling*
- *Single-line diagrams*
- *Motor controls, wiring schedules, load calculations, electrical specifications*
- *Economic evaluations, feasibility studies, technical memorandums, submittal reviews*
- *Pre-design and design reports*
- *Cost estimates and bid document preparation*

Process Controls / Industrial Automation

- *Hardware, software, and instrumentation specifications*
- *Piping and instrumentation diagrams (P&IDs)*
- *PLC programming (versatile experience with a wide variety of PLCs)*
- *Control panel design*
- *Communication networks design*
- *Control strategies and system documentation*
- *System startup & commissioning*

SCADA Systems

- *Process monitoring and control interface screens (multiple SCADA system packages)*
- *Database development, data collection, reporting, trending*
- *Alarm philosophies, alarm systems, auto-dialer configuration*

Project Management

- *Project definition, project scoping and estimates*
- *Resource planning*
- *Project lifecycle tracking*
- *Project reporting and analysis*

Education

Bachelor of Science, Electrical Engineering

- *University of New Orleans, New Orleans, LA*
- *Tau Beta Pi National Engineering Honors Graduate*

Registrations

Professional Electrical Engineer (PE)

- *Electrical Engineer, No. 17557, California*
- *Electrical Engineer, No. 26128, Nevada*

ISA Certified Automation Professional® (CAP)

- *Certification No. 40116*

Professional Certifications & Affiliations

- *Wonderware® Certified Developer*
- *Ignition® Certified Developer*
- *ISA Member (NorCal Section)*

Career History

Jeremy has been Principal Engineer & President of ControlPoint Engineering since 2007.

Before starting ControlPoint Engineering, Jeremy worked for other engineering and system integration consulting firms. He started out as a control systems engineer for PLCs Plus International, Inc. (Bakersfield, CA) and advanced to Lead Project Engineer before moving over to KSI Engineering, Inc. At KSI, Jeremy broadened his engineering knowledge while serving as Lead Design Engineer. For family considerations, a move to Sacramento, CA was next and Jeremy took a job with ATEEM Electrical Engineering as Engineering Design Manager. After working with ECO:LOGIC Engineering (Rocklin, CA) on several projects, he then went to work directly for them prior to starting ControlPoint Engineering.

Project Experience

For a detailed listing of project experience, please see the following pages.

CONTROLPOINT
ENGINEERING

City of Davis Public Works Department

- ***Public Works SCADA Pilot Project.*** *Designed, installed, programmed, and integrated a non-proprietary, state-of-the-art SCADA System for the City's Water Wells, Sewage Lift Stations, and Storm Drain Stations. Hardware consisted of Allen-Bradley's MicroLogix PLC Platform and Motorola Canopy Ethernet Radios that were installed on the top of the City's 125 ft Elevated Water Storage Tank.*

- ***Public Works SCADA Upgrade Project.*** *Designed, installed, developed, and integrated a new city-wide SCADA system. SCADA system architecture consisted of a two redundant servers utilizing Ignition® from Inductive Automation.*

City of Woodland Public Works Department

- ***Water Wells & Elevated Storage Tank.*** *Developed a distributed automated control system for the City's 20+ Wells and Elevated Water Storage Tank. Hardware consisted of Allen-Bradley's CompactLogix PLCs, Panelview 1000 HMIs, and GE MDS SD4 Radios. SCADA System developed in Intellution (GE/Proficy) iFIX software.*

- ***Water Pollution Control Facility – SCADA Systems Integration.*** *SCADA system development with Intellution (GE/Proficy) iFIX to accommodate the plant expansion. SCADA system architecture consisted of a primary and backup SCADA node (each running Microsoft® Windows XP), one terminal server (running Microsoft® Windows Server 2003) and one iHistorian computer (running Microsoft® Windows 2000 Professional). Workstations throughout the plant used terminal services sessions to view the plant data. SCADAlarm version 5.0 was used for alarm annunciation to the on-call operator's cell phone or pager.*

Northstar Community Services District

- ***Water Well and Storage Tanks Automation.*** *Developed PLC ladder logic and complete SCADA system for a 250 hp water well site and storage tank facility. The project involved 3 different PLCs communicating over serial radios. SCADA system was built with Wonderware® InTouch, the PLCs were Allen-Bradley MicroLogix, and the radios were from Teledesign Systems. This system will serve as a baseline for future development at the District.*

Washoe County Department of Water Resources

- ***Fish Springs Ranch Water – SCADA Systems Integration.*** *Complete automation and supervisory control for a 30 mile pipeline project utilizing Wonderware's Industrial Application Server (IAS) Platform (version 3.0, patch 1). SCADA system architecture consisted of a two servers running Microsoft® Windows Server 2003 (two IAS terminal servers – one primary and one failover/InSQL Historian). Workstations throughout the remote pipeline facilities (booster stations and well sites) used Microsoft® Remote Desktop Connections to run InTouch for Terminal Services 10.0 sessions from the primary IAS server. Allen Bradley ControlLogix Programmable Automation Controllers were polled with Kepware® TOP Server.*

El Dorado Irrigation District

- ***Electrical Power and Controls Design.*** *Licensed Electrical Engineer in responsible charge for the electrical power and controls design for a very large scale Waste Water Treatment Plant expansion. Design documents included P&IDs, electrical one-lines, electrical power plans, conduit schedules, lighting panel and power panel schedules, lighting fixture schedules, installation details, and division 16 electrical specifications. In addition to multiple individual design responsibilities, this project involved direct management and supervision of a team of design engineers and technical assistants.*

- ***Filters 1,2, & 3 PLC Upgrades.*** *Upgraded legacy Allen-Bradley PLC-5 with RIO to ControlLogix platform. Updated Wonderware System Platform objects and graphics.*

City of Merced

- ***Electrical Power and Controls Design.*** *Licensed Electrical Engineer in responsible charge for the electrical power and controls design for a very large scale Waste Water Treatment Plant expansion. Design documents included P&IDs, electrical one-lines, electrical power plans, conduit schedules, lighting panel and power panel schedules, lighting fixture schedules, installation details, and division 16 electrical specifications. In addition to multiple individual design responsibilities, this project involved direct management and supervision of a team of design engineers and technical assistants.*

- ***SCADA System Integration.*** *From 2005-2011, as part of an interim expansion project, the Phase IV expansion project, and the Phase V expansion project, the plant's automated control system was completely overhauled and updated. The plant's Allen-Bradley SLC 5/05 PLCs, FactoryTalk View SE Distributed SCADA application, and Win-911 systems were updated to control and monitor new equipment.*

CONTROLPOINT
ENGINEERING

- ***Water Department SCADA Upgrade Project.*** *Designed, installed, developed, and integrated a new city-wide SCADA system. SCADA system architecture consisted of a Microsoft Server 2012 operating system running Ignition® from Inductive Automation.*

Sacramento Municipal Utilities District

- ***SCADA Systems Maintenance.*** *Ongoing on-call contract to perform system maintenance, repair, and improvements on the District's mission-critical SCADA applications.*

Sacramento Suburban Water District

- ***SCADA Upgrade Evaluation.*** *Provided 3rd Party review, evaluation, and recommendations for SCADA Upgrade Project. Three (3) separate SCADA solutions were considered during this study.*

Reno-Stead Wastewater Treatment Plant

- ***PLC and SCADA System Rewrite.*** *In an effort to correct recurring faults and to standardize on a single programming methodology, the PLC ladder logic for 3 of the 5 plant PLCs was completely rewritten. The SCADA system was cleaned up in accordance with the operator's needs and the tagname dictionary was redirected to the new PLC registers. SCADA system was built with Wonderware® InTouch and Modicon PLCs were used throughout the plant.*

Nevada County Sanitation District

- ***Lake Wildwood WWTP – Complete Plant Automation.*** *Supervisory Control of the entire wastewater plant utilizing Wonderware's Industrial Application Server (IAS) Platform (version 2.1, patch 2). SCADA system architecture consisted of a three servers running Microsoft® Windows Server 2003 (two IAS terminal servers – one primary and one failover, and one InSQL Historian). Workstations throughout the plant used Microsoft® Remote Desktop Connections to run InTouch for Terminal Services 9.5 sessions from the primary IAS server. Allen Bradley ControlLogix Programmable Automation Controllers were polled with Wonderware® DA Server. SCADAlarm version 6.0 patch 1 was used for alarm annunciation to the on-call operator's cell phone or pager.*

City of Auburn, CA

- ***Electrical Power and Controls Design.*** *Licensed Electrical Engineer in responsible charge for the electrical power and controls design for the City's Waste Water Treatment Plant expansion. Design documents included P&IDs, electrical one-lines, electrical power plans, conduit schedules, lighting panel and power panel schedules, lighting fixture schedules, installation details, and division 16 electrical specifications.*

  Each of the following projects included contract drawings and specifications and the electrical scope included the PG&E metering section, standby generator with automatic transfer switch, pump control panel, power distribution panel, and associated generator building electrical and lighting infrastructure.

- ***Vintage Oaks Lift Station.*** *Designed the electrical facilities for a lift station featuring two (2) 110 HP sewage lift station pumps.*

- ***Falcon Point Lift Station.*** *Designed the electrical facilities for a lift station featuring two (2) 35 HP sewage lift station pumps.*

- ***Auburn Oaks Lift Station.*** *Designed the electrical facilities for a lift station featuring two (2) 30 HP sewage lift station pumps.*

- ***Montecielo Lift Station.*** *Designed the electrical facilities for a lift station featuring two (2) 5 HP sewage lift station pumps.*

City of Biggs, CA

- ***Electrical Power and Controls Design.*** *Licensed Electrical Engineer in responsible charge for the electrical power and controls design for a mid-sized Waste Water Treatment Plant expansion. Design documents included P&IDs, electrical one-lines, electrical power plans, conduit schedules, installation details, and division 16 electrical specifications.*

Tejon Ranch

- ***Water Storage and Pump Stations Control.*** *Developed wireless control and data acquisition between multiple PLCs for controlling tank levels and pump stations. Project involved PLC programming and OIT development for remote operation of pumps via control room operator interfaces.*

City of St. Helena, CA

- ***Waste Water Treatment Plant Design.*** *Licensed Electrical Engineer in responsible charge for the electrical power and controls design for a small scale Waste Water Treatment Plant expansion. Design documents included P&IDs, electrical one-lines, electrical power plans, conduit schedules, installation details, and division 16 electrical specifications.*

Madera County, CA

- ***Water Delivery System Design.*** *Licensed Electrical Engineer in responsible charge for the electrical power and controls design for a mid-sized water delivery system consisting of 4 wells, a storage tank, and booster pumps. Design documents included P&IDs, electrical one-lines, electrical power plans, conduit schedules, installation details, and division 16 electrical specifications.*

Arvin-Edison Water District

- ***Canal Check Structures.*** *Designed the electrical facilities for three water check/flow control structures. Projects included contract drawings and specifications and the electrical infrastructure included automated control panels, power distribution panels, radio telemetry, and associated area lighting.*

Aera Energy, LLC

- ***Lift Circuit Shutdown Electrical Controls and Automation.*** *Engineered an automated lift shutdown solution for three (3) production field leases. Developed electrical controls and PLC ladder logic to facilitate process-conditioned triggers to open field Reclosers. Communication media involved fiber optics and Ethernet.*
- ***Power Distribution Modeling.*** *Developed power distribution models for six substation distributions encompassing over 50 miles of production wells and facilities.*
- ***Power Distribution Consulting.*** *Provided electrical engineering recommendations for ongoing drilling program expansions including load-shifting, new transformer specifications, transformer resizing, and cost analysis.*
- ***Wastewater Wells Automation and Electrical Power.*** *Engineered and integrated a complete stand-alone solar powered station for monitoring a remote wastewater injection station. This project included a feasibility study on building new 12kV power vs. stand-alone solar power. Additional duties included developing ladder logic and a control-room SCADA system for process measurement and alarming.*
- ***Gas Plant Automation and Electrical Power.*** *Electrical engineer responsible for designing and integrating electrical and automation controls for production gas separation and cooling stations. Duties included sizing a bank of 12kV/480V transformers to feed the facility, lighting design collaboration, and developing ladder logic for PLC controls.*
- ***Vapor Recovery Automation.*** *Controls engineer responsible for automation and controls design and integration for multiple stage vapor recovery units. Duties included developing PLC ladder logic, a remote SCADA system, local operator interfaces, loop (wire) checking the entire facility, and providing startup support on a total of 12 units.*
- ***Gas Injection Wells Measurement.*** *Integrated proprietary gas flow equations into PLC ladder logic and developed process visualization for multiple gas orifice measurement locations.*
- ***Lease Automated Custody Transfer (LACT) Retrofit.*** *Developed and implemented a PLC driven automation solution for converting six (6) single customer LACT stations into multiple customer stations. Other enhancements included the addition of a charge pump boosting station, widespread monitoring, error checking, and data reporting.*
- ***Water Plant Electrical Controls Upgrade.*** *Developed the project scope, cost estimates, and engineering data for providing electrical and process controls upgrades on multiple pump stations, pipelines, and water storage tanks. Upgrades to the electrical equipment included new 4160V and 480V motor starters, controllers, breakers, and fuses. Other duties included project management and on-site startup support and commissioning.*
- ***High Pressure Crude Oil Pipeline Pumps.*** *Engineer responsible for providing automated controls for a crude oil pipeline pump station. Duties included PLC programming, VFD controls, SCADA integration, and data transfer to/from auxiliary pipeline company PLCs.*

Accuflow

- ***Multiphase Metering Systems.*** *Designed and developed PLC controls (programming logic) and supervisory data acquisition system for a patented oil and gas measurement system.*

Berkley Petroleum

- ***Well Production Facility Controls.*** *Developed operator interface applications for controlling automated production separating facilities. Start up and commissioning duties included PLC programming and instrumentation troubleshooting.*

BP Amoco

- ***RTU Retrofit.*** *Controls engineer responsible for replacement of existing gas monitoring and control RTUs for assets throughout Wyoming area. Project involved significant interaction with the BP Amoco Application Engineers in Houston to ensure*

interoperability with custom Modbus drivers and a Unix-based SCADA host server. Extensive documentation for technical support and explanations were prepared. Control logic, including process control and on-board data logging, was developed in IEC 61131-3 compliant software. Pilot unit was tested and supported on-site in Wyoming. The technology developed for this project replaced over 100 units in its first year. Up to 1100 units were targeted for replacement throughout the next few years.

Chevron USA

- ***Eastridge Cogen - Ionics Reverse Osmosis Water Filtration Automation.*** *Designed an updated automation solution to replace an antiquated logic controller on a reverse osmosis filtration station. Duties included specifying new technology, writing new PLC ladder logic, and providing startup support.*
- ***Sulferox Gas Injection Wells Automation.*** *This project involved PLC programming, wireless data transfer, startup support, detailed documentation, and SCADA system development including process screens, historical logging, and real-time and historical trending.*
- ***Liquid Production Cooling Automation.*** *Engineer responsible for designing an automated solution for thermally cooling production liquid. The scope of work involved PLC programming, operator interface development, and SCADA system integration to monitor and control several very large fin fan cooling bays. A detailed operators manual was created to outline the operation of the process and the control features that were designed into the facility.*
- ***Gas Production Cooling Automation.*** *Engineer responsible for designing an automated solution for thermally cooling liquid production. The scope of work involved PLC programming, operator interface development, and SCADA system integration to monitor and control several very large fin fan cooling bays. A detailed operators manual was created to outline the operation of the process and the control features designed into the facility.*
- ***Water Plant SCADA System Integration.*** *Systems integrator responsible for designing a complete SCADA system for a very large scale, multi-lease produced water filtration plant. The overhaul of this SCADA system involved new graphics, database, and I/O servers to support a new plant PLC and distributed remote I/O.*
- ***Fresh Water Pipeline Automation.*** *Controls engineer responsible for complete automation of a 10-mile water pipeline including a well pump station, water storage facility, and a pipeline pump station. Both the wellhead and the storage site were locally controlled with operator interfaces and remotely controlled and monitored via a SCADA system. Data was gathered via wireless Ethernet communications.*
- ***Caustic Soda Storage and Mixing Station Automation.*** *Controls engineer responsible for the complete automation of a hazardous material receiving and handling facility. Project involved a storage facility and automated mixing stations.*
- ***SO2 Gas Scrubber Automation.*** *Controls engineer responsible for the complete automation of a sulfur dioxide removal facility. Project involved automating a large exhaust gas scrubber vessel and several auxiliary vessels and pumps. SCADA integration involved extensive historical reporting and alarming for the Air Pollution Control District.*

Chevron Texaco

- ***Sulferox Plant SCADA System Integration.*** *Controls Engineer responsible for complete overhaul of antiquated HMI SCADA system. New OPC based SCADA system development included process screens, alarming, remote alarm paging, trending, data logging, event logging, and alarm logging.*
- ***Cogen Feed Water Control and Steam Measurement.*** *Responsibilities included developing PLC logic for controlling feed water pumps, calculating steam flow, steam quality (and control), and calculating branch allocations. Several operator interfaces for steam measurement and feed water pump control were used throughout the plant for monitoring and control.*
- ***Brinks Filter Automation.*** *Controls engineer responsible for the complete automation of an exhaust gas particulate filtration system. Project highlights for this very large scale project include motor monitoring and controls for a 600 HP filtration fan motor, multi drop PLC-PLC communication network design and integration, and complex steam generator volumetric controls. SCADA integration involved extensive historical reporting and alarming for the Air Pollution Control District.*
- ***Wireless Geothermal Steam Distribution Measurement.*** *Controls engineer responsible for designing and implementing a controls solution for data processing and measurement on over 30 patented steam splitter systems. A PLC was employed as a data concentrator for calculating steam flow, steam quality, and branch allocations. Analog data from the splitters was gathered via wireless transmitters and sent back to a single point*

data hub. The SCADA system involved an extensive graphic interface, detailed data realization, and wireless PDAs for mobile "on-the-go" alarming and monitoring.

City of Delano

- ***Electrical Power Consulting.*** *Provided electrical engineering design reviews for other consultant's designs.*

EOG Resources

- ***Oil and Gas Processing Plant Automation.*** *Systems integrator responsible for developing a complete automation solution for PLC control of an oil and gas processing plant. The facility size warranted the use of two PLCs, each containing a large quantity of I/O. This project involved an extensive amount of PLC programming. Worked closely with team members in developing the plant SCADA system.*

GM Motors

- ***Conveyor Controls and Automobile Part Testing Stations.*** *Systems integrator responsible for developing ladder logic for three (3) separate PLCs controlling conveyor movements, stop gates, part testing and verification, and pass/fail result logging.*

Grimmway Farms

- ***Cold Storage Room Humidity Controls.*** *Systems integrator responsible for developing an operator interface for alarming and monitoring of several cold storage room controls.*

San Joaquin County – Flag City Wastewater Treatment Facility

- ***Electrical Power and Controls Design.*** *Licensed Electrical Engineer in responsible charge for the electrical and control system improvements for a regulatory compliance improvement project. Design documents included electrical one-lines, electrical power plans, conduit schedules, lighting panel and power panel schedules, installation details, and division 16 electrical specifications.*

EXHIBIT A

Jason Foster

(Lead SCADA Developer)

Summary

Jason has 16 years of Information Technologies and Software Development experience with process controls and industrial automation, SCADA systems, database technologies, computer networks, and web applications.

His industrial sector experience includes water and wastewater treatment plants, pipelines, pump stations, and power plants.

Jason is experienced in website publishing for industrial clients and creates custom dynamic web-based applications utilizing database technologies with an emphasis on simplicity and functionality.

Areas of Expertise

SCADA Software Development

- *Wonderware® ArchestrA and InTouch*
- *Inductive Automation Ignition®*
- *Rockwell® FactoryTalk® Studio*
- *GE iFix*

Process Controls / Industrial Automation

- *Hardware, software, and instrumentation specifications*
- *Piping and instrumentation diagrams (P&IDs)*
- *PLC programming (versatile experience with a wide variety of PLCs)*
- *Control panel design*
- *Communication networks design*
- *Control strategies and system documentation*
- *System startup & commissioning*

SCADA Systems

- *Process monitoring and control interface screens (multiple SCADA system packages)*
- *Database development, data collection, reporting, trending*
- *Alarm philosophies, alarm systems, auto-dialer configuration*

Web/Desktop Applications

- *PHP*
- *JQUERY*
- *AJAX*
- *ASP*
- *Java*
- *C#*
- *PERL*
- *Python*

Professional Certifications & Affiliations

- *Wonderware® Certified Developer*
- *Ignition® Systems Integrator*

Career History

Jason joined ControlPoint Engineering in 2017 as Lead SCADA Developer. Before then he worked at Stantec Consulting Services as a SCADA Specialist / Software Developer and Information Technologies professional.

Throughout his career Jason has used his creativity and enthusiasm to develop a number of custom websites. These websites have ranged in functionality and purpose - from custom SCADA applications to productivity tools.

Project Experience

For a detailed listing of project experience, please see the following pages.

CONTROLPOINT ENGINEERING

Jason Foster
(Lead SCADA Developer)

Donner Summit

- ***Waste Water Treatment Plant Expansion Project.*** *Provided PLC and SCADA development by utilizing Allen Bradley CompactLogix PLC's and a redundant Inductive Automation Ignition System. The Donner Summit Plant is one of the most sophisticated wastewater plants this side of the Sierra Mountains and is the first to provide effluent for recreational skiing.*

South San Joaquin Irrigation District

- ***Division 9 Irrigation Enhancement Project.*** *Worked with district staff to design and implement the Division 9 Pressurized Irrigation System. Performed all programming on the Farmer/District web application, created tools and security methods to transfer data to and from SCADA and provide ongoing support and improvements to this award winning system.*

Dixon, CA

- ***Waste Water Treatment Plant.*** *Provided PLC/SCADA programming during plant buildout. This project built a new WWTP at the site of the city's old WWTP. Provided all PLC and SCADA programming related to the project. The system relies on Rockwell Automation CompactLogix PLC's, Inductive Automation, and a high availability virtualized server infrastructure running VMWare. Assisted with networking, security and VPN configuration.*

Reno, NV

- ***Lift Station Upgrade Project.*** *30 Lift Stations were upgraded to Allen Bradley MicroLogix 1400 PLC's, the existing Motorola Moscad radio system was replaced by 32 cellular modems which provide encrypted IPSec Tunnels back to a redundant Inductive Automation Ignition SCADA system. Provided all PLC programming, SCADA development as well as all networking, security configuration and VPN deployment. This project was unique as it is a fully redundant SCADA system with physically separated nodes, a third "Nuclear SCADA in a Box" system was also provided. Allowing staff the ability to operate SCADA independantly of the two main redundant nodes in the event of an attack or massive city network failure.*

Pinto Valley, AZ

- ***Copper Mine Restart Project.*** *Wonderware Archestra with over 30,000 hard I/O points, developed internal tools to keep the large programming team focused (14 programmers). Developed an automatic code generator utilizing PHP/MSSQL responsible for writing 80% of the boilerplate code. Responsible for fiber network, redundant server hardware, 14+ thin-clients as well as SCADA development. The $4.5 million dollar SCADA project was completed on time.*

Truckee, CA

- ***South Truckee Meadows Pilot Project.*** *The South Truckee Meadows Pilot Project's (STMWRF) main goal is the optimization of ozone-BAC treatment process for potable reuse applications. Developed the MySQL database, offsite storage, website (visualization and backend) for company staff and pilot partners. As the pilot project needs to be constantly monitored the site was developed to include a custom alert notification system to intelligently notify selected users any time an alert is generated. The project utilizes a secure cellular modem for data collection, MySQL, PHP, AJAX, CSS as well as HTML5.*

Lincoln, CA

- ***Waste Water Treatment Plant.*** *Jason is the City of Lincoln's sole-source integrator and IT architect for the Waste Water Treatment Plant. He has performed multiple Wonderware SCADA Upgrades at the City of Lincoln WWTP over the years. The Lincoln plant is very similar in size and complexity to the City of Tracy WWTP. The SCADA system has redundant servers, a Historian, three control room workstations, and over a dozen client terminals.*

EXHIBIT A

Matt Boring

(Engineering Design Manager)

Summary

Matt has 35 of experience with electrical and control design and construction management specific to the water and wastewater industry.

His industrial sector experience includes water and wastewater treatment facilities, conveyance pipelines, pump stations and SCADA systems.

Matt is known for working collectively with contractors and owners to resolve issues and keep projects on schedule. His good nature and experience during all project phases from planning through implementation contribute to his success. Matt enjoys seeing projects through to completion with satisfied owners and contractors.

Areas of Expertise

Engineering and Design

- *Single Lines and load calculations*
- *Site planning*
- *Conduit and conductor design*
- *Power and control specifications*
- *System startup & commissioning*
- *Power and controls trouble shooting and repair*

Process Controls / Industrial Automation

- *Hardware, software, and instrumentation specifications*
- *Piping and instrumentation diagrams (P&IDs)*
- *Control panel design, construction and installation*
- *Communication networks design*
- *Radio path surveys*
- *Control strategies and system documentation*
- *System startup & commissioning*
- *Control system trouble shooting and repair*

Construction Management/Engineering services

- *Submittal review*
- *Construction cost review*
- *Schedule review*
- *On-site observation/electrical inspection*
- *System startup & commissioning*
- *Factory witness testing for electrical and controls*
- *On-site witness testing for electrical systems*
- *Field documentation/reporting*

Professional Certifications & Affiliations

- *NFPA® #2513896*
- *Ignition® Systems Integrator*

Career History

Matt joined ControlPoint Engineering in 2017 after 12 years with Stantec as a project manager/Senior SCADA specialist. During his time at Stantec Matt was responsible for many water and wastewater electrical and SCADA projects including design, construction management and electrical inspection. Prior to Stantec, Matt was the field manager for local Electrical Engineering and Management Consultant, A TEEM. Prior to A TEEM Matt was employed by El Dorado Irrigation District (EID). During his time at EID, Matt had many roles including; system mechanic, crane truck operator, electrician, electrical inspector for contractor installed systems as well as SCADA and instrument technician. Before his time at EID, Matt worked as an electrical contractor and business owner.

Throughout his career Matt has used his talents to see hundreds of water and wastewater project to completion from varying perspectives, as owner during his time in the public sector, as contractor from his construction experience, and presently from the consultant viewpoint. This wide range of experience and his desire to serve his client provides great value to any project.

Project Experience

For a detailed listing of project experience, please see the following pages.

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Matt Boring
(Engineering Manager)

Matt Boring

City of Reno

- ***2015 SCADA Improvements.*** *Acted as lead designer, construction manager and inspector for the electrical and instrumentation upgrade to thirty of the City's sewage lift stations. The new $1.2 million system replaced Motorola MOSCAD controllers and serial radio network. The new system is comprised of Allen Bradley controller connected by Cellular routers and was completed in house. System is built on an enterprise Inductive Automation Mission Critical Ignition system spanning the City Hall and Corporation yard, system includes a completely redundant system with backup SMS alarm and Voice modems.*

City of Woodlake

- ***Phase 1 Waste Water Treatment Plant Improvements.*** *Acted as the peer design reviewer and electrical and instrumentation inspector for the City's WWTP improvements project. Matt was also responsible for startup and testing activities as well as overseeing the SCADA system development and installation. The project utilized Inductive Automations Ignition SCADA application which included a complete Mission Critical redundant system.*

- ***Potable Water Improvements.*** *Matt was responsible for securing the $200,000 Water system improvements project currently in the final design phase. The project includes replacing the control panels for seven well sites, two new well sites and two storage tanks. The remote sites will be integrated into the existing Ignition SCADA system at the recently expanded Wastewater Treatment Facility. The sites are connected via an Ethernet radio network relayed through a centrally located polling mater PLC at the corporation yard. Matt will be providing design services as well as building and installing the new control panels.*

City of Live Oak

- ***Waste Water Treatment Plant Upgrade.*** *Served as electrical inspector and SCADA installation manager for a $17.7 million tertiary wastewater treatment plant upgrade project at the City's existing aerated pond treatment plant. The plant improvements include influent flow mechanical screening, extended air activated sludge (nitrification) secondary treatment, flow equalization, cloth disk tertiary filters, UV light disinfection, effluent pumping, integrated Wonder Ware SCADA system upgrade and improvements that include several off-site facilities.*

City of Auburn

- ***Waste Water Treatment Plant Upgrade.*** *Acted as the lead designer and electrical and instrumentation inspector for the electrical design of the $4.5 Million improvements project consisting of a new UV disinfection system, RAS pump station, SCADA and electrical system modifications and oxidation ditch energy efficiency improvements as well as a new secondary clarifier. Matt also preformed Field and factory testing as well as startup services for the project. Matt was responsible for managing the PLC programming and SCADA system integration. The SCADA system was converted from a Data Flow Systems to Inductive Automations Ignition redundant application as a part of the WWTRF expansion. System included the integration of three Allen Bradley PLC's connected by an Ethernet fiber network as well as a serial radio link to remote sites*

City of Colusa

- ***Waste Water Treatment Plant Upgrade.*** *Served as Electrical Inspector and start up coordinator for the electrical facilities for a new $15.3 million tertiary wastewater treatment plant that replaced the City's existing pond treatment system. The new plant included influent pumping, mechanical screening, extended air activated sludge (nitrification) secondary treatment, flow equalization, cloth disk tertiary filters, UV light disinfection, effluent pumping, aerated lagoon sludge storage, Managed and commissioned the installation of the Allen Bradley Control system with a Wonderware Interface.*

City of Woodland

- ***Waste Water Treatment Plant Expansion.*** *Served as electrical designer collecting all field data for the electrical design. During construction Matt acted as electrical inspector on the $27 million 2005-2007 City of Woodland WWTP Expansion. The project involved construction of a new oxidation ditch, secondary clarifiers, new cloth media filtration, and UV light disinfection. Matt also managed the upgrade of the City's iFix SCADA System.*

- ***Well SCADA System.*** *Matt was responsible for engineering services during the construction including Submittal review, electrical inspection as well as contractor coordination with City operations group. Matt's team also provided integration services for this $1.2 million project. Project included the retrofit of the City's existing 17 well sites included integrating a new serial radio system*

CONTROLPOINT
ENGINEERING

into the existing iFix SCADA application utilizing Allen-Bradley Automation Controllers.

City of Lincoln

- ***Waste Water Treatment Plant Upgrade.*** *Served as associate electrical inspector on the $60 million City of Lincoln Wastewater Treatment and Reclamation Facility. Performed all witness and field testing for the electrical system including startup of the Cities Wonderware SCADA system.*

Midwestern Placer Regional

- ***Waste Water Treatment Plant Expansion.*** *Matt provided instrumentation and SCADA system design for this multi-faceted $19 million regionalization project, which included a 29.5 MGD pump station, conveyance pipeline with odor control facility and an expansion of the City of Lincoln Wastewater Treatment and Reclamation Facility. Matt was responsible for engineering services during construction for all instrumentation and SCADA portions of the project. He was also responsible for managing PLC control programming for the Allen Bradley control system and all Wonderware and Ignition SCADA integration. Project scope has since been modified to include a complete SCADA system upgrade to the Inductive Automations Ignition SCADA application which included approximately 24,000 tags.*

City of Jackson

- ***Waste Water Treatment Plant Improvements.*** *Matt designed and installed an entry level SCADA system complete with new PLC control panels and instrumentation. The system was designed with the intent of expansion over the next several years. Initial cost for the complete turnkey system was approximately $50,000. Since inception, Matt has provided improvements that include flow paced filter coagulant feed and rapid mixing. Matt is currently providing peer review services to the City for the plants 2017 expansion project and is contracted to provide SCADA integration for the expansion.*

City of Angels

- ***Waste Water Treatment Plant Expansion.*** *Matt designed the electrical, instrumentation and control system for the City's new Ultraviolet Disinfection system. Project included integration with existing plant electrical and control system. Matt provided engineering services as well as electrical inspection and was responsible for the management of startup, as well as the testing and integration of the Wonderware HMI.*

- ***Spray Field Improvements.*** *Matt designed the electrical, instrumentation and control system for City's new land disposal system. The project included integration with the existing plant's electrical system and Allen Bradley control system via a new 450MHz serial radio system. Radio system was designed with future integration of the City Water Treatment Plant and outlying remote facilities. Matt provided engineering services as well as electrical inspection during construction, and was responsible for the management of startup, testing and integration of the Wonderware HMI. Project utilizes Allen Bradley Automation controllers communicating via 450 MHz serial radios.*

City of Woodland

- ***Waste Water Treatment Plant Expansion.*** *Served as electrical designer collecting all field data for the electrical design. During construction Matt acted as electrical inspector on the $27 million 2005-2007 City of Woodland WWTP Expansion. The project involved construction of a new oxidation ditch, secondary clarifiers, new cloth media filtration, and UV light disinfection. Matt also managed the upgrade of the City's iFix SCADA System.*

Zone 7 Water Agency

- ***Chain of Lakes Well No. 5 Facility.*** *Design of the electrical and control systems for groundwater pump station and piping to connect to existing raw water transmission line. Project entailed a 500HP municipal production wells , well building, and remote communication over a fiber optic network. Final well production ranged to 1,500 gpm. Matt worked closely with Contractor and Agency staff to design improvements in an expedited design/build project approach.*

Placer County Water Agency

- ***Zone 1 Improvements Project.*** *Design of electrical and control systems to retrofit existing 900 gpm drinking water well and disinfection system and new 900 gpm drinking water well on separate site. These wells are utilized to supplements the existing PCWA drinking water distribution system in western Placer County.*

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Matt Boring
(Engineering Manager)

City of Bishop

- ***Water System SCADA Improvements.*** *Served as project manager and lead designer for the City's turn turnkey $175K SCADA installation. Initial system included five facilities communicating via licensed 250mHZ serial radios. System includes integration of Inductive Automation's Ignition Java based SCADA platform communication with Allen Bradley PLC's in the field. Project has evolved since inception to include a total of eight facilities including the City's wastewater treatment facility. Improvements include energy efficiently controls which have saved the City approximately 30% in utility charges for the Well 2 facility. Matt with cooperation from the City installed the complete system without the need to outsource any construction activities.*

Las Cumbres Mutual Water Company

- ***Slow Sand Filtration Project.*** *Matt was responsible for electrical, controls and SCADA system design as well as engineering services during construction and electrical inspection. Matt preformed startup and commissioning of the of this $1.2 million project which included the in house integration of new and existing Allen Bradley Controllers into a new Inductive Automatons Ignition SCADA HMI. Project is currently in the final stages of commissioning.*

Graton Casino and Resort

- ***Water Filtration Project.*** *Matt was responsible for electrical, controls and SCADA system startup and commission of the of this $1+ million project which included the in house integration of Allen Bradley Controllers into a new Inductive Automatons Ignition SCADA HMI. Matt also provided coordination with the contractor for construction and startup activities.*

Northstar Community Service District

- ***SCADA Replacement Project.*** *Matt was responsible for securing the $210,000 NCSD Wonderware and iFix conversion to Inductive Automations Ignition SCADA application. The project includes combining the existing NCSD Wonderware system and the recently acquired PCWA Zone 4 facilities. The combined tag count is approximately 16,000 tags and includes approximately 15 facilities. The two existing system will be connected by a new T-1 communication line with a backup cellular network connection. Project included field study to collect I/O information and all relative as-built drawings and PLC programs. This information was utilized to develop a technical memo with recommendation to convert to Ignition based on a ten-year cost of ownership study.*

Northstar Community Service District

- ***PLC Replacement Project.*** *Matt is responsible for planning, design and implementation of the Districts Programmable Logic Controller (PLC) replacement project. This ongoing project to replace the Districts legacy PLC's and Operator Interfaces (OIT's) that are now longer support will be phased over the next several budget cycles.*

San Francisco PUD

- ***Harry Tracy WTP Pilot Filter Rehabilitation Project.*** *Matt was responsible completing the rehabilitation of the plant's pilot filtration system. The system consisted of four sand filters including instrumentation and control systems. Matt was responsible for installing piping, instrumentation and configuration of the system. Filter feed pumps modulated to maintain constant flow to the filters with modulating effluent valves to maintain a constant head on the filters for process experimentation/validation. All instrumentation was connected to a data recorder via mA control loops and Modbus RTU serial communications.*

Truckee Meadows Water Authority

- ***Mt. Rose Water Treatment Facility Construction Assistance*** *Matt was engaged by the TMWA to assist their on-staff construction manager to assist with coordination between the design consultant the construction contractor. Duties will include detailed submittal reviews for electrical and controls equipment, change order cost reviews, assistance with contractor coordination, electrical observation/inspection and startup and commissioning. Project is currently in the construction phase and scheduled to be completed early 2020.*

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ENGINEERING

EXHIBIT B

CITY OF COLFAX

STATE OF CALIFORNIA

REQUEST FOR PROPOSALS

SUPERVISORY CONTROL AND DATA ACQUISITION UPGRADE FOR THE CITY'S WASTEWATER TREATMENT FACILITY

July 2023

SWRCB Project No. C-06-8479-210
Construction Agreement No. D2101007
City Project No. 575

EXHIBIT B

Contents

EXHIBIT B

APPENDICES

1 INTRODUCTION & PROJECT SUMMARY

The objective of this Request for Proposal (RFP) is to identify and select the most qualified Supervisory Control and Data Acquisition (SCADA) professional to install and program the City Programmable Logic Controllers and SCADA personal computer running the latest version of Ignition® from Inductive Automation (Ignition System).

Contractor is to provide costs and a schedule for all labor to complete the work described in this RFP, including but not limited to:

1. Project Management
2. Control Strategies
3. SCADA Architecture Diagrams
4. Control Panel Factory Testing
5. Hardware Configuration & Installation
6. PLC Programming
7. SCADA Application Development
8. Software Testing
9. System Commissioning
10. Training
11. Equipment & Materials (limited)

1.1 Project Description

The City of Colfax is located in Placer County serving a community of approximately 2000 residents. The City operates and maintains a wastewater treatment plant and four sewer pump station Figure 1 shows the location of the City's wastewater treatment plant (WWTP). The facility operates 24 hours a day, 365 days a year.

The new Ignition System will replace two SCADA systems providing process visualization, local alarming, and data acquisition. The first system is an older, outdated Citect software application running on an aging PC. The second is an HT3 software application running on proprietary hardware from Data Flow Systems (DFS). Both systems provide similar functions; however, neither is an all-in-one solution for the plant and the collections system. There are some functions the Citect system has that the HT3 system does not; however, the HT3 system is the most complete and the major difference is that it provides process visualization and control for the off-site sewage lift stations. Operations staff must use a combination of both systems to perform supervisory control and data acquisition functions at the WWTP.

This project will be completed in conjunction with construction of a new treatment process titled "Algae Reduction Project." The Algae Reduction Project will supply all hardware (PLCs and PCs) and software licenses (Ignition) to run the new equipment and the SCADA system. The new Ignition System will connect to every existing and new PLC at the plant and the City's lift stations. It will be developed in close coordination with City staff to ensure the system meets Operational needs. As part of this project, the Consultant will write code for the new Programmable Logic Controllers (PLCs).

The City has funding through a Clean Water State Revolving Fund (CWSRF) grant provided by the State Water Resource Control Board (SWRCB). It is expected that the services described herein shall be performed by qualified professionals employed by the firm bidding the project. If exceptions are allowed then nothing contained herein shall create any contractual relationship between the City and subcontractors, or suppliers of the principal entity.

The Contractor shall provide all labor, supervision, materials, tools, equipment, transportation; project management, insurance, etc. for all work described herein specified and or required to complete the project to the City's satisfaction.

1.2 Site information

The location that the Ignition System will be located in at the WWTP within the main monitoring and control building. The PLCs are located throughout the City, including four sewer pump stations at various remoted locations and 7 are at various locations on the WWTP property.

Bidders that were selected to receive this RFP through the Request for Qualifications have previously familiarized themselves with the site(s) during a site walk on July 20, 2023. Bidders may make one follow-up visit with 72 hours advanced notification and scheduling with City staff. A request to visit the sites shall be made to **Jim Fletter, Project Manager, at jfletter@woodrodgers.com**.

2 PERFORMANCE SPECIFICATIONS

2.1 Project Management.

The contractor shall include time for project update meetings and ongoing project-related correspondence and coordination throughout the anticipated 12-month duration of the project. Update meetings, correspondence, and coordination will be required with City staff, the Algae Removal Project Contractor, and the Design Engineers. Provide monthly progress reports, track action items, and log decisions made throughout the project.

2.2 Control Strategies

The contractor shall develop control strategies. A detailed Control Strategy document provides an Operational handbook for the plant. For this project, it will also serve as the baseline for the PLC programming and SCADA application development activities required for the Algae Removal Project.

Contractor will provide a comprehensive Control Strategy document for the entire plant. All existing and new plant equipment, instruments, process variables, and control options will be detailed within this document.

2.3 SCADA Architecture Diagrams

The contractor will develop SCADA architectural diagrams for the plant showing all devices connected to the plant along with their descriptions, model numbers, IP addresses, port assignments, and communication media. Contractor may visit the plant to capture the details on existing equipment to help develop these diagrams.

2.4 Control Panel Testing

Three of the four new control panels provided by the Algae Removal Project will contain contractor-provided PLCs programmed by the bidding contractor for three of the new panels:

- Main Plant Control Panel
- Pond 3 Irrigation Booster Pump Station Control Panel
- Chlorine Contact Basin Pump Station Control Panel

Contractor will participate in Factory Testing activities at the Contractor's system supplier panel shop for these Control Panels by installing their new PLC programs into the Contractor-provided PLCs and working with the Contractor's system supplier to test that the panels have been fabricated properly and the internal panel wiring interfaces properly with the PLC.

2.5 PLC Programing

Contractor will write new PLC programs for the Algae Removal Project in accordance with the Control Strategies developed in Task 2.2.

- Main Plant PLC
- Pond 3 Irrigation Booster Pump Station PLC
- Chlorine Contact Basin Pump Station PLC

The existing Belt Press Control Panel will be reverse-engineered in the field in order to provide a PLC memory map for the undocumented PLC code. A memory map (i.e. documented ladder logic) is required in order to provide process visualization and alarming of the new algae panel and existing Belt Press system on SCADA.

2.6 Hardware Configuration

Contractor will install and configure the base operating system (OS) and all required Ignition® software modules on the new SCADA server provided by the Algae Removal Project Contractor. Contractor will setup server diagnostics and provide configuration to automatically backup the critical software elements to a city-provided offsite location.

Contractor will setup, configure, and field test all equipment they provide:

Base Radio (1)
- Directional Radios (4)
- WiFi Access Points (6)
- Communications Router (1)
- SMS Alarm Modem (1)
- Surface Pro Tablets (2)
- MicroLogix 1400 PLC (1) (replaces the serial-only MicroLogix 1000 PLC at the Headworks)

The tablets and hotspots provide a mobile SCADA solution for Operations staff while at the plant. The communications router provides a secure connection to the plant for outside remote access and handles all of the on-plant data traffic. The SMS alarm modem delivers alarms generated by the SCADA software to the Operator's phones.

2.7 SCADA System Development

Ignition® tags and graphics may be developed to visualize and control a total of eleven (11) PLCs:

Main Plant PLC Processes (Influent Pumps, Plant Water Pumps, Analytics)

- Pond 3 Irrigation Booster Pump Station
- Chlorine Contact Basin Pump Station
- Air Flotation System
- UV System
- Belt Press
- Headworks
- Lift Station 1
- Lift Station 2
- Lift Station 3
- Lift Station 5

Additional elements of the new SCADA application include the following:

- Plant Overview
- Lift Station Communications (configurable polling engine page with statistics)
- Alarm Configuration Pages
- Alarm Summary & History
- Historical Trends and data base management
- Daily & Monthly Reports

2.8 Software Testing

Contractor shall bench test all new PLC code against the new SCADA application, field test the air flotation system's vendor- provided PLC code with the new SCADA application, and field test the existing PLCs with the new SCADA application. Contractor will include 24 hours of additional PLC code and SCADA application development time in this task for additional requests from the City.

2.9 System Commissioning

Contractor will loop check each I/O point coming into the Main Plant PLC, Pond 3 Irrigation Booster Pump Station PLC, and Chlorine Contact Basin Pump Station PLC, to/from the corresponding field device or motor controls, into the PLC, and into the SCADA application. After the loop checks the functionality of the PLC code and SCADA application will need to be tested and then demonstrated to the Operating staff for acceptance training. Contractor will anticipate minor punch-list items and small iterations until the City provides a formal acceptance of the system.

Additionally, some loops may requiring tuning via experimenting with setpoints to find the most workable system setpoints.

2.10 Training

Contractor will provide onsite SCADA application training sessions for operations staff. These training sessions should focus on the capabilities and features of the new SCADA application components. Minimal eight hours of training. Provide training schedule and syllabus.

2.11 Materials

While the Contractor is not expected to provide major equipment such as PLCs, PCs, software licenses, radios, etc., some materials may need to be supplied by the Contractor. To the best of the Contractor's ability based on their investigations during the RFP process, the Contractor will provide a material and equipment list with their proposal that they believe will need to be supplied by the Contractor to successfully complete the integration. Their proposal will include, on a separate line, the cost to the City for this material and equipment.

3 GENERAL REQUIREMENTS

Upon City acceptance of the Contractor's work, the work will be warrantied for one year against errors or omissions discovered in the course of plant operations. Any programming or hardware changes requested by the City after City acceptance, will not be considered an error or omission by the Contractor.

The Contractor shall submit complete documentation of the integration work completed by the Contractor. The documentation will be provided electronically, in a format appropriate to the supplied media. For instance, instruction manuals shall be provided in PDF and the native format (MS Word), programs provided in PDF and native format, databases in PDF and native format, etc. This documentation includes, but may not be limited to:

- SCADA Programs
- SCADA Screen Captures
- PLC Programs
- OIT Programs
- Radio/Communication Settings
- Tablet/Phone Screen Captures/Programming
- Instruction and Training Manuals
- Process Diagrams
- Manufacturer O&M Manuals
- All other documents beneficial to the City/Operator for achiving

The Contractor shall submit shop drawings for the equipment and components for review and comment as well as manuals and record drawings for all work provided under this contract for his use.

3.1 Insurance and bonding

Contractor shall provide and maintain insurance and endorsement as identified in the City contract provided in **Appendix A**.

Contractor shall bond for the entire work based upon the final cost of the integration work including performance and labor during construction plus all design and coordination costs.

3.2 Selection process, award process

The City will interview at least the highest rated Contractor prior to final selection and reserves the right to interview any and all candidates. The project will be awarded based upon proposal and interview results. The City may consider price in their selection process, but cost will not be a

primary selection consideration. The Project will be awarded to the selected Contractor based on a best value evaluation pursuant to California Public Contract Code Section 22614.

The City reserves the right to reject all proposals for any reason.

3.3 Prevailing Wages

The successful proposer who is awarded this Project will be required to comply with all applicable provisions of State labor codes, including all prevailing wage requirements of State of California Department of Industrial Relations. This is **not** a Federally assisted construction contract. Contractor is required to pay the prevailing wage rate as determined by the Labor Statistics and Research Division of the California State Department of Industrial Relations. The Contractor's duty to pay State prevailing wages can be found under Labor Code Section 1770 et seq. and Labor Code Sections 1775 and 1777.7 outline the penalties for failure to pay prevailing wages and employ apprentices including forfeitures and debarment.

In accordance with Labor Code Section 1770 et seq., the Project is a "public work". The successful Contractor and any Subcontractors shall pay wages in accordance with the determination of the Director of the Department of Industrial Relations ("DIR") regarding the prevailing rate of per diem wages. Copies of those rates are on file with the Director of Public Works, and are available to any interested party upon request. The Contractor shall post a copy of the DIR's determination of the prevailing rate of per diem wages at the job site. This Project is subject to compliance monitoring and enforcement by the DIR. The Awarded Contractor shall maintain all records in accordance with State requirements and shall cooperate with the City's labor compliance monitoring consultant to the fullest extent possible.

3.4 Apprenticeship Program

Attention is directed to Sections 1777.5, 1777.6, and 1777.7 of the California Labor Code and Title 8, California Administrative Code, Section 200 et seq. to ensure compliance and complete understanding of the law regarding apprentices.

3.5 Worker's Compensation

Section 1861 of the California Labor Code requires each contractor that is awarded a public works contract to sign and file with the awarding body the following certification prior to performing the work of the contract: "I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for worker's compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract."

3.6 Proposer Acknowledgements

Each proposer makes the following representations relative to its submission of its Proposal:

Compliance with RFP Documents. Proposer represents that its Proposal is made in compliance with the RFP Documents.

- Due Authorization. Proposer represents that the signer(s) of the proposer's Proposal and any other documents submitted on behalf of the proposer to the City that are signed by

proposer is/are authorized to do so on behalf of the proposer and that any proposer, authorized to sign and signing on behalf of the proposer, that is a corporation, partnership, or limited liability company, is duly incorporated under applicable laws and is authorized to do business in, and is in good standing under, the laws of the State of California.

- Agreement for Contact Services. Proposer represents that it has carefully reviewed the terms and conditions of the "Agreement for Contract Services" and that the terms and conditions thereof are satisfactory to proposer and represent in the opinion of the proposer a fair and reasonable allocation and sharing of risks and responsibilities as between the City and Contractor.

Contractor shall be responsible for providing a complete and operating SCADA system, PLC programming, and communications system in accordance with the requirements of this RFP. It is Contractor's responsibility to ensure the City receives all of the necessary components of the Project, although some components are not specifically referenced in the provided documents. The provided non-referenced items shall be of equal quality to all specified items in the RFP documents.

3.7 No Warranty by City

Proposers are solely responsible to satisfy themselves as to the suitability of any estimates, projections, budgets, design concepts, technical criteria, reports, and other information provided to, or reviewed by, them relating to the Project, Site or Existing Improvements and nothing stated therein, in the RFP Documents or in any other information provided by the City shall be construed as implying the creation or existence of any warranty, express or implied, on the part of the City with respect to the completeness, accuracy or sufficiency thereof.

3.8 Confidentiality of Design and Pricing Information Prior to Award

It is understood that all responses sent to the City are sent as confidential documents. City shall make reasonable efforts, consistent with applicable laws, to refrain from disclosing to competing proposers prior to Award, the content of any information on design, prices or pricing that is contained in another proposer's Proposal. No part of the responses will be made public or shown to any persons outside of the City and its Review Committee until after a decision has been made by City staff on who to recommend for award to the City Council and a contract has been executed by the proposer, at which time all documents will be public record, per applicable law.

3.9 Proposal Validity

The offer represented by each proposer's Proposal will remain in full force and effect for ninety (90) days after the Proposal Due Date. If award has not been made within ninety (90) days after the Proposal Due Date, each proposer that has not previously agreed to an extension of such deadline shall have the right to withdraw its Proposal.

3.10 Ownership, Copyright

Drawings, renderings, models, building designs, design approaches, design details, construction techniques, procedures, means and methods and other technical design and construction information contained within a Proposal, or any other documents submitted by proposer to City, shall be deemed the sole and exclusive property of the City, all copyrights thereto shall be deemed assigned to and held by the City, and the proposer shall retain no property, copyright or other proprietary rights with

respect thereto; provided, however, that: (1) nothing herein shall be interpreted as prohibiting or limiting the right of any proposer that does not receive Award of the Agreement to copy, use or incorporate such technical design information contained within its own Proposal for its own use in the conduct of its business trade or profession; and (2) with respect to the proposer who receives Award of the Agreement for Contract Services, such proposer's rights and obligations with respect to copying, use or incorporation of such technical design information in any projects or work other than the Project shall be governed by the terms of the Agreement for Contract Services and General Conditions.

3.11 City of Colfax Rights

The City reserves the right to waive minor irregularities and omissions in the information contained in the Proposal submitted, and to make all final determinations. The City reserves the right to decide not to award an agreement as a result of the RFP or cancel the RFP process. The City shall not be obligated to respond to any Proposal submitted, nor be legally bound in any manner by the submission of the Proposal. The City reserves the right to negotiate Project deliverables and associated costs.

The City reserves the right to request Proposal revisions.

The issuance of an RFP constitutes only an invitation for DBE's to present their competitive Proposals. The City reserves the right to determine, in its sole discretion, whether any aspect of the Proposal satisfactorily meets the criteria established in the RFP and the right to seek clarification from any proposer submitting Proposals. The City also reserves the right to reject any or all Proposals received as a result of this solicitation; to extend the Proposal due date for RFP's; to modify, amend, reissue or rewrite this RFP document; and to procure services by other means. In the event the RFP is withdrawn by the City prior to the receipt of RFP Proposals, or if the City does not proceed for any reason, the City shall have no liability to any proposer for any costs or expenses incurred, in connection with the preparation and submittal of a response to this RFP

3.12 Project management and meetings

The Contractor shall attend a pre-scheduled project meeting once per month, for one hour, for the duration of the project. The Contractor shall provide a complete project schedule. The schedule for the performance of the work shall be a PERT chart system with reasonable assumptions stated.

The schedules shall be revised monthly with a copy thereof to be submitted with each Project Application for Payment. In addition to the monthly update, the schedules shall also be revised at appropriate intervals as required by the conditions of the Work and Project with a copy submitted to the City

4 PROPOSAL

4.1 PROPOSAL SUBMITTAL – PART 1 (METHODOLOGY)

One PDF copy of the following information shall be submitted with the "not to exceed" bid. The following format is required to allow easier comparison of proposals. Additional information, in the form of brochures, etc., may be submitted as appendices. Return of any material, if desired, must be arranged by the Contractor at their expense. If this is a joint proposal between multiple firms, items 2 and 3 shall include the required information for all firms involved in the proposal.

1. Date.
2. Legal name of firm, address and telephone number, and the year firm was established.
3. Identify who would be the principal in charge of the project, and who would be the City's project contact.
4. Names of proposed personnel, their professional qualifications for these projects, and any certifications/registrations. Include a list of all proposed sub-consultants and their function.
5. Description of the scope of work including but not necessarily limited to the following. State all assumptions.
    a. Project Management
    b. Control Strategies
    c. SCADA Architecture Diagrams
    d. Control Panel Factory Testing
    e. Hardware Configuration & Installation
    f. PLC Programming
    g. SCADA Application Development
    h. Software Testing
    i. System Commissioning
    j. Training
    k. Equipment & Materials
6. Discuss firm's understanding of the City's needs and the firm's approach to addressing those needs.
7. Give a representative listing of projects completed in the past five years, with a special emphasis on work of this type for a public agency. If more than one firm is involved in this proposal, specify which firm was involved in the representative project.
8. Provide a list of references, with contact persons and phone numbers from agencies/private companies for whom your firm has provided similar services.
9. List any other information that might aid in ascertaining your firm's qualifications.
10. A copy of the City's standard Contract Services Agreement is provided in **Appendix A**. Provide a summary of changes to the standard language, which will be requested by the firm if selected. <u>Do not fill out the forms.</u>

4.2 PROPOSAL SUBMITTAL – PART 2 (COST)

Included with the Part 1 PDF, provide your costs based on the proposal provided in the methodology proposal submittal. The cost proposal should include at minimum, but does not need to be limited to the following:

A. Project Management
B. Control Strategies
C. SCADA Architecture Diagrams
D. Control Panel Factory Testing
E. Hardware Configuration & Installation
F. PLC Programming
G. SCADA Application Development
H. Software Testing
I. System Commissioning
J. Training
K. Equipment & Materials

4.3 Submittal Packaging & Other Information

Provide a single PDF of proposal submittal. Send the proposal via E-Mail to Jim Fletter at jfletter@woodrodgers.com. Proposals are due by **September 14, 2023 at 5:00PM**

5 TENTATIVE SCHEDULE:

While the successful Consultant will be required to prepare a project schedule, the following are tentative dates through contract execution.

Description of Task	Date(s)
Requests for Proposals sent to Contractor	8/18/2023
Deadline to request additional information, including site review	9/8/2023
Deadline to submit proposals	9/14/2023
Final selection of Contractor	9/29/2023
Negotiate and finalize Agreement for Contract Services	10/13/2023
Council approval of Agreement	11/8/2023

6 SELECTION PROCESS

The selection process will consist of the following:

1. A staff committee will review and evaluate the submitted methodology proposals and make a final selection. The evaluation will take into consideration the proposed integration process and relevant experience with this type of project. Qualifications of firms, individuals and sub-consultants proposed to be used on the project will also be considered.
2. The committee will submit its final recommendations to the City Manager based on the methodology project based on order of preference, including the proposal costs.
3. Selection of highest rated Contractors will be based upon order of preference and the cost proposals.
4. The City will interview the highest rated Contractor prior to final selection. At its discretion, the City may interview the other qualified Contractor prior to making a final selection.
5. After negotiation of a mutually satisfactory agreement, the final selection will be submitted to the City Council with a recommendation for award of contract. A copy of a "Sample" Contract Agreement is provided in **Appendix A**.

6.1 EVALUATION CRITERIA

Firms will be evaluated using the following criteria from their methodology proposal. Each criterion will be weighed according to its importance to the particular services required for the project.

	Technical Criteria	**Points**
1	Demonstrates a clear understanding of the requirements for each task of the project, and the work to be performed	10
2	The overall quality of the technical proposal	5
3	Relevant experience and technical competence of the personnel assigned to this project, and the degree of participation in the project by the key personnel	15
4	Experience of the Firm in providing services for similar types of projects	15
5	Ability of the Firm to meet the needs of the City	25
	Total Points	**70**

EXHIBIT B

APPENDIX A

AGREEMENT FOR CONTRACT SERVICES

EXHIBIT B

AGREEMENT FOR CONTRACT SERVICES

THIS AGREEMENT is made and entered into on this **_____ of _____, 2023** by and between the City of Colfax, a municipal corporation of the State of California ("City") and _____. ("Contractor".)

RECITALS

A. The City desires to retain Contractor to provide the Services set forth in detail in **Exhibit A** hereto (the "Services") subject to the terms and conditions of this Agreement.

B. Contractor is duly licensed and sufficiently experienced to undertake and perform the Services in a skilled and workmanlike manner and desires to do so in accordance with the terms and conditions of this Agreement.

Now, therefore, in consideration of the mutual covenants, promises and conditions set forth in this Agreement, the City and Contractor agree as follows:

Section 1. Services.

Subject to the terms and conditions set forth in this Agreement, Contractor shall furnish and perform all of the Services described in detail in Exhibit A hereto and incorporated herein by this reference (the "Services") to the satisfaction of the City. Contractor shall not perform any work exceeding the scope of the Services described in Exhibit A without prior written authorization from the City.

Section 2. Time of Completion.

Contractor's schedule for performance of the Services is set forth in Exhibit A hereto which is incorporated herein by this reference. Contractor shall commence performance of the Services promptly upon receipt of written notice from the City to proceed. Performance of the Services shall progress and conclude in accordance with the schedule set forth in Exhibit A. During the performance of the Services, Contractor shall provide the City with written progress reports at least once each month and at such additional intervals as City may from time to time request.

Section 3. Compensation.

A. Except as may otherwise be provided in Exhibit A or elsewhere in this Agreement or its exhibits, Contractor shall invoice City once each month for the Services performed during the preceding month. Such invoices shall itemize all charges in such detail as may reasonably be required by City in the usual course of City business but shall include at least (i) the date of performance of each of the Services, (ii) identification of the person who performed the Services, (iii) a detailed description of the Services performed on each date, (iv) the hourly rate at which the Services on each date are charged, (v) an itemization of all costs incurred and (vi) the total charges for the Services for the month invoiced. As long as the Contractor performs the Services to the satisfaction of the City, the City shall pay the Contractor an all inclusive compensation that shall not exceed the amount as detailed in Exhibit A except pursuant to an authorized written change

order issued pursuant to Section 15 of this Agreement before the Services requiring additional compensation are performed. City shall pay Contractor no later than thirty (30) days after approval of the monthly invoice by City's staff.

B. The Contractor's compensation for the Services shall be full compensation for all indirect and direct personnel, materials, supplies, equipment and services incurred by the Contractor and used in carrying out or completing the Services. Payments shall be in accordance with the payment schedule established in Exhibit A or elsewhere in this Agreement or its exhibits.

C. The City shall have the right to receive, upon request, documentation substantiating charges billed to the City pursuant to this Agreement. The City shall have the right to perform an audit of the Contractor's relevant records pertaining to the charges.

D. Any Services performed more than sixty (60) days prior to the date upon which they are invoiced to the City shall not be compensable.

Section 4. Professional Ability; Standard of Quality.

City has relied upon the professional training and ability of Contractor to perform the Services described in Exhibit A as a material inducement to enter into this Agreement. Contractor shall therefore provide properly skilled professional and technical personnel to perform all Services under this Agreement. All Services performed by Contractor under this Agreement shall be in a skillful, workmanlike manner in accordance with applicable legal requirements and shall meet the standard of quality ordinarily to be expected of competent professionals in Contractor's field of expertise.

Section 5. Indemnification.

Contractor shall hold harmless and indemnify, including without limitation the cost to defend, the City and its officers, agents and employees from and against any and all claims, demands, damages, costs or liability that arise out of, or pertain to, or relate to the negligence, recklessness or willful misconduct of Contractor and/or its agents in the performance of the Services. This indemnity does not apply to liability for damages for death or bodily injury to persons, injury to property, or other loss, arising from the sole negligence, willful misconduct or material defects in design by the City or its agents, servants employees or independent contractors other than Contractor who are directly responsible to the City, or arising from the active negligence of the City officers, agents, employees or volunteers

Section 6. Insurance.

Without limiting Contractor's indemnification obligations provided for above, Contractor shall take out before beginning performance of the Services and maintain at all times during the life of this Agreement the following policies of insurance with insurers possessing a Best rating of not less than A. Contractor shall not allow any subcontractor, professional or otherwise, to commence work on any subcontract until all insurance required of the Contractor has also been obtained by the subcontractor.

EXHIBIT B

A. Workers' Compensation Coverage. Statutory Workers' Compensation insurance and Employer's Liability Insurance to cover its employees. In the alternative, Contractor may rely on a self-insurance program to meet its legal requirements as long as the program of self-insurance complies fully with the provisions of the California Labor Code. Contractor shall also require all subcontractors, if such are authorized by the City, to similarly provide Workers' Compensation insurance as required by the Labor Code of the State of California for all of the subcontractor's employees. All Workers' Compensation policies shall be endorsed with the provision that the insurance shall not be suspended, voided, or cancelled until thirty (30) days prior written notice has been provided to City by the insurer. The Workers' Compensation insurance shall also contain a provision whereby the insurance company agrees to waive all rights of subrogation against the City and its elected or appointed officials, officers, agents, and employees for losses paid under the terms of such policy which arise from the Services performed by the insured for the City.

B. General Liability Coverage. General liability insurance, including personal injury and property damage insurance for all activities of the Contractor and its subcontractors, if such are authorized by the City, arising out of or in connection with the Services. The insurance shall be written on a comprehensive general liability form and include a broad form comprehensive general liability endorsement. In the alternative, the City will accept, in satisfaction of these requirements, commercial general liability coverage which is equivalent to the comprehensive general liability form and a broad form comprehensive general liability endorsement. The insurance shall be in an amount of not less than $1 million combined single limit personal injury and property damage for each occurrence. The insurance shall be occurrence based insurance. General liability coverage written on a claims made basis shall not be acceptable absent prior written authorization from the City.

C. Automobile Liability Coverage. Automobile liability insurance covering bodily injury and property damage for all activities of the Contractor arising out of or in connection with this Agreement, including coverage for owned, hired and non-owned vehicles, in an amount of not less than $1 million combined single limit for each occurrence.

D. Policy Endorsements. Each general liability and automobile liability insurance policy shall be endorsed with the following provisions:

1. The City, and its elected or appointed officials, employees and agents shall be named as insureds or additional insureds with regard to damages and defenses of claims arising from activities performed by or on behalf of the Contractor.

2. The insurance afforded by each policy shall apply separately to each insured who is seeking coverage or against whom a claim is made or a suit is brought, except with respect to the insurer's limits of liability.

3. The insurance shall be primary insurance as respects the City and its elected or appointed officers, officials, employees and agents. Any other insurance maintained by the City or its elected or appointed officers, officials, employees, agents or volunteers shall be in excess of this insurance and shall not contribute with it.

4. The insurance shall not be suspended, voided, cancelled, or reduced in coverage or in limits except after thirty (30) days prior written notice has been provided to the City.

5. Any failure to comply with the reporting requirements of any policy shall not affect coverage provided to the City, its elected or appointed officers, officials, employees, or agents.

E. Professional Liability Coverage. If required by the City, Contractor shall also take out and maintain professional liability, errors and omissions insurance in an amount not less than $1 million. The professional liability insurance policy shall be endorsed with a provision stating that it shall not be suspended, voided, cancelled, or reduced in coverage or in limits except after thirty (30) days written notice has been provided to the City.

F. Insurance Certificates and Endorsements. Prior to commencing the Services under this Agreement, Contractor shall submit to the City documentation evidencing the required insurance signed by the insurance agent and the companies named. This documentation shall be on forms which are acceptable to the City and shall include all required endorsements and verify that coverage is actually in effect. This Agreement shall not be effective until the required insurance forms and endorsements are submitted to and approved by the City. Failure to provide these forms within the time period specified by City may result in the award of this Agreement to another Contractor should the City, in its sole discretion, decide to do so. Current certification of insurance shall be kept on file with the City at all times during the term of this Agreement.

G. Deductible and Self-Insured Retentions. Any deductibles or self-insured retentions must be declared to and approved by City.

H. Termination of Insurance. If the City receives notification that Contractor's insurance will be suspended, voided, cancelled or reduced in coverage or in limits, and if the Contractor does not provide for either the reinstatement of that insurance or for the furnishing of alternate insurance containing all of the terms and provisions specified above prior to the termination of that insurance, City may either terminate this Agreement for that breach, or City may secure the required insurance to satisfy the conditions of this Agreement and deduct the cost thereof from compensation which would otherwise be due and payable to the Contractor for Services rendered under the terms of this Agreement.

Section 7. Subcontracts.

Contractor may not subcontract any portion of the Services without the written authorization of City. If City consents to a subcontract, Contractor shall be fully responsible to the City and third parties for all acts or omissions of the subcontractor to which the Services or any portion thereof are subcontracted. Nothing in this Agreement shall create any contractual relationship between City and any subcontractor, nor shall it create any obligation on the part of the City to pay or cause the payment of any monies due to any such subcontractor except as otherwise is required by law.

Section 8. Assignment.

Contractor shall not assign any right or obligation under this Agreement without the City's prior written consent. Any attempted assignment of any right or obligation under this Agreement without the City's prior written consent shall be void.

Section 9. Entire Agreement.

This Agreement represents the entire understanding of City and Contractor as to those matters contained herein. No prior oral or written understanding shall be of any force or effect with respect to those matters covered herein. This Agreement may not be modified or altered except in writing signed by both parties.

Section 10. Jurisdiction.

This Agreement shall be administered and interpreted under the laws of the State of California. Jurisdiction over any litigation arising from this Agreement shall be in the Superior Court of the State of California with venue in Placer County, California.

Section 11. Suspension of Services.

Upon written request by Contractor, City may suspend, in writing, all or any portion of the Services if unforeseen circumstances beyond the control of the City and Contractor make normal progress of the Services impossible, impractical or infeasible. Upon written City approval to suspend performance of the Services, the time for completion of the Services shall be extended by the number of days performance of the Services is suspended.

Section 12. Termination of Services.

City may at any time, at its sole discretion, terminate all or any portion of the Services and this Agreement upon seven (7) days written notice to Contractor. Upon receipt of notice of termination, Contractor shall stop performance of the Services at the stage directed by City. Contractor shall be entitled to payment within thirty (30) days for Services performed up to the date of receipt of the written notice of termination. Contractor shall not be entitled to payment for any Services performed after the receipt of the notice of termination unless such payment is authorized in advance in writing by the City.

Should Contractor fail to perform any of the obligations required of Contractor within the time and in the manner provided for under the terms of this Agreement, or should Contractor violate any of the terms and conditions of this Agreement, City may terminate this Agreement by providing Contractor with seven (7) days written notice of such termination. The Contractor shall be compensated for all Services performed prior to the date of receipt of the notice of termination. However, the City may deduct from the compensation which may be owed to Contractor the amount of damage sustained or estimated by City resulting from Contractor's breach of this Agreement.

Contractor's obligations pursuant to Sections 5 and 6 of this Agreement shall survive termination, and continue in effect for as long as necessary to fulfill the purposes of Sections 5 and 6.

Section 13. Independent Contractor.

Contractor shall in all respects be an independent contractor and not an agent or employee of City. Contractor has and shall retain the right to exercise full control and supervision of the means and methods of performing the Services. Contractor shall receive no premium or enhanced pay for Services normally understood as overtime; nor shall Contractor receive holiday pay, sick leave, administrative leave or pay for any other time not actually expended in the performance of the Services. It is intended by the parties that Contractor shall not be eligible for benefits and shall receive no compensation from the City, except as expressly set forth in this Agreement. Contractor shall submit completed W-9 and Report of Independent Contractor forms upon execution of this Agreement and prior to the payment of any compensation hereunder.

Section 14. Ownership of Documents.

Within thirty (30) days after the Contractor substantially completes performance of the Services, or within thirty (30) days after the termination of this Agreement, the Contractor shall deliver to the City all files, records, materials and documents drafted or prepared by Contractor's in the performance of the Services. It is expressly understood and agreed that all such files, records, materials and documents are the property of the City and not the property of the Contractor. All finished and unfinished reports, plans, studies, documents and other writings prepared by and for Contractor, its officers, employees and agents in the course of performing the Services shall become the sole property of the City upon payment to Contractor for the Services, and the City shall have the exclusive right to use such materials in its sole discretion without further compensation to Contractor or to any other party. Contractor shall, at Contractor's expense, provide such reports, plans, studies, documents and writings to City or any party the City may designate, upon written request. Contractor may keep file copies of all documents prepared for City. Use of any such documents by the City for projects that are not the subject of this Agreement or for purposes beyond the scope of the Services shall be at the City's sole risk without legal liability or expense to Contractor.

Section 15. Changes and/or Extra Work.

Only the City Council may authorize extra and/or changed Services, modification of the time of completion of the Services, or additional compensation for the tasks to be performed by Contractor. Contractor expressly recognizes that other City personnel are without authorization to order extra and/or changed Services or to obligate the City to the payment of additional compensation. The failure of Contractor to secure the prior written authorization for such extra and/or changed Services shall constitute a waiver of any and all right to adjustment in the contract price due to such unauthorized Services, and Contractor thereafter shall not be entitled to any compensation whatsoever for the performance of such extra or changed Services. In the event Contractor and City agree that extra and/or changed Services are required, or that additional compensation shall be awarded to Contractor for performance of the Services under this Agreement, a supplemental agreement providing for such compensation shall be prepared and shall be executed by the

Contractor and the necessary City officials before the extra and/or changed Services are provided.

Section 16. Compliance with Federal, State and Local Laws.

Contractor shall comply with all applicable federal, state and local laws, statutes, ordinances, rules and regulations affecting the Services, including without limitation laws requiring licensing and prohibiting discrimination in employment because of race, creed, color, sex, age, marital status, physical or mental disability, national origin or other prohibited bases. City shall not be responsible or liable for Contractor's failure to comply with applicable laws, statutes, ordinances, rules or regulations.

Section 17. Retention of Records.

Contractor and any subcontractors authorized by the terms of this Agreement shall keep and maintain full and complete documentation and accounting records, employees' time sheets, and correspondence pertaining to the Services, and Contractor shall make such documents available for review and/or audit by City and City's representatives at all reasonable times during performance of the Services and for at least four (4) years after completion of the Services and/or termination of this Agreement.

Section 18. Alternative Dispute Resolution

A. Before resorting to mediation, arbitration or other legal process, the primary contacts of the parties shall meet and confer and attempt to amicably resolve any dispute arising from or relating to this Agreement subject to the following provisions. Any party desiring to meet and confer shall so advise the other party pursuant to a written notice. Within 15 days after provision of that written notice by the party desiring to meet and confer, the primary contacts for each party shall meet in person and attempt to amicably resolve their dispute. Each primary contact, or the person acting in their absence with full authority to resolve the dispute, shall attend the meeting and shall be prepared to devote an entire day thereto. If any dispute remains unresolved at the end of the meeting, any party to this Agreement shall have the right to invoke the mediation process provided for in the subparagraph B below.

B. Subject to the provisions of subparagraph A, any dispute that remains unresolved after the meet and confer shall immediately be submitted to non-binding neutral mediation, before a mutually acceptable, neutral retired judge or justice at the Sacramento Office of the Judicial Arbitration and Mediation Service ("JAMS"). If within five days after the meet and confer the parties are unable to agree upon the selection of a neutral mediator, then the first available retired judge or justice at the Sacramento office of JAMS shall serve as the neutral mediator. The parties agree to commit to at least one full day to the mediation process. Additionally, to expedite the resolution of any dispute that is not resolved by mediation, the parties agree to each bring to the neutral mediation a list of at least five neutral arbitrators, including their resumes, whose availability for an arbitration hearing within 30 days after the mediation has been confirmed.

C. If mediation is unsuccessful, before the mediation concludes, the parties shall mediate the

selection of a neutral arbitrator to assist in the resolution of their dispute. If the parties are unable to agree on an arbitrator, the parties agree to submit selection of an arbitrator to the mediator, whose decision shall be binding on the parties. In that case, the mediator shall select a neutral arbitrator from the then active list of retired judges or justices at the Sacramento Office of the JAMS. The arbitration shall be conducted pursuant to the provisions of the California Arbitration Act, sections 1280-1294.2 of the California Code of Civil Procedure. In such case, the provisions of Code of Civil Procedure Section 1283.05 and 1283.1 shall apply and are hereby incorporated into this Agreement.

D. This section 18 shall survive the termination or expiration of this Agreement. If there is no Sacramento office of JAMS, then the office of JAMS closest to the City shall be used instead of a Sacramento office.

Section 19. Severability.

The provisions of this Agreement are severable. If any portion of this Agreement is held invalid by an arbitrator or by a court of competent jurisdiction, the remainder of the Agreement shall remain in full force and effect unless amended or modified by the mutual written consent of the parties.

Section 20. Entire Agreement; Amendment.

This Agreement, including all exhibits hereto, constitutes the complete and exclusive expression of the understanding and agreement between the parties with respect to the subject matter hereof. All prior written and oral communications, including correspondence, drafts, memoranda, and representations, are superseded in total by this Agreement. This Agreement may be amended or extended from time to time only by written agreement of the parties hereto.

Section 21. Time of the Essence.

Time is of the essence in the performance of the Services. The Contractor will perform its Services with due and reasonable diligence consistent with sound professional practices and shall devote such time to the performance of the Services as may be necessary for their timely completion.

Section 22. Written Notification.

Except as otherwise specified in this Agreement, any notice, demand, request, consent, approval or communications that either party desires or is required to give to the other party shall be in writing and either served personally or sent by first class mail, postage prepaid and addressed as follows. Either party may change its address by notifying the other party in writing of the change of address. Notice shall be deemed communicated within two business days from the time of mailing if mailed within the State of California as provided in this Section.

If to City:

City of Colfax
33 S. Main Street
Colfax, CA 95713

If to Contractor:

Section 23. Execution.

This Agreement may be executed in original counterparts, each of which shall constitute one and the same instrument and shall become binding upon the parties when at least one original counterpart is signed by both parties hereto. In proving this Agreement, it shall not be necessary to produce or account for more than one such counterpart.

Section 24. Successors. This Agreement shall be binding on and inure to the benefit of the respective parties hereto except to the extent of any contrary provision in this Agreement.

Section 25. Attorney's Fees. If any party to this Agreement commences legal proceedings to enforce any of its terms or to recover damages for its breach, the prevailing party shall be entitled to recover its reasonable attorney's fees, costs and the expenses of expert witnesses, including any such fees costs and expenses incurred on appeal.

IN WITNESS WHEREOF, the parties hereby have executed this Agreement on the day first above written:

CITY	CONTRACTOR
Signature_____	Signature_____
Printed Name_____	Printed Name_____
Title_____	Title_____
Date_____	Date_____

APPROVED AS TO FORM:

_____

City Attorney

EXHIBIT B

APPENDIX B

RFQ (FOR INFORMATION ONLY)

EXHIBIT B

CITY OF COLFAX
STATE OF CALIFORNIA

REQUEST FOR QUALIFICATIONS

SUPERVISORY CONTROL AND DATA ACQUISITION UPGRADE FOR THE CITY'S WASTEWATER TREATMENT FACILITY

The City of Colfax (City) is requesting Statements of Qualifications (SOQ) to be used in the selection of a qualified professional (Contractor) to prepare control strategies and diagrams, configure and install hardware, PLC programming, and SCADA application development for a Supervisory Control and Data Acquisition (SCADA) System at the City's Wastewater Treatment Plant (WWTP) and four sewer pump stations. The WWTP is located at the south end of Grand View Way in Colfax**,** CA (see attached Location Map).

The City has existing and is installing new controls for various systems at the WWTP. In addition, the City maintains two SCADA systems providing process visualization, local alarming, and data acquisition. The first system is an older, outdated, Citect software application running on an aging PC. The second is an HT3 software application running on proprietary hardware from Data Flow Systems. Both systems provide similar functions; however, neither is an all-in-one solution for the plant and the collections system. There are some features in the Citect system that are not available in HT3 system; however, the HT3 system is the most complete and includes process visualization and control for the off-site sewage lift stations. Operations staff must use a combination of both systems to perform SCADA functions.

The City has contracted with W.M. Lyles to purchase and install additional control panels with Allen-Bradley PLCs, a SCADA workstation, and the latest version of Ignition® from Inductive Automation. The City seeking a professional SCADA developer to provide the following tasks communicating with existing and soon to be installed PLCs, workstation and Ignition® system.

- Project Management
- Control Strategies
- SCADA Architecture Diagrams
- Control Panel Factory Testing
- Hardware Configuration & Installation
- PLC Programming
- SCADA Application Development
- Software Testing
- System Commissioning
- Training

The list of tasks above are guidelines and the SCADA development professionals are expected to identify and perform the task necessary based upon their understanding of the work and the requirement of the WWTP staff. Minimum requirements will be identified in a subsequent RFP.

EXHIBIT B

Firms specializing in the work are encouraged to attend a mandatory site visit and submit an SOQ in order to be considered to receive a Request for Proposal.

MANDATORY SITE VISIT: JULY 20, 2023 STARTING AT 11:00 A.M. - MUST HAVE ATTENDED THE SITE VISIT TO BE CONSIDERED RESPONSIVE TO THIS RFQ.

Minimum SOQ Contents

One PDF copy of the following information shall be submitted.

1. The following information shall be provided for each company involved on a contractor's team.
   - Role in this project
   - Location of company
   - # of years in business
   - # of years providing similar systems
   - Size of company (# of people)
   - Credentials of key individuals assigned to this project
   - Insurance coverage
   - Service area

2. General description of SCADA system and approach proposed for the City of Colfax.

3. List 3 examples of similar systems completed within the last 5 years, including location, owner name, and a contact person.

The Statement of Qualifications shall be limited to **15 single-sided pages**. Resumes of key personnel may be attached as appendices are in addition to the maximum 15-page count.

SOQs will be received until 3:00 p.m. on July 27, 2023 via email addressed to Jim Fletter, Project Manager, jfletter@woodrodgers.com, (916) 503-5687.

Questions must be submitted in writing to Jim Fletter, Project Manager, at jfletter@woodrodgers.com. and **received prior to 11:00 a.m. on July 24, 2023.**

Statement of Qualifications (SOQ) must be complete, sealed and marked "SCADA Upgrade for WWTP SOQ" and show the contractor's name, address, and telephone number on the outside of the envelope.

The SOQs will be evaluated based on the following criteria:
1. Contractor's professional qualifications and experience with similar SCADA Systems.
2. Completeness of team and ability and experience to perform all tasks identified.
3. Project approach.
4. Adherence to submission requirements.

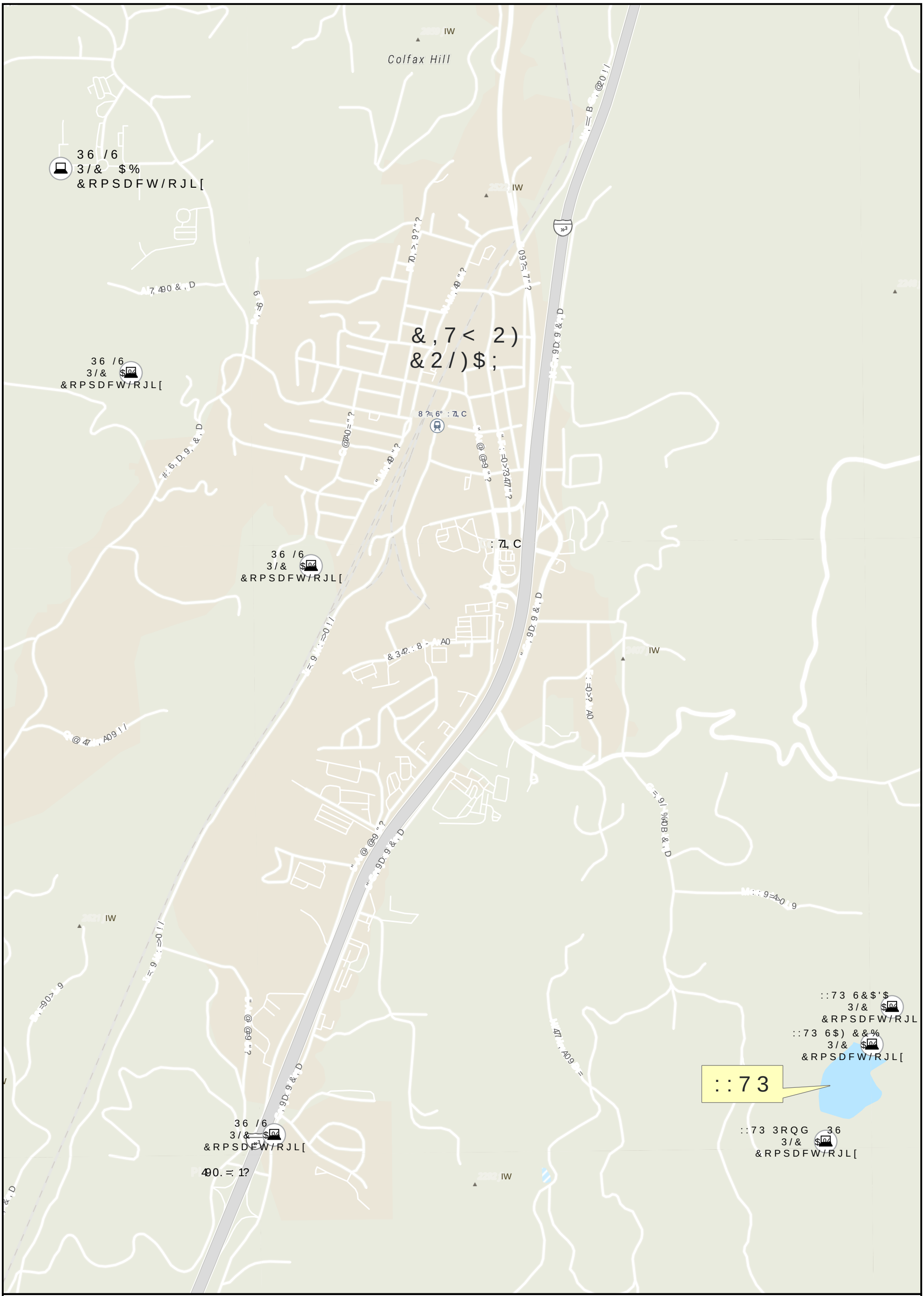
The SOQs will be evaluated by staff, and an RFP sent the highest-ranking qualified firms. The City reserves the right to determine the number of contractors that will be asked to submit an RFP. Final selection will be based on formal Proposals.

The City of Colfax reserves the right to cancel any RFQ/RFP at any time.

Attachments: Vicinity Map
Algae Project Improvement Plans

END OF REQUEST FOR QUALIFICATIONS

EXHIBIT B



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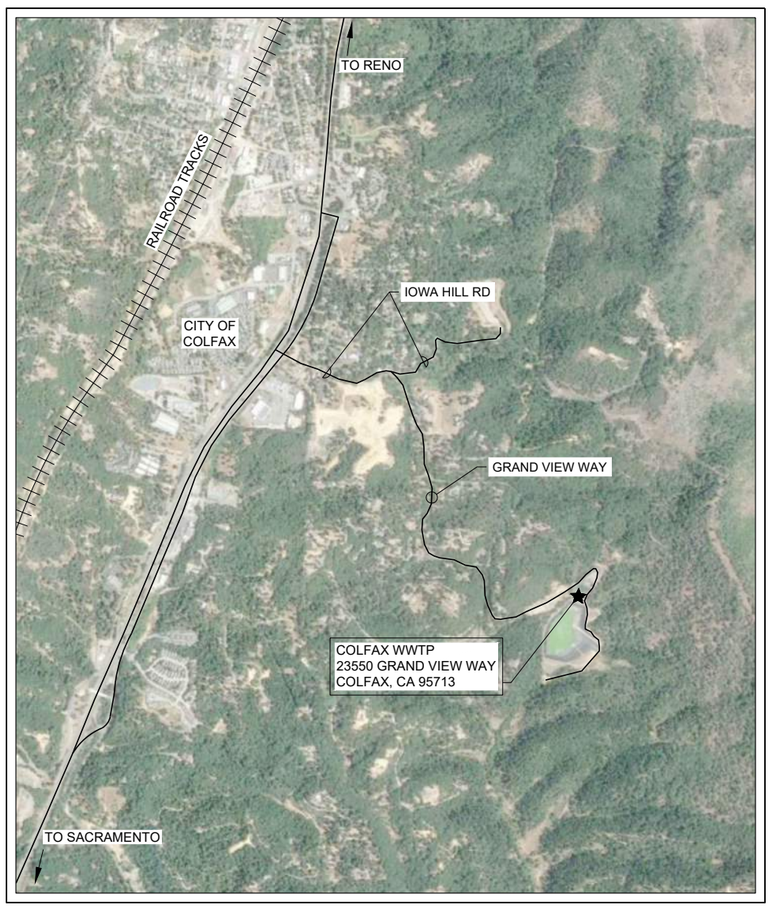
1257+

WOOD RODGERS

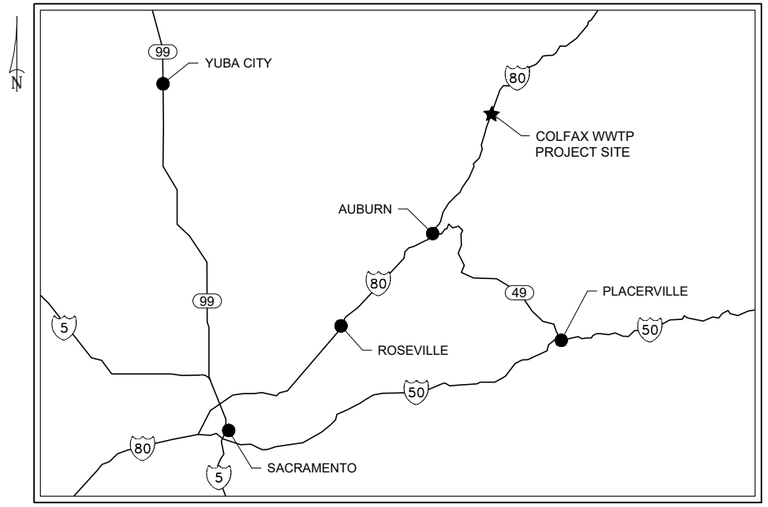
EXHIBIT B

WASTEWATER TREATMENT PLANT
ALGAE REMOVAL PROJECT
CITY OF COLFAX
JANUARY 2023



COLFAX WWTP LOCATION MAP
SCALE: NOT TO SCALE

CITY OF COLFAX
CALIFORNIA



COLFAX WWTP VICINITY MAP
SCALE: NOT TO SCALE

CONFORMED

SUBMITTED: _____
JOE DIGIORGIO, PE PROJECT ENGINEER CE NO. 051439

RECOMMENDED: _____
JIM FLETTER, PE, PROJECT MANAGER

APPROVED: _____
CARL MOORE, CITY ENGINEER

RECORD DRAWINGS NOTE
ALL INFORMATION SHOWN ON THESE PLANS HAS BEEN PREPARED BY, OR UNDER DIRECTION OF, THE UNDERSIGNED ENGINEER. ADJUSTMENTS MADE IN THE FIELD DURING CONSTRUCTION ARE INCLUDED HEREIN AND ARE BASED UPON FIELD OBSERVATIONS MADE UNDER THE DIRECTION OF OR BY THE UNDERSIGNED AND/OR INFORMATION RECEIVED FROM THE PROJECT OWNER, PROJECT CONTRACTORS AND PUBLIC AGENCIES WHEN THE ENGINEER IS ADVISED IN WRITING OF SUCH CHANGE. THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, CHANGES TO THESE PLANS NOT AUTHORIZED BY THE ENGINEER.

DATE_____ _____
ENGINEER SIGNATURE
(STAMP OR SEAL)

NOTICE TO CONTRACTORS
CONTRACTOR TO NOTIFY U.S.A. (UNDERGROUND SERVICE ALERT) AT 800-227-2600 A MINIMUM OF 24 HOURS BEFORE BEGINING UNDERGROUND WORK FOR VERIFICATION OF THE LOCATION OF EXISTING UNDERGROUND UTILITIES.

1-800-642-2444 CALL BEFORE YOU DIG USA UNDERGROUND SERVICE ALERT

1 BAR IS ONE INCH
AT FULL SCALE

	APRV'L	REVISIONS	DATE
1		CONFORMED	03/07/23
2			
3			
4			

NEXGEN UTILITY MANAGEMENT
4010 LENNANE DRIVE
SACRAMENTO, CA 95834
916.564.8000
NEXGEN

PROFESSIONAL ENGINEER JOSEPH B. DIGIORGIO No.051439 Exp. 6-30-2024 STATE OF CALIFORNIA

COLFAX WWTP
ALGAE REMOVAL PROJECT
CITY OF COLFAX
Colfax, California

PROJECT TITLE, LOCATION AND VICINITY MAPS

DATE: 3/7/23
SCALE: AS NOTED
DRAWN BY: JA
DESIGNED BY: JR
CHECKED BY: JD
G01
JOB NO: ·

DRAWING NO:
G01
1 OF 62 SHEETS

C:_Drawings_Colfax\Colfax WWTP_COVER SHEET.dwg 3/07/23 3:30pm connector01

EXHIBIT B

(E) BFP DEWATERING BUILDING

(E) WASTEWATER TREATMENT PLANT MODIFICATIONS, SEE DWG M50

(E) POND No.2 EQ RETURN PS

2" 3W

4" SLG

(E) BIOLOGICAL TREATMENT BUILDING

(E) CLOTH FILTERS

(E) INFLUENT PS

ACCESS ROAD

GRAND VIEW WAY

(E) POND No.2 EFFLUENT PS

(E) POND No. 2

(E) CHLORINE CONTACT BASIN

AREA AVAILABLE FOR CONTRACTOR STAGING

INSTALL (N) ALGAE DEWATERING SYSTEM, SEE DWG C30

4" SLG

2" 3W

4" D

ACCESS ROAD

(E) BRIDGE DECK PROTECT IN PLACE

INSTALL (N) ALGAE REMOVAL PROCESS AND SITE IMPROVEMENTS. SEE DWG C10

(N) 4" AFE, 2" 3W AND ELECTRICAL. SEE DWG C40

(E) CHEMICAL STORAGE BUILDING

(N) 4" AFE, 2" 3W AND ELECTRICAL. SEE DWG C40

(E) CONTROL BUILDING

AREA AVAILABLE FOR CONTRACTOR STAGING

(E) POND No.1 EQ

CONNECT TO (E) 2" 3W AT (E) HB

(E) MANHOLE No. 2

(E) STANDBY GENERATOR AND SWITCHBOARD

(E) STANDBY GENERATOR AND SWITCHBOARD

(E) POND No. 3

ACCESS ROAD

DAM ACCESS ROAD

(E) POND 3 EQ RETURN PUMP STATION BUILDING

REPLACE (E) PUMPS AND PUMP STATION, SEE DWG C20

GRAND VIEW WAY

(E) POND No. 1

STAGING NOTES

1. CONTRACTOR TO MAINTAIN OPEN ACCESS ROAD AT ALL TIMES.
2. WORK HOURS 7AM-5PM.

CONFORMED

N

0 30 60 120 180
1"=60'

1" BAR IS ONE INCH
AT FULL SCALE

	DATE	REVISIONS	APR'L
1	03/07/23	CONFORMED	
1			
1			
1			

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REGISTERED PROFESSIONAL ENGINEER
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No. 051439
Exp. 6-30-2024
CIVIL
STATE OF CALIFORNIA

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

SITE PLAN AND KEY MAP

DATE: 3/7/23
SCALE: 1"=60'
DRAWN BY: JA
DESIGNED BY: JR
CHECKED BY: JD
G04
JOB NO: ·

DRAWING NO:
G04
4 OF 62 SHEETS

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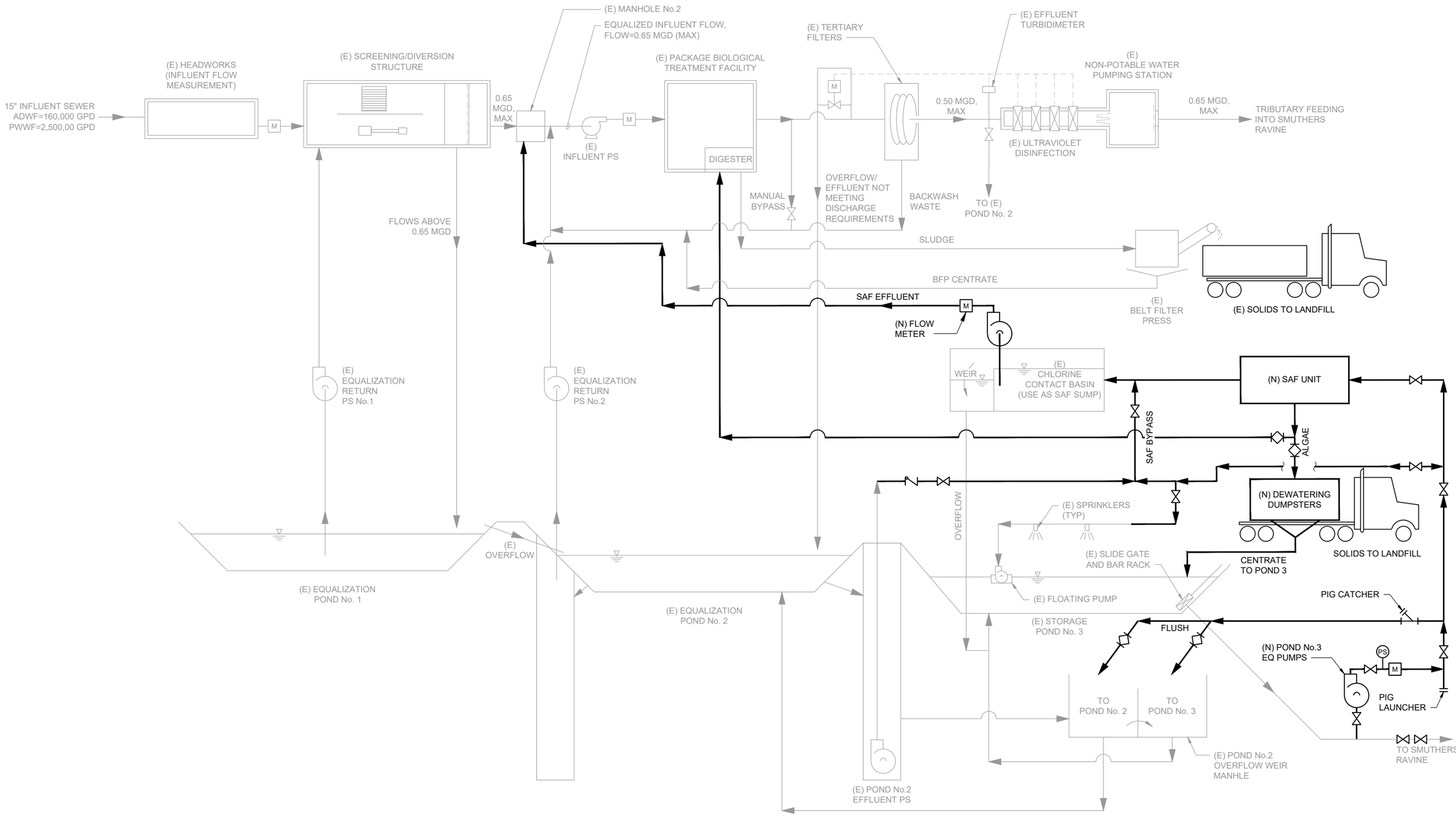
EXHIBIT B



CONFORMED

1 BAR IS ONE INCH
- AT FULL SCALE

APRV'L	REVISIONS	DATE
	CONFORMED	03/07/23
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CIVIL
STATE OF CALIFORNIA

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

FLOW DIAGRAM AND
DESIGN CRITERIA

DATE:	3/7/23
SCALE:	NONE
DRAWN BY:	JA
DESIGNED BY:	JR
CHECKED BY:	JD
	G05
JOB NO:	·

DRAWING NO:
G05
5 OF 62 SHEETS

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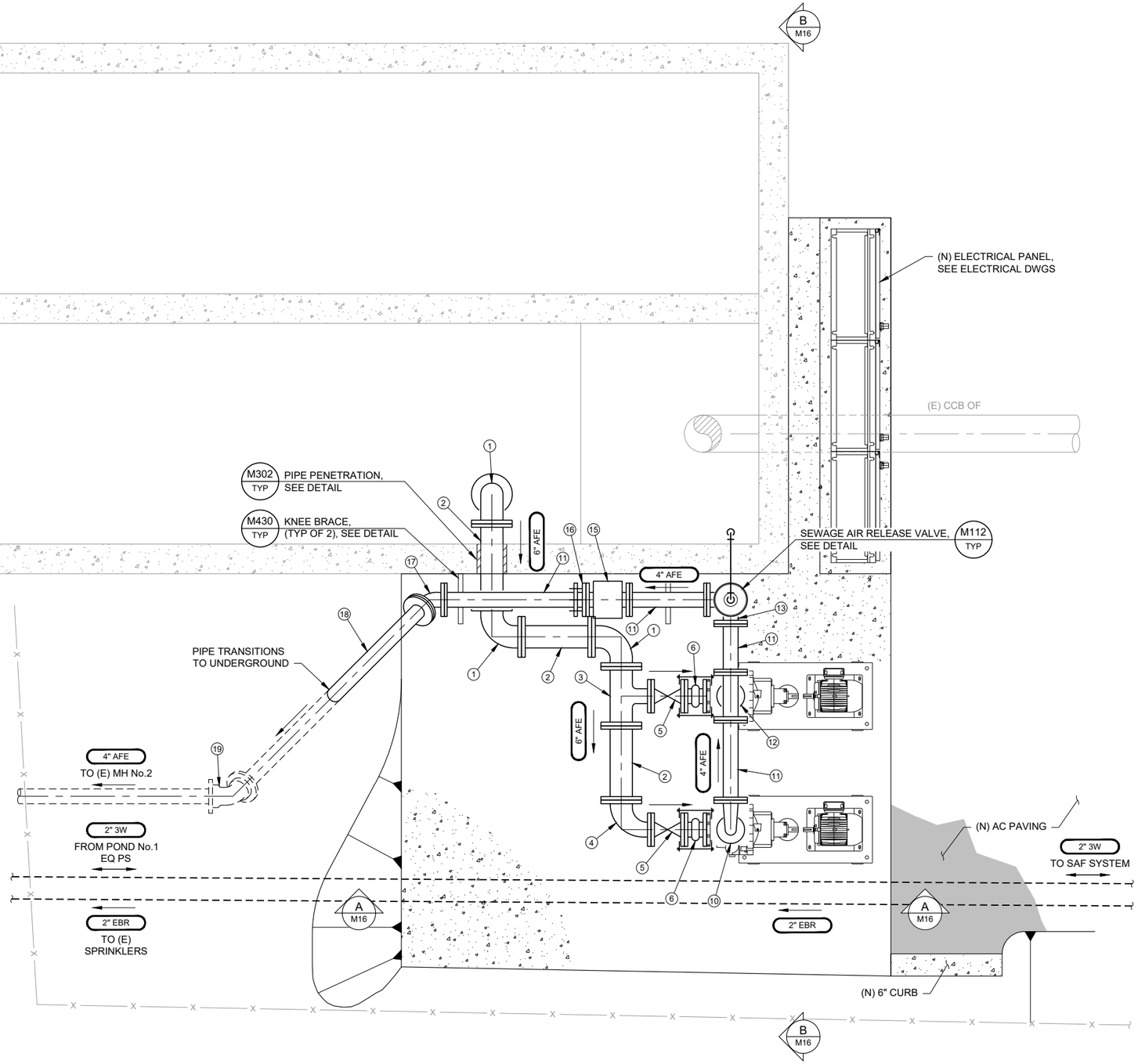
EXHIBIT B



CHLORINE CONTACT BASIN PUMP STATION MECHANICAL SCHEDULE

ITEM No.	DESCRIPTION	QTY
①	6" DI FLG X FLG 90° BEND	3
②	6" DI FLG X FLG SPOOL	4
③	6" X 6" X 4" DI FLGD TEE	1
④	6" X 4" DI FLG X FLG REDUCER 90° BEND	1
⑤	4" GATE VALVE	2
⑥	4" FLEXIBLE RESTRAINED COUPLING ADAPTER	2
⑦	3" FLEX COUPLING	2
⑧	3" CHECK VALVE	2
⑨	3" GATE VALVE	2
⑩	4" X 3" DI FLG 90° BEND REDUCER	1
⑪	4" DI FLG X FLG SPOOL	5
⑫	4" X 4" X 3" DI FLG TEE	1
⑬	4" X 4" X 4" DI FLG TEE	1
⑭	4" DI FLG X FLG 90° BEND	1
⑮	4" MAG METER	1
⑯	4" FLANGED COUPLING ADAPTER	1
⑰	4" FLG X FLG 45° BEND	1
⑱	4" DI FLG X PE SPOOL	1
⑲	4" DI MJ X MJ 90° BEND	1

CONFORMED

0 1 2 3 4
3/4"=1'-0"

1 BAR IS ONE INCH
AT FULL SCALE

APR'L	REVISIONS	DATE
	CONFORMED	03/07/23
-	-	-

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Exp. 6-30-2024
STATE OF CALIFORNIA
CIVIL

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

CHLORINE CONTACT BASIN
PUMP STATION PLAN

DATE:	3/7/23
SCALE:	3/4"=1'-0"
DRAWN BY:	JA
DESIGNED BY:	JR
CHECKED BY:	JD
	M15
JOB NO:	·

DRAWING NO:
M15
20 OF 62 SHEETS

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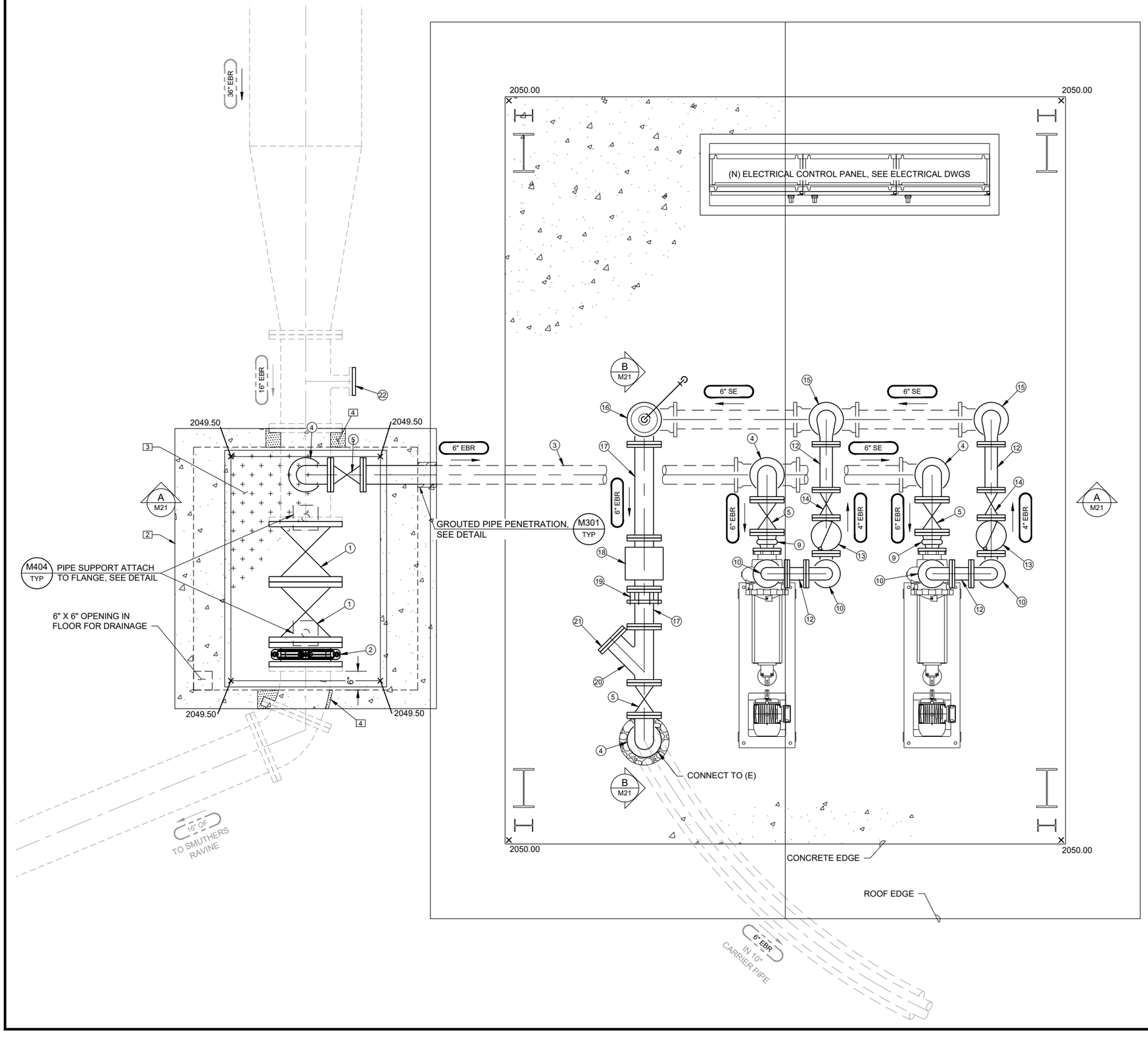
EXHIBIT B



POND No.3 PUMP STATION MECHANICAL SCHEDULE

ITEM No.	DESCRIPTION	QTY
1	16" GATE VALVE	2
2	16" VICTAULIC COUPLING	1
3	6" DI FLG X PE SPOOL	5
4	6" DI FLG X FLG 90° BEND	4
5	6" GATE VALVE	4
6	6" X 6" X 6" MJ TEE	2
7	6" PE X PE SPOOL	3
8	6" DI MJ X MJ 90° BEND	4
9	6" X 4" DI FLG FLEXIBLE COUPLING REDUCER	2
10	4" DI FLG X FLG 90° BEND	6
11	4" DI FLG FLEXIBLE COUPLING	2
12	4" DI FLG X FLG SPOOL	6
13	4" CHECK VALVE	2
14	4" GATE VALVE	2
15	4" DI FLG X 6" FLG 90° BEND REDUCER	2
16	6" X 6" X 6" DI FLG TEE	1
17	6" DI FLG X FLG SPOOL	1
18	6" MAG METER	1
19	6" FLANGED COUPLING ADAPTER	1
20	6" DI FLG WYE	1
21	4" DI FLG WYE	1
22	6" DI BLIND FLANGE	1
23	1/2" BV AND SADDLE	2
24	PRESSURE GAUGE	1

CONSTRUCTION NOTES:

1. CONTRACTOR TO POTHOLE AND VERIFY FITTINGS AND DIMENSIONS BEFORE ORDERING FITTINGS AND VAULT. SEE DRAWING D10.
2. INSTALL APPROX 6'-0" X 6'-6" X 8'-6" DEEP I.D. PRE-CAST CONCRETE VALVE VAULT.
3. INSTALL ALUMINUM ACCESS HATCH MIN 4'-0" X 6'-0" WITH LOCK, STAINLESS STEEL HARDWARE, AND LIFT ASSIST. HATCH AND LID SHALL BE REINFORCED FOR H-20 TRAFFIC LOADING.
4. PROVIDE SLOTTED PIPE OPENINGS IN PRECAST WALLS TO ACCOMMODATE EXISTING 16" PIPE. WRAP PIPE WITH 2 LAYERS OF RUBBER SHEET SIMILAR TO M303/TYP AND GROUT OPENINGS AFTER VAULT PLACEMENT.

CONFORMED

0 1 2 3 4
3/4"=1'-0"

BAR IS ONE INCH
AT FULL SCALE

	DATE	REVISIONS	APR'L
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REGISTERED PROFESSIONAL ENGINEER
JAMES A. DIGIORGIO
No. 051439
Exp. 6-30-2024
STATE OF CALIFORNIA - CIVIL

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

POND No.3 PUMP STATION
PLAN

DATE: 3/7/23
SCALE: 3/4"=1'-0"
DRAWN BY: JA
DESIGNED BY: JR
CHECKED BY: JD
M20
JOB NO: ·

DRAWING NO:
M20
22 OF 62 SHEETS

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EXHIBIT B

ABBREVIATIONS

A	AMPERES
AC	ALTERNATING CURRENT
AF	AIR FLOTATION
AICS	AMPERES INTERRUPTING CAPACITY, SYMMETRICAL
AWG	AMERICAN WIRE GAUGE
BATT	BATTERY
BC	BARE COPPER
C	CONDUIT
CAT6	CATEGORY 6 CABLE
CB	CIRCUIT BREAKER
CCB	CHLORINE CONTACT BASIN
CKT	CIRCUIT
CPT	CONTROL POWER TRANSFORMER
CT	CURRENT TRANSFORMER
(D)	DEMOLISH
DC	DIRECT CURRENT
DISC	DISCONNECT
DWG	DRAWING
(E)	EXISTING
ES	POWER SOURCE
ELEV	ELEVATION
EXT	EXTERNAL
FLA	FULL LOAD AMPS
G, GND	GROUND
GFCI	GROUND FAULT CURRENT INTERUPTING
GRS	GALVANIZED RIGID STEEL
HH	HANDHOLE
HOA	HAND OFF AUTOMATIC
HP	HORSEPOWER
HR	HOUR
Hz	HERTZ
JB	JUNCTION BOX
KVA	KILOVOLT AMPERES
KW	KILOWATT
LA	LIGHTING ARRESTOR
LOS	LOCK OUT STOP CONTROL STATION
LTG	LIGHTING
MA	MILLIAMPERE
MCC	MOTOR CONTROL CENTER
MCB	MAIN CIRCUIT BREAKER
MCP	MOTOR CIRCUIT PROTECTOR
MIN	MINIMUM
MS	MOISTURE SENSOR
N	NEUTRAL
NC	NORMAL CLOSED
NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
NO	NORMAL OPEN
O/Ls	OVERLOADS
P	POLE
PB	PULL BOX, PUSH BUTTON
PH, Ø	PHASE
PFR	POWER FAIL RELAY
PLC	PROGRAMMABLE LOGIC CONTROLLER
PS	PRESSURE SWITCH OR PUMP STATION
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE CONDUIT
RECP	RECEPTACLE
RGS	RIGID STEEL CONDUIT
RVSS	REDUCED VOLTAGE SOLID STATE
PQM	POWER QUALITY METER
SLS	SEWAGE LIFT STATION
SPD	SURGE PROTECTIVE DEVICE
SS	STAINLESS STEEL
SW	SWITCH
TB	TERMINAL BOARD
TDOE	TIME DELAY ON ENERGIZE
TS	TEMPERATURE SWITCH
TSP	TWISTED SHIELDED PAIR
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
UG	UNDERGROUND
UPS	UNINTERRUPTIBLE POWER SUPPLY
	VOLT
VAC	VOLTS AC
VFD	VARIABLE FREQUENCY DRIVE
W/	WITH
WP	WEATHERPROOF
XFMR	TRANSFORMER

1

ELECTRICAL SYMBOLS - SCHEMATIC DIAGRAMS

NORMALLY OPEN	NORMALLY CLOSED	DEVICE
		CONTACT
		PUSH BUTTON SINGLE CIRCUIT MOMENTARY CONTACT
		LIQUID FLOAT LEVEL SWITCH
		PRESSURE OR VACUUM SWITCH
		TEMPERATURE SWITCH
		TIME CONTACT CONTACT ACTION RETARDED ON ENERGIZATION
		TIME CONTACT CONTACT ACTION RETARDED ON DE-ENERGIZATION
		SELECTOR SWITCH (H-O-A)
O/L		MOTOR OVERLOAD RELAY CONTACT
		MOTOR OVERLOAD HEATER
A		PILOT LIGHT R=RED, W=WHITE G=GREEN, A=AMBER
R		PILOT LIGHT-PUSH TO TEST
R		RELAY
TD		TIME DELAY RELAY
M		STARTER COIL
SV		SOLENOID OPERATED VALVE
		MOTOR
		FUSE
		CONTROL POWER TRANSFORMER
		GROUND
		WIRING IN MOTOR STARTER OR CONTROL PANEL
		FIELD WIRING
		WIRE TERMINAL
PFR		PHASE/POWER FAILURE RELAY
		SPACE HEATER
		RESISTOR
		CIRCUIT BREAKER

ELECTRICAL SYMBOLS - SINGLE LINE DIAGRAM

M	UTILITY METERING
3	CURRENT TRANSFORMER, QUANTITY INDICATED
	POWER TRANSFORMER
100A MCP	CIRCUIT BREAKER OR MOTOR CIRCUIT PROTECTOR 3 POLE UNLESS NOTED
	FUSE
F	DISCONNECT SWITCH "F" INDICATES FUSED, SEE PLANS FOR RATING
15	MOTOR, 15 HORSEPOWER
	GROUND
PFR	POWER FAILURE RELAY
	LIGHT FIXTURE
	UTILITY SERVICE POINT, SPLICE OR PANEL/BOARD LUGS
SPD	SURGE PROTECTION DEVICE
N	NEUTRAL BUS OR LUGS
G	GROUND BUS OR LUGS
T	THERMOSTAT

1

ELECTRICAL SYMBOLS - PLANS

CLG.	WALL	FLR.	SYMBOLS DESCRIPTION
			DUPLEX RECEPTACLE *
			JUNCTION BOX
			AREA LIGHT AND POLE
			FEEDER DESIGNATION SEE SCHEDULE OR ONE LINE DIAGRAM FOR SIZE
			CONDUIT IN SLAB OR UNDER CONCRETE CAP, THREE CONDUITS OR LESS
			CONDUIT EXPOSED
			CONDUIT STUB-OUT AND CAPPED
	J		FLEXIBLE CONDUIT CONNECTION
			MOTOR
			GROUND ROD, 3/4" x 10'-0"WITH GROUND WELL. SEE DETAIL,
	X / E-Y		DETAIL CALLOUT- X, DETAIL IDENTIFIER. Y- SHEET WHERE DETAIL IS DRAWN
	J		JUNCTION BOX OR PULLBOX
	(E)		EXISTING TO REMAIN
	(RS)		EXISTING TO BE REMOVE AND SALVAGED.
	(D)		EXISTING TO BE DEMOLISHED.

WIRE INSULATION COLOR

DESCRIPTION	PHASE/CODE	NON-FIELD COLOR	FIELD WIRE COLOR
480 VAC, 3 PHASE	A	BROWN	BROWN
	B	ORANGE	ORANGE
	C	YELLOW	YELLOW
	N	GRAY	GRAY
	G	GREEN	GREEN
240/208 VAC, 3 PHASE	A	BLACK	BLACK
	B	RED (ORANGE)	RED (ORANGE)
	C	BLUE	BLUE
	N	WHITE	WHITE
	G	GREEN	GREEN
240 VAC, 1 PHASE	L1	BLACK	BLACK
	L2	RED	RED
	N	WHITE	WHITE
	G	GREEN	GREEN
AC CONTROL	N/A	RED (YELLOW)	RED
AC DIGITAL INPUT STATUS	N/A	RED	RED
AC DIGITAL OUTPUT	N/A	RED (YELLOW)	RED
DC CONTROL	N/A	BLUE (BLUE/WHT)	BLUE
DC DIGITAL INPUT STATUS	N/A	BLUE	BLUE
DC DIGITAL INPUT COMMON	N/A	GRAY	GRAY
DC DIGITAL OUTPUT	N/A	BLUE (YELLOW)	BLUE
24 VDC POSITIVE	+	BLUE	BLUE
24 VDC NEGATIVE	-	BROWN	BROWN
12 VDC POSITIVE	+	BLUE	BLUE
12 VDC NEGATIVE	-	BLUE	BLUE
5 VDC POSITIVE	+	VIOLET	VIOLET
5 VDC NEGATIVE	-	BLACK/WHITE	BLACK/WHITE
SHIELDED PAIR	N/A	RED/BLACK	RED/BLACK
INTRINSICALLY SAFE WIRING	N/A	LT BLUE	LT BLUE

BAR IS ONE INCH AT FULL SCALE

#	DATE	REVISIONS	APRV'L
1	03/07/23	CONFORMED	
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REGISTERED PROFESSIONAL ENGINEER SAMUEL W. TERRY No.14638 Exp.12-31-24 ELECTRICAL STATE OF CALIFORNIA

COLFAX WWTP
ALGAE REMOVAL PROJECT
CITY OF COLFAX
Colfax, California

ELECTRICAL SYMBOLS, ABBREVIATIONS, NOTES AND AREA PLAN

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: SWT
CHECKED BY: SWT
JOB NO:

DRAWING NO: E01
38 OF 62 SHEETS

CONFORMED

ECS
ECS Engineering, Inc.
Electrical & Control Systems Engineering
916-718-3686
samterry@earthlink.net

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EXHIBIT B

APPROX. LOCATION OF (E) ANTENNA MAST, (N) RADIO AND (N) ANTENNA (MOUNTED AT 20' ABOVE GRADE)

(E) BFP DEWATERING BUILDING

(E) TESCOLEVEL CONTROL PANEL AND (N) MAIN [PLANT] CONTROL PANEL

(E) MCC D (TO BE MODIFIED)

(E) DRY TRANSFORMER

(E) PANEL D

(E) DEWATERING BUILDING WASTEWATER TREATMENT PLANT MODIFICATIONS, SEE DWG E50

(E) MAIN CONTROL PANEL (TO BE MODIFIED)

(E) BE CP

(E) HYPER SERVER

(E) BCP

(E) BIOLOGICAL TREATMENT BUILDING

(E) CLOTH FILTERS

(E) POND No.2 EQ RETURN PS

(E) INFLUENT PS

ACCESS ROAD

(E) POND No.2 EFFLUENT PS

SEE DWG E10

(E) POND No. 2

(E) CHLORINE CONTACT BASIN

(E) CONTROL BUILDING (SEE ENLARGED PLAN DWG E30)

(E) CHEMICAL STORAGE BUILDING

(E) MAIN SWITCHBOARD

(E) POND No.1 EQ

(E) MANHOLE No. 2

(E) STANDBY GENERATOR

GRAND VIEW WAY

(E) POND No. 1

(E) POND No. 3

ACCESS ROAD

(E) BRIDGE DECK

ACCESS ROAD

ACCESS ROAD

(E) POWER POLE

(E) POND 3 EQ RETURN PUMP STATION BUILDING

SEE DWG E20
SEE DWG D10
FOR DEMO

(N) POND NO.3 PS PEDESTAL

P505A

WP GFI

(N) RECEPT AND STANCHION. SIMILAR TO 8/E21

(E) OH LINE

AREA PLAN

SCALE: 1" = 60'

N

0 30 60 120 180

1"=60'

CONFORMED

BAR IS ONE INCH AT FULL SCALE

	DATE	REVISIONS	APRV'L
1	03/07/23	CONFORMED	
2	-	-	
3	-	-	
4	-	-	

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PROFESSIONAL ENGINEER — JAMES W. DAVIS — No. 14638 — Exp. 12-31-24 — CIVIL — STATE OF CALIFORNIA

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

ELECTRICAL SITE PLAN AND KEY PLAN

DATE: 3/7/23
SCALE: 1"=60'
DRAWN BY: JA
DESIGNED BY: JR
CHECKED BY: JD
E1A
JOB NO: ·

DRAWING NO:
E02
39 OF 62 SHEETS

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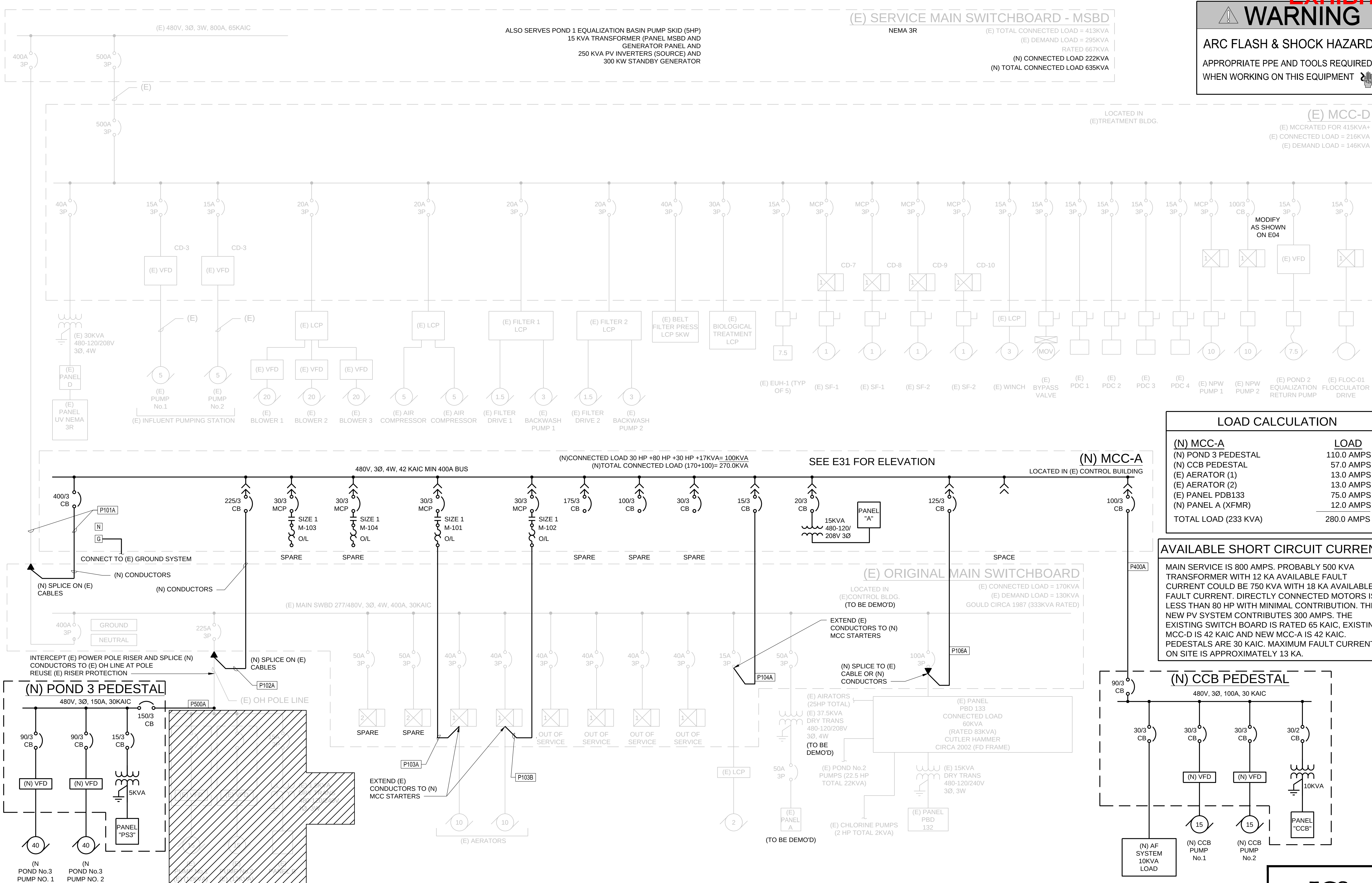
EXHIBIT B

WARNING

ARC FLASH & SHOCK HAZARD

APPROPRIATE PPE AND TOOLS REQUIRED WHEN WORKING ON THIS EQUIPMENT



LOAD CALCULATION

(N) MCC-A	LOAD
(N) POND 3 PEDESTAL	110.0 AMPS
(N) CCB PEDESTAL	57.0 AMPS
(E) AERATOR (1)	13.0 AMPS
(E) AERATOR (2)	13.0 AMPS
(E) PANEL PDB133	75.0 AMPS
(N) PANEL A (XFMR)	12.0 AMPS
TOTAL LOAD (233 KVA)	280.0 AMPS

AVAILABLE SHORT CIRCUIT CURRENT

MAIN SERVICE IS 800 AMPS. PROBABLY 500 KVA TRANSFORMER WITH 12 KA AVAILABLE FAULT CURRENT COULD BE 750 KVA WITH 18 KA AVAILABLE FAULT CURRENT. DIRECTLY CONNECTED MOTORS IS LESS THAN 80 HP WITH MINIMAL CONTRIBUTION. THE NEW PV SYSTEM CONTRIBUTES 300 AMPS. THE EXISTING SWITCH BOARD IS RATED 65 KAIC, EXISTING MCC-D IS 42 KAIC AND NEW MCC-A IS 42 KAIC. PEDESTALS ARE 30 KAIC. MAXIMUM FAULT CURRENT ON SITE IS APPROXIMATELY 13 KA.

(E) ELECTRICAL SINGLE LINE DIAGRAM

WITH MODIFICATION SHOWN IN BOLD

CONFORMED

BAR IS ONE INCH AT FULL SCALE

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COLFAX WWTP ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

SINGLE LINE DIAGRAMS

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: SWT
CHECKED BY: SWT
JOB NO:

ECS
ECS Engineering, Inc.
Electrical & Control Systems Engineering
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samterry@earthlink.net

DRAWING NO: E03

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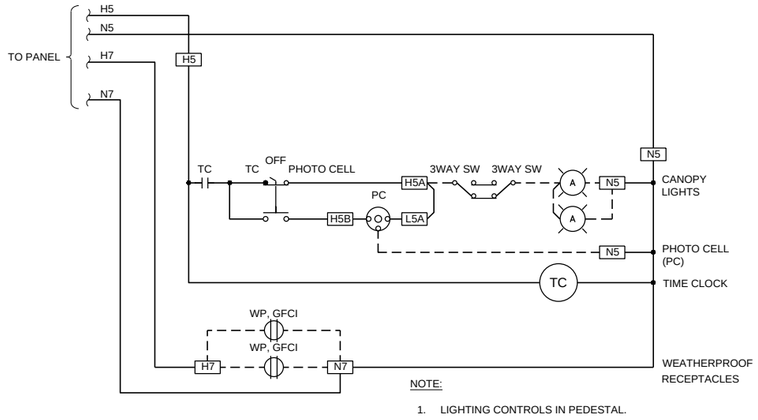
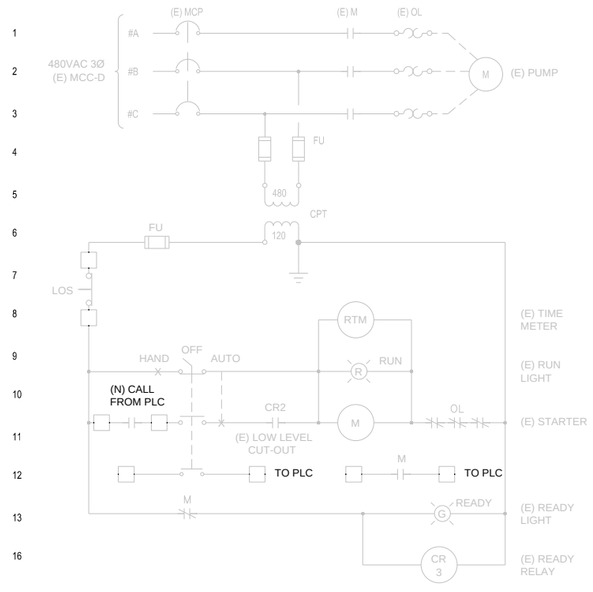
EXHIBIT B



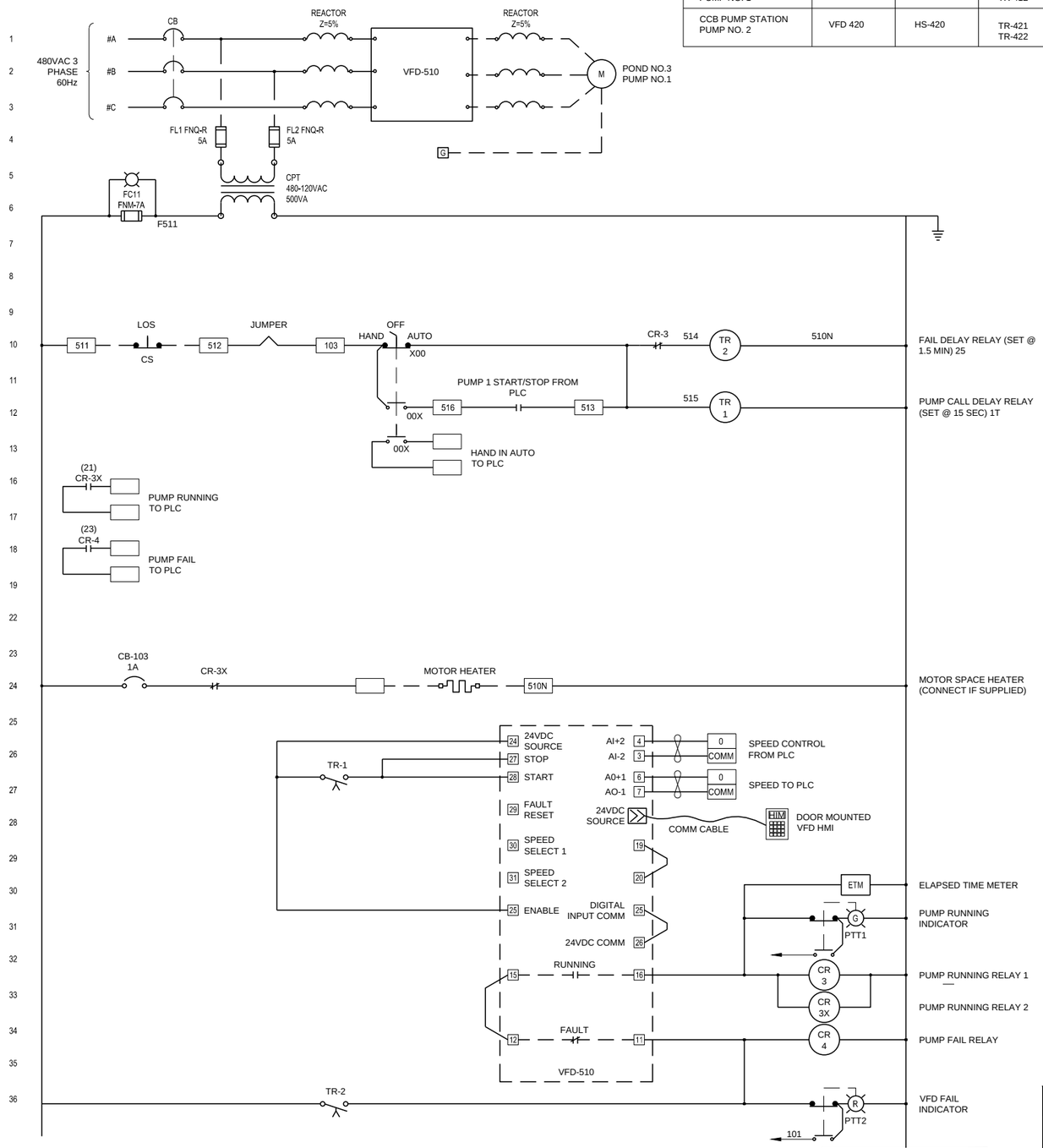
CANOPY LIGHTING AND RECEPTACLE WIRING DIAGRAM



(E) 3WATER (NPW) PUMP 1 AND 2 CONTROL WIRING DIAGRAM

MCC-D, MODIFICATIONS SHOWN IN HEAVY LINE WEIGHT

PUMP	VFD	HS	TR-1/2	CR-3/4	WIRES
POND NO. 3 PUMP NO. 1	VFD 510	HS-510	TR-511 TR-512	CR-513 CR-514	5XX
POND NO. 3 PUMP NO. 2	VFD 520	HS-520	TR-521 TR-522	CR-523 CR-524	5XX
CCB PUMP STATION PUMP NO. 1	VFD 410	HS-410	TR-411 TR-412	CR-413 CR-414	4XX
CCB PUMP STATION PUMP NO. 2	VFD 420	HS-420	TR-421 TR-422	CR-423 CR-424	4XX



TYPICAL PUMP STATION PUMP CONTROL WIRING DIAGRAM

(TYPICAL OF FOUR)

CONFORMED

BAR IS ONE INCH AT FULL SCALE

DATE	REVISIONS	APRV'L
03/07/23	CONFORMED	

NEXGEN UTILITY MANAGEMENT
4010 LENNANE DRIVE
SACRAMENTO, CA 95834
916.564.8000
NEXGEN

REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA — No. 14638 — Exp 12-31-24

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

CONTROL WIRING DIAGRAMS

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: SWT
CHECKED BY: SWT
JOB NO: ·

DRAWING NO: E04
41 OF 62 SHEETS

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samterry@earthlink.net

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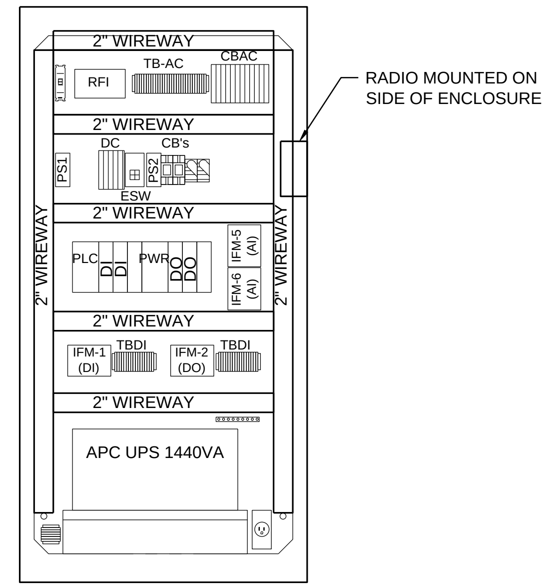
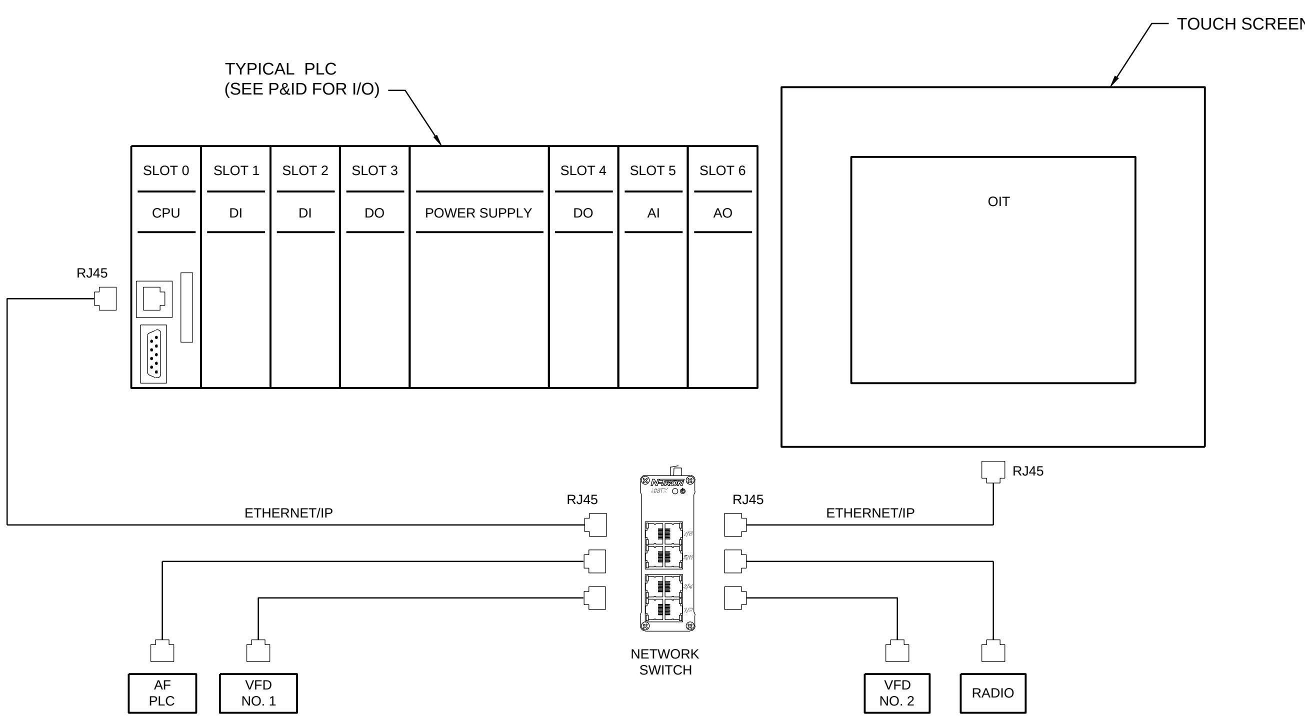
CONTROL PANEL COMPONENTS

NUMBER	DESCRIPTION	MANUFACTURER	PART NUMBER
1	ENCLOSURES	TESCO OR EQUAL	24-000 CUSTOM
2	BACKPANS	TESCO OR EQUAL	24-000 CUSTOM
3	COOLING FAN AND FILTER	ORION	OA172SAP-11-1TB
4	THERMOSTAT	HOFFMAN	A-TEMNO/C
5	RFI POWER LINE FILTER	CORCOM	20VK6
6	RECEPTACLE SIMPLEX, 15 A	HUBBELL	HBL5361I
7	RECEPTACLE GFCI	HUBBELL	GF20WL
8	UPS 1440 VA W/ FAIL CONTACT	APC	
9	LED LIGHT FIXTURES W/ SWITCHES	HOFFMAN	LEDA
10	DOOR SWITCH	MICROSWITCH	1AC2
11	CIRCUIT BREAKER, LESS THAN 15 AMP	CBI	QZ SERIES
12	SURGE PROTECTOR	EATON	SPD SERIES
13	2PDT RELAY, 24 VDC	IDEC	RH2B-UL-24VDC
14	RELAY BASE	IDEC	SH2B-05
15	POWER SUPPLY 24VDC	IDEC	PS5R-SD24
16	FUSES	BUSSMAN	FNM SERIES
17	FUSE BLOCK	SPRECHER & SCHU	FH8 SERIES
18	GROUND BUSBAR	ILSCO	D167-8
19	PILOT DEVICES	ALLEN-BRADLEY	800-H SERIES
20	OPERATOR INTERFACE TERMINAL	AUTOMATION DIRECT	10" COLOR TOUCHSCREEN
21	PLC COMPACTLOGIX	ALLEN-BRADLEY	1769-L16ER-BB1B
22			
23			
24	PLC I/O DISCRETE INPUT CARD	ALLEN-BRADLEY	1769-IA16
25	PLC I/O DISCRETE OUTPUT CARD	ALLEN-BRADLEY	1769-OW8I
26			
27	PLC I/O ANALOG INPUT CARD	ALLEN-BRADLEY	1769-IF8
28	PLC I/0 ANALOG OUTPUT CARD	ALLEN-BRADLEY	1769-OF4
29			
30	ETHERNET SWITCH & PATCH CORDS	N-TRON	108TX
31	COAXIAL CABLE	TIMES MICROWAVE	LMR
32	TIME DELAY FUSE	BUSSMAN	MDL SERIES
33	ANTENNA YAGI	SCALA	YS2165 YAGI
34	RADIO, LICENSED, 200 MHZ	MDS ORBIT	200 mHz LICENSED
35	PLASTIC WIREWAY	PANDUIT	TYPE "E"
36	RFI FILTER	CORCOM	20VK6
37	PROTOCOL CONVERTER	REDLION	DATA STATION PLUS



TYPICAL PUMP STATION CONTROL PANEL BACK PANEL

NOT TO SCALE (SEE E11 AND E41 FOR ADDITIONAL INFORMATION)



TYPICAL PUMP STATION NETWORK DIAGRAM

CONFORMED

BAR IS ONE INCH AT FULL SCALE

#	DATE	REVISIONS	APRV'L
1	03/07/23	CONFORMED	
-			
-			
-			
-			

NEXGEN UTILITY MANAGEMENT
4010 LENNANE DRIVE
SACRAMENTO, CA 95834
916.564.8000

NEXGEN

REGISTERED PROFESSIONAL ENGINEER SAMUEL W. TERRY No. 7125 Exp. 06-30-2023 CONTROL SYSTEM STATE OF CALIFORNIA

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

PUMPS STATION
NETWORK DIAGRAM
AND BACKPANEL ELEVATIONS

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: SWT
CHECKED BY: SWT
JOB NO:

ECS
ECS Engineering, Inc.
Electrical & Control Systems Engineering
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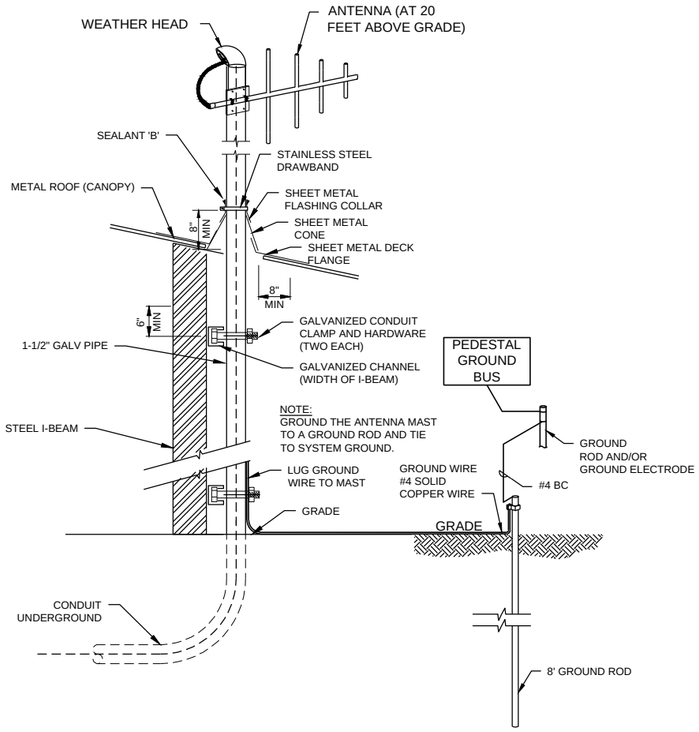
DRAWING NO:
E05

42 OF 62 SHEETS

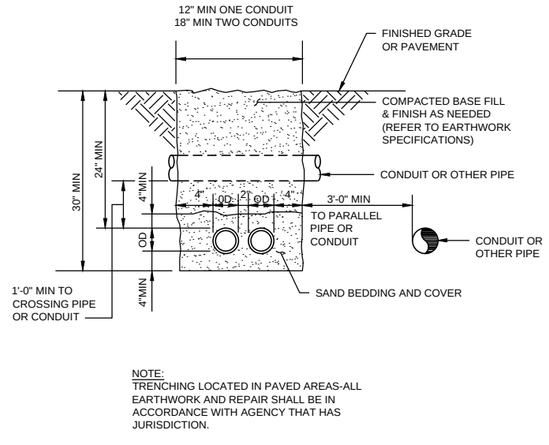
N:\CS_PROJECTS\ECS\22\22004-ColfaxAlgaeSystem\22004-WWTPAlgaeSystem-E05.dwg 3/07/23 2:26pm jayala

EXHIBIT B



ROOF ANTENNA MOUNTING DETAIL 1/E07

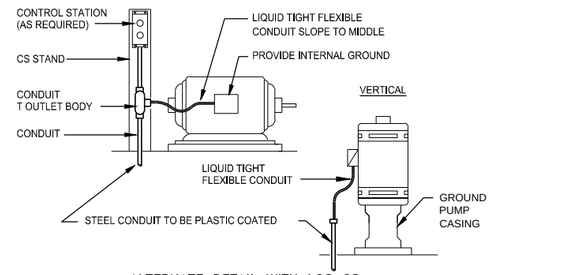
SCALE: NOT TO SCALE



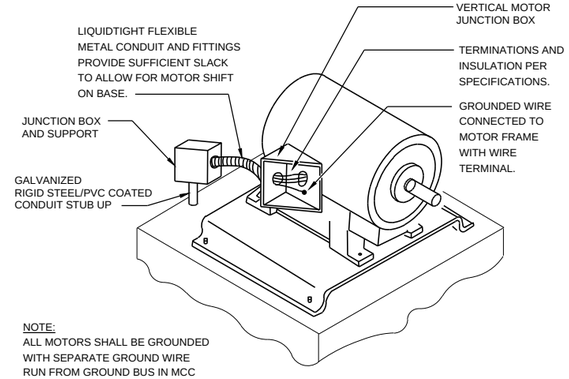
NOTE:
TRENCHING LOCATED IN PAVED AREAS-ALL EARTHWORK AND REPAIR SHALL BE IN ACCORDANCE WITH AGENCY THAT HAS JURISDICTION.

TYPICAL CONDUIT TRENCH DETAIL 2/E07

SCALE: NOT TO SCALE



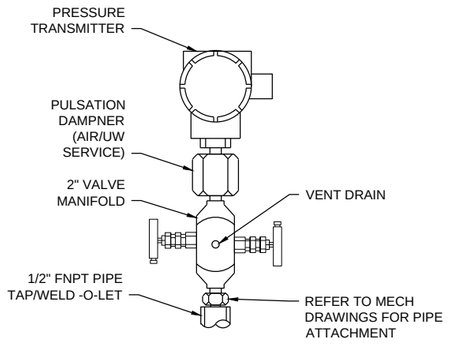
ALTERNATE DETAIL WITH LOS CS



NOTE:
ALL MOTORS SHALL BE GROUNDED WITH SEPARATE GROUND WIRE RUN FROM GROUND BUS IN MCC

TYPICAL MOTOR CONNECTION DETAIL 3/E07

SCALE: NOT TO SCALE



PRESSURE TRANSMITTER INSTALLATION DETAIL 4/E07

SCALE: NOT TO SCALE

CONFORMED

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	DATE	REVISIONS	APR'L
1	03/07/23	CONFORMED	

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REGISTERED PROFESSIONAL ENGINEER ★ ELECTRICAL ★ STATE OF CALIFORNIA
No. 14638
Exp 12-31-24

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

ELECTRICAL DETAILS II

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: SWT
CHECKED BY: SWT
JOB NO: ·

DRAWING NO:
E07
44 OF 62 SHEETS

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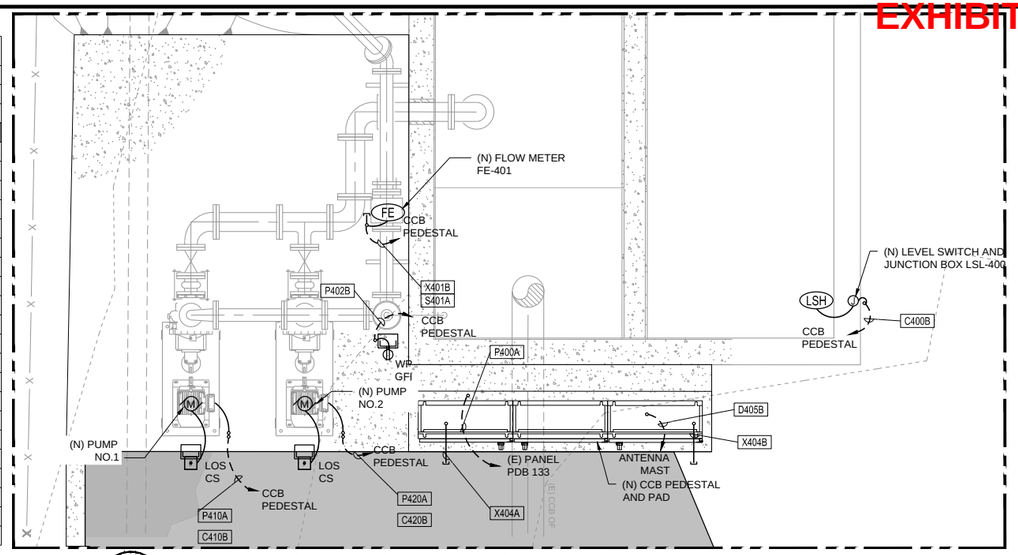
EXHIBIT B

CONDUIT SCHEDULE

CONDUIT NUMBER	SIZE	RUN FROM	RUN TO	LOCATION SERVED	CKT TYPE	CKT VOLTS	NO CKT WIRES	CKT TYPE WIRE	CKT WIRE SIZE	GND TYPE WIRE	GND WIRE SIZE	NOTES
P400A	2"	CCB PEDESTAL (PWR)	(E) PANEL PDB-133	CCB PS	P	480	3	THWN	1	THWN	6	PEDESTAL POWER FEEDER
C400B	3/4"	CCB PEDESTAL (CP)	LSL-400	CCB PS	C	120	2	THWN	14	THWN	14	LOW CCB LEVEL SWITCH STATUS
S401A	1"	CCB PEDESTAL (CP)	FE-401	CCB PS	S	24	1	PER	MFG			FLOWMETER ELEMENT SIGNAL CABLE
X401B	3/4"	CCB PEDESTAL (CP)	FE-401	FUTURE	X	120	1	Pullrope				SPARE - CAP FOR FUTURE USE
P402A	3/4"	CCB PEDESTAL (PWR)	CANOPY LIGHTS	CCB PS	P	120	2	THWN	12	THWN	12	LIGHT FEEDER VIA 3-WAY SWITCHES
P402B	3/4"	CCB PEDESTAL (PWR)	CANOPY RECEPTACLES	CCB PS	P	120	2/EA	THWN	12	THWN	12	RECEPTACLE FEEDERS
P403A	3/4"	CCB PEDESTAL (PWR)	HEAT TAPE RECEPTACLE	CCB PS	P	120	2	THWN	12	THWN	12	HEAT TAPE RECEPTACLE FEEDER
P403B	3/4"	CCB PEDESTAL (PWR)	HEAT TAPE RECEPTACLE	CCB PS	P	120	2	THWN	12	THWN	12	HEAT TAPE RECEPTACLE FEEDER
P403C	3/4"	CCB PEDESTAL (PWR)	HEAT TAPE RECEPTACLE	CCB PS	P	120	2	THWN	12	THWN	12	HEAT TAPE RECEPTACLE FEEDER
P403D	3/4"	CCB PEDESTAL (PWR)	HEAT TAPE RECEPTACLE	CCB PS	P	120	2	THWN	12	THWN	12	HEAT TAPE RECEPTACLE FEEDER
X404A	1-1/4"	CCB PEDESTAL (PWR)	STUB OUT OF PAD	FUTURE	X	120	1	Pullrope				SPARE - CAP FOR FUTURE USE
X404B	1-1/4"	CCB PEDESTAL (CP)	STUB OUT OF PAD	FUTURE	X	120	1	Pullrope				SPARE - CAP FOR FUTURE USE
D405B	1-1/2"	CCB PEDESTAL (CP)	MAST/ANTENNA	CCB PS	D		1	COAX				
P410A	1"	CCB PEDESTAL (MCC)	PUMP NO. 1 (P-410)	CCB PS	P	480	3	THWN	10	THWN	10	PUMP FEEDER
C410B	3/4"	CCB PEDESTAL (MCC)	PUMP NO. 1 LOS CS	CCB PS	C	120	6	THWN	14	THWN	14	PUMP TSH, MOTOR HEATER AND LOS STATUS
P420A	1"	CCB PEDESTAL (MCC)	PUMP NO. 2 (P-420)	CCB PS	P	480	3	THWN	10	THWN	10	PUMP FEEDER
C420B	3/4"	CCB PEDESTAL (MCC)	PUMP NO. 1 LOS CS	CCB PS	C	120	6	THWN	14	THWN	14	PUMP TSH, MOTOR HEATER AND LOS STATUS
P430A	1-1/4"	CCB PEDESTAL (PWR)	AF SKID CONTROL PANEL	AF UNIT	P	480	3	THWN	8	THWN	10	AF CONTROL PANEL POWER FEEDER
D430B	1-1/4"	CCB PEDESTAL (CP)	AF SKID CONTROL PANEL	AF UNIT	D	N/A	1	CAT5				AF CONTROL PANEL NETWORK CABLE
S430C	1"	FE-430	AF SKID CONTROL PANEL	AF UNIT	S	24	1	PER	MFG			FLOWMETER ELEMENT SIGNAL CABLE
X430D	3/4"	FE-430	AF SKID CONTROL PANEL	AF UNIT	X	120	1	Pullrope				SPARE - CAP FOR FUTURE USE

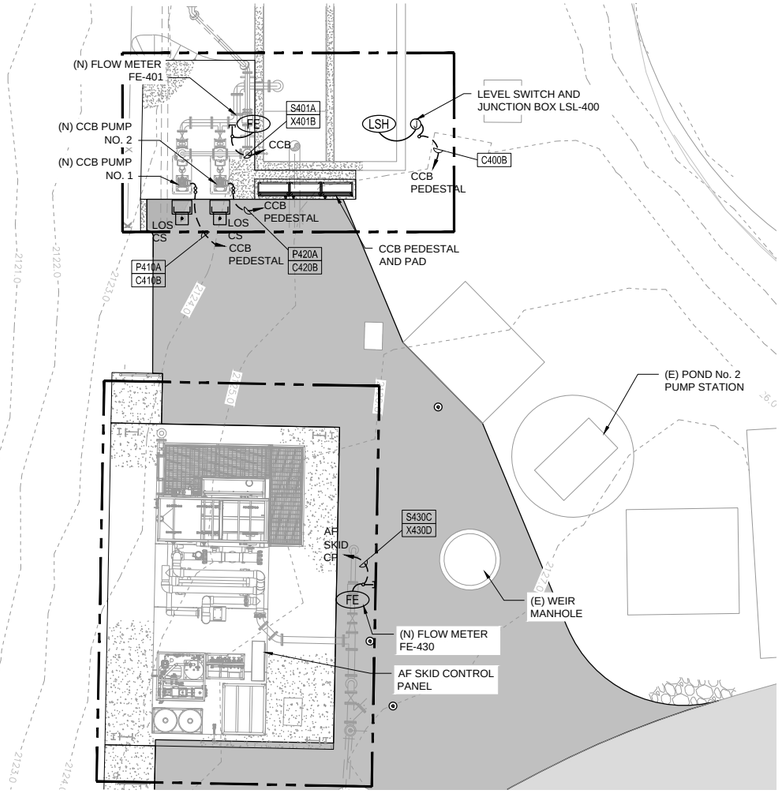
IDENTIFIES THE TYPE OF CIRCUIT BEING SERVICED

C=	CONTROL	D=	DATA
S=	INSTRUMENT SIGNAL	T=	TELEPHONE
P=	POWER	X=	SPARE



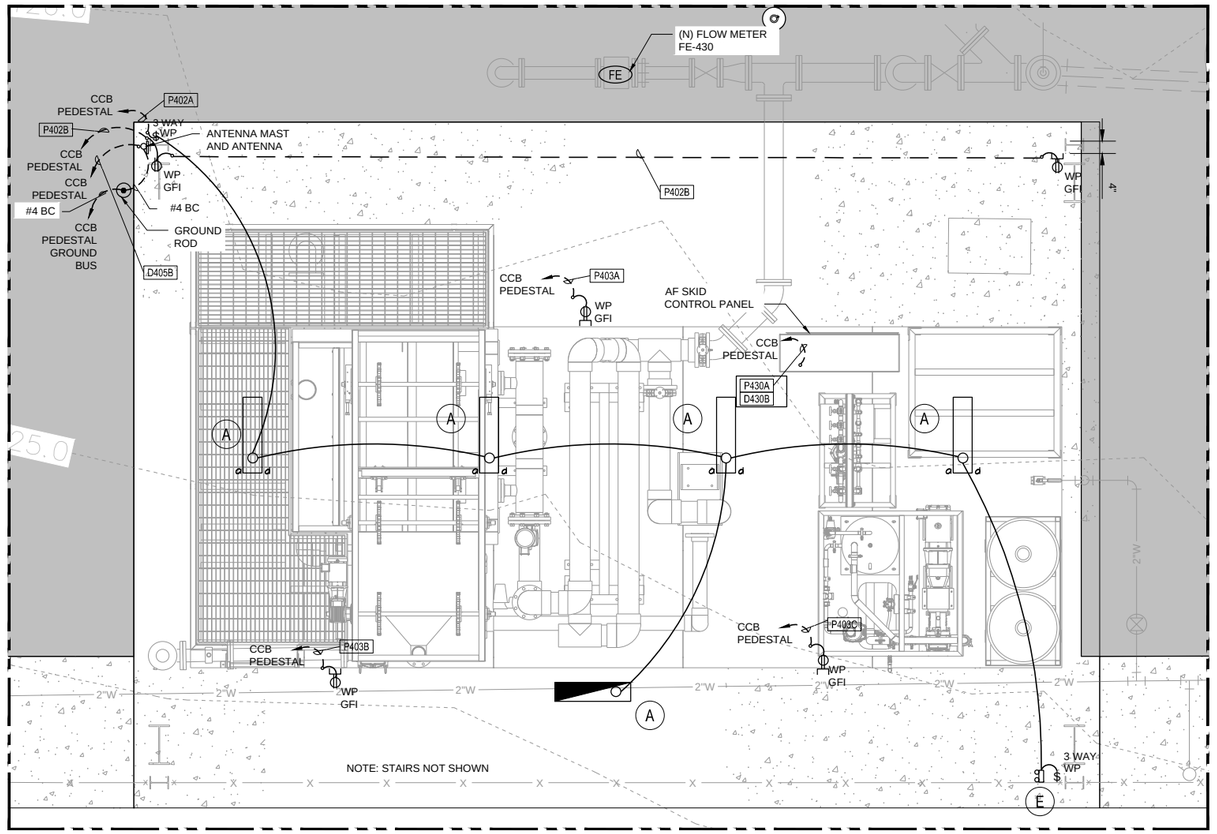
CHLORINE CONTACT BASIN PUMP ELECTRICAL PLAN

SCALE: 1"=2'-0"



AIR FLOATATION ELECTRICAL SITE PLAN

SCALE: 1" = 6'-0"



AIR FLOATATION ELECTRICAL PLAN

SCALE: 1"=2'-0"

CONFORMED

ECS
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Electrical & Control Systems Engineering
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samterry@earthlink.net

BAR IS ONE INCH AT FULL SCALE

APR'L	REVISIONS	DATE	
	CONFORMED	03/07/23	1

NEXGEN UTILITY MANAGEMENT
4010 LENNANE DRIVE
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916.564.8000
NEXGEN

REGISTERED PROFESSIONAL ENGINEER — SAMUEL W. TERRY — No. 14638 — Exp 12-31-24 — ELECTRICAL

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

AIR FLOATATION
ELECTRICAL PLANS

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: SWT
CHECKED BY: SWT
JOB NO: ·

DRAWING NO: E10
45 OF 62 SHEETS

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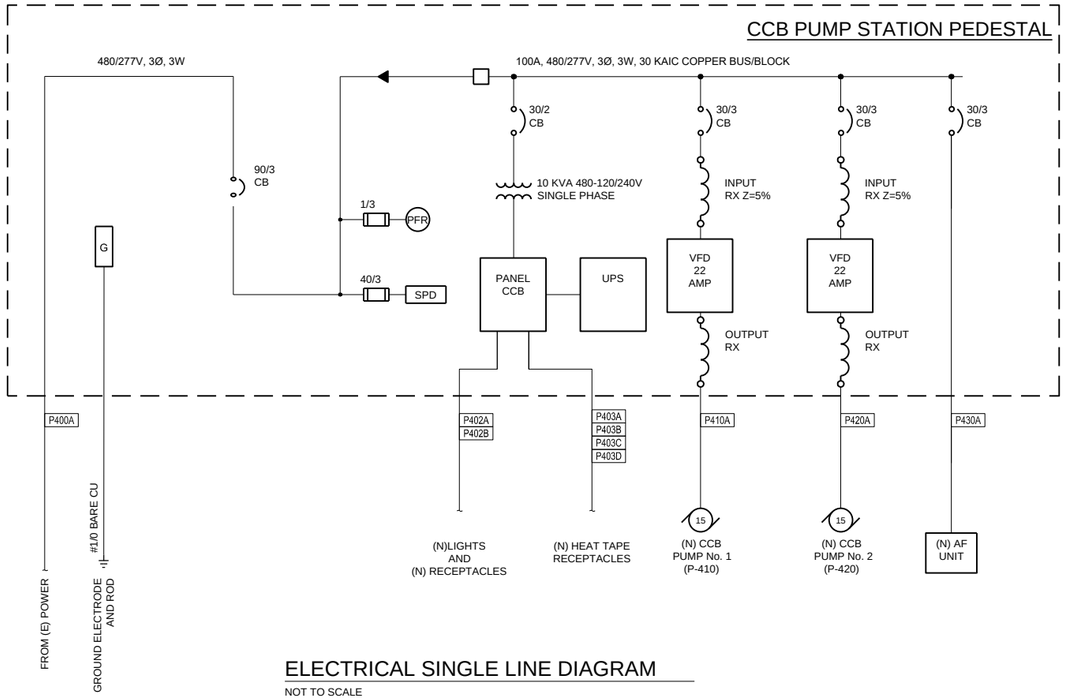
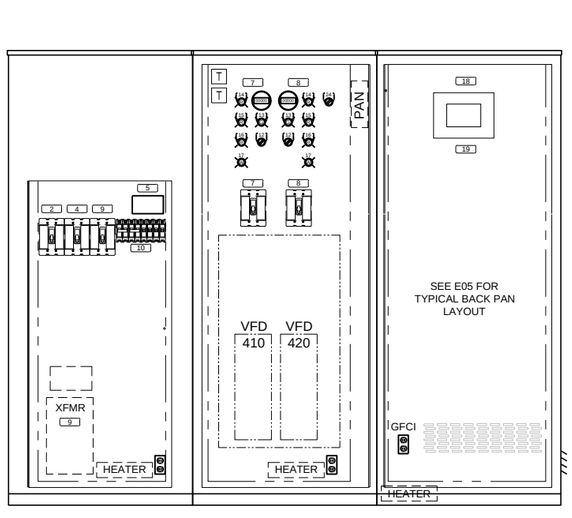
EXHIBIT B

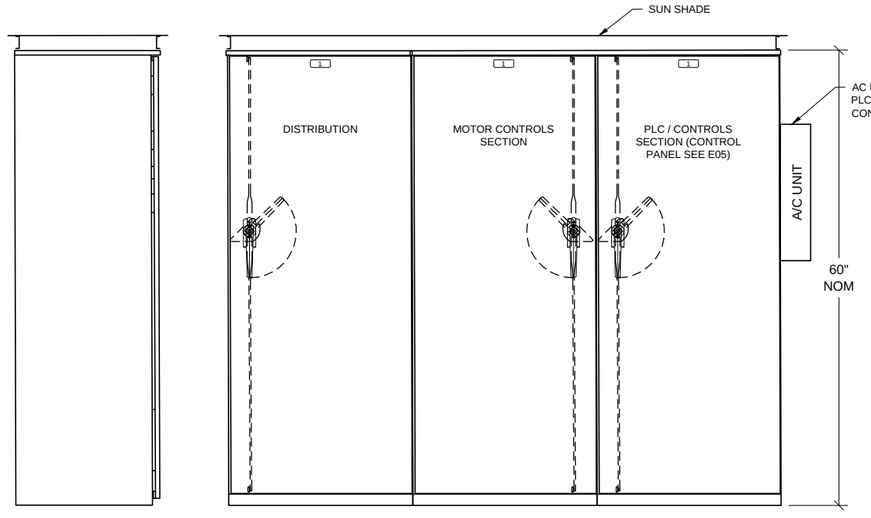


ELECTRICAL SINGLE LINE DIAGRAM

NOT TO SCALE



INTERIOR



EXTERIOR

PUMP STATION PEDESTAL ELEVATION

NOT TO SCALE

PANEL "CCB"

10 KAIC

VOLTAGE: 120/240 | MOUNTING: PEDESTAL | KVA: 5.1
BUS: 50 AMP | TYPE: 40/2 MCB | CURRENT: 22.0 AMPS

LOAD	KVA	CB	NO	NO	CB	KVA	LOAD
UPS RECEPTACLE-CONTROLS	1.00	20	1	2	20	0.50	PEDESTAL LIGHTS,HEATER & FAN
A/C UNIT	2.00	20	3	4	20	0.20	PEDESTAL RECEPTACLES
CANOPY LIGHTS	0.20	20	5	6	20	0.20	HEAT TAPE RECEPTACLE
CANOPY RECEPTACLES	0.40	20	7	8	20	0.20	HEAT TAPE RECEPTACLE
CANOPY E LIGHT	0.10	20	9	10	20	0.20	HEAT TAPE RECEPTACLE
FLOW METER	0.10	20	11	12	20	0.20	HEAT TAPE RECEPTACLE
SPARE	0.10	20	13	14	20	0.20	SPARE

LOAD CALCULATION

CCB PUMP STATION PEDESTAL	LOAD
SAF UNIT 8HP	10.0 AMPS
PUMP NO. 1 (P-410)	18.5 AMPS
PUMP NO. 2 (P-420)	18.5 AMPS
PANEL	10.0 AMPS
25% OF LARGEST MOTOR	4.6 AMPS
TOTAL LOAD (51 KVA @ 480 V)	61.6 AMPS

NAMEPLATE SCHEDULE

No.	LETTER SIZE	INSCRIPTION
1	1/4"	CCB PUMP STATION PEDESTAL
2		MAIN DISCONNECT
3		AC UNIT
4		SPARE
5		SURGE PROTECTION DEVICE
6		POWER MONITOR
7		PUMP NO. 1
8		PUMP NO. 2
9		TRANSFORMER CCB
10		PANEL "CCB"
11		UPS
12	1/8"	HAND OFF AUTO
13		RUN
14		OVER TEMP
15		FAIL
16		HEAT TAPE RECEPTACLE
17		CONTROL POWER
18		CONTROL PANEL
19		OPERATOR INTERFACE
20		LIGHT
21		RECEPTACLE
22		FLOW METER

⚠ WARNING

ARC FLASH & SHOCK HAZARD

APPROPRIATE PPE AND TOOLS REQUIRED WHEN WORKING ON THIS EQUIPMENT

CONFORMED

ECS
ECS Engineering, Inc.
Electrical & Control Systems Engineering
916-718-3686
samterry@earthlink.net

BAR IS ONE INCH AT FULL SCALE

APRV'L	REVISIONS	DATE
	CONFORMED	03/07/23

NEXGEN UTILITY MANAGEMENT
4010 LENNANE DRIVE
SACRAMENTO, CA 95834
916.564.8000
NEXGEN

REGISTERED PROFESSIONAL ENGINEER * SAMUEL WESLEY TERRY * No. 14638 * Exp 12-31-24 * ELECTRICAL * STATE OF CALIFORNIA

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

CCB PUMP STATION
SINGLE LINE DIAGRAM,
ELEVATIONS AND LOAD
CALCULATIONS

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: SWT
CHECKED BY: SWT
JOB NO: -

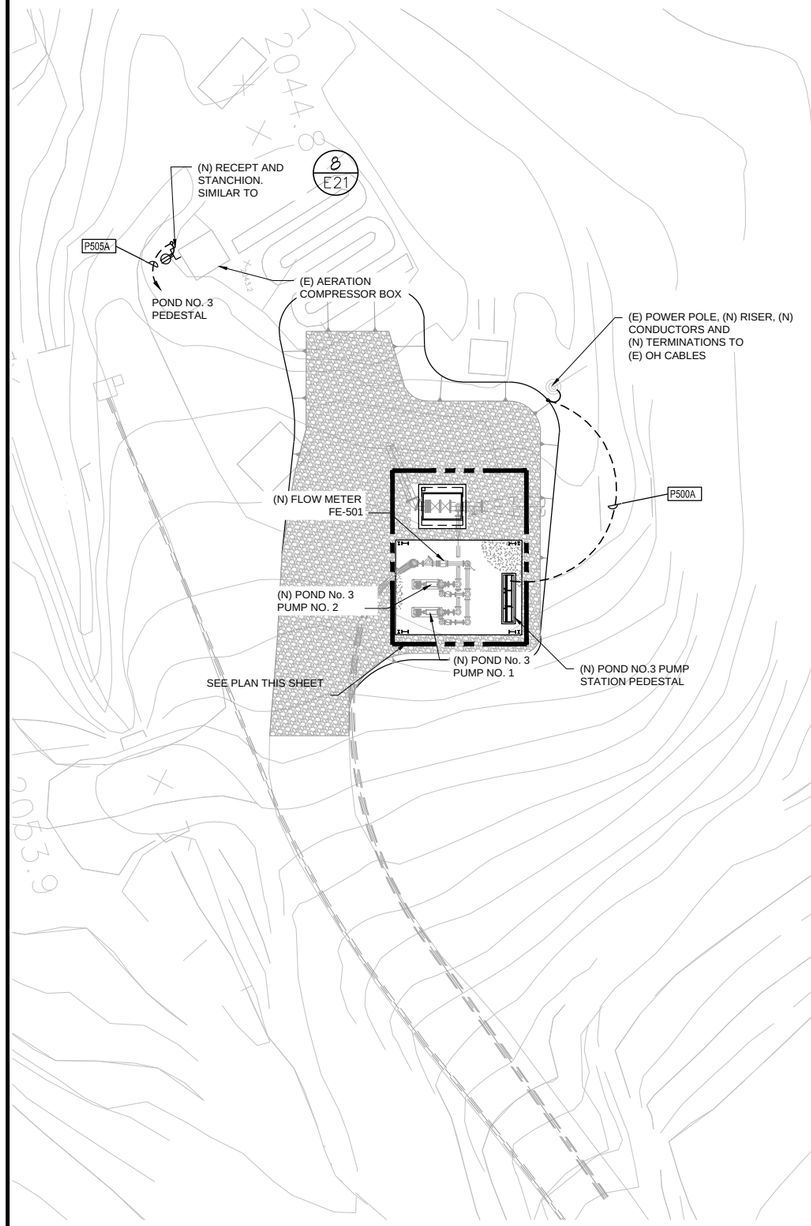
DRAWING NO: E11
46 OF 62 SHEETS

N:\CS_PROJECTS\ECS\Y21\Y2004-CollaxAlgaeSystem\Y2004-MWP\AlgaeSystem-E11.dwg 3/07/23 2:27pm jkyote

EXHIBIT B

FIXTURE SCHEDULE

FIXTURE TYPE	LAMP TYPE	LAMP WATTS	1Ø VOLTS	MOUNTING ARRGT	DESCRIPTION	CATALOG NUMBER
A	LED	24	120	PENDANT OR SURFACE APPROX 10' AFF OR WALKWAY	ENCLOSED INDUSTRIAL, DAMP AREA, 4000K LED	LITHONIA FEML44LIMAFLMD MVOLTGZ1040K80CRI
E	LED	10	120	WALL MOUNT 9' AFF	EMERGENCY BATTERY PACK	LITHONIA ELM6LUVOLTLTPSDRTEHO

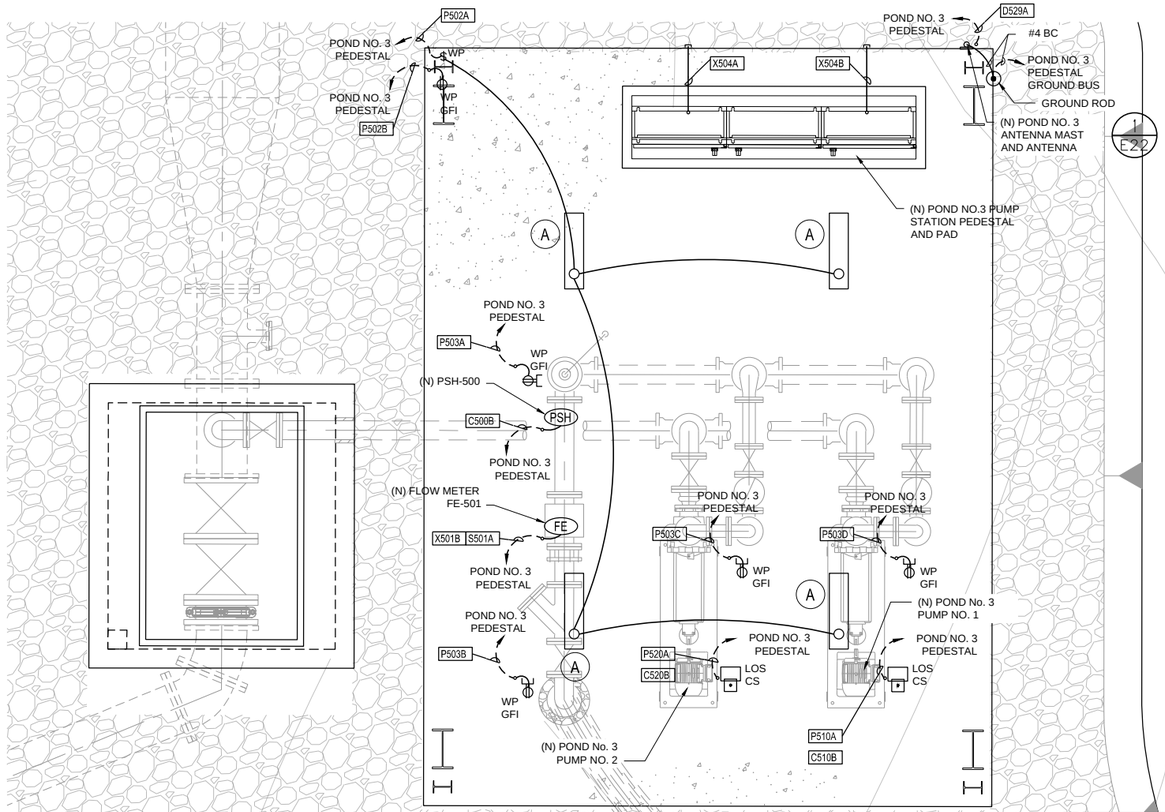


CONDUIT SCHEDULE

CONDUIT NUMBER	SIZE	RUN FROM	RUN TO	LOCATION SERVED	CKT TYPE	CKT VOLTS	NO CKT WIRES	CKT TYPE WIRE	CKT WIRE SIZE	GND TYPE WIRE	GND WIRE SIZE	NOTES
P500A	2"	POND 3 PEDESTAL (PWR)	EXISTING POWER POLE	POND 3 PS	P	480	3	THWN	1/0	THWN	4	PEDESTAL POWER FEEDER
C500B	3/4"	POND 3 PEDESTAL (CP)	PSH-500	POND 3 PS	C	120	2	THWN	14	THWN	14	HIGH DISCHARGE PRESSURE SWITCH STATUS
S501A	1"	POND 3 PEDESTAL (CP)	FE-501	POND 3 PS	S	24	1	PER	MFG			FLOWMETER ELEMENT SIGNAL CABLE
X501B	3/4"	POND 3 PEDESTAL (CP)	FE-501	FUTURE	X	120	1	Pullrope				SPARE - CAP FOR FUTURE USE
P502A	3/4"	POND 3 PEDESTAL (PWR)	CANOPY LIGHTS	POND 3 PS	P	120	2	THWN	12	THWN	12	LIGHT FEEDER VIA SWITCH
P502B	3/4"	POND 3 PEDESTAL (PWR)	CANOPY RECEPTACLES	POND 3 PS	P	120	2/EA	THWN	12	THWN	12	RECEPTACLE FEEDERS
P503A	3/4"	POND 3 PEDESTAL (PWR)	HEAT TAPE RECEPTACLE	POND 3 PS	P	120	2	THWN	12	THWN	12	HEAT TAPE RECEPTACLE FEEDER
P503B	3/4"	POND 3 PEDESTAL (PWR)	HEAT TAPE RECEPTACLE	POND 3 PS	P	120	2	THWN	12	THWN	12	HEAT TAPE RECEPTACLE FEEDER
P503C	3/4"	POND 3 PEDESTAL (PWR)	HEAT TAPE RECEPTACLE	POND 3 PS	P	120	2	THWN	12	THWN	12	HEAT TAPE RECEPTACLE FEEDER
P503D	3/4"	POND 3 PEDESTAL (PWR)	HEAT TAPE RECEPTACLE	POND 3 PS	P	120	2	THWN	12	THWN	12	HEAT TAPE RECEPTACLE FEEDER
X504A	1-1/4"	CCB PEDESTAL (PWR)	STUB OUT OF PAD	FUTURE	X	120	1	Pullrope				SPARE - CAP FOR FUTURE USE
X504B	1-1/4"	CCB PEDESTAL (CP)	STUB OUT OF PAD	FUTURE	X	120	1	Pullrope				SPARE - CAP FOR FUTURE USE
P505A	1"	POND 3 PEDESTAL (PWR)	RECEPTACLE	(E) EQUIPMENT	P	120	3	THWN	10	THWN	10	(E) AERATION COMPRESSOR RECEPTACLE
P510A	1-1/2"	POND 3 PEDESTAL (MCC)	PUMP NO. 1 (P-510)	POND 3 PS	P	480	3	THWN	6	THWN	8	PUMP FEEDER
C510B	3/4"	POND 3 PEDESTAL (MCC)	PUMP NO. 1 LOS CS	POND 3 PS	C	120	6	THWN	14	THWN	14	PUMP TSH, MOTOR HEATER AND LOS STATUS
P520A	1-1/2"	POND 3 PEDESTAL (MCC)	PUMP NO. 2 (P-520)	POND 3 PS	P	480	3	THWN	6	THWN	8	PUMP FEEDER
C520B	3/4"	POND 3 PEDESTAL (MCC)	PUMP NO. 1 LOS CS	POND 3 PS	C	120	6	THWN	14	THWN	14	PUMP TSH, MOTOR HEATER AND LOS STATUS
D529A	2"	POND 3 PEDESTAL (CP)	ANTENNA MAST	POND 3 PS	D	N/A	1	COAX				ANTENNA CABLE

IDENTIFIES THE TYPE OF CIRCUIT BEING SERVICED

C=	CONTROL	D=	DATA
S=	INSTRUMENT SIGNAL	T=	TELEPHONE
P=	POWER	X=	SPARE



N

POND NO. 3 PUMP STATION ELECTRICAL AREA PLAN

SCALE: 1" = 12'-0"

N

POND NO. 3 PUMP STATION ELECTRICAL SITE PLAN

SCALE: 1" = 2'-0"

CONFORMED

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BAR IS ONE INCH AT FULL SCALE

DATE	REVISIONS	APRV'L
03/07/23	CONFORMED	

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COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

POND NO.3
PUMP STATION
ELECTRICAL PLANS

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: SWT
CHECKED BY: SWT
JOB NO: ·

DRAWING NO: E20
47 OF 62 SHEETS

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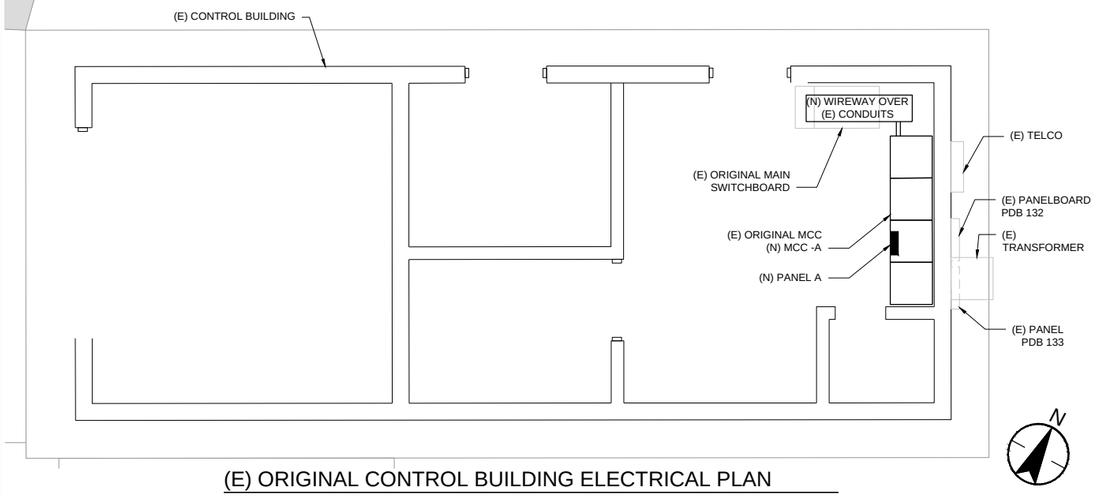
EXHIBIT B

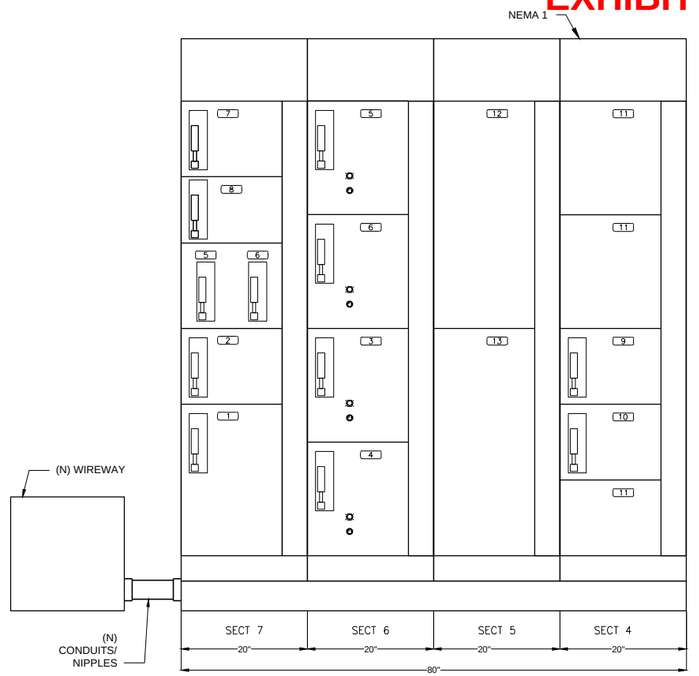


(E) ORIGINAL CONTROL BUILDING ELECTRICAL PLAN

SCALE: 1" = 3'-0"

NOTES

1. OPEN UP THE EXISTING ORIGINAL SWITCHBOARD AND MCC AND CONFIRM EQUIPMENT STILL IN USE AND REPORT ANY DESCREPANCIES WITH BID DOCUMENTS TO THE ENGINEER.
2. COORDINATE ALL WORK WITH THE OPERATORS. THE SHUTDOWN OF THE MCC SHALL NOT BE MORE THAN 72 HOURS. IF THE FACILITY IS OFF LINE FOR MORE THAN 72 HOURS PLAN TO RECONNECT EXISTING PANEL PDB 133 AND POND 3 PUMP STATION FOR 8 HOURS. MEET WITH THE OPERATORS TO DISCUSS THE WORK PLAN AND SCHEDULE.
3. TEMPORARY POWER FOR OTHER LOADS MAY BE REQUIRED. LIMITED CONSTRUCTION POWER CAN BE RUN FROM A RECEPTACLE IN THE MAIN BUILDING.
4. DEMO EXITING ORIGINAL SWITCHBOARD AND MCC. DISPOSE OF THE EXISTING SWITCHBOARD AND MCC. TAKE CARE TO PROTECT CABLES AND CONDUIT TO BE REUSED. REMOVE LEGACY CABLES THAT ARE OUT OF SERVICE. CUT OFF UNUSED CONDUITS AT FLOOR LEVEL IF NECESSARY. CLEAN UP AREA AROUND DEMO'D AREA. PROVIDE ONE DAY FOR OWNER TO PAINT REAR WALL.
5. INSTALL NEW MCC AND WIRE GUTTER. PROVIDE FLOOR ANCHORS (AND WALL ANCHORS, IF REQUIRED). SPLICE AND EXTEND EXISTING MAIN POWER FEEDER CABLES FROM ADJACENT CONDUIT TO NEW MAIN CICUIT BREAKER.
6. SPLICE AND EXTEND CONDUCTORS FOR THE POND 3 PUMP STATION (OVERHEAD LINE) TO NEW FEEDER BREAKER.
7. MODIFY EXISTING POWER FEEDERS FOR THE EXISTING AERATORS STILL IN USE. RECONNECT TO THE NEW MCC AND TEST TO THE OPERATORS' SATISFACTION.
8. MODIFY THE EXISTING POWER FEEDERS FOR THE EXISTING LOCAL CONTROL PANEL. RECONNECT TO THE NEW MCC AND TEST TO THE OPERATORS' SATISFACTION.
9. MODIFY THE EXISTING CONDUIT AND CONDUCTORS FEEDING EXISTING PANEL PDB 133 TOI ALLOW FOR INSTALLATION AND RECONNECTION TO POWER. RECONNECT EXISTING PANEL PDB 133 TO THE NEW MCC AND TEST TO THE OPERATORS' SATISFACTION.
10. PROVIDE NEW CONDUIT AND CONDUCTORS TO FEED POWER FOR THE NEW CCB PEDESTAL. ROUTE THE NEW CONDUIT OVERHEAD AND THROUGH WALL THEN DOWN THE WALL ON EXTERIOR OF BUUILDING. PROVIDE LB FITTINGS.
11. THE NEW MCC INCLUDES A PANELBOARD AND PANELBOARD TRANSFORMER. GROUND THE TRANSFORMER SECONDARY.
12. INVESTIGATE EXISTING PANELBOARD'S EXISTING LOADS TO CONFIRM WHICH ARE STILL IN SERVICE. IN GENERAL, RECONNECT ALL BUILDING INTERIOR AND EXTERIOR LIGHTS, ALL BUILDING INTERIOR AND EXTERIOR RECEPTACLES, CHLORINE ROOM FAN, CHLORINE STORAGE ROOM FAN, BASEBOARD HEATER, RESTROOM WALL HEATER, HEADWORKS LIGHTS AND RECEPTACLES, HOIST, FLOWMETER AND WATER HEATER TO THE NEW PANELBOARD. REMOVE ANY EXISTING CONDUCTORS FROM CONDUITS FOR OUT OF SERVICE EQUIPMENT INCLUDING PACKAGED LABORATORY, CHLORINATION PUMP, PRELORINATOR, POST CHLORINATOR AND CHLORINE GAS DETECTORS. REMOVE ANY UNUSED EXPOSED CONDUIT IN AND AROUND THE NEW MCC. TEST TO THE OPERATOR'S SATISFACTION.



(N) MCC-A ELEVATION

(N) PANELBOARD "A"

LOCATION: EXISTING CONTROL BUILDING MCC-A
MOUNTING: MCC
ENCLOSURE NEMA TYPE: 1
VOLTAGE: 120/208
AIC RATING: 10000
FED FROM (SOURCE): MCC-A

PANEL AMP RATING: 100
PANEL PHASES: 3
PANEL WIRES: 4
MAIN LANDING TYPE: CB
MCB TRIP RATING: 50
MCB FRAME SIZE: 100

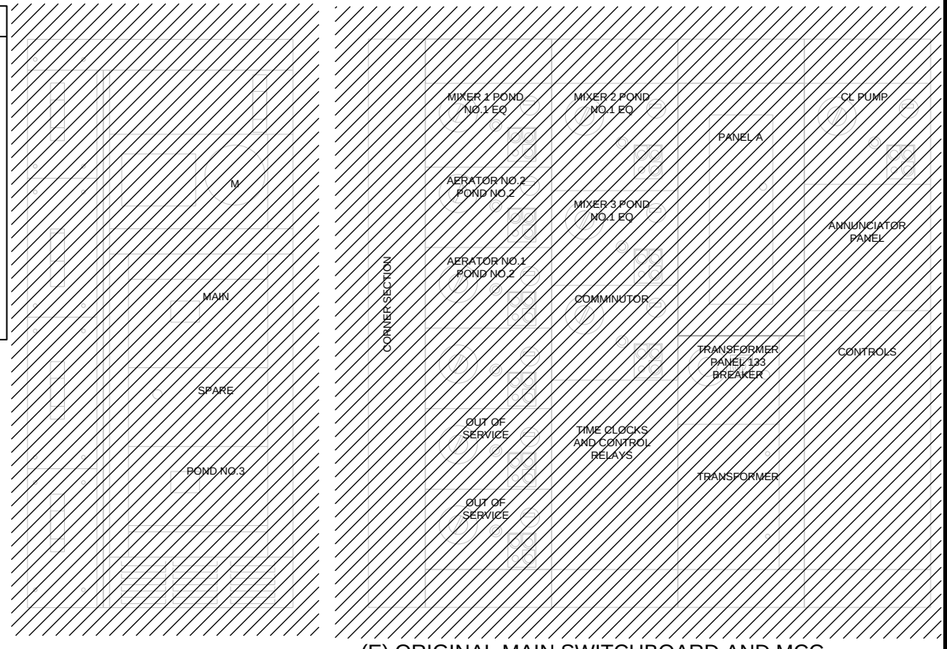
CKT NO.	CIRCUIT DESCRIPTION	TRIP (AMPS)	POLE	PHASE A (VA)	PHASE B (VA)	PHASE C (VA)	PHASE A (VA)	PHASE B (VA)	PHASE C (VA)	POLE	TRIP (AMPS)	CIRCUIT DESCRIPTION	CKT NO.
1	(E) BUILDING LIGHTING	20	1	1100			1000			1	20	(E) LIGHTING AND CEF	2
3	(E) CHLORINE STORAGE RM FAN	20	1		860			860		1	20	(E) CHLORINE RM FAN	4
5	(E) HEADWORKS LIGHTS	20	1			600			800	1	20	(E) BUILDING RECEPTACLES	6
7	(E) HEADWORKS RECEPTACLES	20	1	400			0			1	20	(E) REST RM WALL HEATER	8
9	(E) WATER HEATER	20	2		1000			750		1	20	(E) RESTROOM WALL HEATER	10
11						1000			1500	1	20	(E) BASEBOARD HEATER	12
13	(E) BASEBOARD HEATER	20	1	0			0			1	20	SPARE	14
15	SPARE	20	1		0			0		1	20	SPARE	16
17	SPARE	20	1			0			0	1	20	SPARE	18
19	SPARE	20	1	0			0			1	20	SPARE	20
21	SPARE	20	1		0			0		1	20	SPARE	22
23	SPARE	20	1			0			0	1	20	SPARE	24
25	SPARE	20	1	0			0						26
27	SPARE	20	1		0			0		3	20	SPARE	28
29	SPARE	20	1			0			0				30
	TOTAL LOAD PER PHASE PER SIDE (VA)			1500	1860	1600	1000	1610	2300				
	TOTAL CONNECTED LOAD PER PHASE (VA)			2500	3470	3900							
	TOTAL CONNECTED LOAD (VA)			9870									
	LOAD (AMPS)			27									
	"*" DENOTES NEW BREAKER												

ESTIMATED XFMR MAX SCA
1,600 A SHORT CIRCUIT AMPS

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND (VA)
LIGHTING	2700	1	3375
LARGEST MOTOR	0	1	0
OTHER	7170	1	7170
TOTAL DEMAND LOAD			10545
TOTAL DEMAND CURRENT			29

NAMEPLATE SCHEDULE

NO.	LETTER SIZE	INSCRIPTION
1	1/4"	MCC-A MAIN CIRCUIT BREAKER
2		POND 3 OVERHEAD CABLE
3		AERATOR 1
4		AERATOR 2
5		SPARE
6		SPARE
7		PANEL PDB13
8		PANEL 4 (XFMR)
9		CCB PEDESTAL/AF SYSTEM
10		COMMINUTOR PANEL
11		SPACE
12		PANEL A
13		PANEL A TRANSFORMER



(E) ORIGINAL MAIN SWITCHBOARD AND MCC

(TO BE DEMO'D)

CONDUIT SCHEDULE

CONDUIT NUMBER	SIZE	RUN FROM	RUN TO	LOCATION SERVED	CKT TYPE	CKT VOLTS	NO CKT WIRES	CKT TYPE WIRE	CKT SIZE	GND TYPE WIRE	GND SIZE	NOTES
P101A	(E) 3" + WW	(N) MCC-A	(E) SWITCHBOARD	CONTROL BLDG	P	480	3	THWN	500	THWN	3	PLUS #4 NEUTRAL, SPLICE TO EXISTING CONDUCTORS
P102A	(E) + WW	(N) MCC-A	(E) POWER POLE	POND 3 PS	P	480	3	THWN	1/0	THWN	4	SPLICE TO EXISTING CONDUCTORS
P103A	(E)	(N) MCC-A	(E) AERATOR 1	AERATORS	P	480	3	THWN	MFG			EXTEND EXISTING CONDUCTORS, IF REQUIRED
P103B	(E)	(N) MCC-A	(E) AERATOR 2	AERATORS	P	480	3	THWN				EXTEND EXISTING CONDUCTORS, IF REQUIRED
P104A	(E)	(N) MCC-A	(E) HEADWORKS LCP	HEADWORKS	P	480	3	THWN	12	THWN	12	EXTEND EXISTING CONDUCTORS, IF REQUIRED
P106A	(E)	(N) MCC-A	(E) PANEL PDB 133	VARIOUS	P	480	3	THWN	12	THWN	12	EXTEND EXISTING CONDUCTORS, IF REQUIRED

CONFORMED

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DATE	REVISIONS	APR'L
03/07/23	CONFORMED	

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PROFESSIONAL ENGINEER * MECHANICAL * ELECTRICAL * STATE OF CALIFORNIA
No. 14638
Exp 12-31-24

COLFAX WWTP
ALGAE REMOVAL PROJECT
CITY OF COLFAX
Colfax, California

(E) CONTROL BUILDING AND EQUIPMENT ELEVATIONS

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: SWT
CHECKED BY: SWT
JOB NO: ·

DRAWING NO: E30
48 OF 62 SHEETS

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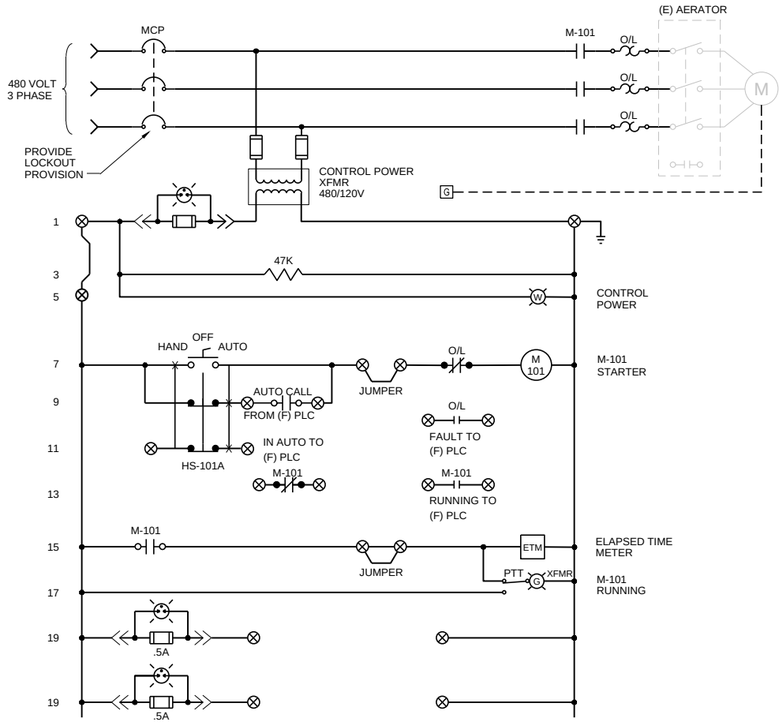
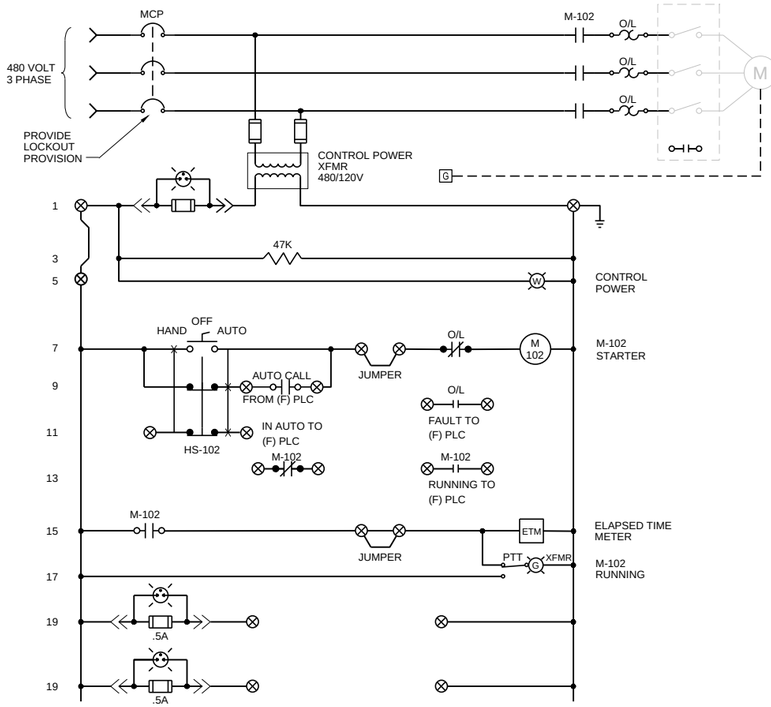
EXHIBIT B

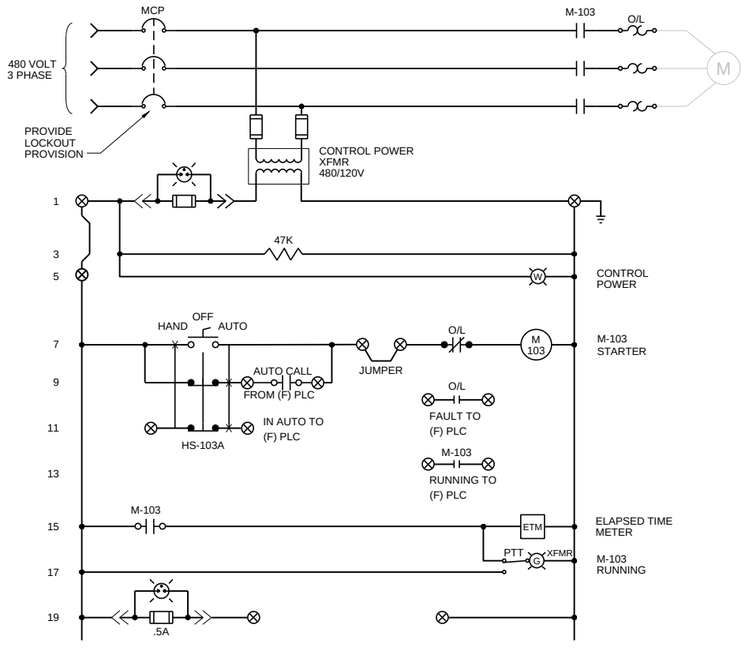


AERATOR STARTER WIRING DIAGRAM I

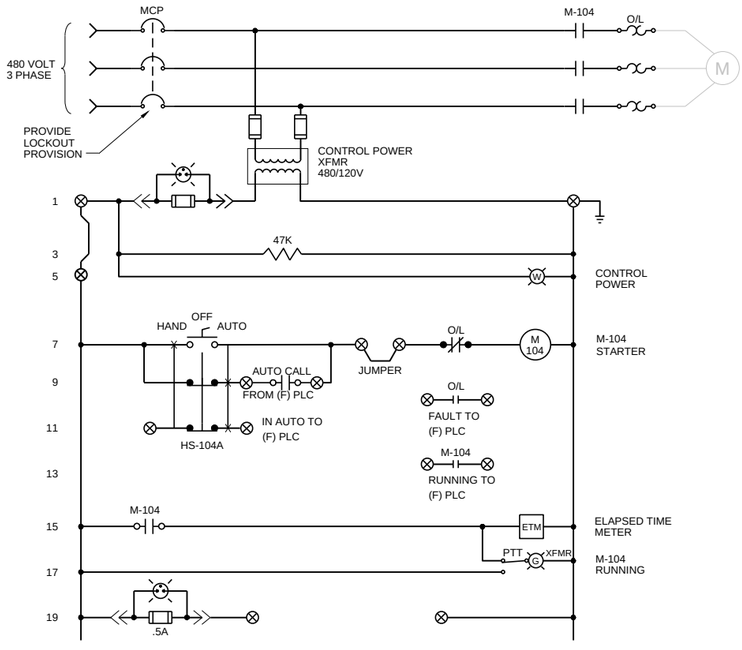


AERATOR STARTER WIRING DIAGRAM II

EQUIPMENT	STARTER	HS	WIRES
(E) AERATOR	M-101	HS-101	101X
(E) AERATOR	M-102	HS-102	102X
FUTURE	M-103	HS-103	103X
FUTURE	M-104	HS-104	104X



SPARE STARTER WIRING DIAGRAM I



SPARE STARTER WIRING DIAGRAM II

CONFORMED

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BAR IS ONE INCH AT FULL SCALE

	DATE	REVISIONS	APR'L
1	03/07/23	CONFORMED	

NEXGEN UTILITY MANAGEMENT
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REGISTERED PROFESSIONAL ENGINEER * CALIFORNIA * SAMUEL W. TERRY * No. 14638 * Exp 12-31-24 * ELECTRICAL

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

CONTROL WIRING DIAGRAMS

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: SWT
CHECKED BY: SWT
JOB NO: .

DRAWING NO:
E31
49 OF 62 SHEETS

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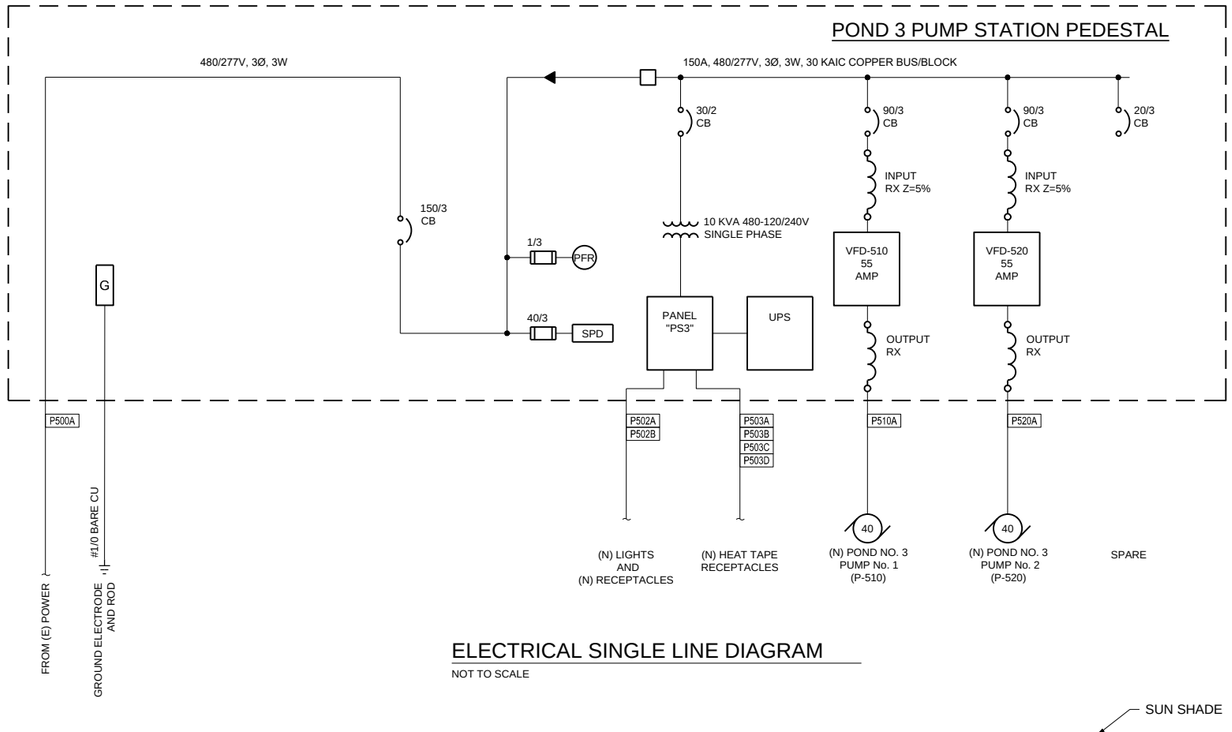
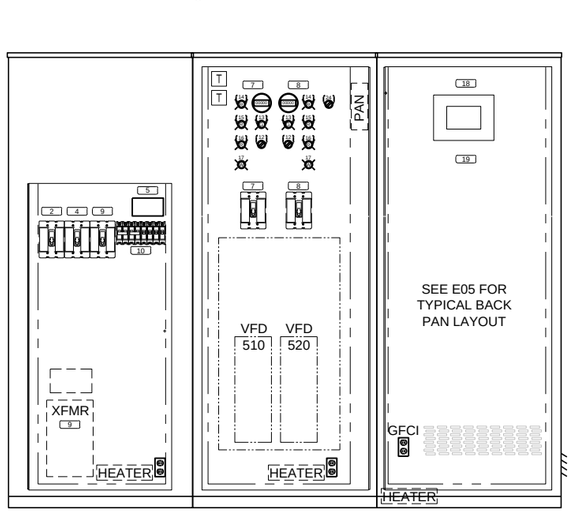
EXHIBIT B

POND 3 PUMP STATION PEDESTAL

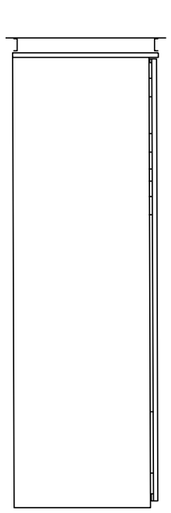


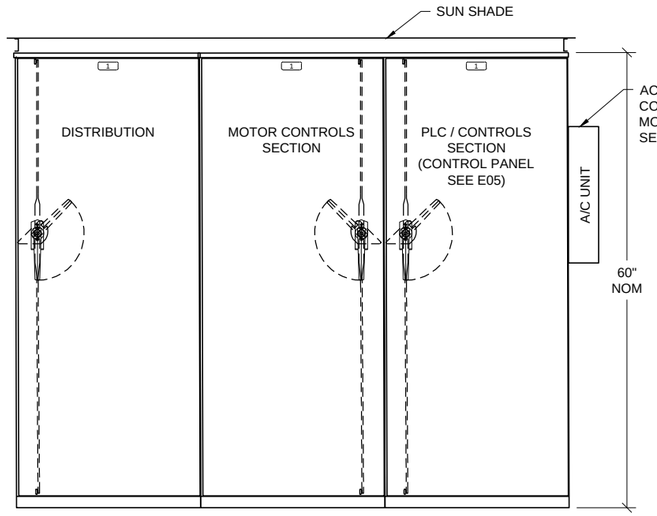
ELECTRICAL SINGLE LINE DIAGRAM

NOT TO SCALE

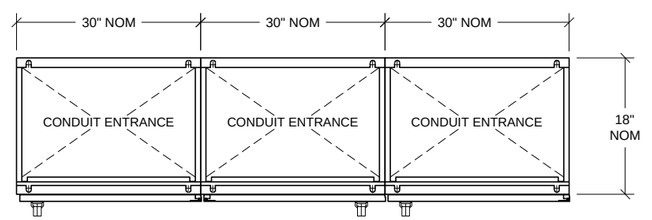


INTERIOR





EXTERIOR



PUMP STATION PEDESTAL ELEVATION

NOT TO SCALE

PANEL "PS3"

10 KAIC

VOLTAGE: 120/240	MOUNTING: PEDESTAL				KVA: 4.9		
BUS: 50 AMP	TYPE: 40/2 MCB				CURRENT: 21.0 AMPS		
LOAD	KVA	CB	NO	NO	CB	KVA	LOAD
UPS RECEPTACLE-CONTROLS	1.00	20	1	2	20	0.50	PEDESTAL FANS LIGHTS & HEATER
A/C UNIT	2.00	20	3	4	20	0.20	PEDESTAL RECEPTACLES
CANOPY LIGHTS	0.20	20	5	6	20	0.20	HEAT TAPE RECEPTACLE
CANOPY RECEPTACLES	0.40	20	7	8	20	0.20	HEAT TAPE RECEPTACLE
FLOW METER	0.10	20	9	10	20	0.20	HEAT TAPE RECEPTACLE
SPARE	0.00	20	11	12	20	0.20	HEAT TAPE RECEPTACLE

LOAD CALCULATION

(N) POND 3 PUMP STATION PEDESTAL	LOAD
PUMP NO. 1 (P-510)	50.0 AMPS
PUMP NO. 2 (P-520)	50.0 AMPS
PANEL	10.0 AMPS
25% OF LARGEST MOTOR	12.3 AMPS
TOTAL LOAD (97.5 KVA @ 480 V)	122.3 AMPS

NAMEPLATE SCHEDULE

No.	LETTER SIZE	INSCRIPTION
1	1/4"	POND 3 PUMP STATION PEDESTAL
2		MAIN DISCONNECT
3		AC UNIT
4		SPARE
5		SURGE PROTECTION DEVICE
6		POWER MONITOR
7		PUMP NO. 1
8		PUMP NO. 2
9		TRANSFORMER PS3
10		PANEL "PS3"
11		UPS
12	1/8"	HAND OFF AUTO
13		RUN
14		OVER TEMP
15		FAIL
16		HEAT TAPE RECEPTACLE
17		CONTROL POWER
18		CONTROL PANEL
19		OPERATOR INTERFACE
20		LIGHTS
21		RECEPTACLE
22		FLOW METER
23		SPARE
24		ALARM LIGHT

⚠ WARNING

ARC FLASH & SHOCK HAZARD

APPROPRIATE PPE AND TOOLS REQUIRED WHEN WORKING ON THIS EQUIPMENT

CONFORMED

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BAR IS ONE INCH AT FULL SCALE

APR'L	REVISIONS	DATE
	CONFORMED	03/07/23

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COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

POND NO.3 PUMP STATION
SINGLE LINE DIAGRAM,
ELEVATIONS AND LOAD
CALCULATIONS

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: SWT
CHECKED BY: SWT
JOB NO:

DRAWING NO:
E41

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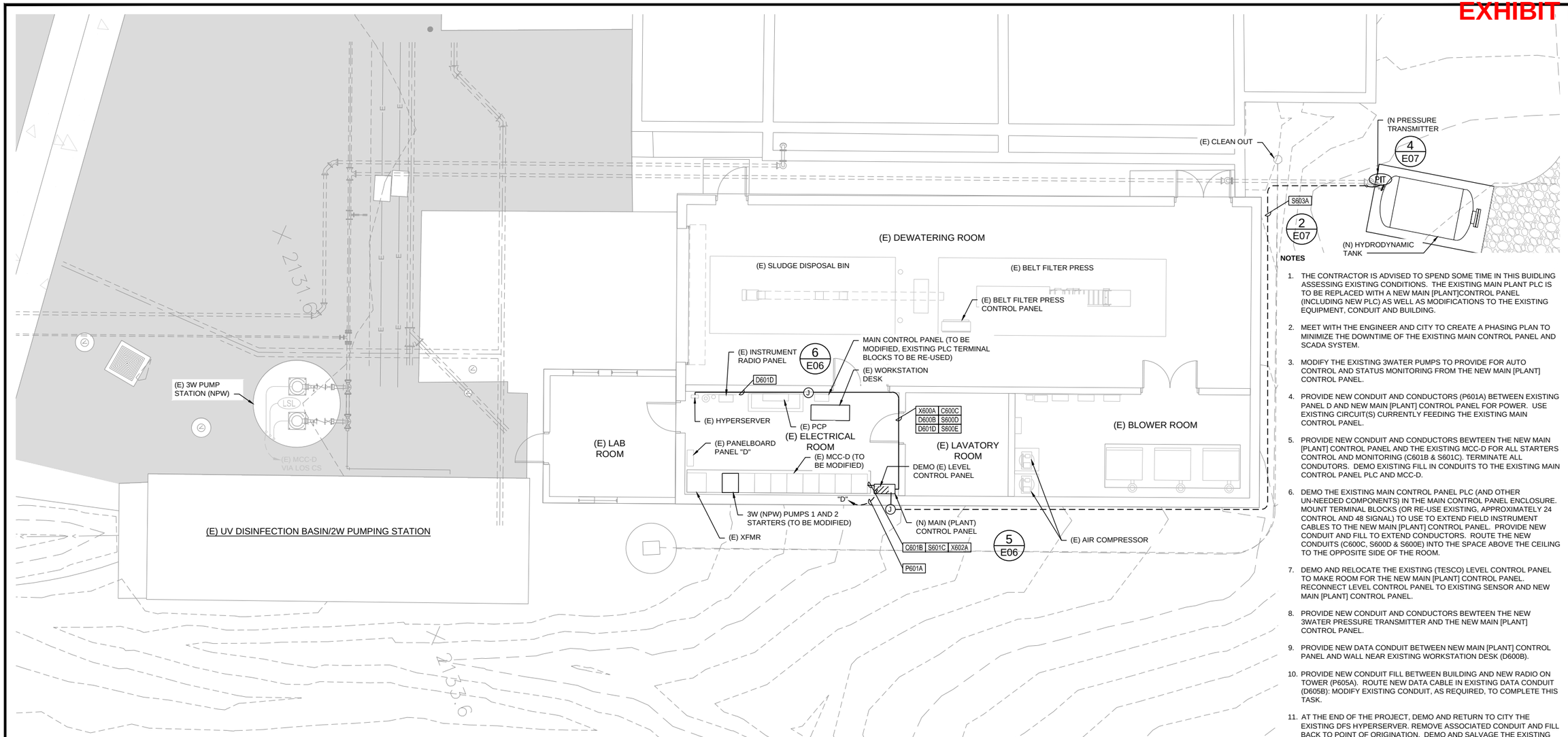
EXHIBIT B

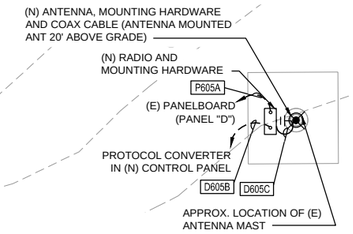


DEWATERING BUILDING AND AREA ELECTRICAL PLAN

SCALE: 1" = 6'-0"

NOTES

1. THE CONTRACTOR IS ADVISED TO SPEND SOME TIME IN THIS BUIDLING ASSESSING EXISTING CONDITIONS. THE EXISTING MAIN PLANT PLC IS TO BE REPLACED WITH A NEW MAIN [PLANT]CONTROL PANEL (INCLUDING NEW PLC) AS WELL AS MODIFICATIONS TO THE EXISTING EQUIPMENT, CONDUIT AND BUILDING.
2. MEET WITH THE ENGINEER AND CITY TO CREATE A PHASING PLAN TO MINIMIZE THE DOWNTIME OF THE EXISTING MAIN CONTROL PANEL AND SCADA SYSTEM.
3. MODIFY THE EXISTING 3WATER PUMPS TO PROVIDE FOR AUTO CONTROL AND STATUS MONITORING FROM THE NEW MAIN [PLANT] CONTROL PANEL.
4. PROVIDE NEW CONDUIT AND CONDUCTORS (P601A) BETWEEN EXISTING PANEL D AND NEW MAIN [PLANT] CONTROL PANEL FOR POWER. USE EXISTING CIRCUIT(S) CURRENTLY FEEDING THE EXISTING MAIN CONTROL PANEL.
5. PROVIDE NEW CONDUIT AND CONDUCTORS BEWTEEN THE NEW MAIN [PLANT] CONTROL PANEL AND THE EXISTING MCC-D FOR ALL STARTERS CONTROL AND MONITORING (C601B & S601C). TERMINATE ALL CONDUTORS. DEMO EXISTING FILL IN CONDUITS TO THE EXISTING MAIN CONTROL PANEL PLC AND MCC-D.
6. DEMO THE EXISTING MAIN CONTROL PANEL PLC (AND OTHER UN-NEEDED COMPONENTS) IN THE MAIN CONTROL PANEL ENCLOSURE. MOUNT TERMINAL BLOCKS (OR RE-USE EXISTING, APPROXIMATELY 24 CONTROL AND 48 SIGNAL) TO USE TO EXTEND FIELD INSTRUMENT CABLES TO THE NEW MAIN [PLANT] CONTROL PANEL. PROVIDE NEW CONDUIT AND FILL TO EXTEND CONDUCTORS. ROUTE THE NEW CONDUITS (C600C, S600D & S600E) INTO THE SPACE ABOVE THE CEILING TO THE OPPOSITE SIDE OF THE ROOM.
7. DEMO AND RELOCATE THE EXISTING (TESCO) LEVEL CONTROL PANEL TO MAKE ROOM FOR THE NEW MAIN [PLANT] CONTROL PANEL. RECONNECT LEVEL CONTROL PANEL TO EXISTING SENSOR AND NEW MAIN [PLANT] CONTROL PANEL.
8. PROVIDE NEW CONDUIT AND CONDUCTORS BEWTEEN THE NEW 3WATER PRESSURE TRANSMITTER AND THE NEW MAIN [PLANT] CONTROL PANEL.
9. PROVIDE NEW DATA CONDUIT BETWEEN NEW MAIN [PLANT] CONTROL PANEL AND WALL NEAR EXISTING WORKSTATION DESK (D600B).
10. PROVIDE NEW CONDUIT FILL BETWEEN BUILDING AND NEW RADIO ON TOWER (P605A). ROUTE NEW DATA CABLE IN EXISTING DATA CONDUIT (D605B): MODIFY EXISTING CONDUIT, AS REQUIRED, TO COMPLETE THIS TASK.
11. AT THE END OF THE PROJECT, DEMO AND RETURN TO CITY THE EXISTING DFS HYPERSERVER. REMOVE ASSOCIATED CONDUIT AND FILL BACK TO POINT OF ORIGINATION. DEMO AND SALVAGE THE EXISTING RADIO PROTOCOL CONVERTER (TO BE RELOCATED, IF NECESSARY).
12. RELOCATE THE EXISTING NETWORK SWITCH AND EXISTING PROTOCOL CONVERTER TO THE WALL BEHIND THE WORKSTATION.



CONDUIT SCHEDULE

CONDUIT NUMBER	SIZE	RUN FROM	RUN TO	LOCATION SERVED	CKT TYPE	CKT VOLTS	NO CKT WIRES	CKT TYPE WIRE	CKT WIRE SIZE	GND TYPE WIRE	GND WIRE SIZE	NOTES
X600A	1"	EXISTING MAIN CONTROL PANEL	MAIN [PLANT] CONTROL PANEL	FUTURE			1	Pullrope				SPARE CONDUIT
D600B	1-1/4"	WORKSTATION	MAIN [PLANT] CONTROL PANEL	WWTP BLDG	D		2	CAT6				1 CAT6 FOR WORK STATION & 1 TO EXTEND EXISTING
C600C	1"	EXISTING MAIN CONTROL PANEL	MAIN [PLANT] CONTROL PANEL	WWTP BLDG	C	24	12	THWN	14	THWN	14	6 USED AND 6 SPARES
S600D	1-1/2"	EXISTING MAIN CONTROL PANEL	MAIN [PLANT] CONTROL PANEL	WWTP BLDG	S	24	8	TWSP	18	THWN	14	EXTEND FIELD SIGNAL CABLES TO NEW M[P]CP
S600E	1-1/2"	EXISTING MAIN CONTROL PANEL	MAIN [PLANT] CONTROL PANEL	WWTP BLDG	S	24	8	TWSP	18	THWN	14	EXTEND FIELD SIGNAL CABLES TO NEW M[P]CP
P601A	3/4"	EXISTING PANEL D	MAIN [PLANT] CONTROL PANEL	WWTP BLDG	P	120	2	THWN	12	THWN		M[P]CP POWER FEEDER
C601B	1-1/4"	EXISTING MCC-D	MAIN [PLANT] CONTROL PANEL	WWTP BLDG	C	24	48	THWN	14	THWN	1	16 USED AND 8 SPARES CONTROL PANELS
S601C	2"	EXISTING MCC-D	MAIN [PLANT] CONTROL PANEL	WWTP BLDG	S	24	8	TWSP	18	THWN	14	6 USED AND 2 SPARES
D601D	1-1/4"	EXISTING NETWORK SWITCH	MAIN [PLANT] CONTROL PANEL	WWTP BLDG	D		1	CAT6				EXISTING SWITCH MAYBE RE-LOCATED
X602A	1"	EXISTING MCC-D	MAIN [PLANT] CONTROL PANEL	FUTURE			1	Pullrope				SPARE CONDUIT
S603A	1'	3WATER PRESSURE XMTR	MAIN [PLANT] CONTROL PANEL	WWTP	S	24	1	TWSP	18	THWN	14	3WATER PRESSURE SIGNAL
P605A	1'	EXISTING PANEL D	RADIO	WWTP BLDG	P	120	2	THWN	12	THWN	12	RADIO POWER
D605B	1-1/4"	NEW PROTOCOL CONVERTER	RADIO	WWTP BLDG	D		1	CAT5/6				ASSUME (N) CONVERTER LOCATED IN M[P]CP
D605C	N/A	NEW ANTENNA	RADIO	WWTP BLDG	D		1	COAX				RADIO AT 5' AND ANTENNA AT 20' ABOVE GRADE

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ECS Engineering, Inc.
Electrical & Control Systems Engineering
916-718-3686
samterry@earthlink.net

BAR IS ONE INCH AT FULL SCALE

APRV'L	REVISIONS	DATE	
	CONFORMED	03/07/23	1

NEXGEN UTILITY MANAGEMENT
4010 LENNANE DRIVE
SACRAMENTO, CA 95834
916.564.8000
NEXGEN

REGISTERED PROFESSIONAL ENGINEER ★ ELECTRICAL ★ SAMUEL W. TERRY ★ No. 14638 ★ Exp 12-31-24 ★ CALIFORNIA ★

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

DEWATERING BUILDING ELECRICAL PLAN

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: SWT
CHECKED BY: SWT
JOB NO: ·

DRAWING NO: E50
51 OF 62 SHEETS

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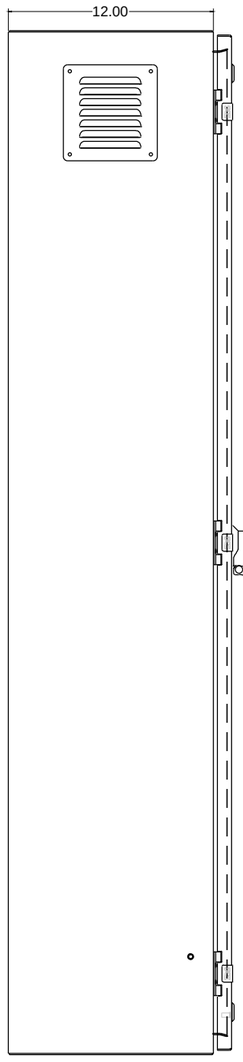
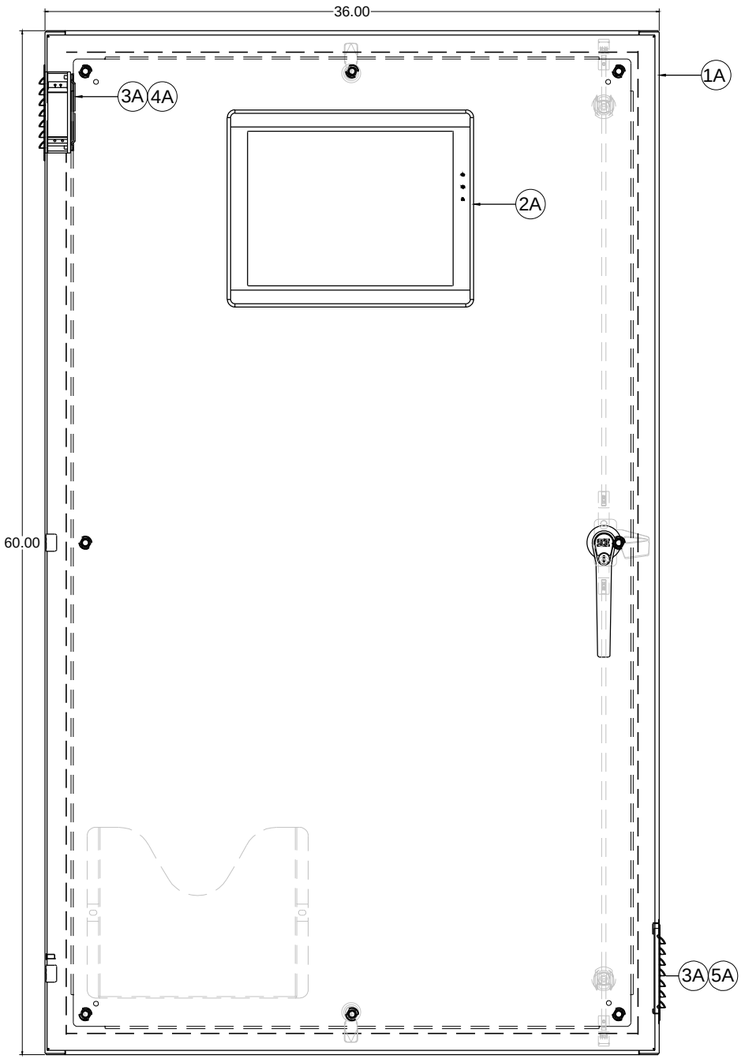
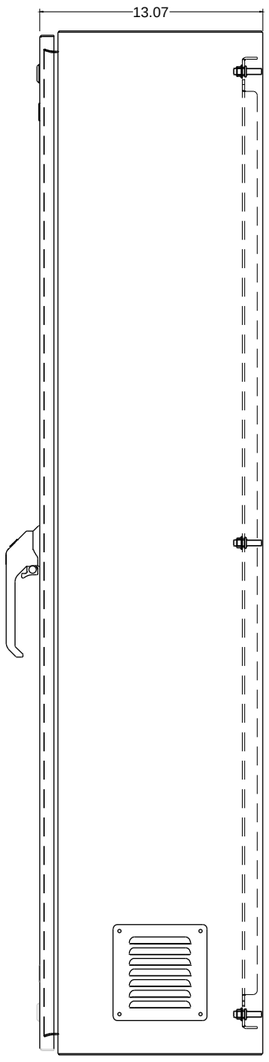
EXHIBIT B



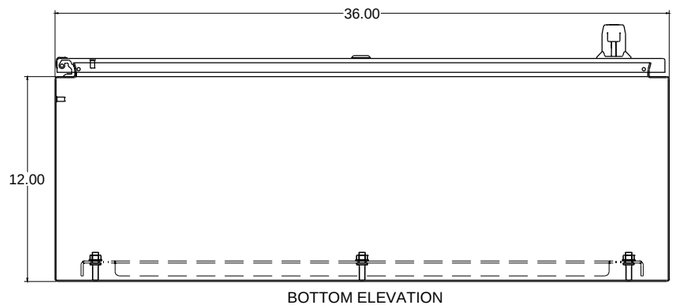
LEFT SIDE ELEVATION



FRONT ELEVATION

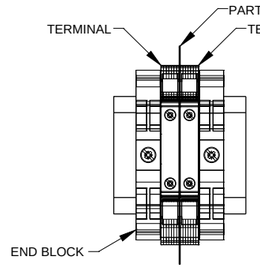


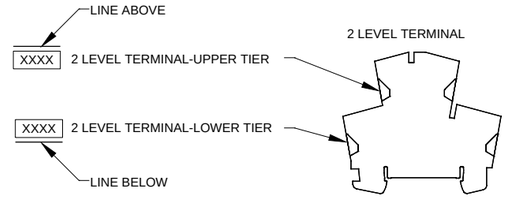
RIGHT SIDE ELEVATION



BOTTOM ELEVATION

MAIN [PLANT] CONTROL PANEL COMPONENTS			
NUMBER	DESCRIPTION	MANUFACTURER	PART NUMBER
1A	ENCLOSURES NEMA TYPE 3R	SCE	SCE-60EL3612LPPL
2A	OPERATOR INTERFACE TERMINAL	MAPLE	HMI5150XL
3A	LOUVER KIT	SCE	SCE-AVK44
4A	FAN KIT	SCE	SCE-CF4
5A	FILTER KIT	SCE	SCE-FLT44
1	BACKPANEL	SCE	SCE-60P36
2	THERMOSTAT	SCE	SCE-TMNO
3	TERMINALS	ALLEN-BRADLEY	1492-JD4C
4	GROUND TERMINALS	ALLEN-BRADLEY	1492-JDG4C
5	CIRCUIT BREAKER 15A	ALLEN-BRADLEY	1489-M1C150
6	CIRCUIT BREAKERS 3A	ALLEN-BRADLEY	1492-SPM1C030
7	CIRCUIT BREAKERS 10A	ALLEN-BRADLEY	1492-SPM1C100
8	END BLOCK	ALLEN-BRADLEY	1492-EAJ35
9	PARTITION BLOCK	ALLEN-BRADLEY	1492-PPJD3
10	CIRCUIT BREAKERS 1A	ALLEN-BRADLEY	1492-SPM1C010
11	CIRCUIT BREAKER 4A	ALLEN-BRADLEY	1492-SPM1C040
12	POWER SUPPLY 24VDC	ALLEN-BRADLEY	1606-XLS240E
13	WIREWAY 1.5X4	RS PRO ALLIED	1369116
14	PLC PROCESSOR	ALLEN-BRADLEY	5069-L3320ER
15	PLC DIGITAL INPUT CARDS	ALLEN-BRADLEY	5069-IBB16
16	PLC DIGITAL OUTPUT CARDS	ALLEN-BRADLEY	5069-OW16
17	PLC ANALOG INPUT CARDS	ALLEN-BRADLEY	5069-IF8
18	PLC ANALOG OUTPUT CARDS	ALLEN-BRADLEY	5069-OF8
19	PLC END CAP	ALLEN-BRADLEY	5069-ECR
20	DIN RAIL	DINNECTOR	DN-R35SAL1
21	ETHERNET SWITCH & PATCH CORDS	NTRON	108TX
22	PLC HARDWARE	ALLEN-BRADLEY	5069-RTB18
23	FUSEHOLDERS	ALLEN-BRADLEY	1492-H6
24	FUSEHOLDER END BARRIERS	ALLEN-BRADLEY	1492-N37
25	FUSES	BUSSMAN	AGC-1/4A
26	TERMINALS	ALLEN-BRADLEY	1492-WTF3
27	TERMINALS GROUND	ALLEN-BRADLEY	1492-JG3
28	TERMINALS	ALLEN-BRADLEY	1492-J3
29	KNIFE SWITCH TERMINAL	ALLEN-BRADLEY	1492-JKD3
30	PLC HARDWARE	ALLEN-BRADLEY	5069-RTB4
31	RELAY SPDT 24VDC	IDEC	RV8H-1L1-D24
32	TERMINALS	ALLEN-BRADLEY	1492-JD4C
33	GROUND BUS	SQUARE D	PK7GTA
34	UPS	ALLEN-BRADLEY	1609-B600N
35	UPS BATTERIES	ALLEN-BRADLEY	1609-SBAT
36	SURGE FILTER	WEIDMULLER	MA15D1S1





PARTITION PLATE TO ALLOW FOR ELECTRICAL SEPARATION OF TERMINAL GROUPS & PROVIDE ELECTRICAL SPACING BETWEEN ADJACENT INSULATED JUMPERS.

CONFORMED

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Electrical & Control Systems Engineering
916-718-3686
samterry@earthlink.net

BAR IS ONE INCH AT FULL SCALE

	APR'L	REVISIONS	DATE
1		CONFORMED	03/07/23

NEXGEN UTILITY MANAGEMENT
4010 LENNANE DRIVE
SACRAMENTO, CA 95834
916.564.8000
NEXGEN

REGISTERED PROFESSIONAL ENGINEER SAMUEL W. TERRY No. 14638 Exp 12-31-24 ELECTRICAL

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

MAIN PLANT CONTROL PANEL
ELEVATIONS

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: CGA
CHECKED BY: SWT
JOB NO:

DRAWING NO:
E52
52 OF 62 SHEETS

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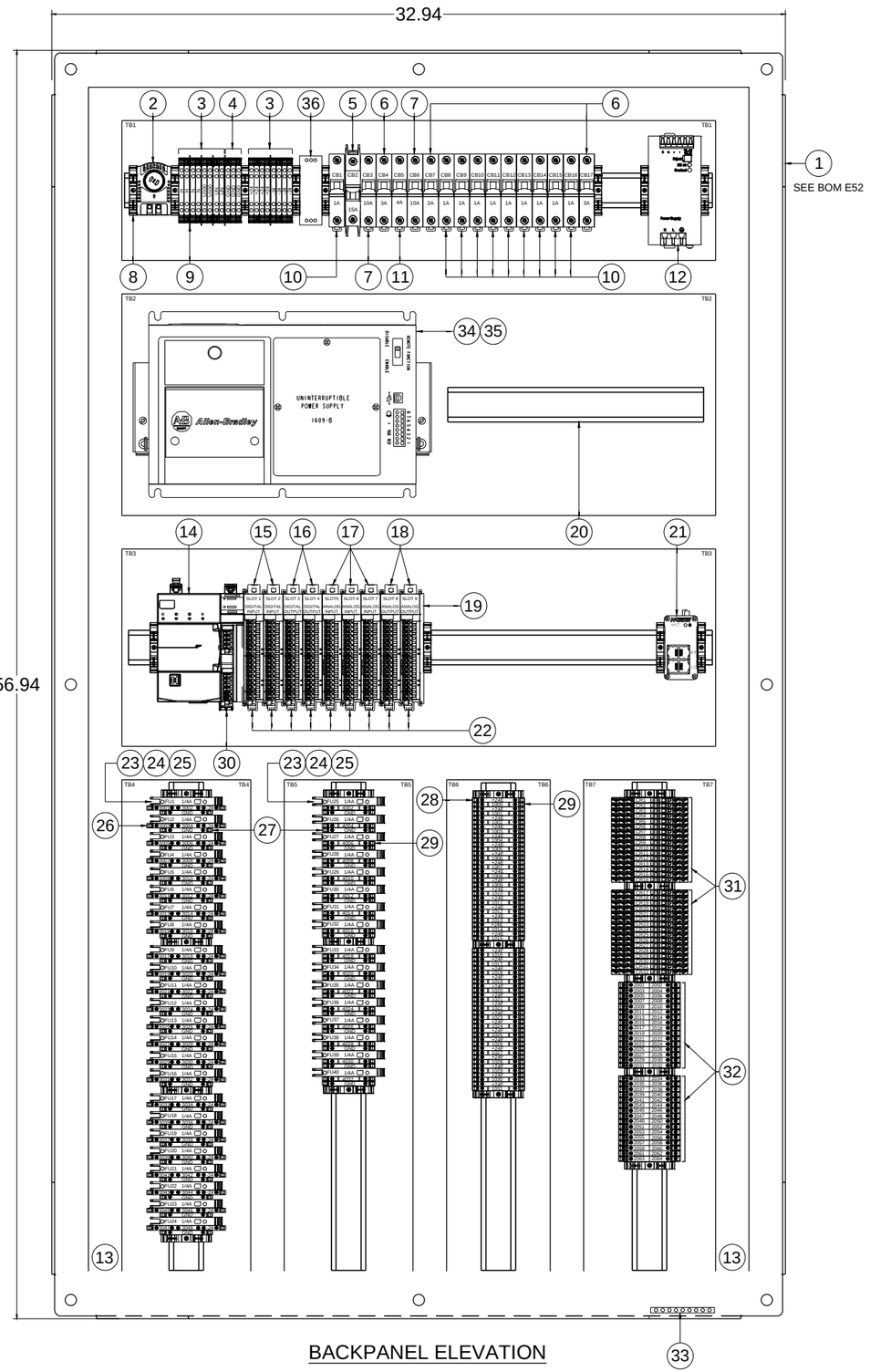
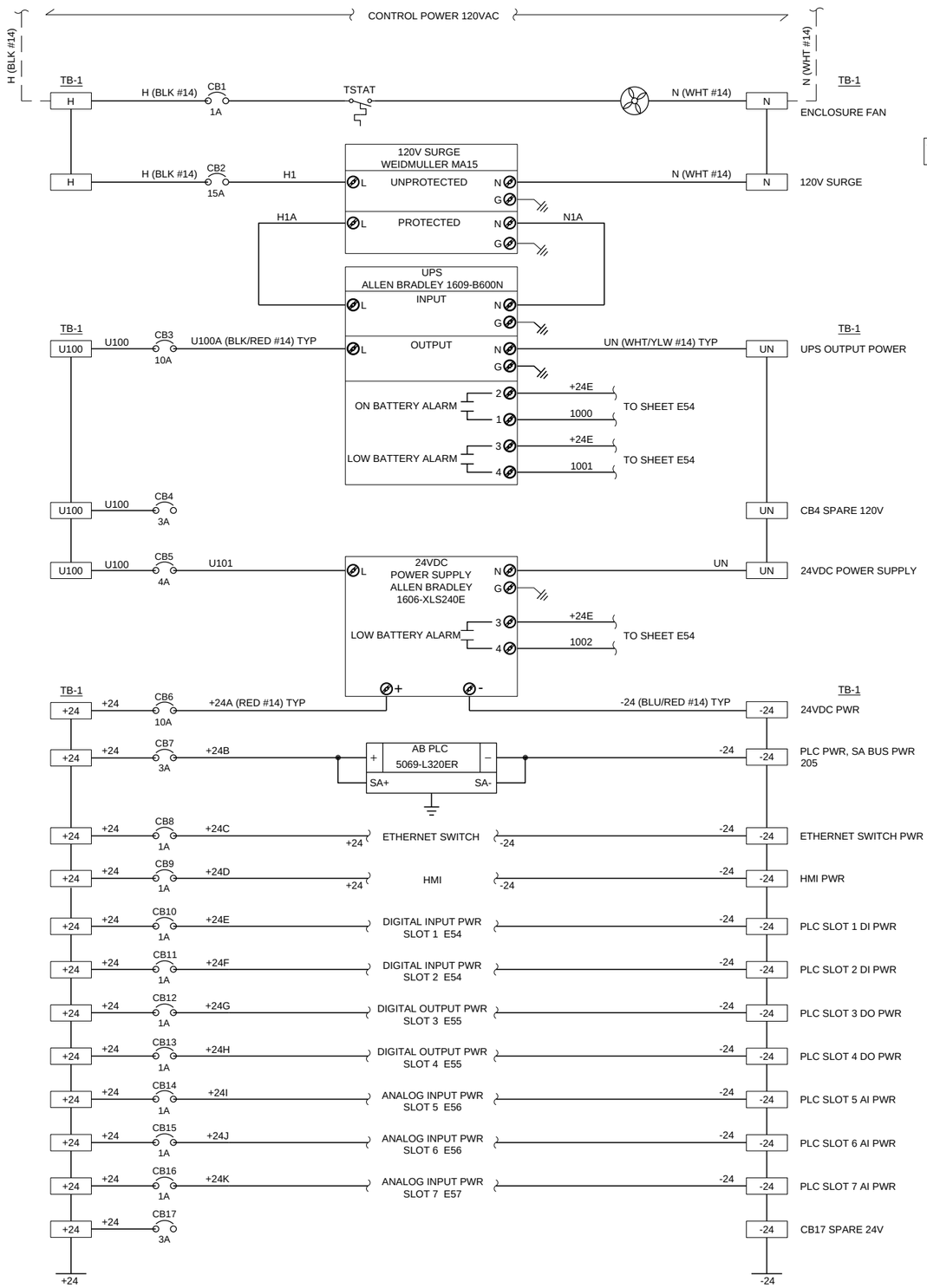
EXHIBIT B



BACKPANEL ELEVATION



MAIN PLANT CONTROL PANEL POWER WIRING DIAGRAM

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APR'L			
REVISIONS	CONFORMED		
DATE	03/07/23		
	-	-	-

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REGISTERED PROFESSIONAL ENGINEER SAMUEL W. TERRY No. 14638 Exp. 12-31-24 ELECTRICAL

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

MAIN PLANT CONTROL PANEL
POWER WIRING DIAGRAM
AND BACK PANEL ELEVATION

DATE:	3/7/23
SCALE:	NONE
DRAWN BY:	JEA
DESIGNED BY:	CGA
CHECKED BY:	SWT
JOB NO:	·

DRAWING NO: E53
53 OF 62 SHEETS

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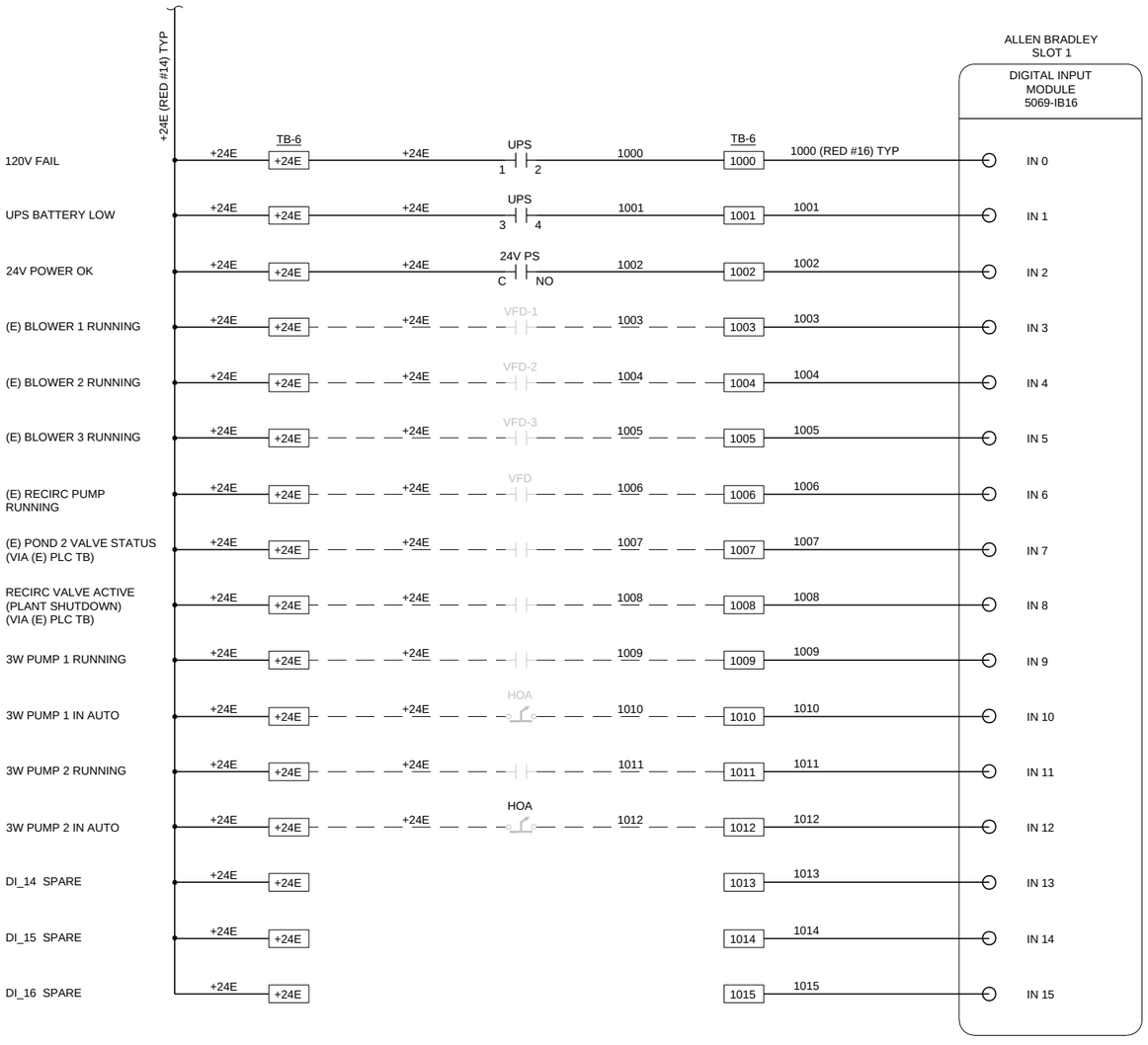
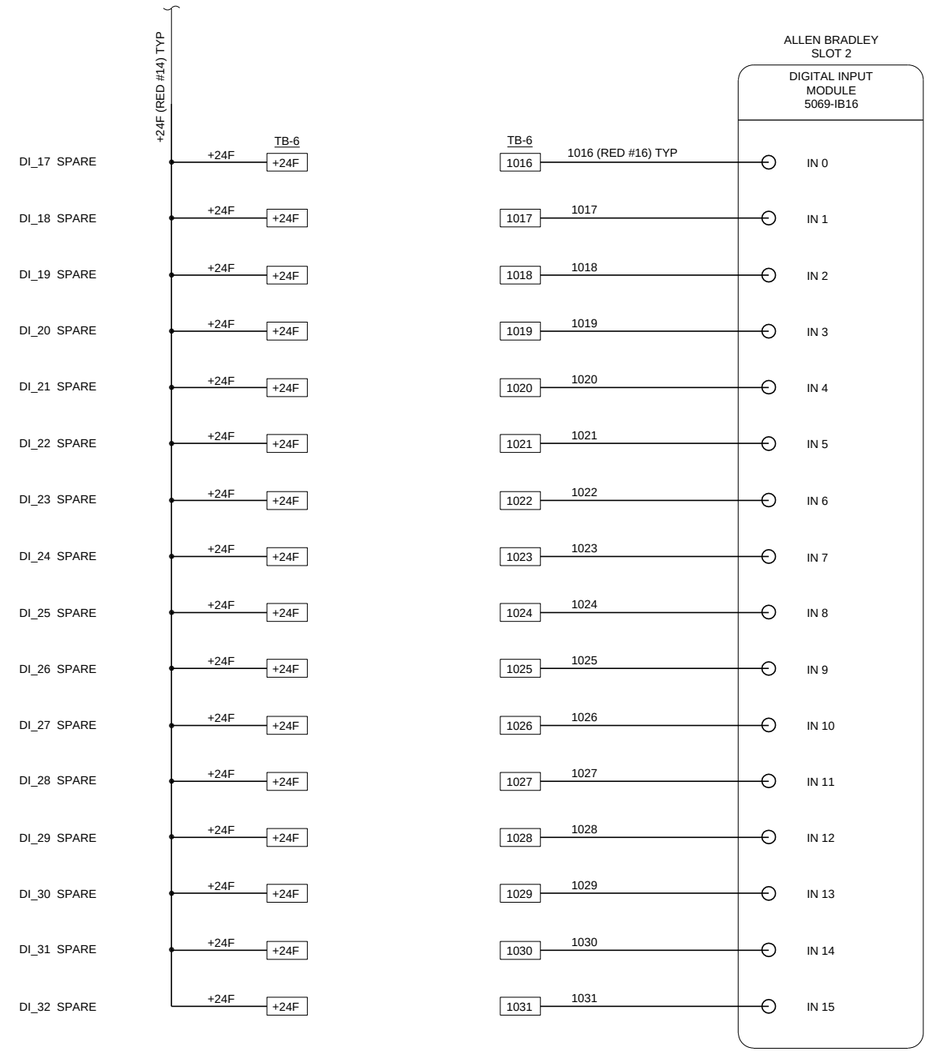
EXHIBIT B

FROM SHEET E53



DI 1 DIAGRAM

FROM SHEET E53



DI 2 DIAGRAM

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APRV'L	REVISIONS	DATE
	CONFORMED	03/07/23
	-	-
	-	-
	-	-

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COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

MAIN PLANT CONTROL PANEL
PLC DIGITAL INPUT
WIRING DIAGRAMS

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: CGA
CHECKED BY: SWT
JOB NO: ·

DRAWING NO:
E54
54 OF 62 SHEETS

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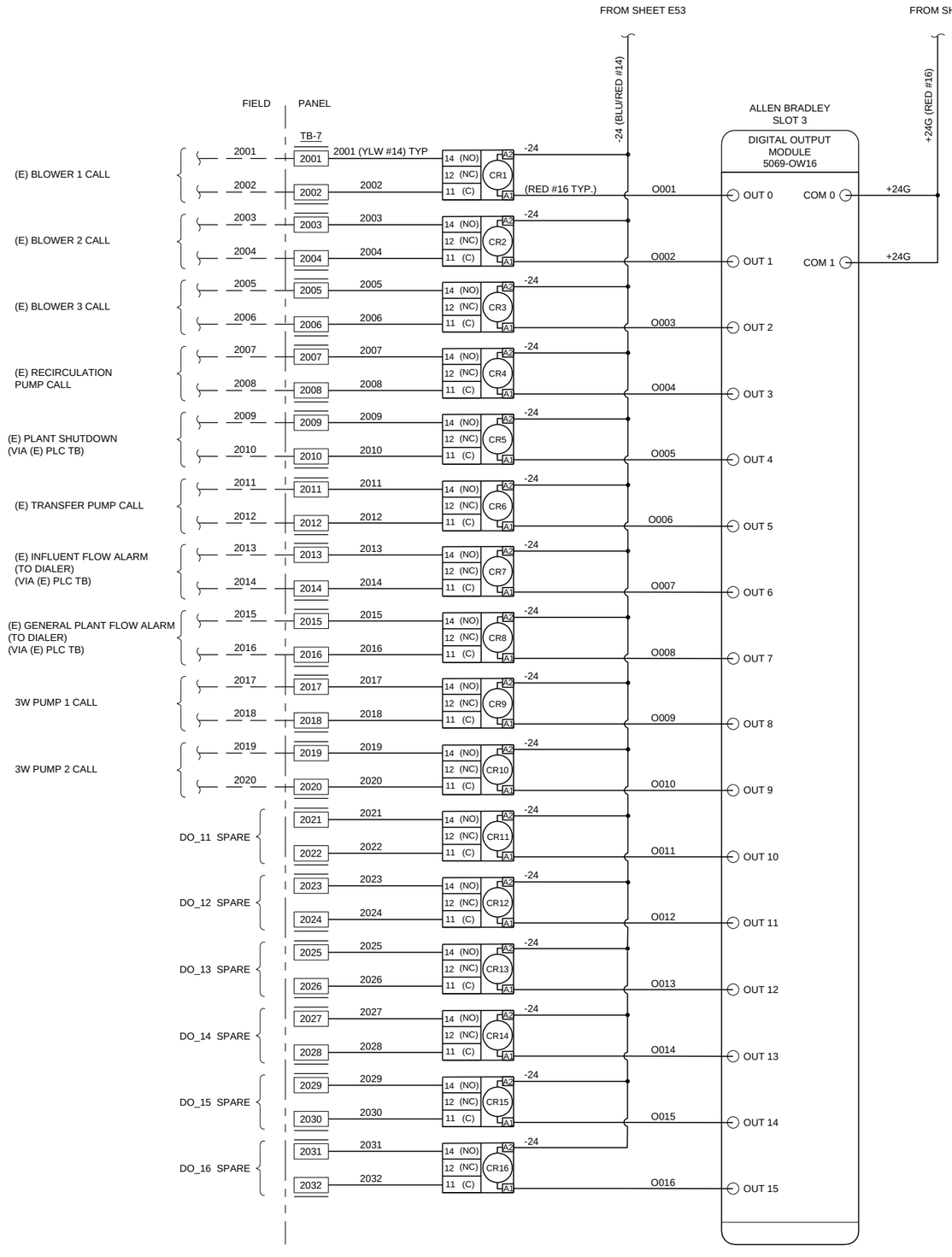
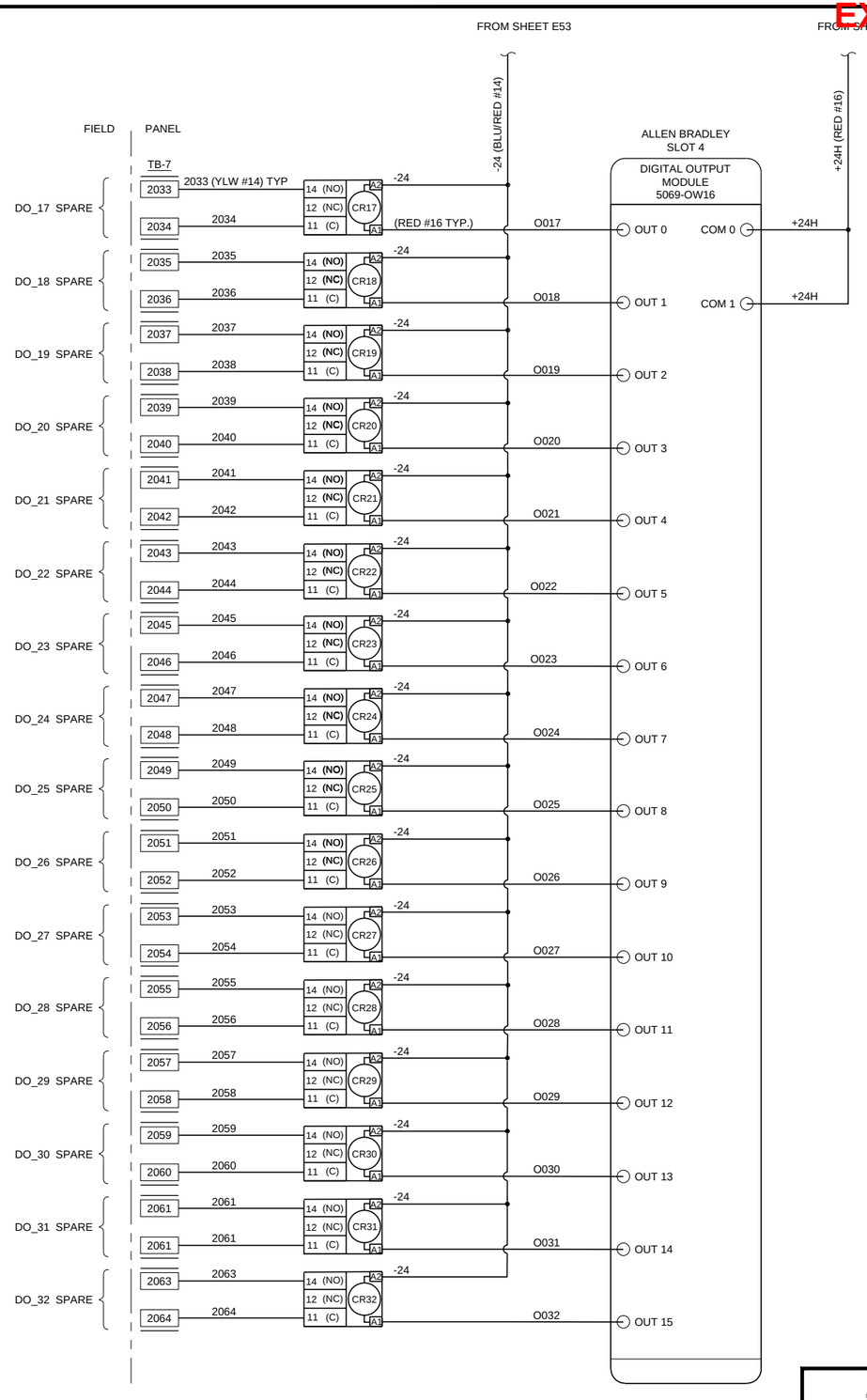


DO 1 DIAGRAM



DO 2 DIAGRAM

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APRV'L	REVISIONS	DATE	
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916.564.8000
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COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

MAIN PLANT CONTROL PANEL
PLC DIGITAL OUTPUT
WIRING DIAGRAMS

DATE:	3/7/23
SCALE:	NONE
DRAWN BY:	JEA
DESIGNED BY:	CGA
CHECKED BY:	SWT
JOB NO:	·
DRAWING NO:	E55
	55 OF 62 SHEETS

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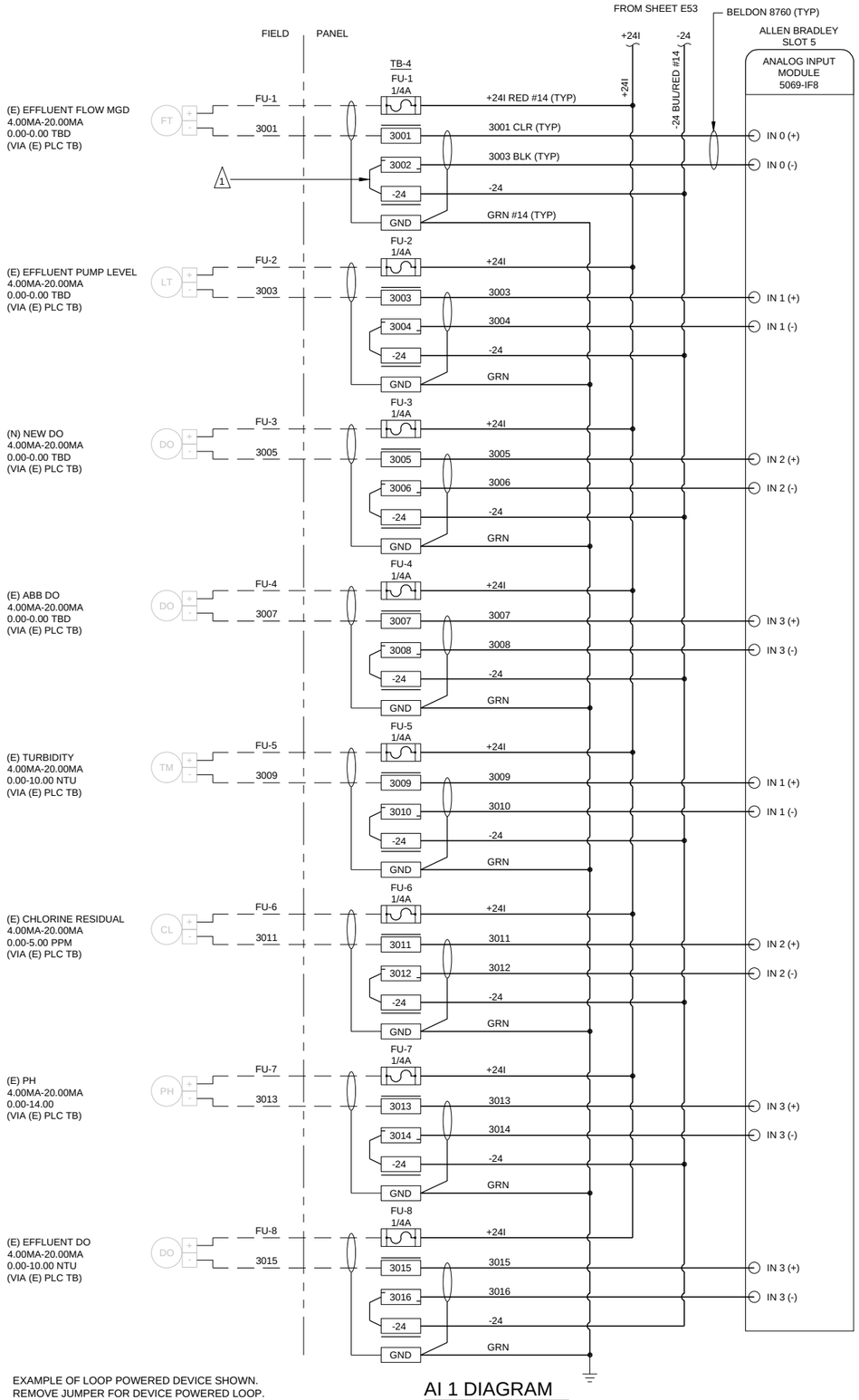
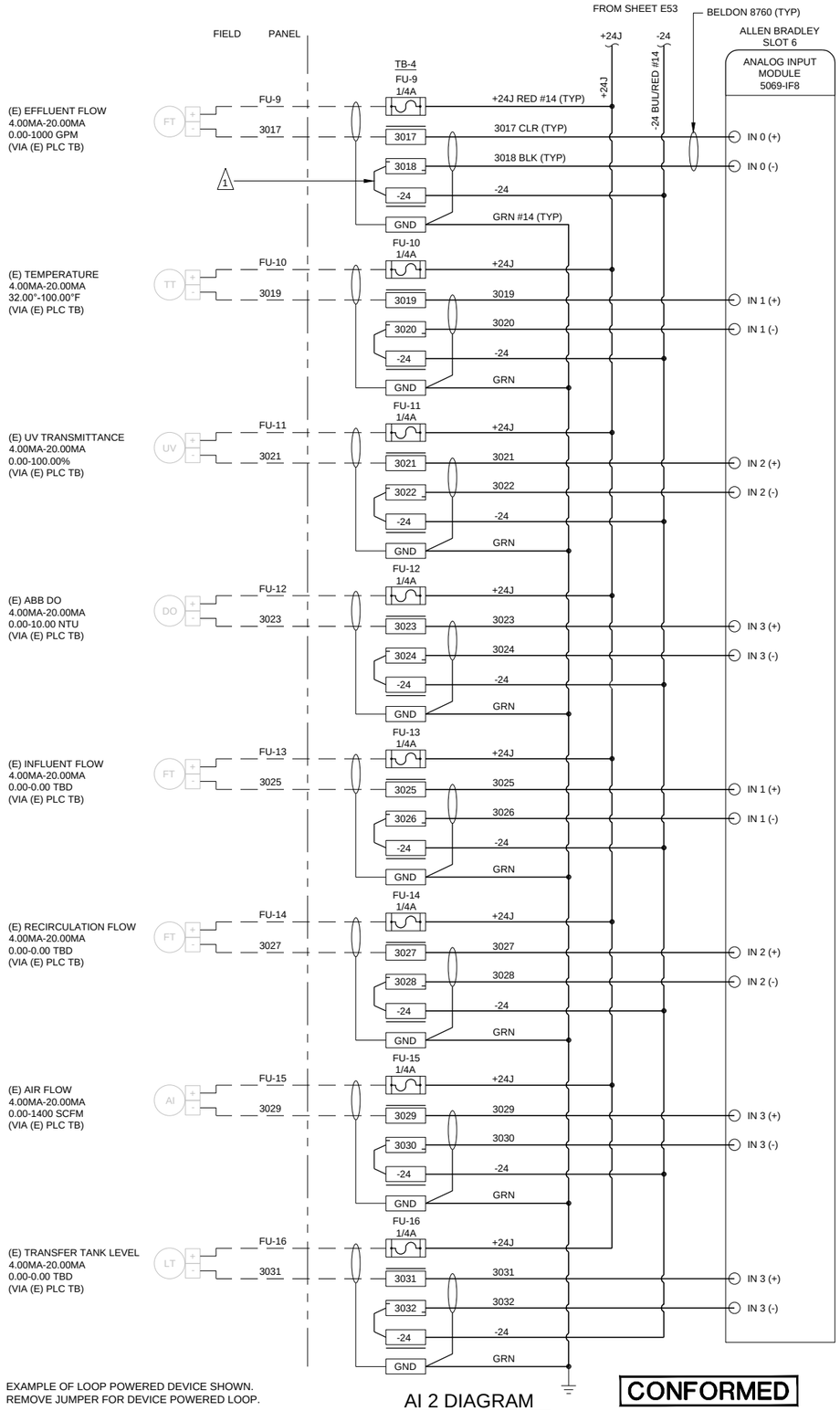
EXHIBIT B



EXAMPLE OF LOOP POWERED DEVICE SHOWN.
REMOVE JUMPER FOR DEVICE POWERED LOOP.

AI 1 DIAGRAM



EXAMPLE OF LOOP POWERED DEVICE SHOWN.
REMOVE JUMPER FOR DEVICE POWERED LOOP.

AI 2 DIAGRAM

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APR'L	REVISIONS	DATE	
	CONFORMED	03/07/23	1
			2
			3
			4

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SACRAMENTO, CA 95834
916.564.8000
NEXGEN

PROFESSIONAL ENGINEER * CALIFORNIA * SAMUEL W. TERRY * No. 14638 * Exp. 12-31-24 * ELECTRICAL

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

MAIN PLANT CONTROL PANEL
PLC ANALOG INPUT
WIRING DIAGRAMS

DATE:	3/7/23
SCALE:	NONE
DRAWN BY:	JEA
DESIGNED BY:	CGA
CHECKED BY:	SWT
JOB NO:	·

DRAWING NO:
E56
56 OF 62 SHEETS

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Electrical & Control Systems Engineering
916-718-3686
samterry@earthlink.net

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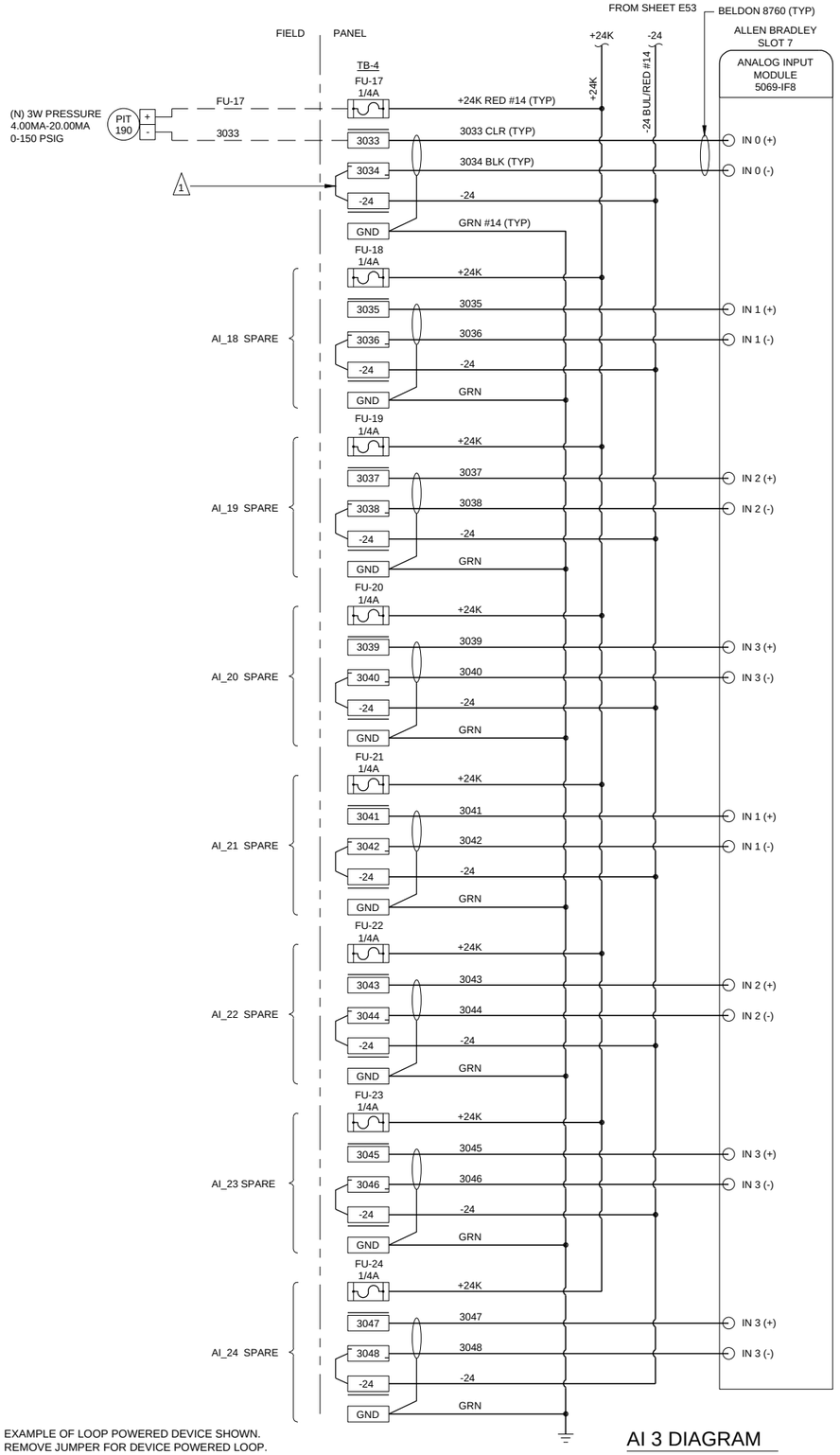
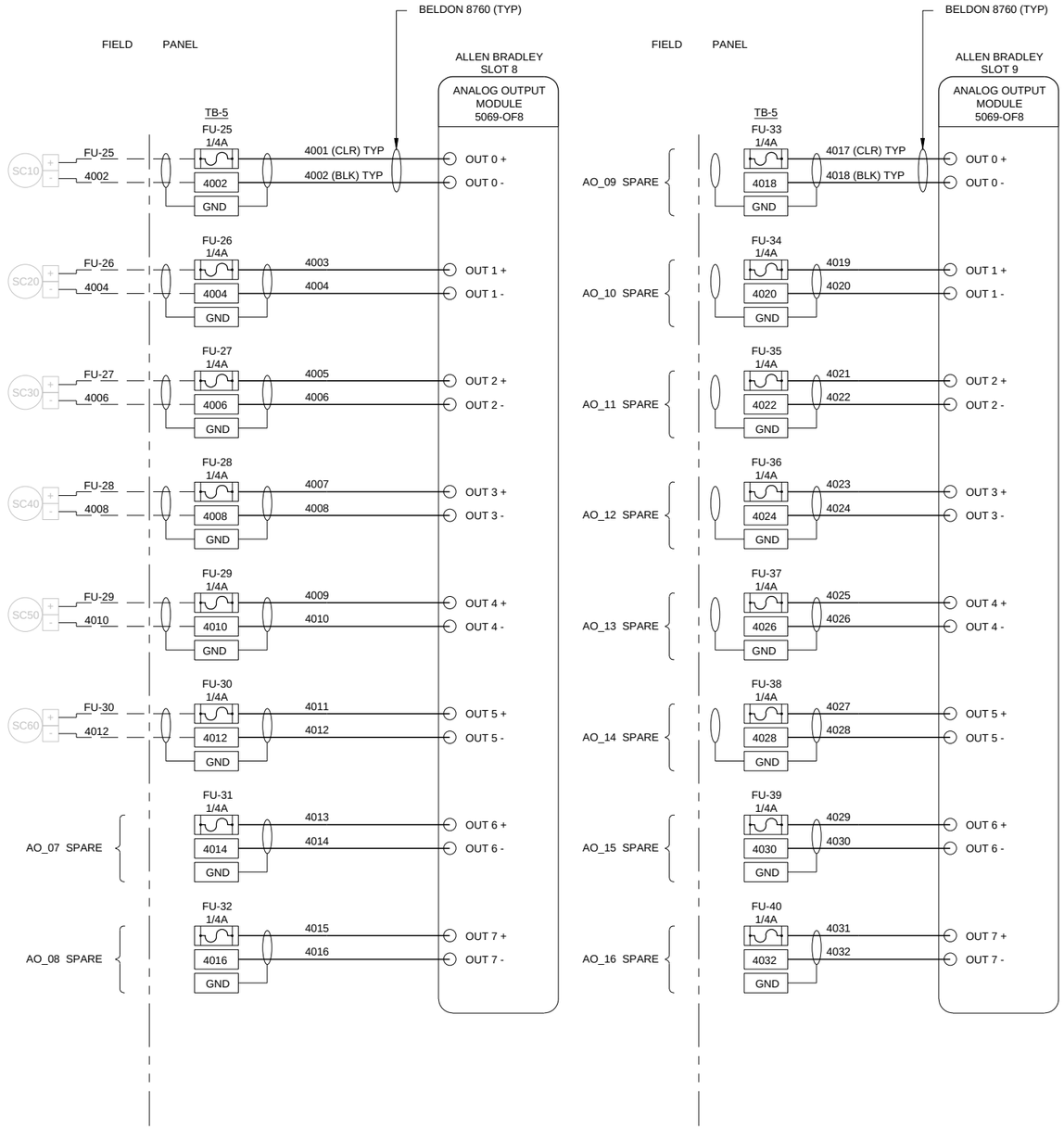
EXHIBIT B



AI 3 DIAGRAM

(E) EFFLUENT PUMP SPEED CMD
4MA-20MA
0-100%



AO 1 DIAGRAM

AO 2 DIAGRAM

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Electrical & Control Systems Engineering
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samterry@earthlink.net

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APR'L	REVISIONS	DATE
	CONFORMED	03/07/23

NEXGEN UTILITY MANAGEMENT
4010 LENNANE DRIVE
SACRAMENTO, CA 95834
916.564.8000
NEXGEN

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE No. 14638 Exp 12-31-24 MECHANICAL

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

MAIN PLANT CONTROL PANEL
PLC ANALOG INPUT/OUTPUT
WIRING DIAGRAMS

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: CGA
CHECKED BY: SWT
JOB NO: ·

DRAWING NO:
E57
57 OF 62 SHEETS

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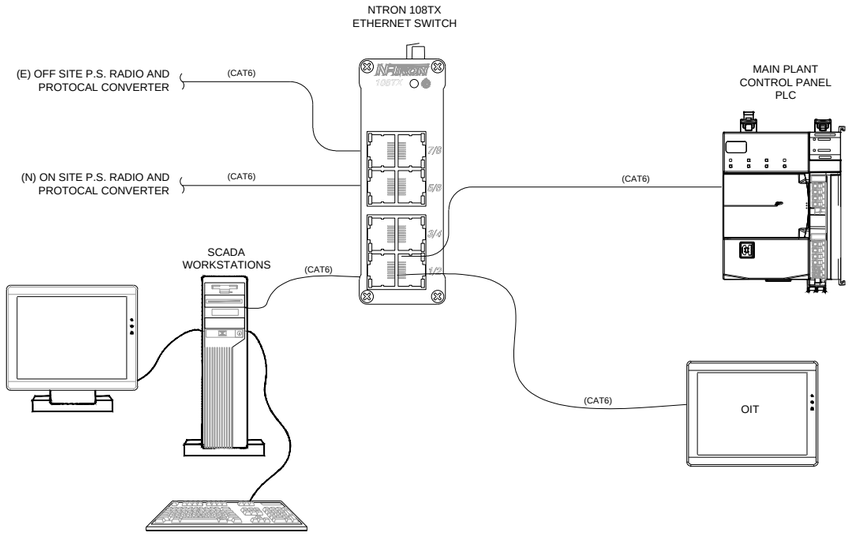
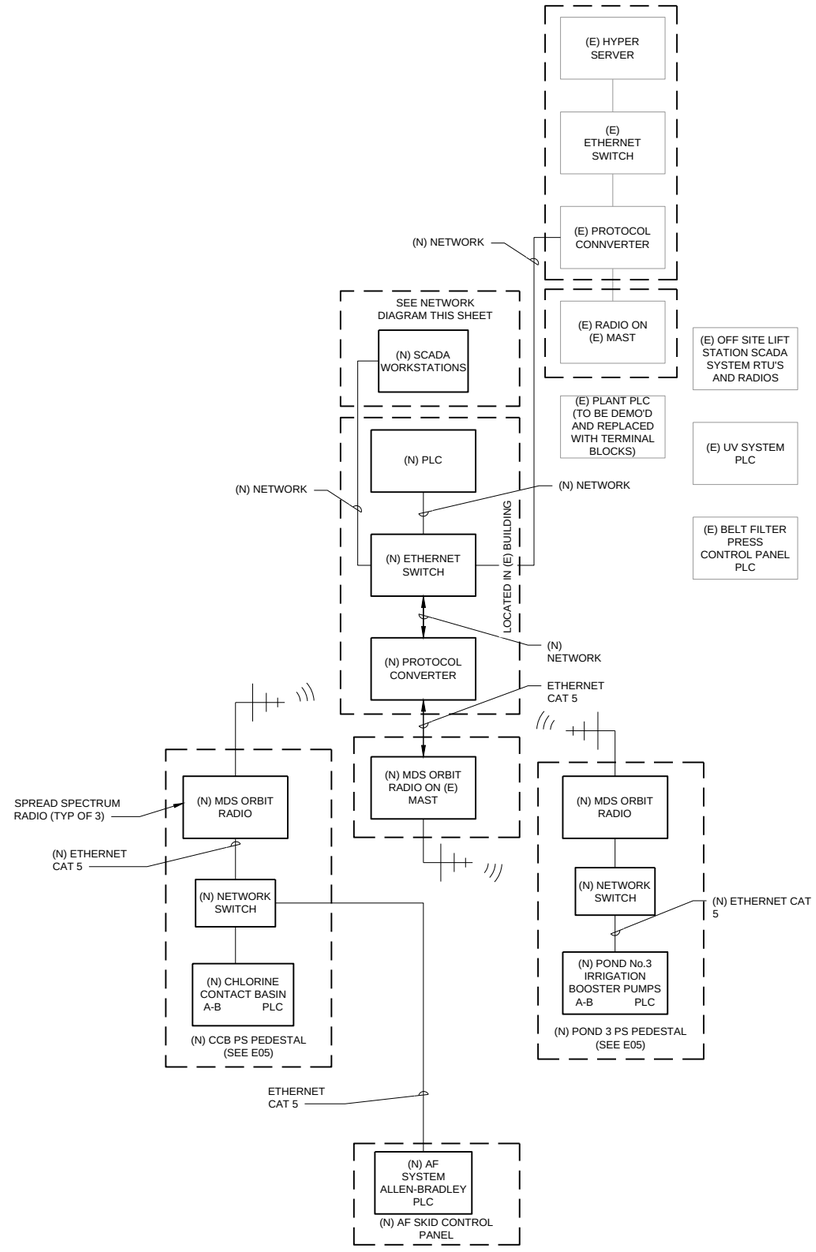
EXHIBIT B



DEWATERING BUILDING SCADA NETWORK DIAGRAM



PLANT COMMUNICATION SYSTEM BLOCK DIAGRAM

WITH MODIFICATION SHOWN IN BOLD

CONFORMED

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	APRV'L	REVISIONS	DATE
1		CONFORMED	03/07/23
2			-
3			-
4			-

NEXGEN UTILITY MANAGEMENT
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SACRAMENTO, CA 95834
916.564.8000
NEXGEN

REGISTERED PROFESSIONAL ENGINEER * CALIFORNIA * Reg. No. 14638 * Exp. 12-31-24 * ELECTRICAL

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

MAIN PLANT
NETWORK DIAGRAMS

DATE:	3/7/23
SCALE:	NONE
DRAWN BY:	JEA
DESIGNED BY:	CGA
CHECKED BY:	SWT
JOB NO:	

DRAWING NO: E58
58 OF 62 SHEETS

ECS
ECS Engineering, Inc.
Electrical & Control Systems Engineering
916-718-3686
samterry@earthlink.net

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EXHIBIT B

SYMBOLS

SYMBOL	DESCRIPTION
47 PFR	PHASE FAILURE RELAY
TDD	TIME DELAY RELAY (DELAY ON DE-ENERGIZATION)
TDE	TIME DELAY RELAY (DELAY ON ENERGIZATION)
LR	LATCHING RELAY
CR	CONTROL RELAY
O	CONTACTOR/ STARTER
LS	LIMIT SWITCH
ISR	INTRINSICALLY SAFE RELAY
5A	INDICATION FUSE HOLDER AMPERE SIZE SHOWN
5A	FUSE, AMPERE SIZE SHOWN
	WIRES CONNECTED
	WIRES NOT CONNECTED
	GROUND
1	SHEET NOTE TAG
FE / M	MAGNETIC FLOW METER
	ELECTRICAL SIGNAL
	ELECTRIC POWER
	ELECTRIC CONTROL
	PNEUMATIC SIGNAL
	CAPILARY TUBING (FILLED SYSTEM)
	HYDRAULIC SIGNAL
	SONIC OR ELECTROMAGNETIC SIGNAL
	SOFTWARE OR DATA LINK
	DRAIN
	SIGNAL CONVERTER
	BASKET STRAINER
BFP	BACK FLOW PREVENTER
I	INTERLOCK
	PRESSURE CONTROL VALVE
	ALTITUDE VALVE
	AIR RELEASE VALVE
	GLOBE VALVE
	GATE VALVE
	BUTTERFLY VALVE
	CHECK VALVE
N.C.	MOTORIZED OPERATED VALVE
	FLEXIBLE COUPLING
	BALL VALVE
	REDUCER
	ULTRASONIC LEVEL SENSOR
	STATIC MIXER
	FLANGE COUPLING ADAPTER

SYMBOL	DESCRIPTION
	BUBBLER ELEMENT
	FLOAT SWITCH
	LEVEL PROBE
	PROPELLER FLOW METER ELEMENT
M	MAGNETIC FLOW METER ELEMENT
	METERING PUMP
	BLOWER
	CALIBRATION COLUMN
M	WELL PUMP
	VENT
ES / AS	ELECTRIC SUPPLY OR AIR SUPPLY
M	MOTOR
	PUMP
RES	RESISTOR
SV	SOLENOID VALVE
	CONTACT NORMALLY OPEN
	CONTACT NORMALLY CLOSED
	LIMIT SWITCH, NORMALLY OPEN
	LIMIT SWITCH, NORMALLY CLOSED
	TIME DELAY CONTACT, NORMALLY CLOSED TIME OPEN
	TIME DELAY CONTACT, NORMALLY OPEN TIME CLOSE
	TIME DELAY CONTACT, NORMALLY OPEN TIME OPEN
	TIME DELAY CONTACT, NORMALLY CLOSED TIME CLOSED
	FLOAT SWITCH CLOSE ON HIGH LEVEL
	FLOAT SWITCH CLOSE ON LOW LEVEL
	PRESSURE SWITCH CLOSE HIGH PRESSURE
	PRESSURE SWITCH CLOSE LOW PRESSURE
	DISCONNECT SWITCH
	PUSH BUTTON, NORMALLY OPEN OR MOMENTARILY CLOSED
	PUSH BUTTON, NORMALLY CLOSED OR MOMENTARILY OPEN
	TEMPERATURE SWITCH, NORMALLY CLOSED OPEN ON HIGH TEMP (CUT OUT)
	TEMPERATURE SWITCH, NORMALLY OPEN CLOSE ON HIGH TEMP
PTT W	WHITE PILOT LIGHT, PUSH TO TEST
PTT G	GREEN PILOT LIGHT, PUSH TO TEST
PTT R	RED PILOT LIGHT, PUSH TO TEST

ABBREVIATIONS

A	AMPS
AC	ALTERNATING CURRENT
AI	ANALOG INPUT
AFD	ADJUSTABLE FREQUENCY DRIVE
AO	ANALOG OUTPUT
AS	AIR SUPPLY SOURCE
BW	BACKWASH
C	CLOSE
CP	CONTROL PANEL
CR	CONTROL RELAY
Cu	COPPER
DC	DIRECT CURRENT
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
D.O.	DISSOLVED OXYGEN
DPDT	DOUBLE POLE DOUBLE THROW
ES	ELECTRICAL POWER SOURCE
ETM	ELAPSED TIME METER
FC	FAIL CLOSED
FLP	FAIL LAST POSITION
FO	FAIL OPEN
F	FILTER
FS	FLOAT SWITCH
FSP	FILTER SOLENOID PANEL
FV	FLOW VALVE
GPM	GALLONS PER MINUTE
G	GREEN
G,GND	GROUND
HOA	HAND OFF AUTO
HP	HORSEPOWER
I	INTERLOCK
I/I	CURRENT TO CURRENT DEVICE
I/E	CURRENT TO VOLTAGE DEVICE
I/0	INPUT/OUTPUT
I/P	CURRENT TO PRESSURE DEVICE
ISR	INTRINSICALLY SAFE RELAY
LPU	LINE PROTECTION UNIT
mA	MILLIAMPERES
MOV	MOTOR OPERATED VALVE
MUX	MULTIPLEXER
N	NEUTRAL
N.O.	NORMALLY OPEN
N.C.	NORMALLY CLOSED
NTS	NOT TO SCALE
O	OPEN
PNL	PANEL
PSIG	POUNDS PER SQUARE INCH GAGE
POT	POTENTIOMETER
P/I	PRESSURE TO CURRENT DEVICE
PID	PROPORTIONAL, INTEGRATION, DERIVATIVE
PLC	PROGRAMMABLE LOGIC CONTROLLER
PR	SHIELDED, PAIR CABLE
PS	PRESSURE SWITCH
PTT	PUSH TO TEST
PV	PROCESS VARIABLE
R	RED
RTU	REMOTE TELEMETRY UNIT
SV	SOLENOID VALVE
SCFM	STANDARD CUBIC FEET PER MINUTE
SP	SOLENOID PANEL
SS	STAINLESS STEEL
TDD,TDE	TIME DELAY RELAY
TWSP	TWISTED SHIELDED PAIR
TWP	TWISTED PAIR
TYP	TYPICAL
V	VOLTS, VOLTAGE
VLV	VALVE
W	WHITE
UPS	UNINTERRUPTIBLE POWER SUPPLY

P & I DIAGRAM INSTRUMENT IDENTIFICATION

CODE LETTER	FIRST LETTER(S)		SUCCEEDING LETTER(S)		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER FLAME				
C	CONDUCTIVITY			CONTROL	CLOSE
D	DENSITY	DIFFERENTIAL			
E	VOLTAGE		ELEMENT		
F	FLOW	RATIO			
G	GAGING		GLASS		
H	HAND				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME			CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MOISTURE	MOMENTARY			MIDDLE
N	STATUS				
O	OPERATOR		ORFICE		OPEN
P	PRESSURE		POINT		
Q	EVENT	TOTALIZE			
R	RESET		RECORD		
S	SPEED	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION		
V	VIBRATION			VALVE	
W	WEIGHT		WELL		
X	SWITCH		TROUBLE/FAIL		
Y	EVENT/STATE			COMPUTE/RELAY	
Z	POSITION			ACTUATE	

GENERAL INSTRUMENT OR FUNCTION SYMBOLS

	LOCATION NORMALLY ACCESSIBLE TO OPERATOR	FIELD MOUNTED	LOCATION NORMALLY NOT ACCESSIBLE TO OPERATOR	SECONDARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR
DISCRETE INSTRUMENTS				
SHARED DISPLAY. SHARED CONTROL				
COMPUTER FUNCTION				
PROGRAMMABLE LOGIC CONTROL				

INPUT & OUTPUT SIGNALS TO PLC/RTU

ANALOG INPUT	ANALOG OUTPUT
PULSE INPUT	MODULATING OUTPUT
DIGITAL INPUT	DIGITAL OUTPUT

CONFORMED

BAR IS ONE INCH AT FULL SCALE

REVISIONS	DATE	APR'L
CONFORMED	03/07/23	

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PROFESSIONAL ENGINEER * MECHANICAL * STATE OF CALIFORNIA * Exp 12-31-24 * No. 14638

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

INSTRUMENTATION
SYMBOLS AND ABBREVIATIONS

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: SWT
CHECKED BY: SWT
JOB NO: ·

DRAWING NO: I01
59 OF 62 SHEETS

ECS
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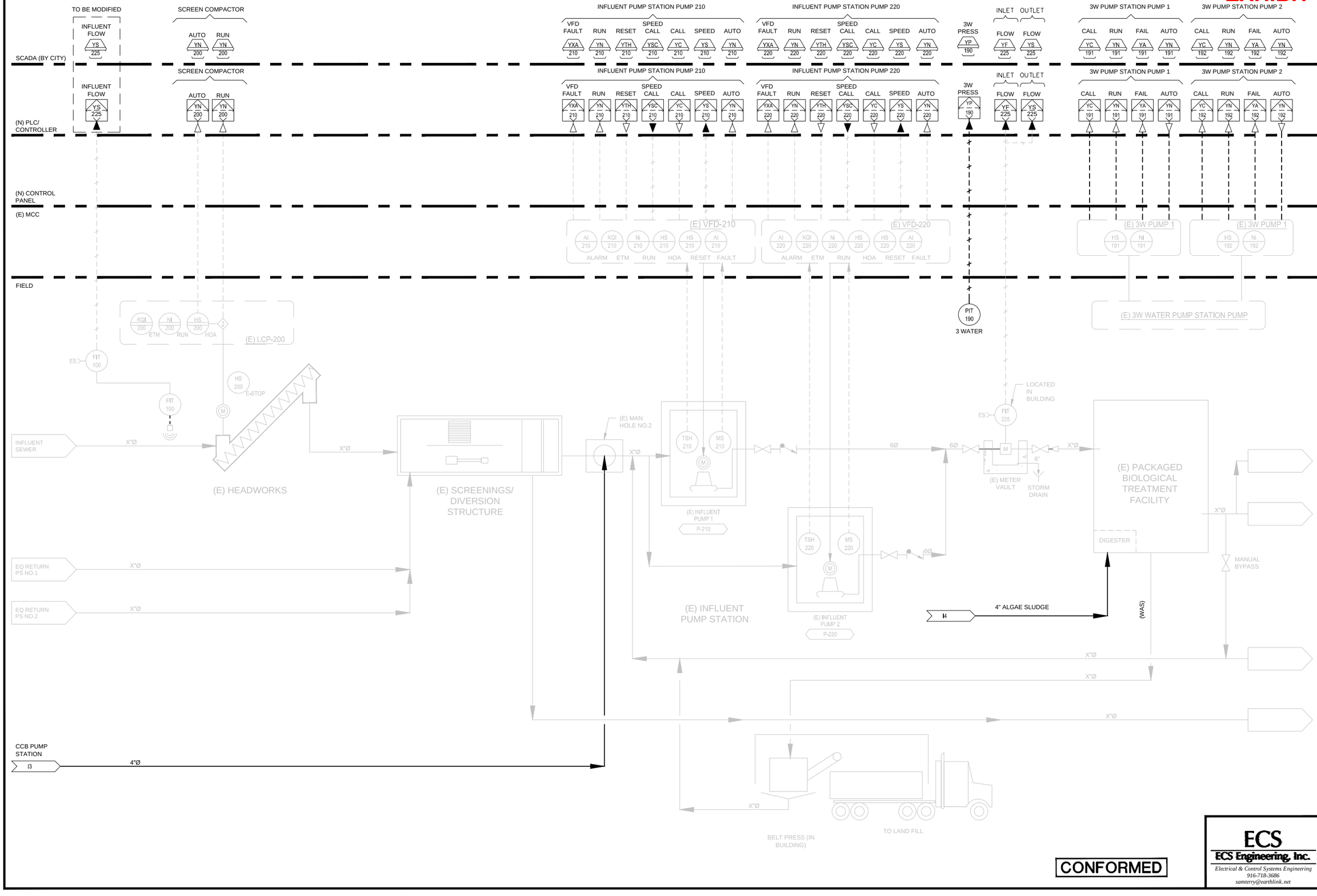
EXHIBIT B



CONFORMED

BAR IS ONE INCH AT FULL SCALE

	APR'L	REVISIONS	DATE
1		CONFORMED	03/07/23

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REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA SAMUEL W. TERRY No. 7125 Lic. 9-30-23 ELECTRICAL

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

PROCESS AND INSTRUMENTATION DIAGRAM I

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: SWT
CHECKED BY: SWT
JOB NO: ·

DRAWING NO: 102
60 OF 62 SHEETS

ECS
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EXHIBIT B

BAR IS ONE INCH AT FULL SCALE

	APR'L	REVISIONS	DATE
1		CONFORMED	03/07/23

SCADA/OIT (BY CITY) — SCADA/OIT

(N) PLC CONTROLLER — PLC CONTROLLER

(N) CONTROL PANEL — CONTROL PANEL

FIELD — FIELD

POND NO. 3 PEDESTAL CONTROL PANEL

POND 3 PUMP STATION PUMP 1

VFD FAULT	RUN	RESET	SPEED CALL	CALL	SPEED	AUTO
YXA 510	YN 510	YTH 510	YSC 510	YC 510	YS 510	YN 510

POND 3 PUMP STATION PUMP 2

VFD FAULT	RUN	RESET	SPEED CALL	CALL	SPEED	AUTO
YXA 520	YN 520	YTH 520	YSC 520	YC 520	YS 520	YN 520

HIGH DISCHARGE PRESSURE: YPH 500 — FLOW: YF 501 — POWER FAILURE: YJA 502 — UPS FAIL: YJA 502A

(N) VFD-510: AI 510 (ALARM), KQI 510 (ETM), NI 510 (RUN), HS 510A (HOA), HS 510B (RESET), AI 510 (FAULT)

(N) VFD-520: AI 520 (ALARM), KQI 520 (ETM), NI 520 (RUN), HS 520A (HOA), HS 520B (RESET), AI 520 (FAULT)

FIT 501 <ES — JA 502 — JA 502A

FROM POND NO. 2 WIER MH/ SLUDGE DRYING PAD — I3

(E) POND 3

(E) SG

EXISTING PUMPS TO BE DEMOLISHED. EXISTING ELECTRICAL EQUIPMENT TO BE DEMOLISHED.

TSH 510 — HS 510C — LOS — POND NO.3 (N) PUMP 1 — P-510

TSH 520 — HS 520C — LOS — POND NO.3 (N) PUMP 2 — P-520

ARV — HB

(N) PSH 500

(N) FE 501 — M

6"Ø

(N) POND 3 PUMP STATION

ANNULAR SEAL

(N) PIG LAUNCH

(E) 1,800 FT 6" Ø IN 10" CARRIER PIPE

(N) PIG CATCHER

(N) DOUBLE GATE VALVES (DAM SAFETY RELEASE ONLY)

6"Ø — TO (N) AF UNIT — I4

FLUSH LINE

(E) POND 2

(E) POND 2 PUMP STATION

POND 2 — POND 3 (FLUSHING)

(E) POND NO.2 WEIR OVERFLOW MH

I3

NOTES:

NORMAL OPERATION: OPERATOR SET FLOW (100-300 GPM) FOR 1 PUMP OPERATION.

FLUSH OPERATION: TWO PUMPS @ FULL SPEED.

FLOW METER TO PROVIDE FEEDBACK FOR NORMAL OPS. PRESSURE SENSOR TO PROVIDE SCADA READOUT & NOTIFICATION AT A SET POINT OF PRESSURE (TIME TO FLUSH)

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REGISTERED PROFESSIONAL ENGINEER — SAMUEL W. TERRY — No. 17251 — Date 3-9-2023 — ELECTRICAL — CONTROL SYSTEMS

COLFAX WWTP
ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

PROCESS AND INSTRUMENTATION DIAGRAM II

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: SWT
CHECKED BY: SWT
JOB NO: ·

DRAWING NO: I03
61 OF 62 SHEETS

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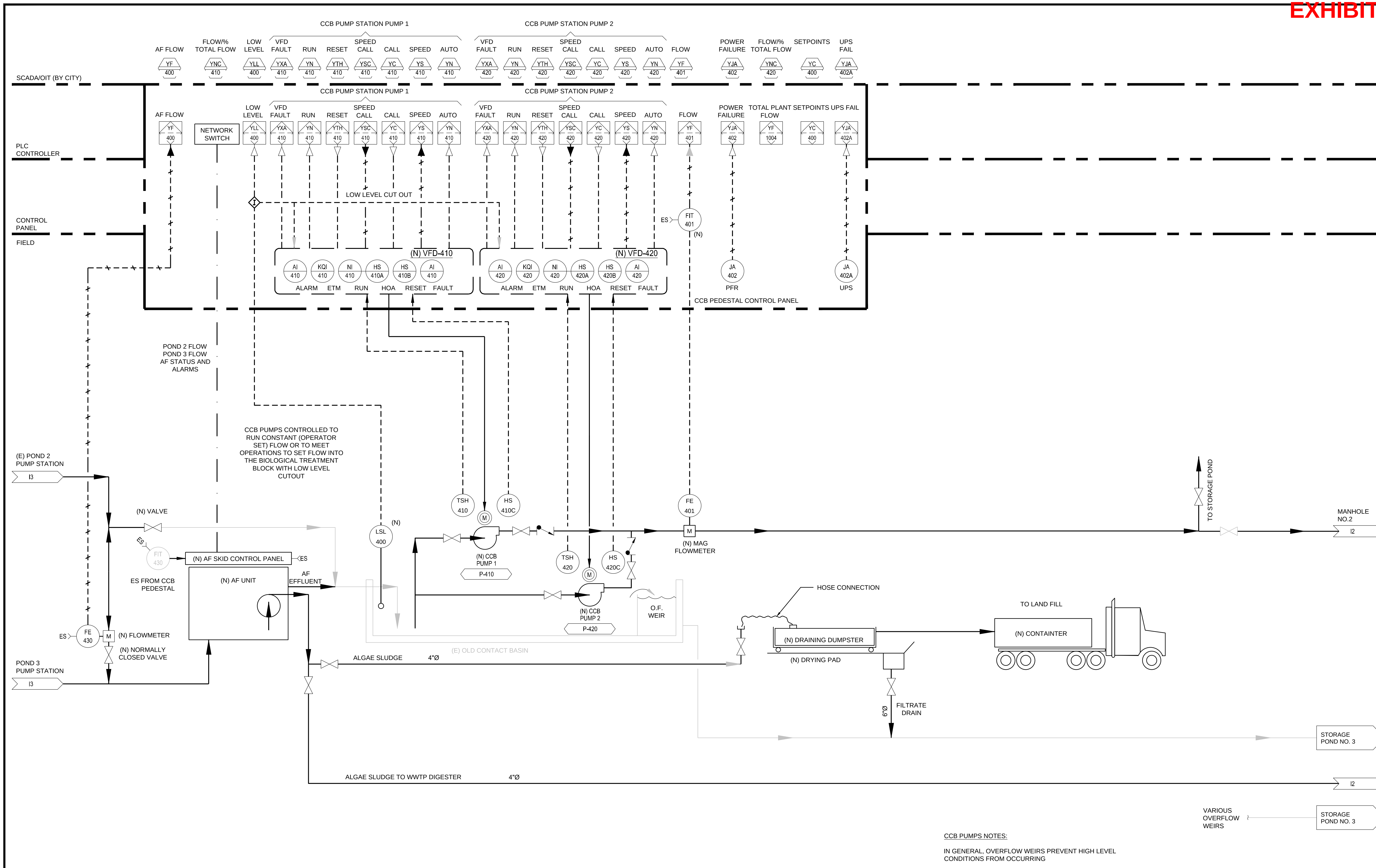
EXHIBIT B



CCB PUMPS NOTES:

IN GENERAL, OVERFLOW WEIRS PREVENT HIGH LEVEL CONDITIONS FROM OCCURRING

CONFORMED

BAR IS ONE INCH AT FULL SCALE

#	DATE	REVISIONS	APRV'L
1	03/07/23	CONFORMED	
-			
-			
-			
-			

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REGISTERED PROFESSIONAL ENGINEER SAMUEL W. TERRY No. 7125 Exp. 06-30-2023 CONTROL SYSTEM STATE OF CALIFORNIA

COLFAX WWTP ALGAE REMOVAL PROJECT

CITY OF COLFAX
Colfax, California

PROCESS AND INSTRUMENTATION DIAGRAM III

DATE: 3/7/23
SCALE: NONE
DRAWN BY: JEA
DESIGNED BY: SWT
CHECKED BY: SWT
JOB NO: ·

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DRAWING NO:
I04

62 OF 62 SHEETS

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EXHIBIT B

City of Colfax
SCADA RFQ
Agenda & Talking Points
JULY 20, 2023 @ 11:00 AM

START:
END:

Agenda

1) Introductions
    a. Jim Fletter, Project Manager, Wood Rodgers, 916-503-5687, jfletter@woodrodgers.com
    b. Devon Morris, Chief Plant Operator, City of Colfax
    c. Joe DiGiorgio, WWTP Engineer, Nexgen Utility Management
    d. Sign-in Sheet
2) Preliminary Anticipated Scope (in Draft RFP)
    a. Project Management
    b. Control Strategies
    c. SCADA Architecture Diagrams
    d. Control Panel Factory Testing
    e. Hardware Configuration & Installation
    f. PLC Programming
    g. SCADA Application Development
    h. Software Testing
    i. System Commissioning
    j. Training
    k. Materials (as needed)
3) PLC Site Visits (as requested)
    a. WWTP (4)
    b. One lift station

EXHIBIT B

4) PLC Sites (11 total)
    a. Four Sewer Lift Stations (1, 2, 3 & 5)
    b. WWTP
        i. Communication & Control Building (existing)
        ii. Headworks
        iii. UV System (existing)
        iv. Belt Press (existing)
        v. SAF System (new)
        vi. CCB (new)
        vii. Pond 3 Return Pump Station (new)
5) PLC Programming
    a. WWTP Communication & Control Building (as needed)
    b. WWTP SAF
    c. WWTP CCB System (Full programming)
    d. WWTP Pond 3 Return Pump Station (Full programming)
    e. All others (no reprogramming anticipated)
6) SCADA Development
    a. New PC provided by others
    b. Ignition license provided by others
    c. Tags, graphics and control for all PLCs
    d. Anticipated screens
        i. Plant overview
        ii. Lift station views
        iii. Alarm configuration pages
        iv. Alarm summary & history
        v. Historical trends
        vi. Daily & monthly reports
        vii. Data export to csv and other standards file formats