Meeting Date: **3/8/2016**

Report Type: Consent

Report ID: 2016-00232

City of SACRAMENTO 12

City Council Report
915 I Street, 1st Floor
www.CityofSacramento.org

Title: Supplemental Agreement: Programming Services for the Water Treatment Plants Rehabilitation Project (Z14006000)

Location: Districts 3 and 6

Recommendation: Pass a Motion authorizing the City Manager, or the City Manager's designee, to execute Supplemental Agreement No. 1 to City Agreement No. 2013-0607 with JSP Automation for additional programming services in an amount not-to-exceed $405,000, bringing the agreement's total not-to-exceed amount to $1,294,068.

Contact: Dan Sherry, Engineering & Water Resources Manager, (916) 808-1419; Brett Grant, Supervising Engineer, (916) 808-1413; Gary Gulseth, Project Manager, (916) 808-1412, Department of Utilities

Presenter: None

Department: Department Of Utilities

Division: Engineering & Water Resources

Dept ID: 14001311

Attachments:

1-Description/Analysis

2-Background

3-Agreement

City Attorney Review

Approved as to Form
Joe Robinson
3/1/2016 11:31:44 AM

Approvals/Acknowledgements

Department Director or Designee: Bill Busath - 2/22/2016 1:30:22 PM

Description/Analysis

Issue Detail: Staff recommends Council approve a supplemental agreement with JSP Automation to provide programming services for improvements currently under construction at the Sacramento River Water Treatment Plant (SRWTP) and the E.A. Fairbairn Water Treatment Plant (EAFWTP).

Due to schedule changes, some construction delays, unanticipated coordination with other suppliers, design changes during construction, and necessary programming modifications, the City needs JSP Automation to increase their programming services beyond what was anticipated at the start of the Water Treatment Plants Rehabilitation Project.

Policy Considerations: The Project, which provides updated infrastructure for a safe and reliable drinking water supply, is consistent with City Council focus areas of public safety, economic development, livability, and sustainability. City Council approval is required for this Supplemental Agreement because it exceeds the limit of the City Manager's approval authority.

Economic Impacts: None**.**

Environmental Considerations: The Community Development Department, Environmental Planning Services prepared a Mitigated Negative Declaration for the Project. City Council approved the Mitigated Negative Declaration and adopted the Mitigation Monitoring Report on March 20, 2012 (Resolution No. 2012-067). Approval of the proposed supplemental agreement would not result in any new environmental impacts not previously identified and analyzed in the adopted Mitigated Negative Declaration.

Sustainability: The Project is consistent with the City's Sustainability Master Plan by providing a safe and reliable water supply for the Sacramento Region.

Commission/Committee Action: Not applicable.

Rationale for Recommendation: Approval of Supplemental Agreement No. 1 will authorize JSP Automation to complete the necessary programming services for the Water Treatment Plants Rehabilitation Project. These additional services are needed to accommodate changes in design and contractor coordination that occurred during construction of the project. These tasks are critical to ensure the safe and continual operation of the City's water treatment facilities.

Financial Considerations: Supplemental Agreement No. 1 is for an amount not to exceed $405,000, for a new total contract amount not-to-exceed $1,294,068. There is sufficient funding in the Water Treatment Rehabilitation Project (Z14006000) for these services.

Local Business Enterprise (LBE): JSP Automation is an LBE.

BACKGROUND

The City's two surface water treatment plants, the Sacramento River Water Treatment Plant (SRWTP) and the EA Fairbairn Water Treatment Plant (EAFWTP), were constructed in the 1920s and 1960s, respectively. Rehabilitation and improvement work is being performed by the Water Treatment Plants Rehabilitation Project. Construction of these improvements began in May of 2013.

JSP Automation was selected through a Request for Qualifications process to provide programming services for the Project. On April 2, 2013, the City Council authorized a professional services agreement with JSP Automation (Contract 2013-0607) to perform Programming Services for the Water Treatment Plants Rehabilitation Project for a total contract amount not to exceed $889,625. This agreement includes the following services:

> The programming services include programming Programmable Logic Controllers (PLCs) and the Human Machine Interfaces (HMI). The PLC programming includes programming for multiple Schneider Electric Modicon Quantum Unity processors with hot standby using IEC ladder and function block programming and the Unity Pro software package. The HMI portion will consist of communication driver configuration, database configuration and screen development/programming for various water plant processes using the latest version of Trihedral VTScada.

The agreement was based on providing the scope of services anticipated prior to the commencement of construction on the project. Due to schedule changes, some construction delays, unanticipated coordination with other suppliers, design changes during construction and necessary programming modifications, the scope of services has increased beyond what was anticipated at the start of this project.

This supplemental agreement increases the programming services to be provided by JSP Automation to the City. It also provides for some contingency funds that the City could authorize at a later date for JSP Automation to modify, tune, or enhance system operations. The total for this Supplemental Agreement is $405,000, for a new total contract amount not- to-exceed $1,294,068.

The Water Treatment Plants Rehabilitation Project is estimated to be completed in June 2016.

SUPPLEMENTAL AGREEMENT

Project Title and Job Number: Z14006000 - WTPs REHABILITATION PROJECT **Date:** MAR-08-16

Purchase Order #: 20777 **Supplemental Agreement No.:** 1

The City of Sacramento ("City") and JSP AUTOMATION ("Contractor"), as parties to that certain Professional Services Agreement designated as Agreement Number 2013-0607, including any and all prior supplemental agreements modifying the agreement (the agreement and supplemental agreements are hereafter collectively referred to as the "Agreement"), hereby supplement and modify the Agreement as follows:

1. The scope of Services specified in Exhibit A of the Agreement is amended as follows:

   JSP to provide all necessary SCADA and PLC programming services that have been identified through Design Clarification Memorandum (DCM), change order, Request For Information (RFI), submittal response, and contractor coordination for the Water Treatment Plants Rehabilitation Project.

2. In consideration of the additional and/or revised services described in section 1, above, the maximum not-to-exceed amount that is specified in Exhibit B of the Agreement for payment of Contractor's fees and expenses, is Increased by $405,000, and the Agreement's maximum not-to-exceed amount is amended as follows:

Agreement's original not-to-exceed amount:	$ 889,625.00
Net change by previous supplemental agreements:	$ 0.00
Not-to-exceed amount prior to this supplemental agreement:	$ 889,625.00
Increase by this supplemental agreement:	$ 405,000.00
New not-to exceed amount including all supplemental agreements:	$1,294,625.00

3. Contractor agrees that the amount of increase or decrease in the not-to-exceed amount specified in section 2, above, shall constitute full compensation for the additional and/or revised services specified in section 1, above, and shall fully compensate Contractor for any and all direct and indirect costs that may be incurred by Contractor in connection with such additional and/or revised services, including costs associated with any changes and/or delays in work schedules or in the performance of other services or work by Contractor.

4. Contractor warrants and represents that the person or persons executing this supplemental agreement on behalf of Contractor has or have been duly authorized by Contractor to sign this supplemental agreement and bind Contractor to the terms hereof.

5. Except as specifically revised herein, all terms and conditions of the Agreement shall remain in full force and effect, and Contractor shall perform all of the services, duties, obligations, and conditions required under the Agreement, as supplemented and modified by this supplemental agreement.

Approval Recommended By:

Project Manager

Approved By:

James S Phillips, PE

Contractor

Approved By:

City of Sacramento

Approved As To Form By:

City Attorney

Attested To By:

City Clerk

(Rev. 9-17-12)

City of Sacramento

Tax ID # if applicable:

Requires Council Approval: ☐ No ☒ YES **Meeting:** April 2,2013

☐ **Real Estate** ☐ **Other Party Signature Needed** ☐ **Recording Requested**

General Information

Type: Professional Services **PO Type: Select PO Type** **$ Not to Exceed: $** 889,625.00	**Attachment: Original No.:** **Original Doc Number:**
Other Party: JSP Automation	**Certified Copies of Document::** 2
Project Name: Water Treatment Plants Rehabilitation Project	**Deed:** ☒None ☐ Included ☐Separate
Project Number: Z14006000 Bid Transaction #:	E/SBE-DBE-M/WBE:

Department Information

Department: Utilities Division: Engineering Services

Project Mgr: Ian Pietz Supervisor: Dan Sherry

Contract Services: Date: 6-11-13 Division Mgr: Bill Busath

Phone Number: 808-1434 Org Number:

Comment: Please interoffice to Karen Parker mail code #13400

Review and Signature Routing

Department	Signature or Initial	Date
Project Mgr:		11 Jun 2013
Accounting:		
Contract Services:		
Supervisor:		6/11/13
Division Manager:		6/11/13

City Attorney	Signature or Initial	Date
City Attorney:		6-17-13

☒ **Send Interoffice Mail** ☐ **Notify for Pick Up**

Authorization	Signature or Initial	Date
Dave Brent Department Director:		6/24/13

City Mgr: yes ☒ No ☐

Contract Cover/Routing Form: Must Accompany ALL Contracts; however, is not part of the contract. (01-01-09)

For City Clerk Processing

Finalized:
Initial:
Date: 07052013

Imaged:
Initial:
Date:

Received:
(City Clerk Stamp Here)

RECEIVED
CITY CLERK'S OFFICE
CITY OF SACRAMENTO
2013 JUL -2 A 11:31

2013-0607
Title: Water Treatment Plants Rehabilitation Project
Other Party: JSP Automation

PROJECT #: **Z14006000**
PROJECT NAME: **WATER TREATMENT PLANTS REHABILITATION PROJECT**
DEPARTMENT: **UTILITIES**
DIVISION: **ENGINEERING**

CITY OF SACRAMENTO

PROFESSIONAL SERVICES AGREEMENT FOR ARCHITECTS, LANDSCAPE ARCHITECTS, PROFESSIONAL ENGINEERS, AND PROFESSIONAL LAND SURVEYORS

THIS AGREEMENT is made at Sacramento, California, as of May 13, 2013, by and between the **CITY OF SACRAMENTO,** a municipal corporation ("CITY"), and

JSP Automation
405 30th Street
Sacramento, CA 95816
(916) 448-3776 / (916) 448-3778
JSPAutomation@sbcglobal.net

("CONTRACTOR"), who agree as follows:

1. **Services.** Subject to the terms and conditions set forth in this Agreement, CONTRACTOR shall provide to CITY the services described in Exhibit A. CONTRACTOR shall provide said services at the time, place, and in the manner specified in Exhibit A. CONTRACTOR shall not be compensated for services outside the scope of Exhibit A unless prior to the commencement of such services: (a) CONTRACTOR notifies CITY and CITY agrees that such services are outside the scope of Exhibit A; (b) CONTRACTOR estimates the additional compensation required for these additional services; and (c) CITY, after notice, approves in writing a Supplemental Agreement specifying the additional services and amount of compensation therefor. CITY shall have no obligations whatsoever under this Agreement and/or any Supplemental Agreement, unless and until this Agreement or any Supplemental Agreement is approved by the Sacramento City Manager or the City Manager's authorized designee, or by the Sacramento City Council, as required by the Sacramento City Code.

2. **Payment.** CITY shall pay CONTRACTOR for services rendered pursuant to this Agreement at the times and in the manner set forth in Exhibit B. The payments specified in Exhibit B shall be the only payments to be made to CONTRACTOR for the services rendered pursuant to this Agreement unless pursuant to Section 1, above, CITY approves additional compensation for additional services. CONTRACTOR shall submit all billings for said services to CITY in the manner specified in Exhibit B, or, if not specified in Exhibit B, according to the usual and customary procedures and practices that CONTRACTOR uses for billing clients similar to CITY.

3. **Facilities and Equipment.** Except as set forth in Exhibit C, CONTRACTOR shall, at its sole cost and expense, furnish all facilities and equipment that may be required for furnishing services pursuant to this Agreement. CITY shall furnish to CONTRACTOR only the facilities and equipment listed in Exhibit C according to any terms and conditions set forth in Exhibit C.

4. **General Provisions.** The General Provisions set forth in Exhibit D, that include indemnity and insurance requirements, are part of this Agreement. In the event of any conflict between the General Provisions and any terms or conditions of any document prepared or provided by CONTRACTOR and made a part of this Agreement, including without limitation any document relating to the scope of services or payment therefor, the General Provisions shall control over said terms or conditions.

5. **Non-Discrimination in Employee Benefits.** This Agreement is subject to the provisions of Sacramento City Code Chapter 3.54, Non-Discrimination in Employee Benefits by City Contractors. The requirements of Sacramento City Code Chapter 3.54 are summarized in Exhibit E. CONTRACTOR is required to sign the attached Declaration of Compliance (Equal Benefits Ordinance), to assure compliance with these requirements.

6. **Authority.** The person signing this Agreement for CONTRACTOR hereby represents and warrants that he/she is fully authorized to sign this Agreement on behalf of CONTRACTOR and to bind CONTRACTOR to the performance of its obligations hereunder.

7. **Exhibits.** All exhibits referred to herein are attached hereto and are by this reference incorporated as if set forth fully herein.

Executed as of the day and year first above stated.

CITY OF SACRAMENTO
A Municipal Corporation

By: _____

Print Name: DAVE BROTT

Title: DIRECTOR

For: John F. Shirey, City Manager

APPROVED TO AS FORM:

_____
City Attorney

ATTEST:

_____ 07052013
City Clerk

Attachments

Exhibit A - Scope of Service
Exhibit B - Fee Schedule/Manner of Payment
Exhibit C - Facilities/Equipment Provided
Exhibit D - General Provisions
Exhibit E - Non-Discrimination in Employee Benefits

CONTRACTOR:

JSP Automation
NAME OF FIRM

45-4408170
Federal I.D. No.

State I.D. No.

102662
City of Sacramento Business Op. Tax Cert. No.

TYPE OF BUSINESS ENTITY *(check one)*:

_____ Individual/Sole Proprietor
_____ Partnership
__X__ Corporation *(may require 2 signatures)*
_____ Limited Liability Company
_____ Other (*please specify:* _____)

Signature of Authorized Person

James Phillips, President
Print Name and Title

Additional Signature *(if required)*

Print Name and Title

DECLARATION OF COMPLIANCE
Equal Benefits Ordinance

Name of Contractor: **JSP Automation**

Address: **405 30th Street, Sacramento, CA 95816**

The above named Contractor ("Contractor") hereby declares and agrees as follows:

1. Contractor has read and understands the Requirements of the Non-Discrimination In Employee Benefits Code (the "Requirements") attached hereto as Exhibit E.

2. As a condition of receiving this Agreement, Contractor agrees to fully comply with the Requirements, as well as any additional requirements that may be specified in the City of Sacramento's Non-Discrimination In Employee Benefits Code codified at Chapter 3.54 of the Sacramento City Code (the "Ordinance").

3. Contractor understands, to the extent that such benefits are not preempted or prohibited by federal or state law, employee benefits covered by the Ordinance are any of the following:

   a. Bereavement Leave
   b. Disability, life, and other types of insurance
   c. Family medical leave
   d. Health benefits
   e. Membership or membership discounts
   f. Moving expenses
   g. Pension and retirement benefits
   h. Vacation
   i. Travel benefits
   j. Any other benefit offered to employees

   Contractor agrees that if Contractor offers any of the above-listed employee benefits, Contractor will offer those benefits, without discrimination between employees with spouses and employees with domestic partners, and without discrimination between the spouses and domestic partners of such employees.

4. Contractor understands that Contractor will not be considered to be discriminating in the provision or application of employee benefits under the following conditions or circumstances:

   a. If the actual cost of providing a benefit to a domestic partner or spouse exceeds the cost of providing the same benefit to a spouse or domestic partner of an employee, Contractor will not be required to provide the benefit, nor shall it be deemed discriminatory, if Contractor requires the employee to pay the monetary difference in order to provide the benefit to the domestic partner or to the spouse.

   b. If Contractor is unable to provide a certain benefit, despite taking reasonable measures to do so, if Contractor provides the employee with a cash equivalent Contractor will not be deemed to be discriminating in the application of that benefit.

   c. If Contractor provides employee benefits neither to employee's spouses nor to employee's domestic partners.

   d. If Contractor provides employee benefits to employees on a basis unrelated to marital or domestic partner status.

   e. If Contractor submits written evidence of making reasonable efforts to end discrimination in employee benefits by implementing policies that will be enacted before the first effective date

after the first open enrollment process following the date this Agreement is executed by the City of Sacramento ("City"). Contractor understands that any delay in the implementation of such policies may not exceed one (1) year from the date this Agreement is executed by the City, and applies only to those employee benefits for which an open enrollment process is applicable.

f. Until administrative steps can be taken to incorporate nondiscrimination in employee benefits. The time allotted for these administrative steps will apply only to those employee benefits for which administrative steps are necessary and may not exceed three (3) months from the date this Agreement is executed by the City.

g. Until the expiration of a current collective bargaining agreement(s) if employee benefits are governed by such collective bargaining agreement(s).

h. Contractor takes all reasonable measures to end discrimination in employee benefits by either requesting that the union(s) involved agree to reopen the agreement(s) in order for Contractor to take whatever steps are necessary to end discrimination in employee benefits or by ending discrimination in employee benefits without reopening the collective bargaining agreement(s).

i. In the event Contractor cannot end discrimination in employee benefits despite taking all reasonable measures to do so, Contractor provides a cash equivalent to eligible employees for whom employee benefits are not available. Unless otherwise authorized in writing by the City Manager, Contractor understands this cash equivalent must begin at the time the union(s) refuse to allow the collective bargaining agreement(s) to be reopened or not longer than three (3) months after the date this Agreement is executed by the City.

5. Contractor understands that failure to comply with the provisions of Section 4(a) through 4(i), above, will subject Contractor to possible suspension and/or termination of this Agreement for cause; repayment of any or all of the Agreement amount disbursed by the City; debarment for future agreements until all penalties and restitution have been paid in full and/or for up to two (2) years; and/or the imposition of a penalty, payable to the City, in the sum of $50.00 for each employee, for each calendar day during which the employee was discriminated against in violation of the provisions of the Ordinance.

6. Contractor understands and agrees to provide notice to each current employee and, within ten (10) days of hire, to each new employee, of their rights under the Ordinance. Contractor further agrees to maintain a copy of each such letter provided, in an appropriate file for inspection by authorized representatives of the City. Contractor also agrees to prominently display a poster informing each employee of these rights.

7. Contractor understands that Contractor has the right to request a waiver of, or exemption from, the provisions of the Ordinance by submitting a written request to the City's Procurement Services Division prior to Agreement award, which request shall identify the provision(s) of the Ordinance authorizing such waiver or exemption and the factual basis for such waiver or exemption. The City shall determine in its sole discretion whether to approve any such request.

8. Contractor agrees to defend, indemnify and hold harmless, the City, its officers and employees, against any claims, actions, damages, costs (including reasonable attorney fees), or other liabilities of any kind arising from any violation of the Requirements or of the Ordinance by Contractor.

The undersigned declares under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that he or she is authorized to bind the Contractor to the provisions of this Declaration.

Signature of Authorized Representative

5-14-13
Date

James Phillips
Print Name

President
Title

EXHIBIT A

PROFESSIONAL SERVICES AGREEMENT FOR DESIGN PROFESSIONALS

SCOPE OF SERVICES

1. **Representatives.**

The CITY Representative for this Agreement is:

Ian Pietz, Senior Engineer
1395 35th Avenue, Sacramento, CA 95822
(916) 808-1910 / 808-1497 / ipietz@cityofsacramento.org

All CONTRACTOR questions pertaining to this Agreement shall be referred to the CITY Representative or the Representative's designee.

The CONTRACTOR Representative for this Agreement is:

James Phillips, President
405 30th Street, Sacramento, CA 95816
(916) 448-3776 / (916) 448-3778 / JSPAutomation@sbcglobal.net

All CITY questions pertaining to this Agreement shall be referred to the CONTRACTOR Representative. All correspondence to CONTRACTOR shall be addressed to the address set forth on page one of this Agreement. Unless otherwise provided in this Agreement, all correspondence to the CITY shall be addressed to the CITY Representative.

2. **Professional Liability Insurance.** Professional Liability (Errors and Omissions) insurance is _X_ is not ___ *[check one]* required for this Agreement. If required, such coverage must be continued for at least _3_ year(s) following the completion of all Services and Additional Services under this Agreement. (See Exhibit D, Section 11, for complete insurance requirements.)

3. **Conflict of Interest Requirements.**

A. **Generally.** Under the California Political Reform Act, Government Code §§ 81000 et seq., designated employees of the CITY are required to comply with the CITY's Conflict of Interest Code. The term "designated employees" is a term of art and includes individuals who are working for contractors who are providing services or performing work for the CITY and who are considered to be "consultants" under the Political Reform Act. The term "consultant" generally includes individuals who make, or participate in making, governmental decisions or who serve in a staff capacity. Individuals who perform work that is solely clerical, ministerial, manual or secretarial are not "consultants."

The CITY's Conflict of Interest Code requires designated employees, including individuals who qualify as "consultants", to file the following statements of economic interests:

(1) An "assuming office" statement of economic interests to be filed within 30 days after execution of the agreement between the City and the contractor;

(2) Annual statements of economic interests while the agreement remains in effect, to be filed not later than April 30 of each year; and

(3) A "leaving office" statement of economic interests to be filed within 30 days of completion of the contract.

The above statements of economic interests are public records subject to public disclosure under the California Public Records Act.

The CITY's Conflict of Interest Code also requires individuals who qualify as "consultants" under the Political Reform Act to comply with the conflict of interest provisions of the Political Reform Act, which generally prohibit individuals from making or participating in the making of decisions that will have a material financial effect on their economic interests.

B. **Conflict of Interest Statements.** The individual(s) who will provide services or perform work pursuant to this Agreement are "consultants" within the meaning of the Political Reform Act and the CITY's Conflict of Interest Code: ____ yes __X__ no *[check one]*

If "yes" is checked above, CONTRACTOR shall cause the following to occur within 30 days after execution of this Agreement:

(1) Identify the individuals who will provide services or perform work under this Agreement as "consultants";

(2) Cause these individuals to file with the CITY Representative the "assuming office" statements of economic interests required by the CITY's Conflict of Interest Code.

Thereafter, throughout the term of the Agreement, CONTRACTOR shall cause these individuals to file with the CITY Representative annual statements of economic interests, and "leaving office" statements of economic interests, as required by the CITY's Conflict of Interest Code. The CITY may withhold all or a portion of any payment due under this Agreement until all required statements are filed.

4. Scope of Services. [*Describe services to be provided here, or, if scope of services is described in an attachment, label the attachment "Attachment 1 to Exhibit A" and include the following sentence:*]

The services provided shall be as set forth in Attachment 1 to Exhibit A, attached hereto and incorporated herein.

5. **Time of Performance.** The services described herein shall be provided during the period, or in accordance with the schedule, set forth in the scope of services.

ATTACHMENT 1 TO EXHIBIT A
SCOPE OF WORK
PLC – HMI PROGRAMMING FOR THE:

Sacramento Water Treatment Plants Rehabilitation Project

SCOPE OF SERVICE

The services required for this project consist of PLC and HMI programming as well as communications setup for field devices. PLC programming will include programming for multiple Schneider Electric Modicon Quantum Unity processors with hot standby using IEC ladder and function block programming and the Unity Pro software package. The HMI portion will consist of communication driver configuration and screen development/programming for various water plant processes using the latest version of Trihedral VTScada. Services may also include migrating screens from other vendor supplied PLCs to the Trihedral SCADA package. The communications setup will include, but is not limited to, Modbus 485, Modbus TCP and Ethernet IP communications to valves, flow meters, variable frequency drives (VFD), instrumentation and motor control centers (MCC).

The control strategies for both water treatment plants are outlined in the project specifications under sections 17100, 17101A, and 17101B (Attachments 2, 3, and 4 to Exhibit A respectively). JSP Automation will implement these control strategies. All programming shall occur in either Canada or the USA.

The water plant processes which need to be automated may include intake systems, coagulation, flocculation and sedimentation, disinfection, sludge dewatering, high service pump stations (HSPS), filtration, filter backwash systems, filter backwash water return and solids handling. Other services required may include setup and configuration of the instrumentation required for the processes such as sludge density meters, turbidity meters, particle counters, fluoride residual meters, chlorine residual meters, streaming current meters, flow meters, pressure transmitters and level sensors. Programming will also include flow to rate ratio control for chlorine and coagulant feeds, motor speed control for pumps and valve control.

The selected firm shall also provide 16 hours of training to City staff. Training shall take place at each water treatment plant. The training shall include a presentation on each SCADA screen modified or created for this project and include how the operator interacts with each SCADA screen. The training shall show in detail all of the parameters shown on each SCADA screen and how these parameters related to the water treatment process.

PROPOSED APPROACH

JSP Automation will utilize these proven and standard methods for this project. Given that our designs are based on established and proven design concepts utilizing the latest working technologies for SCADA, PLC, Communications, Security and Information Systems, the City will receive a reliable and robust system foundation with open architecture for future growth and expansion. Given that JSP has provided like services that have proven successful for systems that are nearly identical to that of the City, our proposal for this project will adhere to these demonstrated methods to provide the City with the best technical solutions.

SCADA Requirements and PLC Control System Definition

The requirements definition is based on workshop meetings with the City to establish the desired operational requirements for the SCADA and PLC system from both a global and departmentalized view. Taking into account the need for security, operations, maintenance, information systems, engineering and data storage, JSP can evaluate the project goals and insure that all SCADA and PLC control system aspects are clearly defined.

Without a sound communications infrastructure in place any SCADA system will function unreliably and provide limited data at the sacrifice of the SCADA information, therefore it is a necessity to evaluate how data is accessed by the SCADA to provide for a robust system. It is our intent to implement a system that will utilize standardized communications methods such as Ethernet, Modbus or other open protocols to support both utility based, dedicated plant communications. JSP will work with the City to determine the needs based on the equipment furnished by the contractor and identify the best communications approach to obtain the PLC control and SCADA data.

Given these evaluations JSP will present to the City with a SCADA/PLC Requirements Definition Report (Technical Memorandum) for each of the packaged system supplied on the project by the contractor. The report will address the following:

- An evaluation of the design documents for PLC control systems and communications methods and its ability to support an open SCADA communications interface. The report will address the need for standardization of components and control measures to simplify operations and maintenance, and cover those sites presented in the Design Documents.
- A review of the packaged equipment, intelligent devices and smart MCC systems to identify coordination items associated with communications protocol, register assignments and communication interface needs.
- A preliminary design report for each system to include SCADA/PLC I/O, future I/O, communications needs and recommended control scenario and proposed user interface requirements to establish the SCADA and HMI system requirements for data monitoring and control of the equipment supplied by the contractor.
- Information system technology requirements to provide for reporting, historical data archiving and remote system access when required.

SCADA and PLC System Programming

JSP will provide SCADA and PLC programming services to meet all of the project requirements outlined in the RFQ. JSP's programmers have extensive experience in PLC and SCADA system programming. In fact the latest projects implemented by JSP Automation deployed the Modicon M340, Quantum and Momentum products utilizing Wondeware as the SCADA system interface. With the exception of the Momentum units the M340 and Quantum PLC's utilized the Modicon Unity Pro series programming tool set with defined function blocks for program development.

As a part of the program development phase, JSP will work with operations and engineering to further define the programming requirements for PLC control and SCADA monitoring. JSP will work with the City in a workshop type environment presenting the group with preliminary data

such as sample graphics, user interfaces and navigation tools to define system requirements before actual program implementation. Programming solutions will be based on the requirements definitions, contract control strategies and workshop presentations to provide the City with a firm understanding of program operation.

Programming Project Management

Our project management goals are to effectively communicate with the client via e-mail, conference calls, and technical memos and on site meetings based on regular project intervals and scheduled project activities that are deemed necessary to effectively design and implement the SCADA and PLC controls project. Our management team utilizes a successful approach that is practical and flexible given the dynamics of planning, designing and implementing a SCADA system project. Many firms will address
this as a typical information system project or a construction management project for their management method and style. Neither of these methods is conducive to effectively manage a SCADA and controls project that contains elements of both and has unique characteristics requiring the management of both technical professional engineering and non-technical contracting companies in a public sector environment. JSP will meet with the City to determine the best approach and management style given the City's in house project management and technical resources to establish a cost effective and productive project management approach for overall SCADA implementation.

Given that JSP has provided programming services direct to the owner for constructed projects, we have extensive experience in coordinating with contractors, equipment suppliers and integrators to insure that the information needed for programming is made available at the earliest time to avoid potential delays. JSP's team will review related equipment programming and interface requirements specifically that of the MCC's and switchgear to insure that all data is made available in the specified Modbus communications formats for retrieval by the PLC control systems.

SCADA and PLC Start-up and Commissioning

Our start-up and commissioning services are provide to thorough test system operation and provide high level QA/QC of the programming function in conjunction with actual operation. Control system technicians, programmers and field engineers will provide comprehensive testing services during the Start-Up, Testing, Commissioning, Operational Readiness and Final Acceptance phases of the projects listed.

ATTACHMENT 2 TO EXHIBIT A

SECTION 17100

CONTROL STRATEGIES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
   1. Contractor-developed loop description submittal requirements.
   2. General programming requirements.
   3. Common control functions:
      a. General control and monitoring functions to be provided throughout the PCIS system.
         1) These requirements apply to all systems, and supplement the specific loop descriptions in Section 17101A and 17101B and information indicated on the Drawings.

A. Related sections:
   1. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
   2. It is the CONTRACTOR's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of CONTRACTOR's Work.
   3. The following sections are related to the Work described in this Section. This list of related sections is provided for convenience only and is not intended to excuse or otherwise diminish the duty of the CONTRACTOR to see that the completed Work complies accurately with the Contract Documents.
      a. Section 17050 - Common Work Results for Process Control and Instrumentation Systems.
      b. Section 17101A - SRWTP Specific Control Strategies.
      c. Section 17101B - EAFWTP Specific Control Strategies.

1.02 REFERENCES

A. As specified in Section 17050.

1.03 DEFINITIONS

A. As specified in Section 17050.

B. Hardwired control: Control circuitry that does not utilize software to initiate functionality.

C. Hardwired interlocks: A safety or protective feature that will interrupt operation of the equipment in all operating modes with no required operator intervention.

D. Software interlocks: A safety or protective feature that will interrupt operation of the equipment when the PLC has control.

E. Slew rate: Rate of change in respect to time.

F. Clamp: Imposed upper and lower limits on setpoints to eliminate entries outside the allowable control parameters.

G. Watch dog timer: Timers imposed to test components such as discrete I/O to verify the health of the car.

1.04 SUBMITTALS

A. As specified in Section 17050.

1.05 WARRANTY

A. As specified in Section 17050.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 ERECTION, INSTALLATION, APPLICATION, CONSTRUCTION

A. As specified in Section 17050.

B. General programming requirements:
   1. Use variable names or aliases derived from tag and loop identification on the P&IDs for all process values.
   2. Store all adjustable parameters in the PLC, and configure so that an operator with sufficient security access can change the parameters from the HMI or OIT. Update and display the current value at all locations, regardless of where the last change was made.
   3. Program slew rates for all setpoints to limit the effect of updated setpoints on the process:
      a. Provide for control setpoints and manual speed and position selections.
      b. Store new setpoints in one register, and gradually ramp the actual setpoint register at the slew rate until it reaches the new value.
      c. Provide operator access to change slew rates from the OIT.
   4. Saved setpoints:
      a. Provide an operator selection to save all setpoint values.
      b. Furnish one or more screens at the OIT that display the initial values for all setpoints defined during startup, and the value for each setpoint the last time they were saved.
      c. Provide an operator selection to restore all setpoints to the initial startup value.
      d. Provide an operator selection to restore all setpoints to the last saved value.
   5. Store a copy of all adjustable parameters and accumulated and integrated totals in SCADA:
      a. Upon re-loading of the PLC program, re-load these values to the PLC from SCADA.
   6. Calculated values:
      a. Program calculations such that division by zero errors cannot occur.

b. Prevent calculations from generating values that exceed the limits of the equipment or data type structures (integers) internal to the PLC.
c. Configure counting functions (start counts and operation counts) to allow a minimum of 10,000 counts, and to roll-over to zero at an even decimal interval (1 followed by 4 or more zeros).
d. Configure integrating functions to accumulate the maximum rate from the instrument for 1 year. Ensure that each incremental addition can be added while maintaining 2 significant digits of the incremental value at all times up to the reset value or 11 percent above the alarm value. Configure the integrated value to roll over to zero at an even decimal interval greater than 1 year's accumulation at full rate, or generate a reset alarm when the accumulated value reaches 90 percent of the maximum value that will allow accurate accumulation.

7. Timers:
   a. Provide programmable settling and proving timers in all control sequences for starting and stopping of equipment to allow the process to settle down before proceeding with any additional control functions.
   b. Embed the timers in the PLC logic, tune in the field, and list separately as part of the software submittal and O&M manual.
8. PCM status:
   a. Furnish a minimum of 1 screen that depicts the status of all enclosures containing PLCs or I/O in the control system, including but not limited to the following:
      1) Intrusion status on all enclosures equipped with intrusion switches.
      2) AC power failure:
         a) Monitor ahead of UPS.
      3) DC power supply failure:
         a) For redundant power supplies, alarm when either power supply fails.
      4) UPS failure signal.
9. PLC system communication status:
   a. Furnish a minimum of 1 screen to display all communication errors and status within the PCIS:
      1) Communication between SCADA and PLCs, PLC to PLC, PLC to RIO.
      2) Display status of each node, and summary of failures over the past 60 minutes.
   b. Generate a communications alarm if any communication fault is detected or there is no response from a node for more than a user specified time.
   c. In the event of communications loss:
      1) Continue normal operation at each PLC.
      2) Where control parameters are received over a communications link:
         a) If a link fails where process elements use the remote value for closed-loop control, hold operating status, speed and position, of the process elements at their last state before the communication alarm, unless other I/O local to that PLC indicates shutdown or over-ride conditions:
            (1) Ensure that the operator can control the process using PCIS HAND mode at the local HMI.
         b) If a link fails where process elements use the remote value to determine setpoints, settings or control levels, continue to operate using the last value received:

(1) Provide a manual over-ride entry at the local HMI to allow an operator to enter a different value for any such remote signal.
(2) Generate an alarm whenever an over-ride value is in use.

C. Common control functions:
1. Incorporate common control functions into all control loops and devices and into the control programming, whether or not specifically shown in the specific control descriptions or elsewhere in the Contract Documents.
2. Alarms:
a. Generate alarms within the PLC logic.
b. Indicate alarms at the HMI and OIT. Enable acknowledgement from either the OIT or the HMI.
c. Generate high, high-high, low, and low-low level alarms where indicated:
1) Provide an alarm reset deadband for each analog value to prevent excessive repeated alarms.
2) Provide logic and timers to inhibit analog alarms based on process events. For example, inhibit low flow alarms when a pump is stopped, or has not been running long enough to establish flow.
d. Flash all alarm and fail conditions and their respective indicators on the PCIS graphic screens and local indicating lights until the condition is acknowledged by the operator, even if the alarm condition is no longer present.
e. Once the alarm is acknowledged by an operator, display alarm conditions in a steady state (not flashing) while the alarm condition is still present:
1) Flash with a cycle rate of 1/2 second on and 1/2 second off.
f. Once the alarm has been cleared and the operator has acknowledged the alarm or fail condition, turn the graphic alarm indicator off.
g. For all alarms that do not have inherent timers, provide an operator-adjustable proving timer to limit nuisance alarms, continuously adjustable from zero seconds to 100 minutes. The initial setting of proving timers shall be zero seconds:
1) The PLC shall start the timer when it first detects an alarm condition, and shall only activate the alarm after the timer has expired.
2) If the alarm condition clears while the timer is running, the timer shall reset, and the alarm shall not be activated.
h. Use interlocks and proving timers to prevent alarms from operating due to power loss, except for loss of power alarms.
i. Furnish an alarm silence pushbutton at each PCM, HMI, or LCP with an audible alarm to signal the PLC to turn off the audible alarm until the next alarm occurs.
~~j. Any alarm that is not acknowledged after a setpoint period of time shall activate the auto dialer.~~

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k. Lamp test: Furnish lamp test pushbuttons at each control panel with more than 10 pilot lights, that illuminates all pilot lights on the panel:
1) The lamp test may sequence through blocks of lights.
2) Minimum on time for each lamp during lamp test 15 seconds.
3. Where a reset is shown for counts, totals and times maintained in the PLC:
a. Provide a reset selection on the OIT screen that displays the value.
b. Provide a preset function on the OIT to allow a operator-entered value to become the current accumulated total.

c. Limit access to the reset and preset functions to operators with suitable security level.
d. Log the value before reset, operator, time, and date of reset in the SCADA archive.
e. Log the value before preset, preset value, operator, time, and date of preset in the SCADA archive.

4. Where start counts are indicated on the Drawings, or required in this Section, count starts for each piece of equipment (off to on transitions of running status) in the PLC:
   a. Display total starts on PCIS screens, and provide a reset function.
   b. Where indicated, calculate number of starts for each day:
      1) Display current day and previous day starts on PCIS displays.
      2) Do not reset daily start count when overall count is reset.
      3) Archive starts for each day through SCADA.
5. Where run time accumulation is indicated on the Drawings, or required in this Section, integrate accumulated run time to the nearest 0.1 hour whenever the running status input indicates that the equipment is running:
   a. Display total run time in hours on PCIS screens.
   b. Where indicated, calculate total run time for each day:
      1) Display current day and previous day run time on the OIT to the nearest 0.1 hour.
      2) Do not reset daily run time when overall time is reset.
      3) Archive run time for each day through SCADA.
6. For all monitored analog values:
   a. Convert all values to engineering units within the PLC.
   b. Maintain trends in SCADA.
   c. Totalized forward and reverse flows shall be transmitted from the flow meter where indicated on the drawings, or required in this section.
      1) Display totals on the OIT and HMI.
      2) Archive totals to the historical database through SCADA.
   d. Generate an alarm whenever an over-ride value is in use.
7. Analog data processing:
   a. Engineering units conversion:
      1) Use engineering units for all analog point values. Convert analog inputs to engineering units.
   b. Analog magnitude checking:
      1) Provide upper and lower limits to prevent operator-entered values (setpoints, etc.) from falling outside acceptable limits.
   c. Analog value quality:
      1) Monitor analog values received at each PLC from analog inputs or communications from another PLC or RIO, and generate alarms for the following conditions:
         a) Rate of change in excess of acceptable limit:
            (1) Provide a separate rate limit for each value.
         b) Stale value:
            (1) For analog signals that come from analog inputs or calculations using analog inputs, which are expected to have some variation each time the input is read, alarm when there is no change in the value for 10 times the normal expected scan or communication update.

8. Analog device override (HMI and OIT):
   a. Provide the following functions from the OIT and the local HMI for each and every analog input:
      1) An over-ride value to be used in place of the analog input:
         a) Enter in engineering units:
            (1) Display the calibrated range in engineering units.
            (2) Only allow entries within the calibrated range of the instrument.
         b) When the analog input is enabled, track the analog input so that the over-ride matches the analog input value when the input is initially disabled.
         c) Maintain over-ride status and value in the PLC.
         d) Only allow access to over-ride selections and settings to operators with sufficient security.
      2) An enable/disable selection:
         a) When enabled, the value used by the PCIS system is equal to the analog input value.
         b) When disabled, the analog input is ignored, and the over-ride value is used for all control and display functions.
         c) Generate an alarm whenever an analog input is disabled.
         d) Enter a value for the analog input from the PCIS system to the PLC.
      3) Use the over-ride value for all display and control functions instead of the actual analog input value.
   b. Provide the following functions in the PLC, with selections and value entry from the OIT and/or HMI:
      1) An over-ride value to be used in place of the normal output value:
         a) Enter in percent of output span.
         b) When the analog output is enabled, track the analog input so that the over-ride matches the analog output value when the output is initially disabled.
      2) An enable/disable selection:
         a) When enabled, the value sent to the output is the value determined by the PLC based on the control logic or operator-entered value in PCIS HAND.
         b) When disabled, the calculated PCIS HAND values are ignored, and the over-ride value is sent to the output.
         c) Generate an alarm whenever an analog output is disabled.
9. Tank and vessel levels:
   a. Display all tank and vessel levels as both a level (typically in feet) and a volume (typically in gallons):
      1) Some individual displays may be only level or volume, when agreed to by the OWNER and ENGINEER during screen meetings.
   b. Monitor rate of change of volume on all tanks and vessels:
      1) Establish the maximum withdraw rate at which the volume should decrease (all pumps or feeders operating at maximum output). Generate an alarm whenever the volume decreases faster than this rate.
      2) Establish the minimum fill rate at which the volume should increase when filling. Generate an alarm whenever the volume increases faster than this rate. Verify tank and vessel level is fluctuating to verify the validity of the IO register. If it is determined the register is

not active or failed in a manner that leaves a stagnant value generate an alarm.

10. I/O filtering and processing:
    a. Analog input filtering:
        1) For each analog input provide an adjustable first order filter, for the purpose of smoothing out spikes and other noise for analog transmitter input signals. By default, configure analog inputs with no filtering affect.
        2) Monitor analog input signal quality:
            a) Over range: The input value is above the normal range (typically over 21 mA).
            b) Under range: The input value is below the normal range (typically under 3 mA, indicating a probable broken connection).
            c) Generate alarms for over or under range inputs.
            d) Do not use over or under range values for control or calculation purposes:
                (1) Where a second instrument is provided to monitor the same condition (a redundant instrument, or additional instruments furnished for averaging or different operating modes), and has a valid signal, use that input for control.
                (2) Otherwise, hold all outputs affected by the signal at their last values before the signal went out of range.
        3) Digital input filtering (proving timer):
            a) Provide an adjustable time delay function (0-10 seconds) on discrete input for the purpose of de-bouncing.
            b) By default, discrete inputs shall be configured with de-bounce timers set to zero seconds.
11. Instrument scaling (OIT/HMI):
    a. Provide 1 or more maintenance screens to display ranges and trigger points for all field instruments:
        1) For analog instruments, use input scaling values in the PLC to determine minimum and maximum calibration points.
        2) For discrete instruments, display calibrated pick-up and drop-out values.
12. PCIS HAND-OFF-AUTO:
    a. Where indicated, provide HAND-OFF-AUTO and START-STOP selections in the PCIS, accessed from an HMI or OIT for operators with sufficient security, to provide the following operating modes:
        1) PCIS AUTO: The normal, automatic control mode of the strategy which allows full PLC control in response to process conditions and programmed sequences.
        2) PCIS HAND: Enables PCIS Manual control where control decisions are made by an operator through the PCIS START-STOP, OPEN/CLOSE, or other selections as indicated.
        3) PCIS OFF: Automated PCIS control is disabled and PLC calls for all associated equipment to stop and valves to close or go to their identified safe state.
        4) Program the PLC so that switching a strategy between AUTO and HAND (either direction) occurs with a smooth transition. Keep running or position status unchanged when control is switched to HAND until a change is requested using the operator selections (START, STOP, OPEN, CLOSE). Keep running and position status

unchanged when control is switched to AUTO until the control logic determines a change is required.

13. Display the current status of all operator selections (PCIS HAND/AUTO, PCIS START/STOP, etc.) on HMI and OIT.
14. Permissives:
    a. Implement software permissives where indicated to place equipment in a safe condition in response to impending hazardous process conditions. Apply software permissives when equipment is operating in PCIS AUTO or PCIS HAND:
        1) Where indicated, provide a selection to bypass software permissives for maintenance functions. This option shall only be selectable in PCIS Manual.
    b. Use hard-wired permissives for equipment protection where indicated.
15. Process control algorithms:
    a. Jog and hold: Unless otherwise indicated, use jog and hold control algorithms where possible:
        1) When the error between process variable and setpoint is beyond a setpoint deadband:
            a) Jog valve or ramp speed in the required direction for a preset "Jog Time" or until the process variable reaches or passes the setpoint.
            b) Then hold speed or position through a setpoint "Hold Time."
            c) Continue alternating jog and hold until the error is less than the deadband.
        2) Provide operator access to Jog Time and Hold Time setpoints from the OIT.
    b. PID algorithms: Use where indicated, or where necessary to provide fast response:
        1) Provide a PID faceplate with the following displays and functions for each PID control algorithm:
            a) Display Output, CV.
            b) Display Setpoint, SP.
            c) Display Process Variable, PV.
            d) Allow for operator selection of Automatic or Manual control of the output.
            e) Under Manual control of output allow the operator to enter the desired output value.
            f) Allow for input of the three Proportional, Integral and Derivative tuning parameters.
            g) Configure PID loops to prevent reset windup when controlled equipment is operating in Manual (local or PCIS), or when the equipment has reached a physical limit.
            h) When controlled equipment is being operated in remote PCIS HAND, configure the PID function to track the process variable to provide a smooth transfer between Manual and Automatic modes.
            i) Provide selectable slew rates with adjustable setpoints to allow the PID algorithm to slowly ramp to its final value to minimize system disturbance.
16. Equipment alternating and sequencing:
    a. Distribute number of starts and run time equally between identical equipment.

17. Motor control:
    a. Monitor the device's LOCAL-OFF-REMOTE (LOR) switch (the hard-wired switch at the MCC, drive or equipment) to determine when the PLC has control of the associated equipment:
        1) Display current REMOTE status on the PCIS screens.
    b. Monitor the device's running status from the starter auxiliary or run status input:
        1) Display the current status (running or stopped) on the PCIS screens.
        2) Use status to calculate total run time and daily run time, and to count total starts and daily starts.
        3) Provide time stamp for each start.
        4) For motors 200 HP and greater, provide software to prevent exceeding the manufacturer's recommended maximum starts per hour.
    c. When equipment control has been given to the PLC as reported by the LOCAL-OFF-REMOTE switch, allow selection of PCIS AUTO or PCIS HAND control modes based upon operator selection using the PCIS screens.
    d. Starting, stopping and running when the device LOR is in LOCAL:
        1) With the LOR switch in the LOCAL position, the motor is controlled by the START and STOP pushbuttons.
        2) With the LOR switch in the OFF position, the motor is prohibited from running.
        3) With the LOR switch in the REMOTE position, the motor is controlled remotely.
    e. Starting, stopping and running when the device LOR is in REMOTE:
        1) When the motor is expected to be running (PLC has issued a START or RUN due to process conditions or operator selection), LOR is in REMOTE, and the device is not reported to be running, start an operator adjustable "Control Activation" timer:
            a) Provide "Control Activation" timers for each piece of controlled equipment:
                (1) If the LOR and required running status do not change, and the PLC does not receive running status within the "Control Activation" time period:
                (a) De-activate the output.
                (b) Place the device in a "Failed" state.
                (c) Generate a "Failed to Respond" alarm.
        2) When the motor is not expected to be running (PLC has issued a STOP or removed the RUN output), LOR is in REMOTE, and the device is reported to be running, start the "Control Activation" timer:
            a) If the LOR and required stopped status do not change, and the PLC does not lose the running status within the "Control Activation" time period:
                (1) Keep the RUN output off or the STOP output on.
                (2) Place the device in a "Failed" state.
                (3) Generate a "Failed to Respond" alarm.
        3) Re-establish PLC control of a device in a "Failed" state only after an operator turns the device's LOR switch out of REMOTE, and back to REMOTE (i.e., REMOTE input to the PLC cycles off and back on).
    f. Where motor winding high temperature switches or RTD temperature elements are shown, generate an alarm when high temperature is sensed

(contact opens or temperature above the high alarm setpoint), but do not stop the motor unless otherwise indicated.

g. Control two-speed motors similar to other motors, except as listed below:
   1) Motor states are RUN-FAST, RUN-SLOW, and STOP.
   2) Start all two-speed motors in the RUN-SLOW state. If or when the high speed is required (RUN-FAST operator selection or process conditions), transition to RUN-FAST after a designated time.
   3) When transitioning from RUN-FAST to RUN-SLOW, remove the RUN-FAST output or issue a STOP, then wait for a "Fast to Slow" time delay before energizing the RUN-SLOW or START-SLOW output.

h. Simultaneous starts:
   1) Prevent more than one motor-driven load 25 HP or larger in the same facility from starting concurrently:
      a) When starting one load, inhibit start logic for all other such equipment until the load being started is up to speed (RVSS or VFD), or after a setpoint time delay (full-voltage starters and miscellaneous equipment).
   2) Use the same logic to prevent multiple large devices from starting concurrently on restoration of power after a power outage, whether operating on generator or utility power.

i. Speed control:
   1) Modulate speed on VFD-driven motors using jog and hold, or PID control algorithms to maintain process conditions as described in the specific loop descriptions.
   2) Operate speed control within a pre-defined range:
      a) Minimum speed as determined by equipment manufacturer. The higher of:
         (1) Minimum motor speed to maintain adequate cooling for the type of load driven (constant or variable torque).
         (2) Minimum equipment speed, such as minimum speed to deliver flow or to deliver minimum flow for equipment cooling or lubrication.
      b) Maximum speed 100 percent (60 Hz) or as identified by equipment manufacturer.
   3) Where multiple equipment may operate together to maintain the same process condition:
      a) Provide an operator selection for starting sequence.
      b) Start the first equipment at a preset starting speed.
      c) When one or more equipment is running and the speed control algorithm reaches a preset "Start Next" speed value (initially 95 percent of speed range) through a preset time delay:
         (1) Start the next available equipment at the preset starting speed.
         (2) Ramp speed of previously running equipment down to a preset value based on the number of items running. Determine preset values for each condition based on equipment and system characteristics to provide approximately the same total flow or process condition with the new load running at the starting speed.

(3) Once the previously-running equipment reaches the preset speed, resume the speed control algorithm for those equipment.
(4) Ramp the speed of the equipment that had just started until it reaches the speed of the previously-running equipment.
(5) Operate all equipment at the same speed following the output of the speed control algorithm.

d) When two or more pieces of equipment are running, monitor for a "Stop Next" condition:
(1) Where flow rate is monitored, use a preset "Stop Next" flow rate for each possible number and combination of equipment:
(a) Determine initial "Stop Next" speed based on the flow that can be provided with one fewer piece of equipment running at a speed slightly below the "Start Next" speed.
(2) When the "Stop Next" condition exists through a preset time delay:
(a) Ramp speed of running equipment except for the equipment to be stopped up to a preset value based on the number of items running. Determine preset values for each condition based on equipment and system characteristics to provide approximately the same total flow or process condition with one fewer load running (typically slightly below the preset "Start Next" speed) while ramping speed of equipment to be stopped down to the preset minimum speed.
(b) Stop the load once it reaches minimum speed.
(c) Operate all remaining equipment at the same speed following the output of the speed control algorithm.

18. Gate and valve control:
a. Monitor the device's LOCAL-OFF-REMOTE (LOR) switch(es) (the integral switch in the actuator or hard-wired switch at the local control station):
1) Display current REMOTE status on PCIS screens.
b. Start an "Open Activation" timer whenever the device is expected to be open (PLC has issued an OPEN command in PCIS AUTO, or OPEN was selected in PCIS HAND):
1) Initially set "Open Activation" time to twice the normal opening time.
2) If the LOR position and open command do not change, and the PLC does not receive fully open status feedback within the "Open Activation" time period:
a) De-activate the open output.
b) Place the device in a "Failed" state.
c) Generate a "Failed to Open" alarm.
c. Start a "Close Activation" timer whenever the device is expected to be closed (PLC has issued a CLOSE command in PCIS AUTO, or CLOSE was selected in PCIS HAND):
1) Initially set "Close Activation" time to twice the normal closing time.
2) If the LOR position and close command do not change, and the PLC does not receive fully closed status feedback within the "Close Activation" time period:
a) De-activate the close output.

b) Place the device in a "Failed" state.
c) Generate a "Failed to Close" alarm.

d. For modulating valves (valves controlled from either a 4-20 mA signal or digital communications command) with position feedback, start a "Position Error" timer whenever the position feedback differs from the required position command by more than a setpoint error when the LOR is in REMOTE:
   1) For analog modulating devices, error is determined by position feedback differing from position command by more than the setpoint error.
   2) For discrete modulating devices, error is determined by feedback not changing in the correct direction, or changing at less than a setpoint rate, when the OPEN or CLOSE PLC output is active.
   3) Initially set the "Position Error" time to 60 seconds.
   4) If the LOR position does not change, and position error stays outside of the setpoint error through the "Position Error" time period:
      a) Hold position output.
      b) Place the device in a "Failed" state.
      c) Generate a "Position Fail" alarm.

e. Provide separate time delay settings for each function and for each device.

f. If the valve position inputs indicate an impossible state (i.e., valve open and closed at the same time), place the device in a "Failed" state and generate an "Illegal State" alarm.

g. Re-establish PLC control of a device in a "Failed" state only after an operator turns the device's LOR switch out of REMOTE and back to REMOTE (i.e., REMOTE input to the PLC cycles off and back on).

h. For all alarm conditions, control other devices (as stopping pumps, etc.) as stated in the individual loop descriptions to make the system safe.

i. For discrete modulating valves (valves positioned to intermediate positions to control process values through discrete OPEN and CLOSE outputs), count the number of actuations (OPEN or CLOSE commands) in the PLC:
   1) Display count on the OIT.
   2) Provide a reset function for the count.

19. Chemical systems (HMI/OIT):
   a. Provide the following chemical system screens:
      1) Where one HMI manages more than one chemical system, a main menu screen that will allow the operator to access the individual chemical system screens using software keys.
      2) One or more screens for each individual chemical system controlled at that location, containing:
         a) All status displays (running, failed, etc.).
         b) Selections (lead/lag, which process flow to pace to, etc.).
         c) Setpoint entry and display.
         d) Calculated feed requirement (result of flow pacing calculation) in engineering units (typically milligrams of chemical per minute).
         e) Output signal to feeder in percent of full span.
         f) Actual chemical flow rate from flowmeter (where shown).
         g) Process flow rate(s) used to pace each chemical on the individual chemical screens (PROC FLOW):

(1) Where different process flows can be selected for flow pacing, display and identify the selected source.

3) Chemical system calculations: Perform calculations as indicated on the Drawings and in the individual loop descriptions. Use the following assumptions, unless otherwise noted.

4) Where chemical flow feedback is not used, assume feeder output is linear in response to control signal.

5) Zero signal (typically 4 milliamperes) produces zero flow.

6) Perform flow-pacing calculations using as indicated on the Drawings or described in the individual loop descriptions.

b. Provide the setpoints and selections indicated on the Drawings and in the individual loop descriptions. Typical setpoints include:

1) QMAX: Maximum calibration value:

a) Chemical flow rate measured from calibration column at maximum feeder output (typically in gallons of solution per hour or milliliters of solution per minute).

2) CONC: Chemical concentration:

a) The concentration of the chemical in the solution to be fed, in engineering units (typically milligrams of chemical per liter of chemical solution).

3) DENSITY:

a) Density of the chemical solution to be fed in engineering units or as a specific gravity.

b) Used to calculate the concentration of the chemical in the solution.

4) DOSE: Desired dosage:

a) Desired chemical concentration in the process stream in engineering units (typically milligrams of chemical per liter of process fluid).

5) FLOW SEL: Selection of process stream(s) for flow pacing.

6) OPEN/CLOSED LOOP:

a) Selection of method of controlling chemical flow-paced feed rate.

b) OPEN LOOP: Signal to feeder is based on feeder calibration (QMAX) to deliver calculated chemical solution feed rate. Chemical solution flowmeter is not used for control.

c) CLOSED LOOP: Chemical feed rate is directly controlled using the calculated chemical solution feed rate as the setpoint, and the flow rate from the chemical solution flowmeter as the process variable.

20. Breaker status:

a. Display the following data to the extent it is available from the specified device:

1) Open.

2) Closed.

3) Tripped.

4) Ground fault.

5) **Relay failure.**

6) **Communications error.**

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21. Power and starter information:

a. Retrieve data via power quality meters, motor protection relays, digital bus networks, or metering instruments, as indicated.

b. Display the following data to the extent it is available from the specified device:
   1) Current: [A]:
      a) A-Phase.
      b) B-Phase.
      c) C-Phase.
   2) Volts: [V]:
      ~~a) A-Phase.~~ **A-B Phase to Phase.**
      ~~b) B-Phase.~~ **B-C Phase to Phase.**
      c) ~~C-Phase.~~ **C-A Phase to Phase.**

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   3) Reactive power: [kVAR].
   4) Real power: [kW].
   5) Apparent power: [kVA].
   6) Power factor: 0.8 percent.
c. For engine/generator system monitoring, also display percent of rated output.

22. Starters, RVSS and VFDs equipped with digital bus communications:
   a. Communicate and display all values listed in the equipment specifications, indicated on the Drawings, or listed below.
   b. Communicate start and stop commands, and receive running feedback over the ~~fieldbus~~ **Modbus** network.

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   c. Monitor the following additional values, and display on the OIT:
      1) Motor current.
      2) Over current alarm.
      3) Under current alarm.
      4) Running status.
      5) Phase loss.
      6) Stall.
      7) **Not ready alarm.**
      8) Number of starts.
      9) History of past 5 trips.

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   d. For Variable Frequency Drives:
      1) Speed command.
      2) Speed feedback.
   e. For RVSS, Variable Frequency Drives, and where otherwise shown or available, monitor the following over the digital bus network:
      1) Line voltage.
      2) Power.
      3) Power factor.
      4) Over voltage alarm.
      5) Under voltage alarm.
      6) Over current alarm.
      7) Under current alarm.

23. Instruments equipped with digital bus communications:
   a. Communicate and display all values listed in the equipment specifications, indicated on the Drawings, or listed below.
   b. Instrument diagnostics.
   c. Communications health.
   d. Process variable.
   e. Alarm summary.
   f. All totalizers (if applicable).

24. Valves and gate operators equipped with digital bus communications:
    a. Communicate and display all controls and data listed in the equipment specification, as indicated on the Drawings, or listed below:
        1) Open, close or direct position commands.
        2) Fully open and closed status.
        3) Position.
        4) High torque, overload and other applicable alarms.
    b. Establish initial torque curves using manufacturer's software for performance tracking and wear.

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25. Plant shutdown: **Provide OOS for all equipment using a single bit for every device and a picture that displays status of all equipment for each area.**
26. Power failure:
    a. Retain all operating setpoints during power failure.
    b. Restore plant operation to the state it was before the power loss:
        1) Store the operating state of all major equipment and systems in the PLC, and retain the last state during a power loss.
        2) When transferring to generator power, Provide a load sequence table on the workstation screen showing the major equipment and systems, and providing a "re-start" selection.
            a) For each item, list the following:
                (1) Equipment name and tag.
                (2) Running kW and kVA.
                (3) Starting kW and kVA.
                (4) Identify whether it was running immediately before the power loss.
                (5) Show current running and available status.
                (6) Operator selection to re-start:
                    (a) Do not allow selection of loads that will cause the generator starting or running capacity to be exceeded.
                    (b) Insert a sequence number showing the order in which the load was selected. If a load is selected again, remove it from the queue, and update the sequence numbers for the remaining equipment.
            b) When operating on generator power, also display the following, updating as selections are made, and as load:
                (1) Generator(s) operating.
                (2) Generator(s) available.
                (3) Remaining running and starting kW and kVA:
                    (a) Calculate from measured generator output kW and kVA, and the maximum starting and running capacity required to start the selected loads.
            c) Once the operator has selected loads, and selected "re-start":
                (1) Start the process loads in the order they were selected.
                (2) Use the logic described above for preventing concurrent starts to provide necessary delays between each step.
            d) After the initial loads have been sequenced on, allow automatic operation to continue to stop and start loads within generator capabilities.

c. Provide an operator selection to permit the plant to re-start. Once re-start is selected: Allow plant loads to re-start, and allow loads to sequence on and ramp up following normal control logic. Where loads were operating in PCIS HAND, restore their operation to the state before the power loss:
   1) Use the logic described above for preventing concurrent starts to provide necessary delays between each start.

d. Operating on generator power:
   1) Include running and starting kW and kVA requirements for each major equipment and system in registers in the PLC:
      a) Where running load can vary due to speed, valve position, etc., use the normal starting value plus 25 percent of the difference between the maximum and minimum values.
   2) Inhibit starting of loads from process control logic and from operator selection (in PCIS HAND) that will exceed generator capability.
   3) Generate the following alarms:
      a) Generator near capacity: When measured kW or kVA reaches 90 percent of the rating of running generators.
      b) Generator at capacity: When measured kW or kVA reaches 95 percent of the rating of running generators.
      c) Unable to start: When an operator selects a load that would exceed generator starting or running capacity.
      d) Insufficient capacity: When the control system needs to start a load, but is inhibited due to generator capacity.
   4) Whenever the Generator at Capacity alarm is active, inhibit starting of any loads, and inhibit increase in speed of all control loops, and other changes that would increase electrical load.
   5) For multiple generator systems, coordinate capacity alarms and equipment starting with generator control system to ensure adequate generator capacity, and to prevent alarms.
   6) Display the following power system data on the workstation screen in numerical and graphical formats:
      a) Available power.
      b) Current power demand.
      c) Capacity of the generator.
      d) Current power demand load as a percentage of capacity.
      e) Generator frequency.
   7) **Provide transition time before restoring to normal. After a time delay (adjustable) when power is available provide a shut down that allows the equipment to transition back to utility power.**

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3.02 DEMONSTRATION AND TRAINING

A. As specified in Section 17050.

END OF SECTION

ATTACHMENT 3 TO EXHIBIT A

SECTION 17101A

Addendum No. 3
1/16/13

SRWTP SPECIFIC CONTROL STRATEGIES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
   1. Loop descriptions:
      a. Specific control requirements and functional descriptions for individual control loops.

B. Related sections:
   1. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
   2. It is the CONTRACTOR's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of CONTRACTOR's Work.
   3. The following sections are related to the Work described in this Section. This list of related sections is provided for convenience only and is not intended to excuse or otherwise diminish the duty of the CONTRACTOR to see that the completed Work complies accurately with the Contract Documents.
      a. Section 01330 - Submittal Procedures.
      b. Section 17050 - Common Work Results for Process Control and Instrumentation Systems.

1.02 REFERENCES

A. As specified in Section 17050.

1.03 DEFINITIONS

A. As specified in Section 17050.

1.04 SUBMITTALS

A. Develop detailed loop descriptions based on the information in the Contract Documents, and submit as specified in Sections 01330 and 17050.
   1. For each control loop, provide a detailed functional description of the operation of the equipment, signals, and controls shown on the P&IDs:
      a. Include all functions depicted or described in the Contract Documents.
      b. Include the following within each loop description:
         1) All requirements specific to that loop.
         2) Common control requirements applicable to that loop.
         3) List of all ranges, setpoints, timers, values, counters, etc.
   2. Where there are similar loops with identical control, such as multiple loops for individual raw water pumps, only 1 loop description need be developed and the remaining loops may reference that loop description.

B. Loop description format:
   1. Loop number and title.
   2. References:
      a. List P&IDs that are specifically referenced.
   3. Abstract:
      a. General description of how the loop works, what devices are involved, and how the process will be controlled.
      b. Process values, setpoints, and limits, including units and ranges:
         1) Show span and range values for analog inputs and outputs, and operating point and deadband for discrete inputs.
   4. Hardwired control:
      a. Detailed description of the control functions at the local level.
      b. Function of local operator interfaces.
      c. Operation of hardwired field pilot controls:
         1) Pushbuttons.
         2) Selector switches.
         3) Potentiometers.
         4) Pilot lights, indicators, and other displays.
   5. Hardwired interlocks:
      a. Explanation of the operation of system interlocks and hardwired permissive conditions.
   6. PLC control:
      a. Detailed description of the control functions that are under control of the PLC.
      b. Operator controls and automatic controls.
      c. Setpoints, alarms, etc.:
         1) Include units and ranges for analog values.
         2) Include span and range for analog inputs and outputs.
         3) Include operating point and deadband for discrete inputs, and identify conditions where contacts are open, and when they close.
      d. Control sequences.
   7. Software interlocks:
      a. Operation of system software interlocks.
   8. HMI control:
      a. Detailed description of the operator controls.
   9. SCADA control:
      a. Detailed description of the operator controls.
      b. Setpoints, alarms, etc.
   10. Indicators and alarms:
      a. List any indicators and alarms specific to the loop that are not covered in the common control strategies.
   11. Failure modes:
      a. List any failure modes specific to the loop that are not covered in the common control strategies.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 FILTER WASTE WASHWATER LAGOON SLUDGE COLLECTION SYSTEM

A. References:
   1. Process Area: FWW Lagoon Sludge Collection System.
   2. P&ID Drawing: S15N-01, S15N-02, S15N-03, S15N-04, and F15N-05.
   3. Mechanical Drawings: S15M-01, S15M03.
   4. Specification Sections: 11360, 11312F, 13448.

B. Mechanical Equipment:

Tag Number	Equipment Name
15DSCOL001	Sludge Collector No. 1
15DSCOL002	Sludge Collector No. 2
15DSCOL003	Sludge Collector No. 3
15DSCOL004	Sludge Collector No. 4
15DSCOL005	Sludge Collector No. 5
15DSCOL006	Sludge Collector No. 6
15DSCOL007	Sludge Collector No. 7
15DSCOL008	Sludge Collector No. 8
15DSCOL009	Sludge Collector No. 9
15DSCOL010	Sludge Collector No. 10
15DSP301	FWW Sludge Pump No. 1
15DSP302	FWW Sludge Pump No. 2
15DSMOV101	Sludge Collector Valve No.1
15DSMOV102	Sludge Collector Valve No.2
15DSMOV103	Sludge Collector Valve No.3
15DSMOV104	Sludge Collector Valve No.4
15DSMOV105	Sludge Collector Valve No.5
15DSMOV201	Sludge Collector Valve No.6
15DSMOV202	Sludge Collector Valve No.7
15DSMOV203	Sludge Collector Valve No.8
15DSMOV204	Sludge Collector Valve No.9
15DSMOV205	Sludge Collector Valve No.10
15DSVLV303	FWW Sludge Pump Interconnection Valve

C. General Description:
   1. Two existing Filter Waste Washwater (FWW) Lagoons will be equipped with 5 new sludge collectors, each with a motorized valve. With the FWW Lagoon in service, the FWW Sludge Collectors will operate in sequence, one at a time, to remove sludge from the bottom of the Lagoons.
   2. Two new constant speed centrifugal pumps will draw from the sludge collector header pipe from each lagoon and pump it to the Gravity Thickener Splitter Box structure. A manual crossover valve (15DSVLV303) shall be provided to allow either pump to draw sludge from either lagoon.
   3. FWW Sludge Collectors and vendor control panels (15-VCP-01 and 15-VCP-02) shall be provided by the Vendor as indicated in specification section 11360. Each VCP shall be equipped with a PLC, Collector Drive VFDs, and a level transmitter at each Lagoon.
   4. Filter Washwater Sludge Pump No. 1 and No. 2 shall be provided with a common LCP (15-LCP-01).

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
         1) Filter Waste Washwater Lagoon No. 1 and No. 2.
            a) Ultrasonic type level transducer (each lagoon) vendor supplied.
   2. Sludge Collectors:
      a. A VCP including VFDs, PLC Control Logic, and all indicators and alarms shall be provided for each lagoon sludge collector system as specified in Section 11360.
   3. Sludge Pumps:
      a. Instruments and Protective Devices:
         1) Local Disconnect switch (each pump).
         2) High Discharge Pressure switch (each pump).
         3) Low Suction Pressure switch (each pump).
      b. Control Devices:
         1) FWW Sludge Pumps: A local control panel (15-LCP-01) shall be provided with the following controls:
            a) HAND/OFF/REMOTE (each pump)
            b) RESET switch (each pump)
      c. Indicators and Alarms:
         1) Run indication (each pump).
         2) Fail ALARM for sludge collection pump (each pump).
         3) READY status for sludge collection pump (each pump).
         4) Low Suction Pressure ALARM (each pump).
         5) High Discharge Pressure ALARM (each pump).
      d. Hardwired Interlocks:
         1) Low-Low Level in the existing FWW Lagoon from the level transmitter shall STOP the sludge collectors.
         2) A low-pressure switch is hardwired to shutdown the pumps to prevent operation if the suction pressure is below the low-pressure setpoint. The low-pressure switch also provides an alarm to the FWW Sludge Pump Local Control Panel.
         3) A high-pressure switch is hardwired to shutdown the pumps to prevent operation if the discharge pressure is above the high-pressure setpoint. The high-pressure switch also provides an alarm to the FWW Sludge Pump Local Control Panel.
      e. Logic:
         1) Local Manual Control Mode:
            a) Each sludge collection pump can be selected using a selector switch P1/OFF/P2 at the VCP. The crossover valve must be in the proper configuration or the OPEN CROSSOVER VALVE alarm will be annunciated at the VCP.
            b) Each sludge collection pump can be started by placing the HAND/OFF/REMOTE selector switch in the HAND position at the FWW Sludge Pump LCP.
         2) Local Automatic Control Mode:
            a) When the HAND/OFF/REMOTE selector switch on the Sludge Collection Pumps' LCP is in the REMOTE position, the pumps shall be Started and Stopped remotely from the Sludge Collector System VCP. The sludge collection pumps can be selected from the VCP or SCADA. A manual crossover valve shall be provided to allow either pump to draw sludge from either lagoon. When

Lagoon 1 is selected to operate with Sludge Collection Pump number 2 or when Lagoon 2 selected to operate with Sludge Collection pump 1 the light "Open Crossover Valve" shall be annunciated at the VCP if the valve is closed, and the operator shall open the crossover valve manually.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC/OIS Functions:
   1. Control:
      a. When LOCAL/OFF/REMOTE for Sludge Collector is in REMOTE position and IN SERVICE the Operator may START and STOP the Sludge Collector System for each Lagoon from SCADA.
         1) Three start time setpoints for each Lagoon shall be selectable in SCADA. When each start time is initiated each sludge collector shall operate in sequence until one complete cycle has been completed.
      b. When LOCAL/OFF/REMOTE for Sludge Collector is in REMOTE position the collector rate of travel can be adjusted or set from the SCADA.
      c. When LOCAL/OFF/REMOTE for Sludge Collector is in REMOTE position FWW Sludge pumps for each Lagoon shall be selected from SCADA.
   2. Screen Indicators and Alarms at PLC/OIS:
      a. Sludge Collectors:
         1) System FAIL ALARM (each FWW lagoon system): An alarm shall be transmitted to SCADA for activated disconnect switch, and PLC fail.
         2) COMMON FAIL ALARM (each sludge collector): An alarm shall be transmitted to SCADA for activated E-STOP, VFD FAIL.
         3) Run indication (each sludge collector).
         4) Run time meter: SCADA shall accumulate total pump run time and starts for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month and total runtime
         5) Rate of Travel indicator controller setpoint adjustment (each sludge collector).
         6) READY status (each Lagoon): The READY status shall be transmitted to SCADA when the LOCAL/OFF/REMOTE selector switch is in REMOTE position, a system FAIL ALARM is not activated and system is ready to run.
         7) Level indication (each Lagoon).
         8) OUT OF SERVICE (all equipment).
         9) LOW-LOW LEVEL ALARM (each Lagoon).
         10) Level Instrument Fail ALARM (each Lagoon).
         11) OPENED status (each sludge collector valve).
         12) CLOSED status (each sludge collector valve).
         13) Valve FAIL ALARM (each sludge collector valve).
         14) OPENED status (crossover valve).
         15) CLOSED status (crossover valve).
         16) OPEN CROSSOVER VALVE indication (crossover valve).
      b. Pumps:
         1) Pump 1/OFF/Pump 2 selection for each Lagoon in SCADA.
         2) COMMON FAIL ALARM: An alarm shall be transmitted to SCADA for motor starter overload low suction pressure, high discharge

pressure, activated disconnect switch, and excessive starts per hour for each pump.

3) Run indication.

4) Run time meter: SCADA shall accumulate total pump run time and starts for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month and non-resetting total hours.

5) READY indication: The status shall be transmitted to SCADA when HAND/OFF/REMOTE selector switch selected in REMOTE position at the LCP, a COMMON FAIL ALARM is not activated and pump is ready to run.

c. Software:

1) When LOCAL/OFF/REMOTE for Sludge Collector system is in REMOTE position, START/STOP of the Sludge Collectors is initiated based on the timer or based on operator initiation of the START/STOP selector switch. Three adjustable time set points to start and stop the Sludge Collection System shall be provided for each Lagoon from the SCADA. The START/STOP selector switch in SCADA shall over-ride the timer set points.

2) When OUT OF SERVICE for any the Sludge Collector is selected, the START/STOP or timers will not operate, alarms for the Sludge Collector will be turned off.

d. Alarms Generated by SCADA:

1) SCADA shall alarm on Excessive Starts per Hour. Initially Excessive Starts per Hour shall be set at 6 starts per hour (0-12 starts per hour).

G. Special Considerations:

1. Power outage and restore operation.

a. During power outages, the Filter Waste Washwater Lagoon Sludge collectors with associated valves and pumps will not operate due to loss of power. The FWW lagoon system COMMON FAIL ALARM will be de-activated at SCADA during power outages. Upon restoration of the power, FWW lagoon associated equipment shall resume normal operation (collectors, valves, and pumps called based on the sequence of operation). Alarms will be re-activated at SCADA upon restoration of power.

3.02 STORM WATER PUMP STATION

A. References:

1. Process Area: Storm Water Pump Station.
2. P&ID Drawing: S17N-01.
3. Mechanical Drawings: S17M-01.
4. Specification Sections: 11312K.

B. Mechanical Equipment:

Tag Number	Equipment Name
17DWP420	Storm Water Pump No.1
17DWP425	Storm Water Pump No.2
17DWP435	Storm Water Pump No.3

C. General Description:
   1. The Storm Water Pump Station pumps will pump Storm Water to the FWW Lagoons or Sludge Lagoons. The Storm Water Pumps shall have a common Vendor Control Panel (17-VCP-01) and ultrasonic level transducer.

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices (vendor supplied):
         1) Ultrasonic level transducer.
         2) FLOOD level float switch.
         3) Moisture detection switch alarm (each pump).
         4) Motor high temperature switch alarm (each pump).
         5) High Discharge Pressure switch (each pump) (not vendor supplied).
   2. Vendor Control Panel:
      a. Provide VCP controls and logic as specified in Section 11312K.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC/OIS Functions:
   1. Controls:
      a. Pumps:
         1) AUTO/MANUAL selector switch for each pump.
         2) START/STOP controls for each pump.
         3) OUT OF SERVICE for each pump.
   2. Screen Indicators and Alarms at PLC/OIS:
      a. System:
         1) HIGH-HIGH LEVEL ALARM (Wetwell Flood Alarm).
         2) HIGH LEVEL ALARM.
         3) LOW LEVEL ALARM.
         4) LOW-LOW LEVEL ALARM.
         5) Wetwell level indication.
         6) Level Instrument Fail ALARM.
      b. Pumps:
         1) COMMON FAIL ALARM: An alarm shall be transmitted to SCADA for failure of the pumps, E-STOP actuation, and excessive starts per hour.
         2) Run indication.
         3) Run time meter: SCADA shall accumulate total pump run time and starts for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month and total runtime.
         4) READY status (each pump): The status shall be transmitted to SCADA when a common alarm is not activated, the local hand switch is in REMOTE position, and pump is ready to run.
      c. Software Interlocks:
         1) None.
      d. Alarms Generated By SCADA:
         1) SCADA shall generate an alarm if the LOW-LOW level setting is met (slightly below the LOW level setting at the level transducer in the LCP) and shut down all pumps if any of the pumps are running.

2) SCADA shall generate an alarm if a HIGH-HIGH level setting is met. The alarm shall be assigned the highest priority.
3) SCADA shall alarm on Excessive Starts per Hour. Initially Excessive Starts per Hour shall be set at 6 starts per hour (0-20 starts per hour).

G. Special Considerations:
Power Outages and Restore Operation: During Power Outage the Pumps will not operate due to loss of power. The Pump Station COMMON FAILED alarms will be de-activated at SCADA during Power Outage. Upon Power Restore the Pumps will operate as called for based on level transmitter signal. Alarms will be re-activated at SCADA upon Power Restore.

3.03 GRAVITY THICKENERS

A. References:
1. Process Area: Gravity Thickeners.
2. P&ID Drawings: S18N-01.
3. Mechanical Drawings: S18M-01.
4. Specification Sections: 11352.

B. Mechanical Equipment:

Tag Number	Equipment Name
18DSTM001	Thickener Mechanism No. 1
18DSTM002	Thickener Mechanism No. 2

C. General Description:
1. Each Gravity Thickener shall have a Thickener Sludge Collector Mechanism for collecting sludge from the bottom of the thickener and moving it towards the sludge hopper at the center of the thickener where it can be removed by the Thickened Sludge Pumps. Each Thickener Mechanism shall be supplied with a VCP (18-VCP-01 and 18-VCP-02). The VCP shall have an HOR switch to control the thickener sludge collector mechanism either Locally or Remotely.

D. Local Controls and Instrumentation:
1. Thickener Mechanism:
   a. Each thickener mechanism shall be supplied with a VCP as specified in Section 11352.
2. System:
   a. Instruments and Protective Devices:
      1) Infrared level transducer (Sludge blanket measurement for each gravity thickener).
      2) Ultrasonic type level transducer (splitter box).
      3) Turbidity Analyzer (each gravity thickener sampled at thickener overflow).
      4) Magnetic Flowmeters (FWW sludge collection pump discharge flow, centrate wetwell flow, existing sludge lagoons/sed basin flow).

E. MCC Controls and Instrumentation:
1. None.

F. PLC/OIS Functions:
1. Remote Manual Controls:

a. When the HAND/OFF/REMOTE selector switch at the VCP is in the REMOTE position and IN SERVICE, the Operator may START and STOP the Gravity Thickener Sludge Collector Mechanism from SCADA. The thickener mechanism shall run continuously until it is stopped manually from SCADA.

2. Remote Automatic Controls:
   a. None.
3. Screen Indicators and Alarms at PLC/OIS:
   a. System:
      1) COMMON FAIL ALARM (each thickener sludge collector mechanism): An alarm shall be transmitted to SCADA for motor starter overload, high torque, excessive runtime, and excessive starts per hour.
      2) Run indication (each thickener sludge collector mechanism).
      3) Run time meter: SCADA shall accumulate total mechanism run time for each mechanism for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month and total runtime.
      4) READY status (each thickener sludge collector mechanism): The status shall be transmitted to SCADA when HAND/OFF/REMOTE selector switch selected in REMOTE position, a common FAIL ALARM is not activated and system is ready to run.
      5) Measured Sludge Blanket Depth (each Gravity Thickener).
      6) Measured value solids content (each Gravity Thickener).
      7) Sludge Blanket Preset Concentration (each Gravity Thickener)
      8) Sludge Level Instrument Fail ALARM (each Gravity Thickener).
      9) Level indication (Splitter Box).
      10) Level Instrument Fail ALARM (Splitter Box).
      11) High Level ALARM (Splitter Box).
      12) High-High Level ALARM (Splitter Box).
      13) Turbidity measurement (each Gravity Thickener).
      14) Analyzer Fail ALARM (each Gravity Thickener).
      15) Total flow to Thickeners (calculated in the PLC based on summation of FWW Sludge Flow (FE/FIT-013), Sed Basin/Sludge Lagoon Flow-(FE/FIT-014), and Centrate Flow (FE/FIT-412).
      16) Thickener Polymer Feed Flow (FE/FIT-781).
   b. Software interlocks:
      1) None.

3.04 THICKENED SLUDGE PUMPS

A. References:
   1. Process Area: Thickened Sludge Pumps.
   2. P&ID Drawing: S18N-02.
   3. Mechanical Drawings: S18M-03.
   4. Specification Sections: 11312R, 13448.

B. Mechanical Equipment:

Tag Number	Equipment Name
18DSP001	Thickened Sludge Pump No.1
18DSP002	Thickened Sludge Pump No.2
18DSMOV001	Gravity Thickener No.1 Thickened Sludge Pump Inlet

	Valve
18DSMOV002	Gravity Thickener No.2 Thickened Sludge Pump Inlet Valve

C. General Description:
   1. Two new constant speed rotary lobe positive displacement pumps shall pump thickened sludge from the thickeners to the thickened sludge homogenizing tanks, to the existing sludge lagoons, or to the splitter box depending on the configuration of the manual valves located in the thickened sludge pump station.

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
         1) Local Disconnect switch (each pump).
         2) High Discharge Pressure switch (each pump).
         3) Low Suction Pressure switch (each pump).
         4) Low Seal Water Flow Switch (each pump).
   2. Local Control Panel:
      a. Control Devices:
         1) HAND/OFF/REMOTE selector switch at the LCP (each pump).
         2) RESET switch at the LCP (each pump).
         3) OPEN/STOP/CLOSE switch (each valve actuator).
         4) LOCAL/OFF/REMOTE selector switch (each valve actuator).
         5) DISCONNECT switch (each valve actuator).
      b. Indicators and Alarms:
         1) RUN indication (each pump) at LCP.
         2) FAIL ALARM (each pump) at LCP.
         3) READY status (each pump) at LCP.
         4) Low Suction Pressure ALARM (each pump) at LCP.
         5) High Discharge Pressure ALARM (each pump) at LCP.
         6) Seal Water Low Pressure ALARM (each pump) at LCP.
         7) Valve FAIL ALARM (each valve actuator).
         8) OPENED status (each valve actuator).
         9) CLOSED status (each valve actuator).
         10) HIGH TORQUE ALARM (each valve actuator).
      c. Interlocks:
         1) A low-flow switch is hardwired to shutdown the pumps to prevent operation if the suction pressure is below the low-pressure setpoint. The low-pressure switch also provides an alarm to the Local Control Panel.
         2) A high-pressure switch is hardwired to shutdown the pumps to prevent operation if the discharge pressure is above the high-pressure setpoint. The high-pressure switch also provides an alarm to the Local Control Panel.
         3) A low-pressure switch is hardwired to shutdown the pumps to prevent operation if the seal water pressure is below the low-pressure setpoint. The low-pressure switch also provides an alarm to the Local Control Panel.
         4) In both the local and remote modes, when a pump is called to start, OPEN the seal water solenoid valve prior to starting the pump.

d. Logic:
   1) Local Manual Control Mode:
      a) Each thickened sludge pump can be started by placing the HAND/OFF/REMOTE in the HAND position at the Local Control Panel (LCP).
   2) Local Automatic Control Mode:
      a) None.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC/OIS Functions:
   1. Controls:
      a. SCADA Manual Control Mode:
         1) When the HAND/OFF/REMOTE selector switch at the LCP is in the REMOTE position and the AUTO/MANUAL selector switch in SCADA is in MANUAL and IN SERVICE, the Operator may START and STOP the thickened sludge pump manually from the SCADA.
      b. SCADA Automatic Control Mode:
         1) When HAND/OFF/REMOTE selector switch is in REMOTE, and AUTO/MANUAL switch is in AUTO, and IN SERVICE starting and stopping of the pump shall be based on 24 one-hour time slots where the Operator shall be able to enter which hour(s) each pump will start as well as the duration for each start time in SCADA. The pump shall shut-off at the end of the time slot or at a low density set point, adjustable by the Operator. The Operator shall also have the ability to override the low density shut-off in SCADA. An interlock shall also be provided to shutdown the pumps under a "NO AVAILABLE TANK" condition. An override in SCADA shall be provided to allow the pumps to operate once the valves have been configured to pump to the Sludge Lagoons.
         2) When the LOR selector switch for the Gravity Thickener Thickened Sludge Pump Inlet Valve Actuators is in the REMOTE position, the valves shall alternate OPEN and CLOSED position just prior to each pump START. If only one of the valves is in REMOTE position, that valve shall remain in the OPEN position. A pump shall not be permitted to START unless one of the valves is in the fully OPEN position.
   2. Screen Indicators and Alarms at PLC/OIS:
      a. System:
         1) COMMON FAIL ALARM (each pump): An alarm shall be transmitted to SCADA for motor overload, high discharge pressure, low suction pressure, low seal water flow, and excessive starts per hour.
         2) Run indication (each pump).
         3) Run time meter: SCADA shall accumulate total pump run time and starts for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month, and total runtime.
         4) READY status (each pump): The status shall be transmitted to SCADA when HAND/OFF/REMOTE selector switch selected in REMOTE position, disconnect switch is closed, a COMMON FAIL ALARM is not activated, and system is ready to run.

5) OPENED status (each valve).
6) CLOSED status (each valve).
7) Valve FAIL ALARM(each valve).
8) Pump Discharge Flow and Totalize Flow Indication.
9) Low Discharge Flow ALARM.
10) Sludge Density Indication.

b. Software interlocks:
1) Pumps shall not be allowed to start if neither of the Thickened Sludge Pump Inlet Valves are in the fully OPEN position.
2) The pump shall shut-off at the end of the time slot or at a low density set point unless the low density override has been selected.
3) An interlock shall also be provided to shutdown the pumps under a "NO AVAILABLE TANK" condition. An override in SCADA shall be provided to allow the pumps to operate once the valves have been configured to pump to the Sludge Lagoons.

c. Alarms Generated by SCADA:
1) SCADA shall alarm on Excessive Starts per Hour. Initially Excessive Starts per Hour shall be set at 6 starts per hour (0-12 starts per hour).

G. Special Considerations:
1. Power Outages and Restore Operation:
a. During Power Outage the Pumps will not operate due to loss of power. The Thickened Pumps COMMON FAIL alarms will be de-activated at SCADA during Power Outage. Upon Power Restore the Pumps will operate as called for based on operating times. Alarms will be re-activated at SCADA upon Power Restore.

3.05 THICKENER OVERFLOW PUMPS

A. References:
1. Process Area: Thickener Overflow pumps.
2. P&ID Drawing: S18N-03.
3. Mechanical Drawings: S18M-04, S18M-06, S18M-07.
4. Specification Sections: 11312K.

B. Mechanical Equipment:

Tag Number	Equipment Name
18DSP003	Thickener Overflow Pump No.1
18DSP004	Thickener Overflow Pump No.2

C. General Description:
1. The thickener overflow pumps shall pump the overflow or underdrain flow from the thickeners to the existing Filter Waste Washwater Lagoons. The pumps shall be supplied with a Vendor Control Panel. The pumps shall operate in LEAD/LAG configuration based on the level in the overflow wet-well.

D. Local Controls and Instrumentation:
1. System:
a. Instruments and Protective Devices:
1) Ultrasonic level transducer (vendor supplied).
2) Moisture detection switch (each pump).

3) Motor high temperature switch (each pump).
4) Level FLOOD switch (vendor supplied).
5) Magnetic Flowmeter
6) High Discharge Pressure switch (each pump).

2. Pumps:
   a. A VCP shall be provided for the pump station as specified in Section 11312K.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC/OIS Functions:
   1. Controls:
      a. None.
   2. Screen Indicators and Alarms at PLC/OIS:
      a. System:
         1) HIGH-HIGH LEVEL ALARM (Wetwell Flood Alarm).
         2) Wetwell level indication.
         3) Level Instrument Fail ALARM.
         4) Discharge Flow and Totalize Flow Indication.
      b. Pumps:
         1) COMMON FAIL ALARM: An alarm shall be transmitted to SCADA for motor over temperature, motor moisture, motor starter overload, E-STOP Activation, High discharge pressure, and excessive starts per hour.
            a) Excessive starts per hour setpoint shall initially be set at 6 starts per hour (0-60 starts per hour).
         2) Run indication.
         3) Run time meter: SCADA shall accumulate total pump run time and starts for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month, and total runtime.
         4) READY status (each pump): The status shall be transmitted to SCADA when common alarm is not activated, pump is ready to run.
      c. Software Interlocks:
         1) None.

G. Special Considerations:
   1. Power Outages and Restore Operation:
      a. During power outages the thickener overflow pumps will not operate due to loss of power. The thickener overflow pump station COMMON FAIL alarms will be de-activated at SCADA during power outages, but FLOOD alarms will remain active. Upon restoration of power the pumps will operate as called for based on level setpoints. Alarms will be re-activated at SCADA upon restoration of power.

3.06 THICKENED SLUDGE PUMP STATION SUMP PUMP SYSTEM

A. References:
   1. Process Area: Thickened Sump Pump System.
   2. P&ID Drawing: S18N-04.
   3. Mechanical Drawings: S18M-03.

4. Specification Sections: 11312J.

B. Mechanical Equipment:

Tag Number	Equipment Name
18DWP405	Thickened Sludge Sump Pump No. 1
18DWP410	Thickened Sludge Sump Pump No. 2

C. General Description:
1. The thickener sump pumps shall pump the area floor drainage to the existing Plant Drain System. The pumps shall be supplied with a Vendor Control Panel 18-VCP-05. The pumps shall operate based on the level in the sump.

D. Local Controls and Instrumentation:
1. System:
   a. Instruments and Protective Devices:
      1) Capacitance probe type level transducer (provided by the vendor).
      2) FLOOD Alarm Level Float switch.
2. Pumps:
   a. Pumps shall be supplied with a VCP as specified in Section 11312J.

E. MCC Controls and Instrumentation:
1. None.

F. PLC/OIS Functions:
1. Controls:
   a. None.
2. Screen Indicators and Alarms at PLC/OIS:
   a. System:
      1) HIGH-HIGH LEVEL ALARM.
   b. Pumps:
      1) COMMON FAIL ALARM: An alarm shall be transmitted to SCADA for, motor starter overload, activated disconnect switch excessive runtime, and excessive starts per hour.
         a) Excessive runtime sepoint shall initially be set at 300 minutes (0-600 minutes).
         b) Excessive starts per hour setpoint shall initially be set at 8 starts per hour (0-60 starts per hour).
      2) Run indication.
      3) Run time meter: SCADA shall accumulate total pump run time and starts for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month, and total runtime.
   c. Software Interlocks:
      1) None.

G. Special Considerations:
1. Power Outages and Restore Operation:
   a. During power outages the sump pumps will not operate due to loss of power. The sump pump station COMMON FAIL alarms will be de-activated at SCADA during power outages, but FLOOD alarms will remain active. Upon restoration of power the pumps will operate as called for

based on level setpoints. Alarms will be re-activated at SCADA upon restoration of power.

3.07 THICKENED SLUDGE HOMOGENIZING TANKS

A. References: Thickened Sludge Homogenizing Tanks:
   1. Process Area:
   2. P&ID Drawing: S19N-01, S19N-02, S19N-03, and S19N-04.
   3. Mechanical Drawings:.S19M-01.
   4. Specification Sections: 11317, 13448.

B. Mechanical Equipment:

Tag Number	Equipment Name
19DSMIX001A	Thickened Sludge Homogenizing Tank Mixer No. 1
19DSMIX002A	Thickened Sludge Homogenizing Tank Mixer No. 2
19DSMIX003A	Thickened Sludge Homogenizing Tank Mixer No. 3
19DSMIX004A	Thickened Sludge Homogenizing Tank Mixer No. 4
19DSMOV001	Thickened Sludge Homogenizing Tank No. 1 Inlet Valve
19DSMOV002	Thickened Sludge Homogenizing Tank No. 2 Inlet Valve
19DSMOV003	Thickened Sludge Homogenizing Tank No. 3 Inlet Valve
19DSMOV004	Thickened Sludge Homogenizing Tank No. 4 Inlet Valve
19DSMOV005	Thickened Sludge Homogenizing Tank No. 1 Disch. Valve No. 1
19DSMOV008	Thickened Sludge Homogenizing Tank No. 2 Disch. Valve No. 1
19DSMOV011	Thickened Sludge Homogenizing Tank No. 3 Disch. Valve No. 1
19DSMOV014	Thickened Sludge Homogenizing Tank No. 4 Disch. Valve No. 1
19DSMOV006	Thickened Sludge Homogenizing Tank No. 1 Disch. Valve No. 2
19DSMOV009	Thickened Sludge Homogenizing Tank No. 2 Disch. Valve No. 2
19DSMOV012	Thickened Sludge Homogenizing Tank No. 3 Disch. Valve No. 2
19DSMOV015	Thickened Sludge Homogenizing Tank No. 4 Disch. Valve No. 2
19DSMOV007	Thickened Sludge Homogenizing Tank No. 1 Disch. Valve No. 3
19DSMOV010	Thickened Sludge Homogenizing Tank No. 2 Disch. Valve No. 3
19DSMOV013	Thickened Sludge Homogenizing Tank No. 3 Disch. Valve No. 3
19DSMOV016	Thickened Sludge Homogenizing Tank No. 4 Disch. Valve No. 3
19DSVLV017	Thickened Sludge Homogenizing Tank No. 1 Isolation Valve
19DSVLV018	Thickened Sludge Homogenizing Tank No. 2 Isolation Valve
19DSVLV019	Thickened Sludge Homogenizing Tank No. 3 Isolation Valve
19DSVLV020	Thickened Sludge Homogenizing Tank No. 4 Isolation Valve

C. General Description:
   1. The Thickened Sludge Homogenizing Tanks shall receive thickened sludge from the thickened sludge pumps and provide storage and mixing for the sludge until it is ready to be processed by the Centrifuges. Each Thickened Sludge Homogenizing Tank will be provided with one Submersible Mixer supplied with a Vendor Control Panel (19-VCP-01, 02, 03 and 04).

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
         1) Ultrasonic level transducer (provided by mixer supplier per Section 11317).
   2. Local Control Panel:

a. Each Homogenizing Tank Mixer shall be supplied with a VCP as specified in Section 11317.
b. Control Devices:
   1) OPEN/STOP/CLOSE selector switch (each valve actuator).
   2) LOCAL/OFF/REMOTE selector switch (each valve actuator).
   3) DISCONNECT switch (each valve actuator).
c. Indicators and Alarms:
   1) Valve FAIL ALARM (each valve actuator).
   2) OPENED status (each valve actuator).
   3) CLOSED status (each valve actuator).
   4) HIGH Torque ALARM (each valve actuator).
d. Interlocks:
   1) Refer to Section 11317 for VCP.
e. Logic:
   1) Local Manual Control Mode:
      a) Refer to Section 11317 for VCP.
   2) Local Automatic Control Mode:
      a) None.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC/OIS Functions:
   1. Controls:
      a. SCADA Manual Control Mode:
         1) Mixers:
            a) START/STOP switch shall be available for manual control of the mixers from SCADA.
         2) An AUTO/MANUAL switch shall be provided in SCADA for each valve actuator. When the LOR for each actuator is in REMOTE position and the switch is in MANUAL and IN SERVICE, the operator may OPEN or CLOSE the valves manually through SCADA.
      b. SCADA Auto Control Mode:
         1) Mixers:
            a) No SCADA Automatic control is provided for the Mixers.
         2) Tank Inlet Control Valves:
            a) Tank inlet valve fill sequence shall be selectable on the Homogenizing Tank Screen in SCADA. When a Tank Inlet Valve's LOCAL/OFF/REMOTE selector switch is placed in REMOTE and IN SERVICE and MANUAL/AUTO SWITCH in AUTO position in SCADA, it shall OPEN when it is called based on its sequence assuming it does not have a "FULL TANK" status. When a tank reaches the "FULL TANK" status, the fill valve of the next tank in the fill sequence shall OPEN, the fill valve of the Full Tank shall then CLOSE. If the next valve in the sequence fails to open after a set period of time, a "FILL VALVE FAIL" Alarm shall be annunciated and the next tank inlet valve in the sequence shall OPEN. If all available tanks have a "FULL TANK" status, a "NO AVAILABLE HOMOGENIZING TANK" Alarm shall be annunciated in SCADA which shall in turn cause the Thickened Sludge Pumps to shutdown. Placing a valve in LOCAL at the actuator or AUTO/MANUAL in MANUAL in

SCADA position shall remove the tank from the filling sequence queue.

3) Tank Discharge Valves:
   a) When the LOCAL/OFF/REMOTE selector switch in REMOTE and MANUAL/AUTO in AUTO position and IN SERVICE, in SCADA the tank discharge valves shall OPEN when a tank is selected to feed sludge to a Centrifuge. This selection shall be made on the Centrifuge SCADA Screen. The status of each tank shall be displayed on the Centrifuge SCADA screen as follows:
   b) Out of Service (Tank Isolation Valve in CLOSED Position)
   c) Filling (Tank Inlet Valve in OPEN Position)
   d) Draining (Tank Discharge Valve is OPEN)
   e) Empty (Tank at Operator Selectable Tank LOW Level Setpoint 2, Default Setting = 1' Tank Depth)
   f) Available (If none of the above conditions are true)
   g) The discharge valve shall CLOSE after a different tank is selected for draining to the Centrifuge and that tank's Discharge Valve is in the fully OPEN position. When the Homogenizing Tank reaches the Tank LOW Level Setpoint 1 (Operator adjustable, Default Setting = 3' Tank Depth), a "SWITCH HOMOGENIZING FEED TANK" Alarm shall be displayed in SCADA on both the Centrifuge SCADA Screen and Homogenizing Tank SCADA Screen. When the Tank reaches the Tank LOW Level Setpoint 2, the associated Centrifuge Feed Pump shall STOP and a "HOMOGENIZING TANK EMPTY" Alarm shall be annunciated in SCADA.

2. Screen Indicators and Alarms at PLC/OIS:
   a. System:
      1) For each Homogenizing Tank:
         a) HIGH Level ALARM-TANK is FULL.
         b) LOW level ALARM-TANK is EMPTY
         c) TANK level indication.
         d) Level Instrument Fail ALARM.
   b. Mixers:
      1) For Each Mixer Provide:
         a) COMMON FAIL ALARM: An alarm shall be transmitted to SCADA for motor overload, and moisture detection.
         b) Run indication.
         c) Run time meter: SCADA shall accumulate total pump run time and starts for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month, and total runtime.
         d) READY status: The status shall be transmitted to SCADA when HAND/OFF/REMOTE selector switch selected in REMOTE position, the mixer fail alarm is not activated, and the mixer ready to run.
         e) Out Of Service.
   c. Valves with Actuators:
      1) Each Motor Actuated Valve shall have the following:
         a) OPENED status.
         b) CLOSED status.

c) In REMOTE status.
d) HIGH TORQUE ALARM.
e) Valve FAIL ALARM.

d. Tank Isolation Valves without Actuators:
1) OPENED status
2) CLOSED/TANK OUT OF SERVICE status.

e. Software Interlocks:
1) If all available tanks have a "FULL TANK" status, a "NO AVAILABLE HOMOGENIZING TANK" Alarm shall be annunciated in SCADA.
2) When the Homogenizing Tank reaches the Tank LOW Level Setpoint 1, a "SWITCH HOMOGENIZING FEED TANK" Alarm shall be displayed in SCADA on both the Centrifuge SCADA Screen and Homogenizing Tank SCADA Screen. When the Tank reaches the Tank LOW Level Setpoint 2, the associated Centrifuge Feed Pump shall STOP and a "HOMOGENIZING TANK EMPTY" Alarm shall be annunciated in SCADA.
3) If the Level in the Thickened Sludge Homogenizing Tank reaches the Operator adjustable HIGH-HIGH Level setpoint, a "HOMOGENIZING TANK OVERFILLED" alarm shall be generated in SCADA and the Thickened Sludge Pumps shall be shutdown and prevented from starting until the alarm is cleared.
4) If the Level in the Thickened Sludge Homogenizing Tank reaches the LOW Level Setpoint 1 (field-matched to the LOW level setpoint at the Vendor Control Panel), and a Mixer is running, a "MIXER FAIL TO STOP" alarm shall be generated in SCADA.

G. Special Considerations:
1. Power Outages and Restore Operation:
a. During Power Outage the alarms associated with the Homogenizing Tank and Mixers will be de-activated at SCADA. Upon Power Restore the Homogenizing Tank Mixers will restart as long as local switches are still in HAND or REMOTE position. Also when Power is restored the Homogenizing Tank and Mixer alarms will be re-activated at SCADA.

3.08 CENTRIFUGE SLUDGE FEED SYSTEM

A. References:
1. Process Area: Centrifuge Sludge Feed System.
2. P&ID Drawing: S19N-05, S19N-07, and S19N-09.
3. Mechanical Drawings: S19M-01, S19M-09.
4. Specification Sections: 11312I, 11334.

B. Mechanical Equipment:

Tag Number	Equipment Name
19DSGDR110	Sludge Grinder No. 1
19DSGDR210	Sludge Grinder No. 2
19DSGDR310	Sludge Grinder No. 3
19DSP121	Centrifuge Feed Pump No. 1
19DSP221	Centrifuge Feed Pump No. 2
19DSP321	Centrifuge Feed Pump No. 3
19DSVLV066	Centrifuge Feed Pump No.1 Discharge Diversion Valve
19DSVLV067	Centrifuge Feed Pump No.1 Magmeter Isolation Valve

19DSVLV167	Centrifuge Feed Pump No.2 Magmeter Isolation Valve
19DSVLV266	Centrifuge Feed Pump No.3 Discharge Diversion Valve
19DSVLV267	Centrifuge Feed Pump No.3 Magmeter Isolation Valve

C. General Description:
   1. Three Centrifuge Sludge Feed Pumps are provided for pumping Thickened Sludge from the Homogenizing Tanks to the three Centrifuges. Diversion and Isolation valves shall be provided to allow a pump to pump sludge to a different centrifuge. A sludge grinder is provided on the suction side of each centrifuge feed pump to prevent large objects from entering the pump or centrifuge and causing damage. The Centrifuge Feed Pump Local control is from the VFD faceplate installed in the Local Control Panel adjacent to each pump. The Sludge Grinders shall each have a VCP (19-VCP-05, 19-VCP-08 and 19-VCP-11).

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
         1) Magnetic Flowmeter (at discharge of each pump).
         2) Centrifuge Feed Pump (each pump):
            a) High Motor Winding Temperature switch (supplied by the pump vendor).
            b) High Stator Run Dry Temperature switch (supplied by the pump vendor).
         3) Seal Water Low Pressure switch (each pump).
         4) Low Suction Pressure switch (each pump).
         5) High Discharge Pressure switch (each pump).
         6) Discharge Pressure Indicating Transmitter (each pump).
         7) Crossover Valve Open Limit Switches.
   2. Centrifuge Feed Pumps:
      a. Control Devices:
         1) Each Pump LCP shall have an integral VFD and shall include the following Local Controls:
            a) HAND/OFF/REMOTE selector switch.
            b) E-STOP pushbutton.
            c) RESET Switch.
            d) Speed Controller.
         2) Each Pump LCP shall contain the following Indicators and Alarms:
            a) High Winding Temperature ALARM.
            b) High Stator Run Dry Temperature ALARM.
            c) Seal Water Low Pressure ALARM.
            d) Low Suction Pressure ALARM.
            e) High Discharge Pressure ALARM.
            f) VFD fail ALARM.
            g) READY status.
            h) Run Indication.
            i) Total Run time.
            j) Speed indicator.
            k) Current Indicator.
         3) Sludge Grinders.
      b. Provide each sludge grinder with a VCP as specified in Section 11334.
      c. Interlocks:

1) Activation of the HIGH Discharge Pressure Switch, HIGH stator temperature alarm, HIGH motor winding high temperature alarm, Seal Water Low Pressure Switch, Suction Low Pressure Switch or Overload due to high current shall result in shutdown of the associated Centrifuge Feed Pump.
2) In both the local and remote modes, when a pump is called to start, OPEN the seal water solenoid valve prior to starting the pump.

d. Logic:
1) Local Manual Control Mode:
a) Each centrifuge feed pump can be started locally by putting the HAND/OFF/REMOTE selector switch at the LCP in HAND. Pump speed may be adjusted locally by changing the speed output from the pushbuttons at the VFD Faceplate.
2) Local Automatic Control Mode:
a) None.

E. PLC/OIS Functions:
1. Controls:
a. Centrifuge Feed Pumps
1) Remote Automatic Control Mode:
a) When the HAND/OFF/REMOTE switch for the centrifuge feed pump is in the REMOTE position and IN SERVICE, the pump shall start and stop automatically and ramp up or down based on signal from PLC-19. The pump flow (sludge feed) setpoint can be adjusted at either the Centrifuge Operating Panel (COP) or in the SCADA Centrifuge Screen. The pump start and stop signals shall be based on the signal from the COP as described in the Centrifuge Systems section of this specification Section.
b) The Centrifuge Feed Pump associated with a particular Centrifuge shall be determined by the manual valve position feedback of the Discharge Diversion and Magmeter Isolation Valves to PLC-19. PLC-19 shall communicate the Feed Pump that is positioned to operate with the associated Centrifuge and the flow setpoint (selectable in lbs/hr or gpm) to that Centrifuge which has been selected through SCADA.
c) Pump RUN status shall be transmitted to SCADA and to the COP for indication.
d) Flowrate and Totalization of sludge flow from the Centrifuge Feed Pump shall be indicated at SCADA from the flow meter via Ethernet. Flow indication shall be transmitted from SCADA to the Centrifuge Operating Panel via Modbus protocol.

b. Sludge Grinders:
1) Remote Automatic Mode:
a) When the HAND/OFF/REMOTE switch for the sludge grinder is in the REMOTE position and IN SERVICE, the grinder shall start and stop automatically when its associated Centrifuge Feed Pump is called to start or stop.
b) The AUTO/OVERRIDE switch shall be selected by the operator when the grinder bypass is being used to bypass sludge flow around a grinder. This override will allow the Centrifuge system to operate without the grinder by sending a grinder RUN signal to the COP.

c. Alarms Generated By SCADA:
   1) For each Centrifuge Feed Pump there shall be a "No Flow" alarm that alarms at SCADA when a Pump is called to run or is running and the flow meter indicates a "No Flow" condition. An adjustable time delay (initially set at 15 seconds) shall allow a "No Flow" condition during startup without a "No Flow" alarm.
   2) There shall be a "Flow out of range" warning alarm that alarms at SCADA when the actual flow (measured by the flow meter) is outside the desired flow setpoint by more than a certain range(adjustable setpoint, Default = 10% higher and 10% lower). An adjustable time delay (initially set at 15 seconds) shall allow the flow to deviate from the setpoint flow during startup without causing a warning alarm.

2. Screen Indicators and Alarms at PLC/OIS:
   a. System:
      1) Discharge Flow and Totalize flow indication.
         a) SCADA shall accumulate total flow for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, previous 14 days, and previous calendar month. Totals shall be recorded for overall Centrifuge Feed Flow (flow to all Centrifuges) as well as individual Solids Flow (to individual Centrifuge).
      2) OPENED status for each manual diversion and isolation valve.
   b. Centrifuge Feed Pumps:
      1) COMMON FAIL ALARM: An alarm shall be transmitted to SCADA for motor overload, High Stator Temperature "Run Dry", High Discharge Pressure, Low Seal Water Flow, and E-Stop activation.
      2) RUN indication.
      3) Run time meter: SCADA shall accumulate total pump run time and starts for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month and total runtime.
      4) READY status (each pump): The status shall be transmitted to SCADA when HAND/OFF/REMOTE selector switch selected in REMOTE position, and the pump is ready to run.
      5) OUT OF SERVICE:
      6) Speed Indication.
      7) Discharge Pressure Indication.
   c. Grinder:
      1) COMMON FAIL ALARM: This alarm shall be transmitted to SCADA from the grinder VCP.
      2) Run indication.
      3) Run time meter: SCADA shall accumulate total pump run time and starts for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month and total runtime.
      4) READY status (each grinder): The status shall be transmitted to SCADA when HAND/OFF/REMOTE selector switch selected in REMOTE position, and the grinder is ready to run.
      5) OUT OF SERVICE:
   d. Software Interlocks:
      1) As specified in the Centrifuge System Control Strategy.

F. Special Considerations:
   1. Power Outages and Restore Operation:
      a. During the Power Outage the Centrifuge Feed Pumps will de-energize and stop due to loss of power. During Power Outage the alarms associated with the Pumps will be de-activated at SCADA. Upon Power Restore the Pumps will restart as long as local switches are still in MANUAL and ON position, or AUTO position with request to run from Centrifuge Operating Panel. Also when Power is Restored the Feed Pumps alarms will be re-activated at SCADA.

3.09 CENTRIFUGE SYSTEMS

A. References:
   1. Process Area: Centrifuge Systems.
   2. P&ID Drawings: S19N-06, S19N-08, and S19N-10.
   3. Mechanical Drawings: S19M-05, S19M-08, S19M-11.
   4. Specification Sections: 11358, 13448.

B. Mechanical Equipment:

Tag Number	Equipment Name
19DSCTF001	Centrifuge No. 1
19DSCTF002	Centrifuge No. 2
19DSCTF003	Centrifuge No. 3
19DSG115	Diverter Gate No.1
19DSG215	Diverter Gate No.2
19DSG315	Diverter Gate No.3
19UWMOV105	Centrifuge No.1 Washwater Valve
19UWMOV205	Centrifuge No.2 Washwater Valve
19UWMOV305	Centrifuge No.3 Washwater Valve
19UWMOV110	Diverter Gate No.1 Washwater Valve
19UWMOV210	Diverter GateNo.2 Washwater Valve
19UWMOV310	Diverter Gate No.3 Washwater Valve

C. General Description:
   1. Three Centrifuges shall be provided with Centrifuge Operating Panels (COPs) (19-VCP-06, 19-VCP-09 and 19-VCP-12). Centrifuge System control PLCs shall be located in the COPs. Centrifuge Starter Panels (19-VCP-07, 19-VCP-10 and 19-VCP-13) shall supply power to the centrifuge drives and will include the VFDs for the Centrifuge Main Drives and Back Drives.
   2. Each Centrifuge System will be supported by a Centrifuge Polymer Feed System, Centrifuge Sludge Feed System and Cake Conveyor System. Each COP shall have a dedicated PLC which shall control all aspects of Centrifuge System operation. During normal operation, all of the above equipment for one particular system shall be set to Automatic, and shall be controlled automatically by the plant PLC or PLC within the Centrifuge Operating Panel (COP).
   3. Each Centrifuge shall be controlled locally through its Centrifuge Operating Panel or remotely through PLC-19 OIS. Each COP will have an Operator Interface Terminal (OIT) mounted at the front of the COP enclosure for operator control, monitoring and settings interface. Three PLC-19 OIS's shall be located in the Dewatering Building, one at each level.

D. Local Controls and Instrumentation:
   1. System:
      a. Controls:
         1) Each Centrifuge shall be supplied with a vendor supplied Centrifuge Operating Panel (COP) and Starter Panel (CSP) as specified in Section 11358 and as indicated on the Drawings.
         2) The following outputs from COP to field mounted devices will be required at a minimum.
            a) Wash water valve open command.
            b) Wash water valve close command.
            c) Diverter gate open command.
            d) Diverter gate close command.
            e) Diverter gate wash water valve open command.
            f) Diverter gate wash water close command.
            g) Cake conveyor water valve open command.
            h) Lube oil cool water valve open command (if applicable).
      b. Instruments and Protective Devices (vendor supplied):
         1) As specified in Section 11358 and as indicated on the Drawings.

E. PLC/OIS Functions:
   1. Controls:
      a. System:
         1) The Centrifuge System control screen in the PLC/OIS shall allow for control and adjustment of various ancillary equipment and process parameters necessary for control of the Centrifuges which in turn shall be communicated to the COP. These include the Sludge Homogenizing Tanks, Centrifuge Sludge Feed Pumps, Centrifuge Polymer Feed Pumps and shall be as follows:
            a) Homogenizing Tank Selection to Feed to Centrifuge.
               (1) The status/availability of each tank shall be displayed on the Centrifuge SCADA screen.
            b) Centrifuge Sludge Feed Pump Selection.
               (1) If a Feed Pump is selected without the correct valve configuration in place, an "OPEN CENTRIFUGE FEED PUMP BYPASS VALVE" Alarm shall be annunciated.
            c) Sludge Feed Rate Setpoint Selection.
            d) Polymer Feed Pump Selection:
               (1) If a Feed Pump is selected without the correct valve configuration in place, an "OPEN CENTRIFUGE POLYMER FEED PUMP BYPASS VALVE" Alarm shall be annunciated.
            e) Polymer Feed Rate Setpoint Selection.
         2) Centrifuge:
            a) Centrifuge Auto Shutdown Initiation Switch. This switch shall allow the operator to initiate an auto shut-down of the Centrifuge through SCADA.
            b) After a start-up has been completed through the COP and the Centrifuge is in operation, the operator shall be capable of entering a shutdown time in SCADA to end a process run. At the end of the run time the COP control system will automatically begin a shutdown and cleaning cycle.

c) Centrifuge Pause mode – Pause refers to the temporary stopping and starting of the process pumps (polymer and sludge feed). This feature shall be available through SCADA allowing the sludge and polymer feed to temporarily stop. The operator may also select a Bin change pause in which the sludge and polymer shall stop, the diverter gate shall close, and the washwater valves will open for a variable time to push the majority of the material out the solids end of the machine. Once the wash water de-energizes, spillage will be at a minimum allowing a cleaner method of changing cake bins. In either case, depressing the Resume push button, the process pumps shall restart at the previous settings.

d) Additionally, all operator interface parameters from the COP PLC shall be made available through Ethernet connection in PLC-19. This shall allow each COP to be accessible through the PLC-19 HMIs. However, startup of the Centrifuge through the PLC-19 HMIs shall not be made available.

e) The following control outputs shall be provided from each COP to PLC-19.

(1) Selected polymer feed pump run command.

(2) Selected sludge feed pump run command.

(3) Cake conveyor system run command.

2. Screen Indicators and Alarms at PLC/OIS:

a. Centrifuge System: All the alarms and indicators available in the COP OIT shall be made available in SCADA. Additionally, provide the following:

1) Fail Alarm: A common centrifuge fail alarm shall be annunciated in SCADA if there is a loss of communication with the COP or if one of the Centrifuge Shutdown Alarms as defined in Section 11358 occurs.

2) Trouble Alarm: This alarm shall be annunciated if an ancillary related alarm as defined in Section 11358 occurs.

3) Centrifuge Run indication.

4) Centrifuge Run time meter: SCADA shall accumulate total centrifuge run time for each centrifuge for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month, and total runtime.

5) Homogenizing Tank Status for each Homogenizing Tank.

6) Selected Centrifuge Feed Pump Flow Indication.

7) Selected Polymer Feed Pump Flow Indication.

8) OPEN/CLOSE status for Washwater Influent Valve.

9) OPEN/CLOSE status for Diverter Gate Washwater Valve.

10) OPEN/CLOSE status for Diverter Gate.

11) OUT OF SERVICE.

b. Software Interlocks:

1) As described in Section 11358 including but not limited to the following:

a) Conveyor No. 1 or No. 2 Fail Alarm or shutdown shall trigger a shutdown of all Centrifuges.

F. Special Considerations:

1. Power Outages and Restore Operation:

a. Power Outage and Restore Operation: During Power Outage the Centrifuge System will de-energize and stop due to loss of power. During Power Outage the alarms associated with the Centrifuge Systems will be de-activated at SCADA. Upon Power Restore the Centrifuge Systems will remain Stopped and await Operator local Reset and manual initiate to restart system. Also when Power Restored the Centrifuge Systems alarms will be re-activated at SCADA.

3.10 CENTRIFUGE SYSTEM CONVEYORS AND TRUCK LOADING

A. References:
1. Process Area: Centrifuge System Conveyors and Truck Loading.
2. P&ID Drawing: S19N-11, and S19N-12.
3. Mechanical Drawings: S19M-03, and S19M-04.
4. Specification Sections:14556, 13448.

B. Mechanical Equipment:

Tag Numbers	Equipment Name
19DSCON101	Conveyor No. 1
19DSCON002	Conveyor No. 2
19DSCON003	Truck Loading Bay Conveyor
19DSG101	Conveyor Slide Gate No.1
19DSG102	Conveyor Slide Gate No.2
19DSG103	Conveyor Slide Gate No.3
19DSG104	Conveyor Slide Gate No.4
19DSG105	Conveyor Slide Gate No.5
19DSG-106	Conveyor Slide Gate No.6

C. General Description:
1. Conveyor No.1, Conveyor No,2, and the Truck Loading Bay Conveyor and associated motor actuated gates, shall be provided for conveyance of Dewatered Sludge, or "cake", from the Centrifuges located in the Dewatering Building to the Truck Loading Area or to the Sludge Drying Bed area. All three Centrifuges discharge into Conveyor No.1 which in turn can discharge into either Conveyor No.2 or into the Truck Loading Bay Conveyor depending on the gate positions.

D. Local Controls and Instrumentation:
1. System:
   a. Instruments and Protective Devices: Vendor supplied as specified in Section 14556.
   b. E-STOP (Vendor supplied per 14556)
2. Local Control Panel:
   a. A Vendor Control Panel (VCP) shall be supplied for each conveyor as specified in Section 14556.
   b. Gate actuator controls shall be vendor supplied as specified in Section 14556 and 13448.

E. MCC Controls and Instrumentation:
1. None.

F. PLC/OIS Functions:
1. Conveyor Controls:

a. When the HAND/OFF/REMOTE selector switches at the VCPs are in the REMOTE position and IN SERVICE, the Conveyors shall start and stop based on commands from the Plant PLC/OIS.
b. The Auto/Manual selector switch in the PLC/OIS shall allow the conveyors to be started either manually or automatically from the PLC/OIS.
   1) Remote Manual Mode:
      a) In Manual Mode the operator may START or STOP individual conveyors remotely from SCADA.
      b) With conveyor gates in manual mode, the operator may OPEN or CLOSE selected gates remotely from SCADA.
   2) Remote Auto Mode:
      a) In Auto Mode the PLC shall automatically start and stop Conveyor No. 1 and Conveyor No. 2 to operate in conjunction with the Centrifuges.
      b) When a Centrifuge is called to start, the signal from the COP to start the conveyors shall be transmitted to the Plant PLC and from the Plant PLC shall be transmitted to the VCP of the conveyors.
      c) RUN status of each Conveyor shall be transmitted from the VCP to the SCADA/HMI for indication. The Centrifuges shall not be allowed to start until RUN status is received from both Conveyors No. 1 and No. 2.
      d) From SCADA, the Operator shall be able to select Truck Loading mode. This selection shall automatically start the Truck Loading Bay Conveyor and Open gate 19DSG-101 to allow sludge to be conveyed to the truck loading bay. Conveyors No. 1 and No. 2 shall continue to run in this mode.

2. Screen Indicators and Alarms at PLC/OIS:
   a. Conveyors:
      1) RUNNING Status.
      2) READY Status.
      3) FAIL (motor overload) Alarm.
      4) ZERO SPEED Alarm.
      5) Run Time Meter- The PLC shall accumulate total Conveyor Run Time for each conveyor for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, previous calendar month, and total runtime.
   b. Gate Actuators:
      1) OPEN Status.
      2) CLOSED Status.
      3) In REMOTE Status.
      4) FAIL Status
3. Software Interlocks:
   a. As indicated in Centrifuge Control Strategy.

G. Special Considerations:
   1. Power Outages and Restore Operation:
      a. Power Outage and Restore Operation: During Power Outage the Centrifuge System Conveyors will de-energize and stop due to loss of power. During Power Outage the alarms associated with the Centrifuge Systems Conveyors will be de-activated by the Plant PLC. Upon Power Restore the Centrifuge System Conveyors will remain Stopped and await

Operator local Reset and manual initiate to restart system. Also when Power Restored the Centrifuge System Conveyors alarms will be re-activated by the Plant PLC.

3.11 CENTRATE PUMPS

A. References:
   1. Process Area: Centrate Pumps.
   2. P&ID Drawing: S19N-18.
   3. Mechanical Drawings: S19M-17, 18, and 19.
   4. Specification Sections: 11312K.

B. Mechanical Equipment:

Tag Number	Equipment Name
19DSP405	Centrate Pump No.1
19DSP410	Centrate Pump No.2

C. General Description:
   1. The Centrate pumps shall pump the centrate flow from the centrifuges to the thickener splitter box or to existing plant drain pump station. The pumps shall be supplied with a Vendor Control Panel. The pumps shall operate based on level control in the centrate wet-well.

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
         1) Ultrasonic level transducer (vendor supplied).
         2) Moisture detection switch alarm (each pump).
         3) Motor high temperature switch alarm (each pump).
         4) Level FLOOD switch (vendor supplied).
         5) High Discharge Pressure switch (each pump).
         6) Magnetic Flowmeter.
   2. Pumps:
      a. Pumps shall be supplied with a VCP as specified in Section 11312K.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC/OIS Functions:
   1. Controls:
      a. None.
   2. Screen Indicators and Alarms at PLC/OIS:
      a. System:
         1) HIGH-HIGH LEVEL ALARM (Wetwell Flood Alarm).
         2) Wetwell level indication.
         3) Level Instrument Fail ALARM.
         4) Discharge Flow and Totalize Flow Indication.
      b. Pumps:
         1) COMMON FAIL ALARM: An alarm shall be transmitted to SCADA for motor over temperature, motor moisture, motor starter overload, E-STOP Activation, and excessive starts per hour.
         2) Run indication.

3) Run time meter: SCADA shall accumulate total pump run time and starts for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month and total runtime.
4) READY status (each pump): The status shall be transmitted to SCADA when a common alarm is not activated, and pump is ready to run.
5) OUT OF SERVICE:

c. Software Interlocks:
1) None.

G. Special Considerations:
1. Power Outages and Restore Operation:
a. During power outages the Centrate pumps will not operate due to loss of power. The Centrate pumps station COMMON FAIL alarms will be de-activated at SCADA during power outages, but FLOOD alarms will remain active. Upon restoration of power the pumps will operate as called for based on level setpoints. Alarms will be re-activated at SCADA upon restoration of power.

3.12 DEWATERING POLYMER MAKEUP AND AGING (BATCHING) SYSTEM.

A. References:
1. Process Area: Dewatering Polymer Makeup And Aging (Batching) System.
2. P&ID Drawing: S19N-13, S19N-14, S19N-15, and S19N-16.
3. Mechanical Drawings: S19M-12.
4. Specification Sections:

B. Mechanical Equipment:

Tag Number	Equipment Name
19PDP715	Emulsion Polymer Pump No.1
19PDB710	Dry Polymer Blower
19PDFDR001	Dry Polymer Feeder
19PDMOV001	Dry Polymer Diverter Valve
19PDP740	Utility Water Booster Pump
19PDMIX730	Polymer Mixer No.1
19PDMIX735	Polymer Mixer No.2
19PDMIX740	Polymer Mixer No.3
19PDMOV731	Polymer Tank No.1 Drain Valve
19PDMOV736	Polymer Tank No.2 Drain Valve
19PDMOV741	Polymer Tank No.3 Drain Valve

C. General Description:
1. The Dewatering Polymer Batching System is provided to prepare Dry or Emulsion Polymer into a dilute solution to serve as a dewatering aid to the Gravity Thickeners and Centrifuges. The Polymer Feed Pumps will deliver the polymer solution from the Polymer Tanks to the Thickeners or Centrifuges. All equipment including the vendor supplied Polymer Vendor Control Panel (19-VCP-17) shall be supplied by the vendor as specified in Section 11256.

D. Local Controls and Instrumentation:
1. System:

a. Instruments and Protective Devices (provided by the vendor):
   1) As specified in Section 11256 and as indicated on the Drawings.
b. Control Devices: All Polymer Batching System components shall be controlled through the VCP as specified in Section 11256.
c. Interlocks:
   1) As recommended by vendor. Refer to specification Section 11256.
d. Logic:
   1) System Logic shall reside in the system PLC located in the VCP as specified in Section 11256.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC/OIS Functions:
   1. Controls:
      a. None.
   2. Screen Indicators and Alarms at PLC/OIS:
      a. System:
         1) The polymer system control panel shall include the following alarms and indications which shall be communicated to SCADA:
            a) Polymer System in AUTO.
            b) Polymer System RUN Status.
            c) Polymer System RUN time indication.
            d) Emulsion Polymer Low Level (when in Emulsion Feed Mode Only).
            e) Emulsion Polymer Weight Scale Indication.
            f) Dry Polymer Blower READY status.
            g) Dry Polymer Blower LOW Air Pressure Alarm.
            h) Emulsion Polymer READY status.
            i) Emulsion Polymer RUN status.
            j) Loss of Emulsion Polymer Flow Alarm (Based on Emulsion Polymer Pump FAIL Alarm).
            k) High Hopper Level Alarm.
            l) Low Hopper Level Alarm.
            m) Dry Polymer Feeder RUN status.
            n) Dry Polymer Feeder FAIL Alarm.
            o) Dry Polymer Feeder READY status.
            p) Polymer Flow Rate and Totalizer (calculated in Vendor PLC).
            q) Dry Polymer Diverter Valve Position Indication.
            r) Dry Polymer Diverter Valve FAIL Alarm.
            s) Dry Polymer Diverter Valve READY status.
            t) Utility Water Booster Pump READY status.
            u) Utility Water Booster Pump RUN status.
            v) Utility Water Booster Pump Run Time Indication.
            w) Utiltiy Water Booster Pump FAIL Alarm.
            x) Utility Water System Pressure Indication.
            y) Utility Water Systel LOW Pressure Alarm.
            z) For Each Polymer System Motor Actuated Valve Provide the Following:
               (1) High Torque Alarm.
               (2) OPEN/CLOSE status.
               (3) FAIL Alarm.

aa) For Each Polymer Tank Provide the Following Indications and Alarms:
(1) Mixer RUN status.
(2) Mixer FAIL Alarm.
(3) Mixer READY status.
(4) Tank HIGH Level Alarm.
(5) Tank Level Indication.
(6) Tank Low Level Alarm.

b. Software Interlocks:
1) If all Polymer Tanks have a Low Level status, all Thickener Polymer Feed and Centrifuge Polymer Feed Pumps shall be shut down and a "POLYMER SYSTEM EMPTY" Alarm shall be annunciated in SCADA.

G. Special Considerations:
1. Power Outages and Restore Operation:
a. During power outages the Centrate pumps will not operate due to loss of power. The thickener overflow pump station COMMON FAIL alarms will be de-activated at SCADA during power outages, but FLOOD alarms will remain active. Upon restoration of power the pumps will operate as called for based on level setpoints. Alarms will be re-activated at SCADA upon restoration of power.

3.13 CENTRIFUGE POLYMER FEED SYSTEM

A. References:
1. Process Area: Centrifuge and Thickener Polymer Feed Systems.
2. P&ID Drawings: S19N-17.
3. Mechanical Drawings: S19M-01, S19M-12, S19M-13.
4. Specification Sections: 11312I.

B. Mechanical Equipment:

Tag Number	Equipment Name
19PDP750	Polymer Feed Pump No.1
19PDP755	Polymer Feed Pump No.2
19PDP760	Polymer Feed Pump No.3
19PDVLV753	Centrifuge No.1 Polymer Feed Valve
19PDVLV754	Centrifuge No.1 Polymer Feed Bypass Valve
19PDVLV758	Centrifuge No.2 Polymer Feed Valve
19PDVLV759	Centrifuge No.2 Polymer Feed Bypass Valve
19PDVLV763	Centrifuge No.3 Polymer Feed Valve

C. General Description:
1. Three Centrifuge Polymer Feed Pumps (19PDP-750, 19PDP-755, and 19PDP-760) are provided for feeding Polymer to the three Centrifuges. The vendor supplied Centrifuge Polymer Feed Vendor Control Panel (19-VCP-19) has a PLC and shall control all three pumps.

D. Local Controls and Instrumentation:
1. System:
a. Instruments and Protective Devices:
1) Electrical magnetic flow meters.

b. Indicators and Alarms:
   1) Flow rate indication.
   2) Position Indication for each valve.

2. Polymer Feed Pumps:
   a. A Vendor Control Panel shall be supplied to serve the three pumps as specified in Section 11312I. Pump VFDs shall also be housed in the VCP.
   b. Logic:
      1) As specified in Section 11312I.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC OIS Functions:
   1. Polymer Feed Pumps:
      a. Remote Manual Control Mode:
         1) None.
      b. Remote Automatic Control Mode:
         1) When the HAND/OFF/REMOTE switch for the centrifuge polymer feed pump is in the REMOTE position and IN SERVICE, the pump shall start and stop automatically and ramp up or down based on signal from PLC-19. The pump flow (polymer feed) setpoint can be adjusted at either the Centrifuge Operating Panel (COP) or in the SCADA Centrifuge Screen. The pump start and stop signals shall be based on the signal from the COP as described in the Centrifuge Systems section of this specification Section.
         2) The Centrifuge Feed Pump associated with a particular Centrifuge shall be determined by the manual valve position feedback of the Centrifuge Polymer Feed and Bypass Valves to PLC-19. PLC-19 shall communicate the Feed Pump that is positioned to operate with the associated Centrifuge and the flow setpoint (selectable in gph) to that Centrifuge which has been selected through SCADA.
         3) Pump RUN status shall be transmitted to SCADA and to the COP for indication.
         4) Flowrate and Totalization of polymer flow from the Centrifuge Polymer Feed Pump shall be indicated at SCADA from the flow meter via Ethernet. Flow indication shall be transmitted from SCADA to the Centrifuge Operating Panel via Modbus protocol.
   2. Screen Indicators and Alarms at PLC/OIS:
      a. System:
         1) Polymer Flow Indication shall be provided in the Centrifuge SCADA screen.
      b. Pumps:
         1) RUN indication (each pump).
         2) COMMON FAIL ALARM (each pump).
         3) Motor speed indication (each pump).
         4) Pump READY indication (each pump).
         5) Pump speed setpoint indication (each pump).
         6) OUT OF SERVICE:
      c. Software Interlocks:
         1) If a Centrifuge Polymer Feed Pump is selected to feed to a particular Centrifuge and the Feed and Bypass Valve position is not correct, an

"OPEN POLYMER FEED BYPASS VALVE" Alarm shall be annunciated.

2) If all Polymer Tanks have a Low Level status, all Polymer Feed Pumps shall be shut down and a "POLYMER SYSTEM EMPTY" Alarm shall be annunciated in SCADA.

G. Special Considerations
1. Power Outage and Restore Operation:
a. During power outage, the Centrifuge Polymer Feed Pumps will de-energize and stop due to loss of power. During power outage the alarms associated with the Centrifuge Polymer Feed Pumps will be de-activated at SCADA. Upon Power Restore the Centrifuge Polymer Feed Pumps will restart as long as local switches are still in HAND position, or REMOTE position with request to run from Centrifuge COP. Also when power is restored, the Centrifuge Polymer Feed Pump alarms will be re-activated at SCADA.

3.14 THICKENER POLYMER FEED PUMPS

A. References:
1. Process Area: Centrifuge and Thickener Polymer Feed Systems.
2. P&ID Drawings: S19N-17.
3. Mechanical Drawings: S19M-01, S19M-12, S19M-14.
4. Specification Sections: 11312I.

B. Mechanical Equipment:

Tag Number	Equipment Name
19PDP765	Polymer Feed Pump No. 4
19PDP770	Polymer Feed Pump No. 5

C. General Description:
1. Two Thickener Polymer Feed Pumps (19PDP765 and 19PDP770) are provided for feeding Polymer to the Gravity Thickener Splitter Box to enhance sludge thickening. One pump shall be operated at a time with the second pump serving as a backup. The vendor supplied Thickener Polymer Feed Vendor Control Panel (19-VCP-20) has a PLC and shall serve both Metering Pumps.

D. Local Controls and Instrumentation:
1. System:
a. Instruments and Protective Devices:
1) Electrical magnetic flow meter.
b. Indicators and Alarms:
1) Flow rate indication (to be displayed on Gravity Thickener SCADA Screen).
2. Local Control Panel:
a. A Vendor Control Panel shall be supplied to serve both pumps as specified in Section 11312I. Pump VFDs shall also be housed in the VCP.

E. MCC Controls and Instrumentation:
1. None.

F. PLC/OIS Functions:

1. Controls:
   a. SCADA Manual Control Mode:
      1) DUTY/STANDBY pump selection shall be made in through SCADA.
      2) The operator shall select a polymer flow setpoint (Range 4 to 420 gph) for polymer flow to the thickeners.
      3) When the pump HOR selector switch is in REMOTE and IN SERVICE, the Duty Pump shall be started through SCADA using the START/STOP selector switch.
      4) If the Duty Pump Fails or Fails to start, the Standby Pump shall automatically start if it is in REMOTE position.
   b. SCADA Automatic Control Mode:
      1) None.
2. Screen Indicators and Alarms at PLC/OIS:
   a. System:
      1) Thickener Polymer Flow Rate.
   b. Pumps:
      1) RUN indication (each pump).
      2) COMMON FAIL Alarm (each pump).
      3) Motor speed indication (each pump).
      4) READY indication (each pump).
      5) OUT OF SERVICE (each pump).
      6) Pump speed setpoint indication (each pump).
      7) Run Time Meter: SCADA shall accumulate total Thickener Polymer Pump Run Time for each Thickener Polymer Pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, and previous calendar month and total runtime.
   c. Software Interlocks:
      1) If all Polymer Tanks have a Low Level status, all Polymer Feed Pumps shall be shut down and a "POLYMER SYSTEM EMPTY" Alarm shall be annunciated in SCADA.

G. Special Considerations
   1. Power Outage and Restore Operation:
      a. During power outage, the Thickener Polymer Feed Pumps will de-energize and stop due to loss of power. During power outage the alarms associated with the Thickener Polymer Feed Pumps will be de-activated at SCADA. Upon Power Restore the Thickener Polymer Feed Pumps will restart as long as local switches are still in HAND position, or REMOTE position with request to run from Centrifuge COP. Also when power is restored, the Thickener Polymer Feed Pump alarms will be re-activated at SCADA.

3.15 DEWATERING BUILDING SUMP PUMP SYSTEM

A. References:
   1. Process Area: Thickened Sump Pump System.
   2. P&ID Drawing: S19N-19.
   3. Mechanical Drawings: S19M-01.
   4. Specification Sections: 11312J.

B. Mechanical Equipment:

Tag Number	Equipment Name
18DWP505	Dewatering Sump Pump No. 1
18DWP510	Dewatering Sump Pump No. 2

C. General Description:
   1. The dewatering building sump pumps shall pump the area floor drainage to the existing Plant Drain System. The pumps shall be supplied with a Vendor Control Panel 19-VCP-22. The pumps shall operate based on the level in the sump.

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
         1) Capacitance probe type level transducer (provided by the vendor).
         2) FLOOD Alarm Level Float switch.
   2. Pumps:
      a. Pumps shall be supplied with a VCP as specified in Section 11312J.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC/OIS Functions:
   1. Controls:
      a. None.
   2. Screen Indicators and Alarms at PLC/OIS:
      a. System:
         1) HIGH-HIGH LEVEL ALARM.
      b. Pumps:
         1) COMMON FAIL ALARM: An alarm shall be transmitted to SCADA for, motor starter overload, activated disconnect switch excessive runtime, and excessive starts per hour.
            a) Excessive runtime sepoint shall initially be set at 300 minutes (0-600 minutes).
            b) Excessive starts per hour setpoint shall initially be set at 8 starts per hour (0-60 starts per hour).
         2) Run indication.
         3) Run time meter: SCADA shall accumulate total pump run time and starts for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month and total runtime.
      c. Software Interlocks:
         1) None.

G. Special Considerations:
   1. Power Outages and Restore Operation:
      a. During power outages the sump pumps will not operate due to loss of power. The sump pump station COMMON FAIL alarms will be de-activated at SCADA during power outages, but FLOOD alarms will remain active. Upon restoration of power the pumps will operate as called for based on level setpoints. Alarms will be re-activated at SCADA upon restoration of power.

3.16 RAW WATER INTAKE PUMP SOUTH AND NORTH BAY

A. References:
   1. Process Area: Intake Pump Station.
   2. P&ID Drawing: S20N-01.
   3. Mechanical Drawings:NA (All existing mechanical equipment).
   4. Specification Sections: 16267.

B. Mechanical Equipment:

Tag Number	Equipment Name
20RWP003	Intake Pump No. 3 (Existing Pump with new VFD)
20RWP006	Intake Pump No. 6 (Existing Pump with new VFD)

C. General Description:
   1. New Variable Frequency Drives shall be provided to replace the existing constant speed drives on Intake Pumps No. 3 and No. 6.

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
         1) Low Flow Switches at Pump Discharges.
         2) All Existing to Remain.
   2. Local Control Panel:
      a. Control Devices: VFD Panel local controls shall be as indicated on the Drawings and as specified in Section 16267.
      b. Interlocks:
         1) None.
      c. Logic:
         1) Local Manual Control Mode:
            a) When the LOR selector switch on the VFD is in the LOCAL position, the pump may be started and stopped locally and the speed may be adjusted locally at the VFD keypad.
         2) Local Automatic Control Mode:
            a) None.

E. PLC OIS Functions:
   1. Controls:
      a. SCADA Manual Control Mode:
         1) When the local LOR selector switch is in the REMOTE position and the SCADA AUTO/MANUAL selector switch is in MANUAL position, the pump may be started and stopped remotely through SCADA and the pump speed can be manually adjusted.
      b. SCADA Automatic Control Mode:
         1) Retain the existing SCADA AUTO pump controls.
   2. Screen Indicators and Alarms at PLC/OIS:
      a. Pumps (provide the following for each pump):
         1) LOW FLOW Alarm existing.
         2) In REMOTE Indication existing.
         3) VFD Fault Alarm.
         4) RUN Indication existing.
         5) Run Time Meter existing.
         6) Speed Indication.

7) HIGH Motor Temperature Alarm existing.
8) HIGH Bearing Temperature Alarm existing.

b. Software Interlocks:
1) None

c. Alarms Generated By SCADA:
1) The SCADA system shall generate a Valve FAIL-TO-OPEN alarm if the Valve is called to Open at SCADA and the OPENED status is not indicated within 120 seconds (adjustable). The SCADA system shall generate a FAIL-TO-CLOSE alarm if the Valve is called to Close at SCADA and the CLOSED status is not indicated within 120 seconds (adjustable). The SCADA system shall generate a Valve ILLEGAL-IO alarm if the Valve position indicates an OPENED and CLOSED status simultaneously.
2) The SCADA system shall generate a FLOW EXCEEDS 10% alarm if the flow setpoint is greater than 10% of the plant flowrate as determined by the Raw Water Intake Pump Station flow setpoint.

F. Special Considerations:
1. Power Outages and Restore Operation:
a. During power outages the pumps will not operate due to loss of power. The pump station alarms will be de-activated at SCADA during power outages. Upon restoration of power the pumps will need to be restarted by the Operator. Alarms will be re-activated at SCADA upon restoration of power.

3.17 PLANT RECYCLE FLOW CONTROL

A. References:
1. Process Area: Plant Recycle Flow Control (Washwater Return Pump Station).
2. P&ID Drawing: S30N-01.
3. Mechanical Drawings: NA (All existing mechanical equipment).
4. Specification Sections: 13448.

B. Mechanical Equipment:

Tag Number	Equipment Name
30XWMOV500	Motorized Plant Recycle Flow Control Valve

C. General Description:
1. The filter waste washwater and lagoon return pump station returns water to the head of the plant for retreatment. Valve 30XWMOV500 will be modulated to control the return flow. This valve can be opened or closed locally or via SCADA.

D. Local Controls and Instrumentation:
1. System:
a. Instruments and Protective Devices:
1) Existing Flowmeter (FE/FIT-005)
2. Local Control Panel:
a. Control Devices:
1) DISCONNECT Switch.
2) LOCAL/OFF/ REMOTE Switch.
3) OPEN/STOP/CLOSE Switch.

b. Interlocks:
   1) None.
c. Logic:
   1) Local Manual Control Mode:
      a) Local Manual control of the Valve can be performed at the Local Control Station. The Valve shall be operated locally using the OPEN/STOP/CLOSE switch when the selector switch is in LOCAL.
   2) Local Automatic Control Mode:
      a) None.

E. PLC OIS Functions:
1. Controls:
   a. SCADA Manual Control Mode:
      1) OPENED and CLOSED status of each Valve is transmitted to the SCADA system for indication. When the LOCAL/OFF/REMOTE switch at the valve actuator control station is in REMOTE and IN SERVICE,, the Operator can OPEN or CLOSE the valve from SCADA. REMOTE operation status of each valve is transmitted to the SCADA system for indication. If the valve is not in REMOTE, then SCADA shall indicate it is NOT IN REMOTE.
   b. SCADA Automatic Control Mode:
      1) The Operator may enter a set return flow in GPM. When any of the FWW/Lagoon Pumps are operating, the valve shall modulate to maintain the flow setpoint via a PID control algorithm.
      2) The SCADA system shall compare the operator entered flow setpoint to a flow table to ensure the flow setpoint is within a Supervisor set flow range for the number of pumps operating. (Initial flow ranges shall be: One pump operating: 0-2,000 gpm, Two pump operating: 1,500-3,000 gpm, Three pumps operating: 2,500-4,500 gpm.) If operator entered setpoint is outside of the flow range for the number of current pumps operating, the SCADA system shall provide a notification to the Operator.
2. Screen Indicators and Alarms at PLC/OIS:
   a. System:
      1) OPEN Indication.
      2) CLOSED Indication.
      3) FAIL Alarm.
      4) REMOTE status.
      5) Torque Alarm.
      6) Position Indication.
      7) Position Setpoint.
      8) OUT OF SERVICE.
   b. Software Interlocks:
      1) None.
   c. Alarms Generated By SCADA:
      1) The SCADA system shall generate a Valve FAIL-TO-OPEN alarm if the Valve is called to Open at SCADA and the OPENED status is not indicated within 120 seconds (adjustable). The SCADA system shall generate a FAIL-TO-CLOSE alarm if the Valve is called to Close at SCADA and the CLOSED status is not indicated within 120 seconds (adjustable). The SCADA system shall generate a Valve ILLEGAL-

IO alarm if the Valve position indicates an OPENED and CLOSED status simultaneously.

2) The SCADA system shall generate a FLOW EXCEEDS 10% alarm if the flow setpoint is greater than 10% of the plant flowrate as determined by the Raw Water Intake Pump Station flow setpoint.

F. Special Considerations:
1. Power Outage and Restore Operation:
   a. During Power Outage the valves will de-energize and hold position.
   b. During Power Outage the alarms associated with the Valves will be de-activated at SCADA. Upon Power Restore the Valves will continue to operate.
   c. If Valve is called to Open or Close during a Power Outage and a FAIL alarm is generated, this would put the Valve in Fault and require Operator Reset.
   d. When Power Restored, the Valve alarms will be re-activated at SCADA.

3.18 MAIN PROCESS - SEDIMENTATION BASIN FLOW SPLIT

A. References:
1. Process Area: Main Process - Sedimentation Basin Flow Split.
2. P&ID Drawings: S30N-01.
3. Mechanical Drawings: None.
4. Specification Sections: None.

B. Mechanical Equipment:

Tag Number	Equipment Name
30MWMOV061	Motorized Valve to Flocc/Sed Basins 1 & 2
30MWMOV071	Motorized Valve to Flocc/Sed Basins 3 & 4

C. General Description:
1. The two motor operated valves will modulate to maintain the flow setpoint (operator adjustable) to each of the two pairs of flocculation/sedimentation basins 1/2 and 3/4 from the grit basin and flash mix chamber.

D. Local Controls and Instrumentation:
1. System:
   a. Instruments and Protective Devices:
      1) None.
2. Local Control Panel:
   a. Control Devices:
      1) DISCONNECT Switch.
      2) LOCAL/OFF/ REMOTE Switch.
      3) OPEN/STOP/CLOSE Switch.
   b. Interlocks:
      1) None
   c. Logic:
      1) Local Manual Control Mode:
         a) Local Manual control of each Valve can be performed at the Local Control Station. The Valve shall be operated locally using the OPEN/STOP/CLOSE switch when the selector switch is in LOCAL.

2) Local Automatic Control Mode:
   a) None.

E. PLC OIS Functions:
1. Controls:
   a. SCADA Manual Control Mode:
      1) OPENED and CLOSED status of each Valve is transmitted to the SCADA system for indication. When the LOCAL/OFF/REMOTE switch at the valve Local Control Panel is in REMOTE and IN SERVICE,, the Operator can OPEN or CLOSE the valve from SCADA. REMOTE operation status of each valve is transmitted to the SCADA system for indication. If the valve is not in REMOTE, then SCADA shall indicate it is NOT IN REMOTE.
   b. SCADA Automatic Control Mode:
      1) When the LOCAL/OFF/REMOTE switches for both Basin Flow Control valves are in REMOTE and IN SERVICE, the SCADA system controls the flow split between flocculation/sedimentation basins 1/2 and 3/4 and include maintaining a level setpoint in the grit basin as follows:
      2) Flow Setpoints: The Operator enters the desired flow distribution between the two sets of basins based upon one of the two following flow scenarios:
         (1) Percent Flow Split: There shall be two Operator entered values, one for each of the basin pairs (1/2 and 3/4). These values define what percent of total plant flow will go to each pair of basins. The two numbers must total 100% and when either value is entered, the other value is automatically calculated based upon 100% minus the entered value. The SCADA system sums the flow through the two basin flowmeters and multiplies the sum by each of these percent values to determine the flow setpoints for each pair of basins.
         (2) Set Basin Flow: The Operator may enter a set flowrate through either of the pair of basins (1/2 or 3/4). This entered value becomes the flow setpoint for that basin, the SCADA system shall modulate flow based upon the following algorithm and the remaining flow shall go to the other pair of basins. (An alarm shall be indicated if the total plant flow minus the entered Set Basin Flow will result in the other basin receiving a flow beyond its designed capacity of 80 mgd. Example: The entered value for basin 1/2 is 40 mgd. The sum of the two flowmeters is 150 mgd. This will result in 110 mgd going to basin 3/4, which is beyond its capacity.)
      b) Flow Control Algorithm: The SCADA system shall control the two flow control valves based on the following description to maintain the flow setpoints described above through the two basin flow meters:
         (1) The SCADA system shall select a valve to be the initial Modulating Valve and the other to be the initial Max Open Valve. If the flow setpoints are equal for both pairs of basins, Basin 1/2 shall be selected to be the initial Max

Open Valve and basin 3/4 shall be selected to be the initial Modulating Valve. If the flow setpoints are not equal, the basin with the highest flow setpoint shall be selected to be the initial Max Open Valve and the other to be the initial Modulating Valve.

(2) The SCADA system shall open the Max Open valve to the Maximum Open Valve Position (supervisor adjustable, initially set to 80% open). The Modulating Valve shall modulate between 0% and the Maximum Open Valve Position to maintain flow at the flow setpoints for both pairs of basins (1/2 and 3/4) via a PID control algorithm.

(3) If the Modulating Valve cannot maintain flow and is at the Maximum Open Valve Position for a given duration (supervisor adjustable), the SCADA system shall switch the Modulating Valve and the Max Open Valve designations of the valves and the new Modulating Valve will modulate to maintain the flow setpoints via the same PID control algorithm.

2. Screen Indicators and Alarms at PLC/OIS:
   a. System:
      1) Valves:
         a) OPEN Indication.
         b) CLOSED Indication.
         c) FAIL Alarm.
         d) READY status (Valve is READY when the disconnect is closed, the valve is in REMOTE and there is not an active FAIL alarm.)
      2) Basin 1/2 Flow.
      3) Basin 3/4 Flow.
   b. Software Interlocks:
      1) None
   c. Alarms Generated By SCADA:
      1) The SCADA system shall generate a Valve FAIL-TO-OPEN alarm if the Valve is called to Open at SCADA and the OPENED status is not indicated within 120 seconds (adjustable). The SCADA system shall generate a FAIL-TO-CLOSE alarm if the Valve is called to Close at SCADA and the CLOSED status is not indicated within 120 seconds (adjustable). The SCADA system shall generate a Valve ILLEGAL-IO alarm if the Valve position indicates an OPENED and CLOSED status simultaneously.
      2) The SCADA system shall generate a BASIN CAPACITY alarm if the flow setpoint for either pair of basins (1/2 or 3/4) is higher than the basin capacity.
      3) The SCADA system shall generate a LOW SETPOINT notification if a basin flow setpoint is entered in MGD that is lower than the plant flow setpoint entered for the Raw Water Intake Pump Station (existing).

F. Special Considerations:
   1. Power Outage and Restore Operation:
      a. During Power Outage the valves will de-energize and hold position. During Power Outage the alarms associated with the Valves will be de-activated at SCADA. Upon Power Restore the Valves will continue to

operate. If Valve is called to Open or Close during a Power Outage and a FAIL alarm is generated, this would put the Valve in Fault and require Operator Reset. When Power Restored, the Valve alarms will be re-activated at SCADA.

3.19 MAIN PROCESS - FLOCCULATION INLET VALVES

A. References:
   1. Process Area: Main Process - Flocculation Inlet Valves.
   2. P&ID Drawings: S41N-01, S42N-01 and S42N-03.
   3. Mechanical Drawings: S41M-01, S42M-01, S42M-05, S42M-09 and S42M-10.
   4. Specification Sections: 13448 and 15112.

B. Mechanical Equipment:

Tag Number	Equipment Name
41MWMOV010A, B, C	Basin 1 - Motorized Valves 1, 2, 3
41MWMOV020A, B, C	Basin 2 - Motorized Valves 1, 2, 3
42MWMOV010A, B, C	Basin 3 - Motorized Valves No. 1, 2, 3
42MWMOV020A, B, C	Basin 4 - Motorized Valves No. 1, 2, 3

C. General Description:
   1. Each of the two new flocculation basins and the two existing basins will have three motorized butterfly valves on the inlet to each basin. Each valve can be opened or closed locally or via SCADA.

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
         1) None.
   2. Local Control Panel:
      a. Control Devices:
         1) DISCONNECT Switch.
         2) LOCAL/OFF/ REMOTE Switch.
         3) OPEN/STOP/CLOSE Switch.
      b. Interlocks:
         1) None.
      c. Logic:
         1) Local Manual Control Mode:
            a) Local Manual control of each Valve can be performed at the Local Control Station. The Valve shall be operated locally using the OPEN/STOP/CLOSE switch when the selector switch is in LOCAL.
         2) Local Automatic Control Mode:
            a) None.

E. PLC OIS Functions:
   1. Controls:
      a. SCADA Manual Control Mode:
         1) OPENED and CLOSED status of each Valve is transmitted to the SCADA system for indication. When the LOCAL/OFF/REMOTE switch at the valve Local Control Panel is in REMOTE and IN SERVICE, the Operator can OPEN or CLOSE the valve from

SCADA. REMOTE operation status of each valve is transmitted to the SCADA system for indication. If the valve is not in REMOTE, then SCADA shall indicate it is NOT IN REMOTE.

b. SCADA Automatic Control Mode:
   1) None.

2. Screen Indicators and Alarms at PLC/OIS:
   a. System:
      1) OPEN Indication.
      2) CLOSED Indication.
      3) FAIL Alarm.
      4) HIGH Torque Alarm.
      5) REMOTE status.
      6) OUT OF SERVICE
   b. Software Interlocks:
      1) None.
   c. Alarms Generated By SCADA:
      1) The SCADA system shall generate a Valve FAIL-TO-OPEN alarm if the Valve is called to Open at SCADA and the OPENED status is not indicated within 120 seconds (adjustable). The SCADA system shall generate a FAIL-TO-CLOSE alarm if the Valve is called to Close at SCADA and the CLOSED status is not indicated within 120 seconds (adjustable). The SCADA system shall generate a Valve ILLEGAL-IO alarm if the Valve position indicates an OPENED and CLOSED status simultaneously.

F. Special Considerations:
   1. Power Outage and Restore Operation:
      a. During Power Outage the valves will de-energize and hold position. During Power Outage the alarms associated with the Valves will be de-activated at SCADA. Upon Power Restore the Valves will continue to operate. If Valve is called to Open or Close during a Power Outage and a FAIL alarm is generated, this would put the Valve in Fault and require Operator Reset. When Power Restored, the Valve alarms will be re-activated at SCADA.

3.20 MAIN PROCESS - FLOCCULATORS

A. References:
   1. Process Area: Main Process-Flocculators.
   2. P&ID Drawings: S42N-01, and S42N-03.
   3. Mechanical Drawings: S42M-01, S42M-05, S42M-09 and S42M-10.
   4. Specification Sections: 11229.

B. Mechanical Equipment:

Tag Number	Equipment Name
42MWFLC011A, B, C	Basin 3 - Flocculator No. 1, 2, 3
42MWFLC012A, B, C	Basin 3 - Flocculator No. 4, 5, 6
42MWFLC013A, B, C	Basin 3 - Flocculator No. 7, 8, 9
42MWFLC014A, B, C	Basin 3 - Flocculator No. 10, 11, 12
42MWFLC021A, B, C	Basin 4 - Flocculator No. 1, 2, 3
42MWFLC022A, B, C	Basin 4 - Flocculator No. 4, 5, 6
42MWFLC023A, B, C	Basin 4 - Flocculator No. 7, 8, 9

C. General Description:
   1. Coagulated raw water is transported to the flocculation basins. There are two new Flocculation Basins each consisting of four stages. Each stage has three flocculation mixers controlled by a common variable speed controller. The mixers are operated using local controls or via SCADA and are normally run continuously at a fixed speed.

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
         1) None.
   2. Local Control Panel:
      a. Control Devices:
         1) DISCONNECT Switch.
         2) HAND/OFF/ REMOTE on one panel for three mixers.
         3) Speed Indication Controller on one panel for three mixers.
      b. Interlocks:
         1) None.
      c. Logic:
         1) Local Manual Control Mode:
            a) Local Manual control of each Flocculator can be performed at the Local Control Station. The Flocculator shall run when the selector switch is in HAND. Speed can be set at the LCP manually for each group of three Flocculators. Flocculator speed (as percent speed) is transmitted to the SCADA system for indication. RUN status VFD FAIL (overcurrent), and Speed Indication shall be indicated at the VFD.
         2) Local Automatic Control Mode:
            a) None.

E. VFD Controls and Instrumentation:
   1. VFD Panels:
      a. VFD Control Devices
         1) SPEED Indication Controller (each panel).
      b. Indicators and Alarms:
         1) RUN indication (each panel).
         2) Motor speed indication (each panel).
         3) COMMON FAIL ALARM (each panel).
         4) Ethernet node addresses can be set locally at the VFD faceplate.

F. PLC OIS Functions:
   1. Controls: Selection of Remote Manual or Remote Automatic modes can be made at the local PLC or the plant OIS.
      a. SCADA Manual Control Mode:
         1) SCADA shall accumulate total Flocculator run time for each flocculator for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, previous 14 days, month to date, and previous calendar month.
         2) When the HAND/OFF/REMOTE selector switch at the LCP is in the REMOTE position and IN SERVICE, the operator may:

a) Start and stop the Flocculators from SCADA.
b) Set the speed of the Flocculators from SCADA. Set speed as percent speed (0 to 100%). A single speed setting input shall be used for each stage of Flocculators at each basin (three flocculators per stage, four stages per basin, for each of two basins).
SCADA Automatic Control Mode:
3) None.

2. Screen Indicators and Alarms at PLC/OIS:
   a. System:
      1) RUN Indication.
      2) FAIL Alarm.
      3) READY status of the Flocculator is transmitted from the VFD to SCADA for indication. (Flocculator is READY when the disconnect is closed, the equipment is in REMOTE and there is not an active FAIL alarm.)
      4) Speed Indication.
   b. Software Interlocks:
      1) None.

G. Special Considerations:
   1. Power Outage and Restore Operation:
      a. During Power Outage the Flocculators will de-energize and stop due to loss of power. During Power Outage the alarms associated with the Flocculators will be de-activated at SCADA. Upon Power Restore the Flocculators will still be in previous SCADA Manual control mode (there is no SCADA Automatic control mode) and will restart and ramp to speed setpoint. Also, when Power Restored, the Flocculator alarms will be re-activated at SCADA.

3.21 MAIN PROCESS – SLUDGE COLLECTORS

A. References:
   1. Process Area: Main Process – Sludge Collectors.
   2. P&ID Drawings: S42N-02, and S42N-04.
   3. Mechanical Drawings: S42M-07, S42M-09, and S42M-10.
   4. Specification Sections: 11351.

B. Mechanical Equipment:

Tag Number	Equipment Name
42SWCOL030	Basin 3 Cross Collector
42SWCOL040	Basin 4 Cross Collector
42SWCOL031, 032, 033, 034, 035, 036	Basin 3 Collectors No. 1, 2, 3, 4, 5, 6
42SWCOL041, 042, 043, 044, 045, 046	Basin 4 Collectors No. 1, 2, 3, 4, 5, 6

C. General Description:
   1. The sedimentation basins provide solids removal by allowing larger, heavier particles formed in the flocculators to settle. The two new sedimentation basins will be installed with three parallel sections each. There are three forward and three aft longitudinal sludge collectors which sweep settled sludge to a center collection trough. A center cross collector trough spans all three sections of the sedimentation basin and scrapes sludge towards a sludge sump where sludge

can be drawn off to the sludge vault. The sludge collectors are normally operated on a periodic basis to avoid excessive sludge build up in the sedimentation basin. Collectors shall have constant speed motors.

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
         1) High Torque Switch.
   2. Local Control Panel:
      a. Control Devices:
         1) DISCONNECT Switch.
         2) HAND/OFF/ REMOTE selector switch.
      b. Interlocks:
         1) High Torque.
      c. Logic:
         1) Local Manual Control Mode:
            a) Each collector includes the following Local Control Devices, HAND/OFF/AUTO Selector Switch, and Lockout Stop Device. The Sludge Collector shall run when the selector switch is in HAND.
         2) Local Automatic Control Mode:
            a) None.

E. MCC Controls and Instrumentation:
   1. MCC Panels:
      a. MCC Control Devices.
         1) High Torque RESET switch.
      b. Indicators and Alarms:
         1) FAIL Alarm (each panel).
         2) Run Indication (each panel).
         3) READY Status (each panel) - System is READY when the disconnect is closed, the equipment is in REMOTE and there is not an active FAIL alarm.
         4) High Torque Alarm (each panel).

F. PLC OIS Functions:
   1. Controls:
      a. SCADA Manual Control Mode:
         1) RUN and READY status of the Sludge Collectors are transmitted from the MCC to SCADA for indication.
         2) SCADA shall accumulate Sludge Collector run time for each Sludge Collector for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, previous 14 days, month to date, and previous calendar month.
         3) When the HAND/OFF/REMOTE selector switch at the local control station is in the REMOTE position and IN SERVICE, the Operator may start and stop the Sludge Collector from SCADA, which will operate the collector until the Operator changes the operation.
         4) In the SCADA Manual mode, each individual Sludge Collector can be started and stopped from SCADA.
      b. SCADA Automatic Control Mode:
         1) The operation of the collectors follows the following steps.

Step Description	Front Collectors	Aft Collectors	Cross Collector	Sludge Withdrawal Call	Step Continues Until
Start Basin CYCLE TIMER	Off	Off	Off	Off	CYCLE TIMER Expires
Start Longitudinal Collectors	Start	Start			Receive Run Status For Collectors
Start Basin ON-TIMER	Running	Running			Continue to the next step
Start Cross Collector START DELAY TIMER					START DELAY TIMER Expires
Start Cross Collector			Start		Receive Run Status For Collector
Start SLUDGE WITHDRAWAL DELAY TIMER					SLUDGE WITHDRAWAL DELAY TIMER Expires
Start the SLUDGE WITHDRAWAL DELAY TIMER					SLUDGE WITHDRAWAL DELAY TIMER Expires
Send CALL to Sludge Valve Control Strategy				On	BASIN ON-TIMER Expires
Start FRONT COLLECTOR EXTEND TIMER		Stop			FRONT COLLECTOR EXTEND TIMER expires
Start CROSS COLLECTOR EXTEND TIMER	Stop				CROSS COLLECTOR EXTEND TIMER expires
End Collector Cycle			Stop	Off	Continue to the next step
Reset the CYCLE TIMER and Restart the Sequence.	Stopped	Stopped	Stopped	Off	Return to first sequence step

2) The control strategy shall only allow sludge removal from one sedimentation basin at a time. If one basin's CYCLE TIMER expires while the other basin is withdrawing sludge (i.e. collectors are running or the sludge valve is opened), it will hold-off collector operation until the operating basin has completed sludge removal operation.

3) Calculate the TIME REMAINING UNTIL NEXT RUN PERIOD for each basin, based on the amount of time elapsed since the last run cycle and the CYCLE TIMER.

4) The Operator may manually initiate an Automatic Cycle at any time when another basin is not currently withdrawing sludge which will initiate the automatic sequence described above.

2. Screen Indicators and Alarms at PLC/OIS:
   a. System:
      1) RUN Indication.
      2) FAIL Alarm.
      3) READY status of the Sludge Collectors is transmitted from the VFD to SCADA for indication.
      4) Torque Alarm.
      5) REMOTE status Indication.
   b. Software Interlocks:
      1) None.
   c. Alarms Generated By SCADA:
      1) The SCADA system shall generate a Collector FAIL-TO-START alarm if a Collector is called to run at SCADA and the RUN status is not indicated within 30 seconds (adjustable). The SCADA system shall generate a Collector FAIL-TO-STOP alarm if a Collector is called to stop from SCADA and the RUN status is not removed within 30 seconds (adjustable). The SCADA system shall generate a Collector FAILED RUNNING alarm if a Collector was running and stops without a SCADA command to stop.

G. Special Considerations:
   1. Power Outage and Restore Operation:
      a. Power Outage and Restore Operation: During Power Outage the Collectors will de-energize and stop due to loss of power. During Power Outage the alarms associated with the Collectors will be de-activated at SCADA. Upon Power Restore the Collectors will be in FAULT (since Run status was lost) and require Operator Reset and toggle back to SCADA Automatic Mode if Desired. Once in SCADA Automatic mode, if the Duration Timer is still accumulating the Collectors will operate for the remaining time. Also when Power restored, the Collector alarms will be re-activated at SCADA.

3.22 SEDIMENTATION BASIN SLUDGE BLOWOFF VALVES AND PUMP

A. References:
   1. Process Area: Sedimentation Basins Sludge Blowoff Valves and Pump.
   2. P&ID Drawings: S42N-05.
   3. Mechanical Drawings: S42M-11.
   4. Specification Sections: 11312R, 13448 and 15116.

B. Mechanical Equipment:

Tag Number	Equipment Name
42SLP207	Sedimentation Basin No. 3 & 4 Sludge Pump
42SLMOV050	Sedimentation Basin No. 3 Motor Actuated Sludge Valve
42SLMOV051	Sedimentation Basin No. 4 Motor Actuated Sludge Valve

C. General Description:
   1. Sludge lines from each of two Sedimentation Basins shall allow sludge to flow to the Sludge Vault by opening of motor operated valves. The Sludge Pump

shall operate to pump sludge from the Sludge Vault to the solids handling facilities.

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
         1) Low Pump Suction Pressure Switch.
         2) High Pump Discharge Pressure Switch.
         3) Sludge Density Meter.
         4) Sludge Flow Meter.
   2. Local Control Panel:
      a. Control Devices:
         1) DISCONNECT Switch.
         2) Valves:
            a) LOCAL/OFF/REMOTE selector switch.
            b) OPEN/STOP/CLOSE switch.
      b. Interlocks:
         1) Low Pump Suction Pressure or High Pump Discharge Pressure shall automatically stop pump and indicate alarm.
         2) In both the local and remote modes, when a pump is called to start, OPEN the seal water solenoid valve, monitor seal water flow, and start the pump.
         3) If the seal water flow does not appear within an adjustable period of time (0 to 90 seconds, default setting: 10 seconds) after the pump starts, shut down the pump and generate a seal water FAIL Alarm at the PLC. To clear the alarm, the pump reset button will need to be pressed.
      c. Logic:
         1) Local Manual Control Mode:
            a) Local Manual control of each valve is performed by using the LOCAL/OFF/REMOTE selector switch and the OPEN/STOP/CLOSE pushbuttons located at the Valve's Local Control Panel. OPENED and CLOSED status of each Valve is indicated at the Valve's Local Control Panel.
            b) Local Manual control of the pump is performed by using the HAND/OFF/REMOTE selector switch and SPEED control at the pump VFD panel.
         2) Local Automatic Control Mode:
            a) None.

E. VFD Controls and Instrumentation:
   1. VFD Panel:
      a. VFD Control Devices:
         1) HAND/OFF/REMOTE selector switch.
         2) SPEED Indicating Controller.
         3) Alarm RESET switch.
      b. Indicators and Alarms:
         1) FAIL Alarm.
         2) Run Indication.
         3) READY Status.
         4) Low Suction Pressure Alarm.
         5) High Discharge Pressure Alarm.

6) Speed Indication.

F. PLC OIS Functions:

1. Controls:

a. SCADA Manual Control Mode:

1) Valves: OPENED and CLOSED status of each Valve is transmitted to the SCADA system for indication. When the LOCAL/OFF/REMOTE switch at the valve Local Control Panel is in REMOTE and IN SERVICE the Operator can OPEN or CLOSE the valves from SCADA. REMOTE operation status of each valve is transmitted to the SCADA system for indication. If the valve is not in REMOTE, then SCADA shall indicate it is NOT IN REMOTE.

2) Pump: When the pump HAND/OFF/REMOTE switch at the pump VFD is in REMOTE and IN SERVICE the Operator can START and STOP the pump and can adjust the SPEED of the pump from SCADA. If the pump is not in REMOTE, then SCADA shall indicate it is NOT IN REMOTE.

b. SCADA Automatic Control Mode:

1) This control strategy will periodically operate each sludge withdrawal valve and the sludge pump in conjunction with the operation of a sedimentation basin's sludge collectors. When the Sludge Withdrawal control strategy receives a SLUDGE WITHDRAWAL CALL FOR OPERATION request, the basin's sludge valve shall be opened, the sludge pump shall start and the SLUDGE WITHDRAWAL PERIOD TIMER shall be started.

2) As long as the SLUDGE WITHDRAWAL CALL FOR OPERATION is active and the sludge density remains above the SLUDGE DENSITY SETPOINT (adjustable), the sludge pump shall withdraw sludge. If the Sludge Density falls below the SLUDGE DENSITY SETPOINT, the pump shall stop for a PUMP PAUSE (adjustable) duration before restarting. The pump shall operate for a MINIMUM PUMP RUN (adjustable) duration. After the Minimum pump run time has expired, if the sludge density is above the SLUDGE DENSITY SETPOINT, it shall remain running, if it is below the Setpoint, it shall Pause. The pump shall operate under this sequence until the SLUDGE WITHDRAWAL CALL FOR OPERATION is removed.

3) When the SLUDGE WITHDRAWAL CALL FOR OPERATION register de-activates, the control strategy shall start the SLUDGE WITHDRAWAL EXTEND TIMER and the pump shall operate. Upon expiration of the SLUDGE WITHDRAWAL EXTEND TIMER, the sludge pump stops and the valve closes.

4) The valve interlock logic allowing only one valve to be open at a time shall apply to the SCADA Automatic mode.

5) The PLC shall calculate the totalized sludge volume removed for each sedimentation basin.

2. Screen Indicators and Alarms at PLC/OIS:

a. System:

1) Valve FAIL of each valve is transmitted to the SCADA system for indication.

2) Pump Common FAIL Alarm.

3) Low Pump Suction Pressure Alarm.

4) High Pump Discharge Pressure Alarm.

b. Software Interlocks:
   1) None.
c. Alarms Generated By SCADA:
   1) The SCADA system shall generate a Valve FAIL-TO-OPEN alarm if the Valve is called to Open at SCADA and the OPENED status is not indicated within 120 seconds (adjustable). The SCADA system shall generate a Valve FAIL-TO-CLOSE alarm if the Valve is called to Close at SCADA and the CLOSED status is not indicated within 120 seconds (adjustable). The SCADA system shall generate a Valve ILLEGAL-IO alarm if the Valve position indicates an OPENED and CLOSED status simultaneously.
   2) The SCADA system shall generate a Pump FAIL-TO-START alarm if the Pump is called to Start at SCADA and the RUNNING status is not indicated within 60 seconds (adjustable).

G. Special Considerations
   1. Power Outage and Restore Operation:
      a. During Power Outage the Valves will de-energize and hold position. During Power Outage the alarms associated with the Valves will be de-activated at SCADA. Upon Power Restore the Valves will continue to operate. If Valve is called to Open or Close during a Power Outage and a FAIL alarm is generated, this would put the Valve in Fault and require Operator Reset and toggle back to Automatic Mode. When Power Restored, the Valve alarms will be re-activated at SCADA.
      b. During Power Outage the Pump will de-energize and stop. Upon Power Restore the Pump will return to its previous operational status.

3.23 FLOCCULATION/SEDIMENTATION BASINS SUMP PUMP SYSTEM

A. References:
   1. Process Area: Flocculation/Sedimentation Basins Sump Pump System.
   2. P&ID Drawing: S42N-06.
   3. Mechanical Drawings: S42M-11.
   4. Specification Sections: 11312J.

B. Mechanical Equipment:

Tag Number	Equipment Name
42DWP405	Sump Pump No. 1
42DWP410	Sump Pump No. 2

C. General Description:
   1. The Flocculation/Sedimentation Basins sump pumps shall pump the Sludge Blow-down area floor drainage to the existing Plant Drain System. The pumps shall be supplied with a Vendor Control Panel 19-VCP-22. The pumps shall operate based on the level in the sump.

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
         1) Capacitance probe type level transducer (provided by the vendor).
         2) FLOOD Alarm Level Float switch.

2. Pumps:
   a. Pumps shall be supplied with a VCP as specified in Section 11312J.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC/OIS Functions:
   1. Controls:
      a. None.
   2. Screen Indicators and Alarms at PLC/OIS:
      a. System:
         1) HIGH-HIGH LEVEL ALARM.
      b. Pumps:
         1) COMMON FAIL ALARM: An alarm shall be transmitted to SCADA for, motor starter overload, activated disconnect switch excessive runtime, and excessive starts per hour.
            a) Excessive runtime sepoint shall initially be set at 300 minutes (0-600 minutes).
            b) Excessive starts per hour setpoint shall initially be set at 8 starts per hour (0-60 starts per hour).
         2) Run indication.
         3) Run time meter: SCADA shall accumulate total pump run time and starts for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month and total runtime.
      c. Software Interlocks:
         1) None.

G. Special Considerations:
   1. Power Outages and Restore Operation:
      a. During power outages the sump pumps will not operate due to loss of power. The sump pump station COMMON FAIL alarms will be de-activated at SCADA during power outages, but FLOOD alarms will remain active. Upon restoration of power the pumps will operate as called for based on level setpoints. Alarms will be re-activated at SCADA upon restoration of power.

3.24 FILTERS

A. References:
   1. Process Area: Filters
   2. P&ID Drawings: S51N-01 thru S51N-08
   3. Mechanical Drawings: S51M-01 thru S51M-16
   4. Specification Sections: 13448, 15112, 17206, 17302, 17406, 17508 and 17509

B. Mechanical Equipment:

Tag Number	Equipment Name
51SWMOV__1	Filter Influent Valve
51FRMOV__2	Filter Effluent Valve
51BWMOV__3	Filter Backwash Valve
51AWMOV__4	Filter Air Wash Valve
51WWMOV__5	Filter Waste Washwater Valve

Existing	Master Filter To Waste Valve
Existing	Backwash Supply Pumps
Existing	Airwash Blowers

(__ represents the filter number)

C. General Description:
1. Eight new dual media filters are provided as part of the expansion project and will be added to the existing eight dual media filters. Water from the Flocculation/Sedimentation Basins flows through the Filters where suspended and colloidal contaminants are removed. Five valves for each Filter are used to control Filter operations. Each Filter has a differential pressure (headloss) transmitter, a level transmitter and a particle counter. There is a common Filter-To-Waste valve that is existing.
2. Each Filter has associated with it five motor actuated valves: the Backwash Valve, the Influent Valve, the Waste Washwater Valve, the Airwash Valve, and the Effluent Valve. All the valves have an OPEN/STOP/CLOSE and LOCAL/OFF/REMOTE local interface. In addition, the Effluent Valve can be modulated by the PLC to maintain the setpoint filter level.
3. In normal filter operation the valves are controlled as follows:
   a. The Airwash, Backwash, and Waste Washwater Valves are closed.
   b. The Influent Valve is open.
   c. The Effluent Valve is modulated under PID action to maintain level in the filter.
      1) The Filter "safe" state is defined as Backwash Pumps off, Air Blowers off, and all valves closed on an individual Filter except the Waste Washwater Valve. If a power outage occurs during a Filter Backwash, the Filter shall default to the "safe" state once power is returned. Also, see the control strategy entitled "Backwash Sequence."
      2) The UFRV (Unit Filter Run Volume) and runtime for each filter is calculated and displayed for all filters on both trains utilizing the following formula:
      a) UFRV (gal /ft2) = (influent flow/number of filters online) x time / filter media surface area (1152 sq. ft.)
4. Filter programming for the new eight filters shall be identical to the existing programming for the existing eight filters with the exceptions indicated below and shall include, but not be limited to the following features:
   a. Similar programming features to existing programming of existing eight filters:
      1) Normal filtration (Filter effluent valve is modulated to maintain a constant level in the filter.)
      2) Filter backwash, including airwash.
      3) Common filter to waste.
      4) Rinse to waste.
      5) Filter resting.
   b. Differences with new eight filters compared to existing programming of existing eight filters:
      1) The existing eight filters have a single common particle counter. Each of the new eight filters have a dedicated particle counter to each filter and the instrument readings shall be indicated on SCADA as indicated on the P&ID drawings.

2) Filters 15 and 16 are equipped with a filter effluent flow meter and an inlet weir bypass valve. These two filters shall be provided with the option to switch from the standard "constant level" filtration mode to a "rate of flow" control mode. The rate of flow control mode will open the influent weir bypass valve and will modulate the filter effluent valve in order to maintain a filter effluent flow rate setpoint (operator adjustable).

D. Local Controls and Instrumentation:
1. System:
a. Instruments and Protective Devices:
1) Filter Effluent Turbidimeter (each filter).
2) Filter Effluent Particle Counter (each filter).
3) Filter Level Transmitter (each filter).
4) Differential Pressure Transmitter (each filter).
5) Filter Effluent Flowmeter (Filters 15 and 16 only).
2. Local Control Panel:
a. Control Devices:
1) LOCAL/OFF/REMOTE Selector switch (Each valve).
2) OPEN/STOP/CLOSE pushbuttons (Each valve).
b. Interlocks:
1) None.
c. Logic:
1) Local Manual Mode:
a) Local Manual control of each filter valve is performed by using the LOCAL/OFF/REMOTE selector switch and the OPEN/STOP/CLOSE pushbuttons located at the valve operator. OPENED and CLOSED status of each valve is indicated at the valve operator.
2) Local Remote Mode:
a) None.

E. MCC Controls and Instrumentation:
1. None

F. PLC OIS Functions:
1. Controls:
a. SCADA Manual Control Mode:
1) At SCADA the Operator can control the Filter in a Manual or Automatic mode. In the Manual mode, the Operator may open, close or position the filter valves.
2) OPENED and CLOSED status of each Valve is transmitted to the SCADA system for indication. When the LOCAL/OFF/REMOTE switch at the Valve is in REMOTE and IN SERVICE the Operator can OPEN or CLOSE the Valves from SCADA. REMOTE operation status of each Valve is transmitted to the SCADA system for indication. If a Valve is not in REMOTE, then SCADA shall indicate it is NOT IN REMOTE.
b. SCADA Automatic Mode:
1) In the Automatic mode, the SCADA system shall modulate the Filter Effluent Valve to maintain a Superintendent adjustable level setpoint. Filter RUN TIME, TURBIDITY, PARTICLE COUNT, HEADLOSS,

FILTER LEVEL (setpoint level is common to all eight Filters, actual level will be slightly different in each Filter to allow smooth P&ID operation of the Filter Effluent Valve), BACKWASH FLOWRATE, FINISHED WATER CLEARWELL LEVEL, WASTE WASHWATER BASIN LEVEL, AIR SCOUR FLOWRATE, and FILTER-TO-WASTE FLOWRATE shall be displayed on the Operator Workstation. All the six Valves (including the common Filter To Waste valve) must be in SCADA Automatic mode for the automatic controls to function.

2. Screen Indicators and Alarms at PLC/OIS:
   a. System:
      1) Valve FAIL of each valve is transmitted to the SCADA system for indication.
   b. Software Interlocks:
      1) None.
   c. Alarms Generated By SCADA:
      1) The SCADA system shall generate a Valve FAIL-TO-OPEN alarm if the Valve is called to Open at SCADA and the OPENED status is not indicated within 120 seconds (adjustable). The SCADA system shall generate a Valve FAIL-TO-CLOSE alarm if the Valve is called to Close at SCADA and the CLOSED status is not indicated within 120 seconds (adjustable). The SCADA system shall generate a Valve ILLEGAL-IO alarm if the Valve position indicates an OPENED and CLOSED status simultaneously.
      2) The SCADA system shall generate an Effluent Valve FAIL TO ACHIEVE POSITION alarm if the Effluent Valve is called to move and the Valve position feedback does not match Valve position setpoint within 120 seconds (adjustable). The SCADA system shall generate a Effluent Valve ILLEGAL IO alarm if the Effluent Valve position status to SCADA is both OPENED and CLOSED.
      3) Filter LOW and HIGH LEVEL, HIGH TURBIDITY, HIGH PARTICLE COUNT, and HIGH HEADLOSS (initially set at six feet) shall be alarmed at SCADA if the values exceed Operator adjustable setpoint values. Filter RUN TIME shall be alarmed if the elapsed filter run time exceeds an Operator adjustable setpoint.
      4) Filter Run Time shall be generated by SCADA for each individual Filter whenever the respective Effluent Valve is NOT CLOSED or the filter is in Filter To Waste mode. The Filter Run Time shall be reset to zero when the Influent Valve is opened following a backwash cycle.

G. Special Considerations
   1. Power Outage and Restore Operation:
      a. During Power Outage the Filter Valves will remain in last position due to power outage. During Power Outage alarms associated with the Valves will be de-activated. Upon Power Restore the Valves will still be in previous SCADA control mode (Manual or Auto) and the Effluent Valve will make adjustments to meet setpoint. Also when Power Restored, associated Filter Valves alarms will be re-activated at SCADA.

3.25 HIGH SERVICE PUMP STATION

A. References:

1. Process Area: High Service Pumps Station.
2. P&ID Drawings: S71N-01 thru S71N-05.
3. Mechanical Drawings: S71M-01.
4. Specification Sections: 11312D.

B. Mechanical Equipment:

Tag Number	Equipment Name
71FWP001	High Service Pump No. 1
71FWP002	High Service Pump No. 2
71FWP003	High Service Pump No. 3
71FWP004	High Service Pump No. 4
71FWP005	High Service Pump No. 5
71FWP006	High Service Pump No. 6
71FWP007	High Service Pump No. 7
71FWP008	High Service Pump No. 8

C. General Description:
1. There are 4 constant speed and 4 VFD equipped variable speed pumps which pump finished water from the Sacramento River Water Treatment Plant High Service Pump Station (HSPS) to the 66" treated water main connected to the existing transmission system. The pumps are controlled automatically to maintain an operator selected flow or system pressure from the HSPS to the transmission system. Monitoring of the HSPS will be as shown on the P&ID's.
2. For the eight pumps, following the initial selection, whenever a pump shuts down, the pump assignment shall be rotated in a revolving sequence based on the accumulated run time of the pumps.

D. Local Controls and Instrumentation:
1. System:
   a. Instruments and Protective Devices:
      1) High Vibration Switch (each pump).
      2) High High Vibration Switch (each pump).
      3) High Discharge Pressure Switch (each pump).
      4) Low Discharge Flow Switch (each pump).
2. Local Control Panel:
   a. Control Devices:
      1) None.
   b. Interlocks:
      1) The individual pumps will shut down and send an alarm on LOW FLOW detected at each of the pump discharge lines. Other pump shutdown alarms are HIGH VIBRATION, HIGH BEARING TEMPERATURE, or HIGH WINDING TEMPERATURE.
   c. Logic:
      1) Local Manual Control Mode:
         a) Local control for the HSPS is performed by placing the individual pump HAND/OFF/REMOTE selector switch to the HAND mode to start the pump and into the OFF mode to stop the pump. For each VFD equipped pump, speed adjustment will be made directly at the variable speed drive (VFD) panel with the potentiometer.
      2) Local Automatic Control Mode:
         a) None.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC OIS Functions:
   1. Controls:
      a. SCADA Manual Control Mode:
         1) When set to Manual, pumps may be operated individually and manually. This mode is intended for testing purposes only and shall be used with caution. The following other modes will be disabled in this mode:
            a) Pump Rotation.
            b) Increase Output.
            c) Decrease Output.
      b. SCADA Automatic Control Mode:
         1) When set to REMOTE and IN SERVICE, the HSPS will operate at steady state, reduce output, or increase output, based on flow and pressure, or based on pressure only per the operator selection.
         2) Output of the HSPS will be increased by order of the following until the flow or pressure condition is met:
         3) Run one VFD pump.
         4) Increase speed of the operating VFD pump.
         5) Reduce speed of the operating VFD pump and run a second VFD pump; synchronize speeds amongst both VFD pumps.
         6) Increase the speed of the operating VFD pumps in synchronous.
         7) Reduce speed of the operating VFD pumps in synchronous, and run a constant speed pump.
         8) Increase the speed of the operating VFD pumps in synchronous.
         9) Reduce speed of the operating VFD pumps in synchronous, and run a second constant speed pump.
         10) Increase the speed of the operating VFD pumps in synchronous.
         11) Reduce speed of the operating VFD pumps in synchronous, and run a third constant speed pump.
         12) Increase the speed of the operating VFD pumps in synchronous.
         13) Reduce speed of the operating VFD pumps in synchronous, and run a fourth constant speed pump.
         14) Increase the speed of the operating VFD pumps in synchronous.
         15) Reduce speed of the operating VFD pumps in synchronous, and run an additional (third) VFD pump at full speed (to be treated as a fifth constant speed pump, started at a set (adjustable) reduced speed and slowly (adjustable) ramped up to 100% speed.
         16) Increase the speed of the operating VFD pumps in synchronous.
         17) The fourth VFD pump may substitute for any one of the above constant/full speed pumps called for, but shall be started at a set (adjustable) reduced speed and slowly (adjustable) ramped up to 100% speed. The fourth VFD pump may also substitute for any one of the variable speed pumps called for, and operate as a variable speed pump.
         18) Output of the HSPS will be decreased in opposite of the above order, and where called for an increase in VFD speed, instead the speed shall be reduced.
         19) The HSPS will be stage off based on the level from each reservoir and the valve open position. If both reservoirs are low or the valves

are not open then shutdown the high service pumps. The HSPS shutdown at the LOW LOW Level will include shutting down the pumps in a controlled manner and inhibiting them from starting until the reservoir levels are no longer LOW, and the valves are open.

20) Rotation of Pumps:
    a) When set to SEQUENCE_ROTATION, each time a VFD pump is shutoff, it becomes ranked at the bottom of the queue of standby VFD pumps ready for operation. A subsequent VFD pump which is shutoff will then be ranked at the bottom of the queue, and bump up the ranking of the previous bottom-of-the-queue pump up by one position. The next VFD pump to start when called for by the PLC will be the pump ranked at the top position in the queue.
    b) Each time a constant speed pump is shutoff, it becomes ranked at the bottom of the queue of standby constant speed pumps ready for operation. A subsequent constant speed pump which is shutoff will then be ranked at the bottom of the queue, and bump up the ranking of the previous bottom-of-the-queue pump up by one position. The next constant speed pump to start when called for by the PLC will be the pump ranked at the top position in the queue.
    c) When set to RUN_TIME_ROTATION, each time a VFD pump is shutoff, it becomes ranked at the bottom of the queue of standby VFD pumps ready for operation based on the total runtime of the pump, e.g., the more runtime the pump has, the lower the rank it will be assigned. Each subsequent VFD pump which is shutoff will be placed in the same standby VFD pump queue, and all pumps within the queue will be re-ranked based on the total runtime of each pump from the order of least runtime at the top of the queue, to the most runtime at the bottom of the queue. The next VFD pump to start when called for by the PLC will be the pump ranked at the top position in the queue.
    d) Each time a constant speed pump is shutoff, it becomes ranked at the bottom of the queue of standby constant speed pumps ready for operation based on the total runtime of the pump, e.g., the more runtime the pump has, the lower the rank it will be assigned. Each subsequent constant speed pump which is shutoff will be placed in the same standby constant speed pump queue, and all pumps within the queue will be re-ranked based on the total runtime of each pump from the order of least runtime at the top of the queue, to the most runtime at the bottom of the queue. The next constant speed pump to start when called for by the PLC will be the pump ranked at the top position in the queue.
    e) When set to RANDOM_ROTATION, the pump rotation feature is disabled, and the next available VFD pump which is required to start will be selected randomly from the available standby VFD pumps, and the next available constant speed PUMP which is required to start will be selected randomly from the available standby constant speed pumps.

2. Screen Indicators and Alarms at PLC/OIS:
    a. System:

1) The individual pumps will shut down and send an alarm on LOW FLOW detected at each of the pump discharge lines. Other pump shutdown alarms are HIGH VIBRATION, HIGH BEARING TEMPERATURE, or HIGH WINDING TEMPERATURE. Each pump has a common FAIL alarm status input provided to the SCADA system for indication at the operator workstation.

b. Software Interlocks:
   1) Low Low level from L053 and L091.
   2) High Discharge Pressure.
   3) Vibration High.
   4) Out of Service.
   5) Low Flow
   6) Gates not open.

c. Alarms Generated By SCADA:
   1) None.

G. Special Considerations:
   1. Power Outage and Restore Operation:
      a. Power Outage and Restore Operation: During Power Outage the HSPS Monitoring Equipment will de-energize and stop communicating due to loss of power. During Power Outage the alarms associated with the HSPS Monitoring Equipment will remain activated at SCADA. Upon Power Restore the HSPS Monitoring Equipment will restart monitoring and communicating to SCADA.

3.26 SURGE VESSELS AND AIR COMPRESSORS

A. References:
   1. Process Area: Surge Vessels And Air Compressor.
   2. P&ID Drawings: S71N-06, S71N-07.
   3. Mechanical Drawings: S71M-15 through S71M-19.
   4. Specification Sections: 13206, 13206B, 11372B.

B. Mechanical Equipment:
   1. As scheduled in Sections 13206, 13206B and 11372B.

C. General Description:
   1. Surge Vessels: There are two surge vessels, 71-FWPVL-601 and 71-FWPVL-701 on the HSPS discharge. The vessels operate to dampen hydraulic surges on pump starts and stops. Each vessel has a vendor-supplied level indicator and HIGH and LOW LEVEL switches.
   2. The vessels receive compressed air from two air compressors and receiver tanks, 71-FWC-600 and 71-FWC-700. This system has oil-less/oil-free duplex tank-mounted compressors.

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
         1) As specified in Section 13206.
   2. Local Control Panel:
      a. Control Devices:
         1) None.
      b. Interlocks:

1) Each compressor motor has a high temperature and low oil sensor. Activation of either will shut down the respective motor until the condition clear. It will also transmit an alarm to the PLC and annunciate the operator at the HMI.
2) Each surge vessel has LOW, LOW-LOW, HIGH and HIGH-HIGH level probes provided by the vendor.

c. Logic:
1) Local Manual Mode:
a) Air Compressor: The air compressor panel has HOA switches for each compressor motor. There are also RUN lights for each motor.
b) The vendor-provided controls operate automatically to maintain the water level in surge vessel within setpoint levels by opening and closing the respective solenoid air valve.
c) Surge vessel level control shall be as specified in SECTION 13206 - HYDROPNEUMATIC SURGE CONTROL SYSTEM.
2) Local Automatic Mode:
a) Compressors will operate with pressure switch set points compared to the pressure of the tank. See 13327B.

E. MCC Controls and Instrumentation:
1. None.

F. PLC OIS Functions:
1. Controls:
a. SCADA Manual Control Mode:
1) None.
b. SCADA Automatic Control Mode:
1) None.
2. Screen Indicators and Alarms at PLC/OIS:
a. System:
1) Common Fail alarm and Run status shall be transmitted to SCADA.
2) Low Low and High High Pressure alarms.
3) Vessel pressure indication.
4) Vessel High High Level alarm.
5) Vessel Low Low Level alarm.
6) Vessel fail alarm.
7) Isolation valve open/closed.
b. Software Interlocks:
1) None.
c. Alarms Generated By SCADA:
1) None.

G. Special Considerations
1. Power Outage and Restore Operation:
a. Power Outages, the Surge Vessel Monitoring Equipment will de-energize and stop communicating due to loss of power. During Power Outages the alarms associated with the Surge Vessel Monitoring Equipment will remain activated at SCADA. Upon Power Restore the Surge Vessel Monitoring Equipment will restart monitoring and communicating to SCADA.
2. Surge Vessel Isolation Valves:

a. The 36" Surge Vessel Isolation Valves (71-FWVLV-601, 71-FWVLV-701) will be equipped with open position limit switches wired to the respective surge system control panels. In the event that the valve is not 100 percent open, and the high service pump station is operational, an alarm signal shall be transmitted to SCADA. Valve position and alarm status shall be annunciated at the local control panel and at the HMI.

3.27 HIGH SERVICE PUMP STATION MEDIUM VOLTAGE (4160 V) SWITCHGEAR MONITORING EQUIPMENT

A. References:
   1. Process Area: High Service Pump Station Medium Voltage (4160 V) Switchgear Monitoring Equipment.
   2. P&ID Drawings: S96N-03.
   3. Mechanical Drawings: NA.
   4. Specification Sections: 16295.

B. Mechanical Equipment:
   1. None.

C. General Description:
   1. Both 4160 V Feeder Protection Relays to the High Service Pump Station Electrical Building and all Motor Protection Relays for the 4160 V High Service Pumps shall communicate to SCADA via Modbus TCP/IP protocol over copper Ethernet network. All values from the relays will be processed in PLC 71 and SCADA will read the values in a consecutive register tabulated order. The PLC will zero registers if communications are lost after a time delay and provide a communications fail alarm. The programmer will provide math equations necessary for a correct floating point value provided to SCADA.

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
   2. Local Control Panel:
      a. Control Devices:
         1) None.
      b. Interlocks:
         1) None.
      c. Logic:
         1) Local Manual Control Mode:
            a) The HSPS Switchgear (96-SWGR-1) Main, Tie, and Main Breaker's OPENED and CLOSED statuses shall be transmitted to SCADA for indication via hardwire. All F60's and F35's will transmit a relay fail alarm to SCADA using a hardwire connection.
         2) Local Automatic Control Mode:
            a) None.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC OIS Functions:
   1. Controls:

a. SCADA Manual Control Mode:
   1) No SCADA Manual control is provided. Power Monitoring Equipment on the two Main 4160 V feeders and on the Motor Protection Relays for Pumps 71-FW-P-01, 71-FW-P-02, 71-FW-P-03, 71-FW-P-04, 71-FW-P-05, 71-FW-P-06, 71-FW-P-07 and 71-FW-P-08 shall communicate data to SCADA via Modbus TCP/IP protocol over copper Ethernet network.
   2) The following data for the twelve 4160 V Feeder Protection Relays shall be displayed and archived at SCADA: Phase A Current, Phase B Current, Phase C Current, A-B Voltage, B-C Voltage, C-A Voltage, KW and power factor.
   3) The following data for the Motor Protection Relays shall be displayed and archived at SCADA: Phase A Current, Phase B Current, Phase C Current, A-B Voltage, B-C Voltage, and C-A Voltage, Hottest RTD °C, Real Horsepower, Real Kilowatts and Power Factor.

b. SCADA Automatic Control Mode:
   1) None.

2. Screen Indicators and Alarms at PLC/OIS:
   a. System:
      1) Two Main Breaker's,tie and feeder breakers (twelve breakers) TRIP condition shall be alarmed at SCADA. TRIP status is derived from the 86 relay digital input.
      2) Provide spring charged, Auto/Manual status, Relay Fail, Breaker Racked Out, and Common Breaker Alarm.
      3) Provide battery charger alarms and indications provided by the Supplier using Modbus 485 and hardwire.
   b. Software Interlocks:
      1) Main switchgear power loss. Communication failure.
   c. Alarms Generated By SCADA:
      1) Communications alarm.

G. Special Considerations
   1. Power Outage and Restore Operation:
      a. Power Outage and Restore Operation: During Power Outage the HSPS Monitoring Equipment will de-energize and stop communicating due to loss of power. During Power Outage the alarms associated with the HSPS Monitoring Equipment will remain activated at SCADA. Upon Power Restore the HSPS Monitoring Equipment will restart monitoring and communicating to SCADA.

3.28 DEMONSTRATION AND TRAINING

A. As specified in Section 17050.

3.29 21KV/4.16KV MAIN DISTRIBUTION SWITCHGEAR MONITORING EQUIPMENT

A. References:
   1. Process Area: Main Distribution Medium Voltage 21KV/4.16KV Switchgear Monitoring Equipment.
   2. P&ID Drawings: S96N-01.
   3. Mechanical Drawings: NA.
   4. Specification Sections: 16295.

B. Mechanical Equipment:
   1. None.

C. General Description:
   1. All Protection Relays for SRWTP communicate to SCADA via Modbus TCP/IP protocol over copper Ethernet network. All values from the relays will be processed in PLC 71 and SCADA will read the values in a consecutive register tabulated order. The PLC will zero registers if communications are lost after a time delay and provide a communications fail alarm. The programmer will provide math equations necessary for a correct floating point value provided to SCADA.

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
   2. Local Control Panel:
      a. Control Devices:
         1) None.
      b. Interlocks:
         1) See control diagrams S00E-50, 51 , 52, 54, 55, 56, and 57.
      c. Logic:
         1) Local Manual Control Mode:
            a) The Switchgear shall be controlled and monitored using an operator interface touch screen. All F60's and G60's will transmit a relay fail alarm to SCADA using a hardwire connection.
         2) Local Automatic Control Mode:
            a) See Section.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC OIS Functions:
   1. Controls:
      a. SCADA Manual Control Mode:
         1) No SCADA Manual control is provided. Power Monitoring Equipment shall communicate data to SCADA via Modbus TCP/IP protocol over copper Ethernet network.
         2) The following data for the fourteen Protection Relays shall be displayed and archived at SCADA: Phase A Current, Phase B Current, Phase C Current, A-B Voltage, B-C Voltage, C-A Voltage, KW and power factor.
      b. SCADA Automatic Control Mode:
         1) None.
   2. Screen Indicators and Alarms at PLC/OIS:
      a. System:
         1) All Main Breaker's, tie breakers, and feeder breakers (sixteen breakers) TRIP condition shall be alarmed at SCADA. TRIP status is derived from the 86 relay digital input.
         2) Provide spring charged, Auto/Manual status, Relay Fail, Breaker Racked Out, and Common Breaker Alarm.
         3) Provide battery charger alarms and indications provided by the Supplier using Modbus 485 and hardwire.

4) Provide Generator alarms, fuel level indication, generator running, generator in exercise mode.
5) Provide time notification before a transfer of Main or ties to normal power.

b. Software Interlocks:
1) Main switchgear power loss. Communication failure.

c. Alarms Generated By SCADA:
1) Communications alarm.

G. Special Considerations.

3.30 INTRUSION ALARMING AND GATE CONTROL

A. Provide alarming of all doors and gates including common alarms provided by the Hirsh equipment and power supplies.

B. Include programming for gate open relay at the PLC to open each gate with a SCADA controlled pushbutton.

3.31 POWER QUALITY MONITORS

A. Provide SCADA monitoring of all Power Quality Monitors. Power Monitoring Equipment shall communicate data to SCADA via Modbus TCP/IP protocol over copper Ethernet network. All values from the PQM's will be processed in closest PLC and SCADA will read the values in a consecutive register tabulated order. The PLC will zero registers if communications are lost after a time delay and provide a communications fail alarm. The programmer will provide math equations necessary for a correct floating point value provided to SCADA.

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ATTACHMENT 4 TO EXHIBIT A

SECTION 17101B

Addendum No. 3
1/16/13

EAFTWP SPECIFIC CONTROL STRATEGIES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
   1. Loop descriptions:
      a. Specific control requirements and functional descriptions for individual control loops.

B. Related sections:
   1. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
   2. It is the CONTRACTOR's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of CONTRACTOR's Work.
   3. The following sections are related to the Work described in this Section. This list of related sections is provided for convenience only and is not intended to excuse or otherwise diminish the duty of the CONTRACTOR to see that the completed Work complies accurately with the Contract Documents.
      a. Section 01330 - Submittal Procedures.
      b. Section 17050 - Common Work Results for Process Control and Instrumentation Systems.

1.02 REFERENCES

A. As specified in Section 17050.

1.03 DEFINITIONS

A. As specified in Section 17050.

1.04 SUBMITTALS

A. Develop detailed loop descriptions based on the information in the Contract Documents, and submit as specified in Sections 01330 and 17050.
   1. For each control loop, provide a detailed functional description of the operation of the equipment, signals, and controls shown on the P&IDs:
      a. Include all functions depicted or described in the Contract Documents.
      b. Include the following within each loop description:
         1) All requirements specific to that loop.
         2) Common control requirements applicable to that loop.
         3) List of all ranges, setpoints, timers, values, counters, etc.
   2. Where there are similar loops with identical control, such as multiple loops for individual raw water pumps, only 1 loop description need be developed and the remaining loops may reference that loop description.

B. Loop description format:
   1. Loop number and title.
   2. References:
      a. List P&IDs that are specifically referenced.
   3. Abstract:
      a. General description of how the loop works, what devices are involved, and how the process will be controlled.
      b. Process values, setpoints, and limits, including units and ranges:
         1) Show span and range values for analog inputs and outputs, and operating point and deadband for discrete inputs.
   4. Hardwired control:
      a. Detailed description of the control functions at the local level.
      b. Function of local operator interfaces.
      c. Operation of hardwired field pilot controls:
         1) Pushbuttons.
         2) Selector switches.
         3) Potentiometers.
         4) Pilot lights, indicators, and other displays.
   5. Hardwired interlocks:
      a. Explanation of the operation of system interlocks and hardwired permissive conditions.
   6. PLC control:
      a. Detailed description of the control functions that are under control of the PLC.
      b. Operator controls and automatic controls.
      c. Setpoints, alarms, etc.:
         1) Include units and ranges for analog values.
         2) Include span and range for analog inputs and outputs.
         3) Include operating point and deadband for discrete inputs, and identify conditions where contacts are open, and when they close.
      d. Control sequences.
   7. Software interlocks:
      a. Operation of system software interlocks.
   8. HMI control:
      a. Detailed description of the operator controls.
   9. SCADA control:
      a. Detailed description of the operator controls.
      b. Setpoints, alarms, etc.
   10. Indicators and alarms:
      a. List any indicators and alarms specific to the loop that are not covered in the common control strategies.
   11. Failure modes:
      a. List any failure modes specific to the loop that are not covered in the common control strategies.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 FILTER WASTE WASHWATER LAGOON SLUDGE COLLECTION SYSTEM

A. References:
   1. Process Area: FWW Lagoon Sludge Collection System
   2. P&ID Drawing: F15N-01, F15N-02, and F15N-03.
   3. Mechanical Drawings: F15M-01, F15M-02, F15M-03.
   4. Specification Sections: 11312F, 11360, 13448.

B. Mechanical Equipment:

Tag Number	Equipment Name
15DSCOL001	Sludge Collector No. 1
15DSCOL002	Sludge Collector No. 2
15DSCOL003	Sludge Collector No. 3
15DSCOL004	Sludge Collector No. 4
15DSCOL005	Sludge Collector No. 5
15DSCOL006	Sludge Collector No. 6
15DSCOL007	Sludge Collector No. 7
15DSCOL008	Sludge Collector No. 8
15DSP301	FWW Sludge Pump No. 1
15DSP302	FWW Sludge Pump No. 2
15DSMOV101	Sludge Collector Valve No. 1
15DSMOV102	Sludge Collector Valve No. 2
15DSMOV103	Sludge Collector Valve No. 3
15DSMOV104	Sludge Collector Valve No. 4
15DSMOV201	Sludge Collector Valve No. 5
15DSMOV202	Sludge Collector Valve No. 6
15DSMOV203	Sludge Collector Valve No. 7
15DSMOV204	Sludge Collector Valve No. 8
15DSVLV303	FWW Sludge Pump Interconnection Valve

C. General Description:
   1. Two existing Filter Waste Washwater (FWW) Lagoons will be equipped with new 4 sludge collectors, each with a motorized valve. With the FWW Lagoon in service, the FWW Sludge Collectors will operate in sequence, one at a time, to remove sludge from the bottom of the Lagoons.
   2. Two new constant speed centrifugal pumps will draw from the sludge collector header pipe from each lagoon and pump it to the Gravity Thickener Splitter Box structure. A manual crossover valve (15DSVLV303) shall be provided to allow either pump to draw sludge from either lagoon.
   3. FWW Sludge Collectors and vendor control panels (15-VCP-01 and 15-VCP-02) shall be provided by the Vendor as indicated in specification section 11360. Each VCP shall be equipped with a PLC, Collector Drive VFDs, and a level transmitter at each Lagoon.
   4. Filter Washwater Sludge Pump No. 1 and No. 2 shall be provided with a common LCP (15-LCP-01).

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
         1) Filter Waste Washwater Lagoon No. 1 and No. 2.

a) Ultrasonic type level transducer (each lagoon) vendor supplied.

2. Sludge Collectors:
   a. A VCP including VFDs, PLC Control Logic, and all indicators and alarms shall be provided for each lagoon sludge collector system as specified in Section 11360.
3. Sludge Pumps:
   a. Instruments and Protective Devices:
      1) Local Disconnect switch (each pump).
      2) High Discharge Pressure switch (each pump).
      3) Low Suction Pressure switch (each pump).
   b. Control Devices:
      1) FWW Sludge Pumps: A local control panel (15-LCP-01) shall be provided with the following controls:
         a) HAND/OFF/REMOTE (each pump)
         b) RESET switch (each pump)
   a. Indicators and Alarms:
      1) Run indication for sludge collection pump (each pump).
      2) Fail ALARM for sludge collection pump (each pump).
      3) READY status for sludge collection pump (each pump).
      4) Low Suction Pressure ALARM (each pump).
      5) High Discharge Pressure ALARM (each pump).
   b. Hardwired Interlocks:
      1) Low-Low Level in the existing FWW Lagoon from the level transmitter shall STOP the sludge collectors.
      2) A low-pressure switch is hardwired to shutdown the pumps to prevent operation if the suction pressure is below the low-pressure setpoint. The low-pressure switch also provides an alarm to the FWW Sludge Pump Local Control Panel.
      3) A high-pressure switch is hardwired to shutdown the pumps to prevent operation if the discharge pressure is above the high-pressure setpoint. The high-pressure switch also provides an alarm to the FWW Sludge Pump Local Control Panel.
   c. Logic:
      1) Local Manual Control Mode:
         a) Each sludge collection pump can be selected using a selector switch P1/OFF/P2 at the VCP. The crossover valve must be in the proper configuration or the OPEN CROSSOVER VALVE alarm will be annunciated at the VCP.
         b) Each sludge collection pump can be started by placing the HAND/OFF/REMOTE selector switch in the HAND position at the FWW Sludge Pump LCP.
      2) Local Automatic Control Mode:
         a) When the HAND/OFF/REMOTE selector switch on the Sludge Collection Pumps' LCP is in the REMOTE position, the pumps shall be Started and Stopped remotely from the Sludge Collector System VCP. The sludge collection pumps can be selected from the VCP or SCADA. A manual crossover valve shall be provided to allow either pump to draw sludge from either lagoon. When Lagoon 1 is selected to operate with Sludge Collection Pump number 2 or when Lagoon 2 selected to operate with Sludge Collection pump 1 the light "Open Crossover Valve" shall be annunciated at the VCP if the valve

is closed and the operator shall open the crossover valve manually.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC/OIS Functions:
   1. Control:
      c. When LOCAL/OFF/REMOTE for Sludge Collector is in REMOTE position and IN SERVICE, the Operator may START and STOP the Sludge Collector System for each Lagoon from SCADA.
         1) Three start time setpoints for each Lagoon shall be selectable in SCADA. When each start time is initiated each sludge collector shall operate in sequence until one complete cycle has been completed.
      d. When LOCAL/OFF/REMOTE for Sludge Collector is in REMOTE position the collector rate of travel can be adjusted or set from the SCADA.
      e. When LOCAL/OFF/REMOTE for Sludge Collector is in REMOTE position FWW Sludge pumps for each Lagoon shall be selected from SCADA.
   4. Screen Indicators and Alarms at PLC/OIS:
      a. Sludge Collectors:
         1) System FAIL ALARM (each FWW lagoon system): An alarm shall be transmitted to SCADA for activated disconnect switch, and PLC fail.
         2) COMMON FAIL ALARM (each sludge collector): An alarm shall be transmitted to SCADA for activated E-STOP, VFD FAIL.
         3) Run indication (each sludge collector).
         4) Run time meter: SCADA shall accumulate total pump run time for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month and total runtime.
         5) Rate of Travel indicator controller setpoint adjustment (each sludge collector).
         6) READY status (each Lagoon): The READY status shall be transmitted to SCADA when the LOCAL/OFF/REMOTE selector switch is in REMOTE position, a system FAIL ALARM is not activated and system is ready to run.
         7) OUT OF SERVICE (for each device).
         8) Level indication (each Lagoon).
         9) LOW-LOW LEVEL ALARM (each Lagoon).
         10) Level Instrument Fail ALARM (each Lagoon).
         11) OPENED status (each sludge collector valve).
         12) CLOSED status (each sludge collector valve).
         13) Valve FAIL ALARM (each sludge collector valve).
         14) OPENED status (crossover valve).
         15) CLOSED status (crossover valve).
         16) OPEN CROSSOVER VALVE indication (crossover valve).
      b. Pumps:
         1) Pump 1/OFF/Pump 2 selection for each Lagoon in SCADA.
         2) COMMON FAIL ALARM: An alarm shall be transmitted to SCADA for motor starter overload low suction pressure, high discharge pressure, activated disconnect switch, and excessive starts per hour for each pump.
         3) Run indication.

4) Run time meter: SCADA shall accumulate total pump run time for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, and previous calendar month and total runtime.
5) READY indication: The status shall be transmitted to SCADA when HAND/OFF/REMOTE selector switch selected in REMOTE position at the LCP, a COMMON FAIL ALARM is not activated and pump is ready to run.

c. Software:
1) When LOCAL/OFF/REMOTE for Sludge Collector system is in REMOTE position and IN SERVICE, START/STOP of the Sludge Collectors is initiated based on the timer or based on operator initiation of the START/STOP selector switch. Three adjustable time set points to start and stop the Sludge Collection System shall be provided for each Lagoon from the SCADA. The START/STOP selector switch in SCADA shall over-ride the timer set points.

d. Alarms Generated by SCADA:
1) SCADA shall alarm on Excessive Starts per Hour. Initially Excessive Starts per Hour shall be set at 6 starts per hour (0-12 starts per hour).

G. Special Considerations:
1. Power outage and restore operation.
a. During power outages the Filter Waste Washwater Lagoon Sludge collectors with associated valves and pumps will not operate due to loss of power. The FWW lagoon system COMMON FAIL ALARM will be de-activated at SCADA during power outages. Upon restoration of the power, FWW lagoon associated equipment shall resume normal operation (collectors, valves, and pumps called based on the sequence of operation). Alarms will be re-activated at SCADA upon restoration of power.

3.02 GRAVITY THICKENERS

A. References:
1. Process Area: Gravity Thickeners.
2. P&ID Drawings: F18N-01.
3. Mechanical Drawings: F18M-01.
4. Specification Sections: 11352.

B. Mechanical Equipment:

Tag Number	Equipment Name
18DSTM001	Thickener Mechanism No. 1
18DSTM002	Thickener Mechanism No. 2

C. General Description:
1. Each Gravity Thickeners shall have a Thickener Sludge Collector Mechanism for collecting sludge from the bottom of the thickener and moving it towards the sludge hopper at the center of the thickener where it can be removed by the Thickened Sludge Pumps. Each Thickener Mechanism shall be supplied with a VCP (18-VCP-01 and 18-VCP-02). The VCP shall have an HOR switch to control the thickener sludge collector mechanism either Locally or Remotely.

D. Local Controls and Instrumentation:
   1. Thickener Mechanism:
      a. Each thickener mechanism shall be supplied with a VCP as specified in Section 11352.
   2. System:
      a. Instruments and Protective Devices:
         1) Infrared level transducer (Sludge blanket measurement for each gravity thickener).
         2) Ultrasonic type level transducer (splitter box).
         3) Turbidity Analyzer (each gravity thickener sampled at thickener overflow).
         4) Magnetic Flowmeters (FWW sludge collection pump discharge flow, centrate wetwell flow, existing sludge lagoons/sed basin flow).

E. MCC Controls and Instrumentation:
   1. None.

F. PLC/OIS Functions:
   1. Remote Manual Controls:
      a. When the HAND/OFF/REMOTE selector switch at the VCP is in the REMOTE position and IN SERVICE, the Operator may START and STOP the Gravity Thickener Sludge Collector Mechanism from SCADA. The thickener mechanism shall run continuously until it is stopped manually from SCADA.
   2. Remote Automatic Controls:
      a. None
   3. Screen Indicators and Alarms at PLC/OIS:
      a. System:
         1) COMMON FAIL ALARM (each thickener sludge collector mechanism): An alarm shall be transmitted to SCADA for motor starter overload, high torque, excessive runtime, and excessive starts per hour.
         2) Run indication (each thickener sludge collector mechanism).
         3) Run time meter: SCADA shall accumulate total mechanism run time for each mechanism for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, previous 14 days, month to date, and previous calendar month.
         4) READY status (each thickener sludge collector mechanism): The status shall be transmitted to SCADA when HAND/OFF/REMOTE selector switch selected in REMOTE position, a common FAIL ALARM is not activated and system is ready to run.
         5) Sludge Blanket Depth (each Gravity Thickener).
         2) Sludge Blanket Preset Concentration (each Gravity Thickener).
         6) Sludge Level Instrument Fail ALARM (each Gravity Thickener).
         7) Level indication (Splitter Box).
         8) Level Instrument Fail ALARM (Splitter Box).
         9) High Level ALARM (Splitter Box).
         10) High-High Level ALARM (Splitter Box).
         11) Turbidity measurement (each Gravity Thickener).
         12) Analyzer Fail ALARM (each Gravity Thickener).
         13) Total flow to Thickeners (calculated in the PLC based on summation of FWW Sludge Flow FIT/FE-013, Existing Sludge

Lagoon Flow-FIT/FE-015, Centrate Flow-FIT/FE-014, and flows from existing Sed Basin Blowdown Pump flowmeters).

14) Thickener Polymer Feed Flow (FIT/FE-781).

b. Software interlocks:

1) None.

3.03 THICKENED SLUDGE PUMPS

A. References:

1. Process Area: Thickened Sludge Pumps.
2. P&ID Drawing: F18N-02.
3. Mechanical Drawings: F18M-04, F18M-06.
4. Specification Sections: 11312R, 13448.

B. Mechanical Equipment:

Tag Number	Equipment Name
18DSP001	Thickened Sludge Pump No.1
18DSP002	Thickened Sludge Pump No.2
18DSMOV001	Gravity Thickener No.1 Thickened Sludge Pump Inlet Valve
18DSMOV002	Gravity Thickener No.2 Thickened Sludge Pump Inlet Valve

C. General Description:

1. Two new constant speed rotary lobe positive displacement pumps shall pump thickened sludge from the thickeners to the thickened sludge homogenizing tanks or to the existing sludge lagoons, or to the splitter box depending on the configuration of the manual valves located in the thickened sludge pump station.

D. Local Controls and Instrumentation:

1. System:
   a. Instruments and Protective Devices:
      1) Local Disconnect switch (each pump).
      2) High Discharge Pressure switch (each pump).
      3) Low Suction Pressure switch (each pump).
      4) Low Seal Water Pressure switch (each pump).
2. Local Control Panel:
   a. Control Devices:
      1) HAND/OFF/REMOTE selector switch at the LCP (each pump).
      2) RESET switch at the LCP (each pump).
      3) OPEN/STOP/CLOSE switch (each valve actuator).
      4) LOCAL/OFF/REMOTE selector switch (each valve actuator).
      5) DISCONNECT switch (each valve actuator).
   b. Indicators and Alarms:
      1) RUN indication (each pump) at LCP.
      2) FAIL ALARM (each pump) at LCP.
      3) READY status (each pump) at LCP.
      4) Low Suction Pressure ALARM (each pump) at LCP.
      5) High Discharge Pressure ALARM (each pump) at LCP.
      6) Seal Water Low Pressure ALARM (each pump) at LCP.
      7) Valve FAIL ALARM (each valve actuator).

8) OPENED status (each valve actuator).
9) CLOSED status (each valve actuator).
10) HIGH TORQUE ALARM (each valve actuator).

c. Interlocks:
1) A low-pressure switch is hardwired to shut down the pumps to prevent operation if the suction pressure is below the low-pressure setpoint. The low-pressure switch also provides an alarm to the Local Control Panel.
2) A high-pressure switch is hardwired to shutdown the pumps to prevent operation if the discharge pressure is above the high-pressure setpoint. The high-pressure switch also provides an alarm to the Local Control Panel.
3) A low-pressure switch is hardwired to shut down the pumps to prevent operation if the seal water pressure is below the low-pressure setpoint. The low-pressure switch also provides an alarm to the Local Control Panel.
4) In both the local and remote modes, when a pump is called to start, OPEN the seal water solenoid valve prior to starting the pump.

d. Logic:
1) Local Manual Control Mode:
a) Each thickened sludge pump can be started by placing the HAND/OFF/REMOTE in the HAND position at the Local Control Panel (LCP).
2) Local Automatic Control Mode:
a) None.

E. MCC Controls and Instrumentation:
1. None.

F. PLC/OIS Functions:
1. Controls:
a. SCADA Manual Control Mode:
1) When the HAND/OFF/REMOTE selector switch at the LCP is in the REMOTE position, IN SERVICE and the AUTO/MANUAL selector switch in SCADA is in MANUAL, the Operator may START and STOP the thickened sludge pump manually from the SCADA.

b. SCADA Automatic Control Mode:
1) When HAND/OFF/REMOTE selector switch is in REMOTE, IN SERVICE and AUTO/MANUAL switch is in AUTO, starting and stopping of the pump shall be based on 48 half-hour time slots where the Operator shall be able to enter which hour(s) each pump will start as well as the duration for each start time in SCADA. The pump shall shut-off at the end of the time slot or at a low density set point, adjustable by the Operator. The Operator shall also have the ability to override the low density shut-off in SCADA. An interlock shall also be provided to shutdown the pumps under a "NO AVAILABLE TANK" condition. An override in SCADA shall be provided to allow the pumps to operate once the valves have been configured to pump to the Sludge Lagoons.
2) When the LOR selector switch for the Gravity Thickener Thickened Sludge Pump Inlet Valve Actuators is in the REMOTE position, the valves shall alternate OPEN and CLOSED position just prior to

each pump START. If only one of the valves is in REMOTE position, that valve shall remain in the OPEN position. A pump shall not be permitted to START unless one of the valves is in the fully OPEN position.

2. Screen Indicators and Alarms at PLC/OIS:
   a. System:
      1) COMMON FAIL ALARM (each pump): An alarm shall be transmitted to SCADA for motor overload, high discharge pressure, low suction pressure, low seal water pressure, and excessive starts per hour.
      2) Run indication (each pump).
      3) Run time meter: SCADA shall accumulate total pump run time for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, previous 14 days, month to date, and previous calendar month.
      4) READY status (each pump): The status shall be transmitted to SCADA when HAND/OFF/REMOTE selector switch selected in REMOTE position, a COMMON FAIL ALARM is not activated, and system is ready to run.
      5) OUT OF SERVICE.
      6) OPENED status (each valve).
      7) CLOSED status (each valve).
      8) Valve FAIL ALARM(each valve).
      9) Pump Discharge Flow and Totalize Flow Indication.
      10) Low Discharge Flow ALARM.
      11) Sludge Density Indication.
   b. Software interlocks:
      1) Pumps shall not be allowed to start if neither of the Thickened Sludge Pump Inlet Valves are in the fully OPEN position.
      2) The pump shall shut-off at the end of the time slot or at a low density set point unless the low density override has been selected.
      3) An interlock shall also be provided to shutdown the pumps under a "NO AVAILABLE TANK" condition. An override in SCADA shall be provided to allow the pumps to operate once the valves have been configured to pump to the Sludge Lagoons.
   c. Alarms Generated by SCADA:
      1) SCADA shall alarm on Excessive Starts per Hour. Initially Excessive Starts per Hour shall be set at 6 starts per hour (0-12 starts per hour).

G. Special Considerations:
   1. None.

3.04 THICKENER OVERFLOW PUMPS

A. References:
   1. Process Area: Thickener Overflow pumps.
   2. P&ID Drawing: F18N-03.
   3. Mechanical Drawings: F18M-04, F18M-05.
   4. Specification Sections: 11312K.

B. Mechanical Equipment:

Tag Number	Equipment Name
18DSP003	Thickener Overflow Pump No.1
18DSP004	Thickener Overflow Pump No.2

C. General Description:
1. The thickener overflow pumps shall pump the overflow or underdrain flow from the thickeners to the existing Filter Waste Washwater Lagoons. The pumps shall be supplied with a Vendor Control Panel. The pumps shall operate in LEAD/LAG configuration based on the level in the overflow wet-well.

D. Local Controls and Instrumentation:
1. System:
   a. Instruments and Protective Devices:
      1) Ultrasonic level transducer (vendor supplied).
      2) Moisture detection switch (each pump).
      3) Motor high temperature switch (each pump).
      4) Level FLOOD switch (vendor supplied).
      5) Magnetic Flowmeter.
      6) High Discharge Pressure switch (each pump).
2. Pumps:
   a. A VCP shall be provided for the pump station as specified in Section 11312K.

E. MCC Controls and Instrumentation:
1. None.

F. PLC/OIS Functions:
1. Controls:
   a. None.
2. Screen Indicators and Alarms at PLC/OIS:
   a. System:
      1) HIGH-HIGH LEVEL ALARM (Wetwell Flood Alarm).
      2) Wetwell level indication.
      3) Level Instrument Fail ALARM.
      4) Discharge Flow and Totalize Flow Indication.
   b. Pumps:
      1) COMMON FAIL ALARM: An alarm shall be transmitted to SCADA for motor over temperature, motor moisture, motor starter overload, E-STOP Activation, High discharge pressure, and excessive starts per hour.
         a) Excessive starts per hour setpoint shall initially be set at 6 starts per hour (0-60 starts per hour).
      2) Run indication.
      3) Run time meter: SCADA shall accumulate total pump run time for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month and total runtime.
      4) READY status (each pump): The status shall be transmitted to SCADA when common alarm is not activated, pump is ready to run.
   c. Software Interlocks:
      1) None.

G. Special Considerations:
   1. Power Outages and Restore Operation:
      a. During power outages the thickener overflow pumps will not operate due to loss of power. The thickener overflow pump station COMMON FAIL alarms will be de-activated at SCADA during power outages, but FLOOD alarms will remain active. Upon restoration of power the pumps will operate as called for based on level setpoints. Alarms will be re-activated at SCADA upon restoration of power.

3.05 THICKENED SLUDGE PUMP STATION SUMP PUMP SYSTEM

A. References:
   1. Process Area: Thickened Sludge Pump Station.
   2. P&ID Drawing: F18N-04.
   3. Mechanical Drawings: F18M-04.
   4. Specification Sections: 11312J.

B. Mechanical Equipment:

Tag Number	Equipment Name
18DWP405	Thickened Sludge Sump Pump No. 1
18DWP410	Thickened Sludge Sump Pump No. 2

C. General Description:
   1. The thickener sump pumps shall pump the area floor drainage to the existing Plant Drain System. The pumps shall be supplied with a Vendor Control Panel 18-VCP-04. The pumps shall operate based on the level in the sump.

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices :
         1) Capacitance probe type level transducer (provided by the vendor).
         2) FLOOD Alarm Level Float switch.
   2. Pumps:
      a. Pumps shall be supplied with a VCP as specified in Section 11312J.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC/OIS Functions:
   1. Controls:
      a. None.
   2. Screen Indicators and Alarms at PLC/OIS:
      a. System:
         1) HIGH-HIGH LEVEL ALARM.
      b. Pumps:
         1) COMMON FAIL ALARM: An alarm shall be transmitted to SCADA for, motor starter overload, activated disconnect switch excessive runtime, and excessive starts per hour.
            a) Excessive runtime setpoint shall initially be set at 300 minutes (0-600 minutes).
            b) Excessive starts per hour setpoint shall initially be set at 8 starts per hour (0-60 starts per hour).
         2) Run indication.

3) Run time meter: SCADA shall accumulate total pump run time for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, and previous calendar month and total runtime.

c. Software Interlocks:

1) None.

G. Special Considerations:

1. Power Outages and Restore Operation:

a. During power outages the sump pumps will not operate due to loss of power. The sump pump station COMMON FAIL alarms will be de-activated at SCADA during power outages, but FLOOD alarms will remain active. Upon restoration of power the pumps will operate as called for based on level setpoints. Alarms will be re-activated at SCADA upon restoration of power.

3.06 THICKENED SLUDGE HOMOGENIZING TANKS

A. References: Thickened Sludge Homogenizing Tanks:

1. Process Area:
2. P&ID Drawing: F19N-01, and F19N-02.
3. Mechanical Drawings: F19M-01, F19M-05, F19M-13, and F19M-14.
4. Specification Sections: 11317, 13448.

B. Mechanical Equipment:

Tag Number	Equipment Name
19DSMIX001A	Thickened Sludge Homogenizing Tank Mixer No. 1
19DSMIX002A	Thickened Sludge Homogenizing Tank Mixer No. 2
19DSMIX003A	Thickened Sludge Homogenizing Tank Mixer No. 3
19DSMOV001	Thickened Sludge Homogenizing Tank No. 1 Inlet Valve
19DSMOV002	Thickened Sludge Homogenizing Tank No. 2 Inlet Valve
19DSMOV003	Thickened Sludge Homogenizing Tank No. 3 Inlet Valve
19DSMOV004	Thickened Sludge Homogenizing Tank No. 1 Drain Valve
19DSMOV005	Thickened Sludge Homogenizing Tank No. 2 Drain Valve
19DSMOV006	Thickened Sludge Homogenizing Tank No. 3 Drain Valve

C. General Description:

1. The Thickened Sludge Homogenizing Tanks shall receive thickened sludge from the thickened sludge pumps and provide storage and mixing for the sludge until it is ready to be processed by the Centrifuges. Each Thickened Sludge Homogenizing Tank will be provided with one Submersible Mixer supplied with a Vendor Control Panel (19-VCP-01, 02, and 03).

D. Local Controls and Instrumentation:

1. System:

a. Instruments and Protective Devices:

1) Ultrasonic level transducer (provided by mixer supplier per Section 11317).

2. Local Control Panel:

a. Each Homogenizing Tank Mixer shall be supplied with a VCP as specified in Section 11317.

b. Control Devices:

1) OPEN/STOP/CLOSE selector switch (each valve actuator).
2) LOCAL/OFF/REMOTE selector switch (each valve actuator).
3) DISCONNECT switch (each valve actuator).

c. Indicators and Alarms:
1) Valve FAIL ALARM (each valve actuator).
2) OPENED status (each valve actuator).
3) CLOSED status (each valve actuator).
4) HIGH Torque ALARM (each valve actuator).

d. Interlocks:
1) Refer to Section 11317 for VCP.

e. Logic:
1) Local Manual Control Mode:
a) Refer to Section 11317 for VCP.
2) Local Automatic Control Mode:
a) None.

E. MCC Controls and Instrumentation:
1. None.

F. PLC/OIS Functions:
1. Controls:
a. SCADA Manual Control Mode:
1) Mixers:
a) START/STOP switch shall be available for manual control of the mixers from SCADA.
2) An AUTO/MANUAL switch shall be provided in SCADA for each valve actuator. When the LOR for each actuator is in REMOTE position, IN SERVICE, and the switch is in MANUAL, the operator may OPEN or CLOSE the valves manually through SCADA.

b. SCADA Auto Control Mode:
1) Mixers:
a) No SCADA Automatic control is provided for the Mixers.
2) Tank Inlet Control Valves:
a) Tank inlet valve fill sequence shall be selectable on the Homogenizing Tank Screen in SCADA. When a Tank Inlet Valve's LOCAL/OFF/REMOTE selector switch is placed in REMOTE and MANUAL/AUTO SWITCH in AUTO position in SCADA, it shall OPEN when it is called based on its sequence assuming it does not have a "FULL TANK" status. When a tank reaches the "FULL TANK" status, the fill valve of the next tank in the fill sequence shall OPEN, the fill valve of the Full Tank shall then CLOSE. If the next valve in the sequence fails to open after a set period of time, a "FILL VALVE FAIL" Alarm shall be annunciated and the next tank inlet valve in the sequence shall OPEN. If all available tanks have a "FULL TANK" status, a "NO AVAILABLE HOMOGENIZING TANK" Alarm shall be annunciated in SCADA which shall in turn cause the Thickened Sludge Pumps to shutdown. Placing a valve in LOCAL at the actuator or AUTO/MANUAL in MANUAL in SCADA position shall remove the tank from the filling sequence queue.
3) Tank Discharge Valves:

a) When the LOCAL/OFF/REMOTE selector switch in REMOTE, IN SERVICE and MANUAL/AUTO in AUTO position in SCADA the tank discharge valves shall OPEN when a tank is selected to feed sludge to a Centrifuge. This selection shall be made on the Centrifuge SCADA Screen. The status of each tank shall be displayed on the Centrifuge SCADA screen as follows:
b) Out of Service (selected by operator). This selection inhibits the Inlet or Discharge valves from opening.
c) Filling (Tank Inlet Valve in OPEN Position).
d) Draining (Tank Discharge Valve is OPEN).
e) Empty (Tank at Operator Selectable Tank LOW Level Setpoint 2, Default Setting = 1' Tank Depth).
f) Available (If none of the above conditions are true).
g) The discharge valve shall CLOSE after a different tank is selected for draining to the Centrifuge and that tank's Discharge Valve is in the fully OPEN position.. When the Homogenizing Tank reaches the Tank LOW Level Setpoint 1 (Operator adjustable, Default Setting = 3' Tank Depth), a "SWITCH HOMOGENIZING FEED TANK" Alarm shall be displayed in SCADA on both the Centrifuge SCADA Screen and Homogenizing Tank SCADA Screen. When the Tank reaches the Tank LOW Level Setpoint 2, the associated Centrifuge Feed Pump shall STOP and a "HOMOGENIZING TANK EMPTY" Alarm shall be annunciated in SCADA.

2. Screen Indicators and Alarms at PLC/OIS:
   a. System:
      1) For each Homogenizing Tank:
         a) HIGH Level ALARM-TANK is FULL.
         b) LOW level ALARM-TANK is EMPTY.
         c) TANK level indication.
         d) Level Instrument Fail ALARM.
   b. Mixers:
      1) For Each Mixer Provide:
         a) COMMON FAIL ALARM: An alarm shall be transmitted to SCADA for motor overload, and moisture detection.
         b) Run indication.
         c) Run time meter: SCADA shall accumulate total pump run time for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, previous 14 days, month to date, and previous calendar month.
         d) READY status: The status shall be transmitted to SCADA when HAND/OFF/REMOTE selector switch selected in REMOTE position, the mixer fail alarm is not activated, and the mixer ready to run.
         e) OUT OF SERVICE
   c. Valves with Actuators:
      1) Each Motor Actuated Valve shall have the following:
         a) OPENED status.
         b) CLOSED status.
         c) In REMOTE status.
         d) HIGH TORQUE ALARM.
         e) Valve FAIL ALARM.

d. Software Interlocks:
   1) If all available tanks have a "FULL TANK" status, a "NO AVAILABLE HOMOGENIZING TANK" Alarm shall be annunciated in SCADA.
   2) When the Homogenizing Tank reaches the Tank LOW Level Setpoint 1, a "SWITCH HOMOGENIZING FEED TANK" Alarm shall be displayed in SCADA on both the Centrifuge SCADA Screen and Homogenizing Tank SCADA Screen. When the Tank reaches the Tank LOW Level Setpoint 2, the associated Centrifuge Feed Pump shall STOP and a "HOMOGENIZING TANK EMPTY" Alarm shall be annunciated in SCADA.
   3) If the Level in the Thickened Sludge Homogenizing Tank reaches the Operator adjustable HIGH-HIGH Level setpoint, a "HOMOGENIZING TANK OVERFILLED" alarm shall be generated in SCADA and the Thickened Sludge Pumps shall be shutdown and prevented from starting until the alarm is cleared.
   4) If the Level in the Thickened Sludge Homogenizing Tank reaches the LOW Level Setpoint 1 (field-matched to the LOW level setpoint at the Vendor Control Panel), and a Mixer is running, a "MIXER FAIL TO STOP" alarm shall be generated in SCADA.

G. Special Considerations:
   1. Power Outages and Restore Operation:
      a. During Power Outage the alarms associated with the Homogenizing Tank and Mixers will be de-activated at SCADA. Upon Power Restore the Homogenizing Tank Mixers will restart as long as local switches are still in HAND or REMOTE position. Also when Power is restored the Homogenizing Tank and Mixer alarms will be re-activated at SCADA.

3.07 CENTRIFUGE SLUDGE FEED SYSTEM

A. References:
   1. Process Area: Centrifuge Sludge Feed System.
   2. P&ID Drawing: F19N-03, F19N-05.
   3. Mechanical Drawings: F19M-05.
   4. Specification Sections: 11312I, 11334.

B. Mechanical Equipment:

Tag Number	Equipment Name
19DSGDR110	Sludge Grinder No. 1
19DSGDR210	Sludge Grinder No. 2
19DSP121	Centrifuge Feed Pump No. 1
19DSP221	Centrifuge Feed Pump No. 2
19DSVLV165	Centrifuge Feed Pump Discharge Diversion Valve
19DSVLV165	Centrifuge Feed Pump No. 1 Discharge Diversion Valve
19DSVLV166	Centrifuge Feed Pump No. 1 Magmeter Isolation Valve

C. 19DSVLV266Centrifuge Feed Pump No. 2 Magmeter Isolation Valve General Description:
   1. Two Centrifuge Sludge Feed Pumps are provided for pumping Thickened Sludge from the Homogenizing Tanks to the two Centrifuges. Diversion and Isolation valve shall be provided to allow a pump to pump sludge to a different

centrifuge. A sludge grinder is provided on the suction side of each centrifuge feed pump to prevent large objects from entering the pump or centrifuge and causing damage. The Centrifuge Feed Pump Local control is from the VFD faceplate installed in the Local Control Panel adjacent to each pump. The Sludge Grinders shall each have a VCP (19-VCP-05, and 19-VCP-08).

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
         1) Magnetic Flowmeter (at discharge of each pump)
         2) Centrifuge Feed Pump (each pump):
            a) High Motor Winding Temperature switch (supplied by the pump vendor)
            b) High Stator Run Dry Temperature switch (supplied by the pump vendor).
         3) Seal Water Low Pressure switch (each pump).
         4) Low Suction Pressure switch (each pump).
         5) High Discharge Pressure switch (each pump).
         6) Discharge Pressure Indicating Transmitter (each pump).
         7) Crossover Valve Open Limit Switches.
   2. Centrifuge Feed Pumps:
      a. Control Devices:
         1) Each Pump LCP shall have an integral VFD and shall include the following Local Controls:
            a) HAND/OFF/REMOTE selector switch.
            b) E-STOP pushbutton.
            c) RESET Switch.
            d) Speed Controller.
         2) Each Pump LCP shall contain the following Indicators and Alarms:
            a) High Winding Temperature ALARM.
            b) High Stator Run Dry Temperature ALARM.
            c) Seal Water Low Pressure ALARM.
            d) Low Suction Pressure ALARM.
            e) High Discharge Pressure ALARM.
            f) VFD fail ALARM.
            g) READY status.
            h) Run Indication.
            i) Total Run time.
            j) Speed indicator.
            k) Current Indicator.
         3) Sludge Grinders.
      b. Provide each sludge grinder with a VCP as specified in Section 11334.
      c. Interlocks:
         1) Activation of the HIGH Discharge Pressure Switch, HIGH stator temperature alarm, HIGH motor winding high temperature alarm, Seal Water Low Pressure Switch, Suction Low Pressure Switch or Overload due to high current shall result in shutdown of the associated Centrifuge Feed Pump.
         2) In both the local and remote modes, when a pump is called to start, OPEN the seal water solenoid valve prior to starting the pump.

d. Logic:
   1) Local Manual Control Mode:
      a) Each centrifuge feed pump can be started locally by putting the HAND/OFF/REMOTE selector switch at the LCP in HAND. Pump speed may be adjusted locally by changing the speed output from the pushbuttons at the VFD Faceplate.
   2) Local Automatic Control Mode:
      a) None.

E. PLC/OIS Functions:
   1. Controls:
      a. Centrifuge Feed Pumps
         1) Remote Automatic Control Mode:
            a) When the HAND/OFF/REMOTE switch for the centrifuge feed pump is in the REMOTE position, and IN SERVICE, the pump shall start and stop automatically and ramp up or down based on signal from PLC-19. The pump flow (sludge feed) setpoint can be adjusted at either the Centrifuge Operating Panel (COP) or in the SCADA Centrifuge Screen. The pump start and stop signals shall be based on the signal from the COP as described in the Centrifuge Systems section of this specification Section.
            b) The Centrifuge Feed Pump associated with a particular Centrifuge shall be determined by the manual valve position feedback of the Discharge Diversion and Magmeter Isolation Valves to PLC-19. PLC-19 shall communicate the Feed Pump that is positioned to operate with the associated Centrifuge and the flow setpoint (selectable in lbs/hr or gpm) to that Centrifuge which has been selected through SCADA.
            c) Pump RUN status shall be transmitted to SCADA and to the COP for indication.
            d) Flowrate and Totalization of sludge flow from the Centrifuge Feed Pump shall be indicated at SCADA from the flow meter via Ethernet. Flow indication shall be transmitted from SCADA to the Centrifuge Operating Panel via Modbus protocol.
      b. Sludge Grinders:
         1) Remote Automatic Mode:
            a) When the HAND/OFF/REMOTE switch for the sludge grinder is in the REMOTE position and IN SERVICE, the grinder shall start and stop automatically when its associated Centrifuge Feed Pump is called to start or stop.
            b) The AUTO/OVERRIDE switch shall be selected by the operator when the grinder bypass is being used to bypass sludge flow around a grinder. This override will allow the Centrifuge system to operate without the grinder by sending a grinder RUN signal to the COP.
      c. Alarms Generated By SCADA:
         1) For each Centrifuge Feed Pump there shall be a "No Flow" alarm that alarms at SCADA when a Pump is called to run or is running and the flow meter indicates a "No Flow" condition. An adjustable time delay (initially set at 15 seconds) shall allow a "No Flow" condition during startup without a "No Flow" alarm.

2) There shall be a "Flow out of range" warning alarm that alarms at SCADA when the actual flow (measured by the flow meter) is outside the desired flow setpoint by more than a certain range(adjustable setpoint, Default = 10% higher and 10% lower). An adjustable time delay (initially set at 15 seconds) shall allow the flow to deviate from the setpoint flow during startup without causing a warning alarm.

2. Screen Indicators and Alarms at PLC/OIS:
   a. System:
      1) Discharge Flow and Totalize flow indication.
         a) SCADA shall accumulate total flow for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, previous 14 days, and previous calendar month. Totals shall be recorded for overall Centrifuge Feed Flow (flow to all Centrifuges) as well as individual Solids Flow (to individual Centrifuge).
      2) OPENED status for each manual diversion and isolation valve.
   b. Centrifuge Feed Pumps:
      1) COMMON FAIL ALARM: An alarm shall be transmitted to SCADA for motor overload, High Stator Temperature "Run Dry", High Discharge Pressure, Low Seal Water Flow; and E-Stop activation.
      2) RUN indication.
      3) Run time meter: SCADA shall accumulate total pump run time for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, previous 14 days, month to date, and previous calendar month.
      4) READY status (each pump): The status shall be transmitted to SCADA when HAND/OFF/REMOTE selector switch selected in REMOTE position, and the pump is ready to run.
      5) OUT OF SERVICE.
      6) Speed Indication.
      7) Discharge Pressure Indication.
   c. Grinder:
      1) COMMON FAIL ALARM: This alarm shall be transmitted to SCADA from the grinder VCP.
      2) Run indication.
      3) Run time meter: SCADA shall accumulate total pump run time for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, previous 14 days, month to date, and previous calendar month.
      4) READY status (each grinder): The status shall be transmitted to SCADA when HAND/OFF/REMOTE selector switch selected in REMOTE position, and the grinder is ready to run.
   d. Software Interlocks:
      1) As specified in the Centrifuge System Control Strategy.

F. Special Considerations:
   1. Power Outages and Restore Operation:
      a. During the Power Outage the Centrifuge Feed Pumps will de-energize and stop due to loss of power. During Power Outage the alarms associated with the Pumps will be de-activated at SCADA. Upon Power Restore the Pumps will restart as long as local switches are still in

MANUAL and ON position, or AUTO position with request to run from Centrifuge Operating Panel. Also when Power is Restored the Feed Pumps alarms will be re-activated at SCADA.

3.08 CENTRIFUGE SYSTEMS

A. References:
   1. Process Area: Centrifuge Systems.
   2. P&ID Drawings: F19N-04, and F19N-06.
   3. Mechanical Drawings: F19M-06, and F19M-07.
   4. Specification Sections: 11358, 13448.

B. Mechanical Equipment:

Tag Number	Equipment Name
19DSCTF001	Centrifuge System No. 1
19DSCTF002	Centrifuge System No. 2
19DSG115	Diverter Gate No. 1
19DSG215	Diverter Gate No. 2
19UWMOV105	Centrifuge No. 1 Washwater Valve
19USMOV110	Diverter Gate No. 1 Washwater Valve
19UWMOV205	Centrifuge No. 2 Washwater Valve
19USMOV210	Diverter Gate No. 2 Washwater Valve

C. General Description:
   1. Two Centrifuges shall be provided with Centrifuge Operating Panels (19-VCP-04, and 19-VCP-07). Centrifuge System control PLCs shall be located in the COPs. Centrifuge Starter Panels (19-VCP-06, and 19-VCP-09) shall supply power to the centrifuge drives and will include the VFD for the Centrifuge Main Drives and Back Drives.
   2. Each Centrifuge System will be supported by Centrifuge Polymer Feed System, Centrifuge Sludge Feed System and Cake Conveyor System. Each COP shall have a dedicated PLC which shall control all aspects of Centrifuge System operation During normal operation, all of the above equipment for one particular system shall be set to Automatic, and shall be controlled automatically by the plant PLC or PLC within the Centrifuge Operating Panel (COP).
   3. Each Centrifuge shall be controlled locally through its Centrifuge Operating Panel or remotely through PLC-19 OIS. Each COP will have an Operator Interface Terminal (OIT) mounted at the front of the COP enclosure for operator control, monitoring and settings interface. Two PLC-19 OIS's shall be located in the Dewatering Building, one at each level.

D. Local Controls and Instrumentation:
   1. System:
      a. Controls:
         1) Each Centrifuge shall be supplied with a vendor supplied Centrifuge Operating Panel (COP) and Starter Panel (CSP) as specified in Section 11358 and as indicated on the Drawings.
         2) The following outputs from COP to field mounted devices will be required at a minimum.
            a) Wash water valve open command.
            b) Wash water valve close command.

c) Diverter gate open command.
d) Diverter gate close command.
e) Diverter gate wash water valve open command.
f) Diverter gate wash water close command.
g) Cake conveyor water valve open command.
h) Lube oil cool water valve open command (if applicable).

b. Instruments and Protective Devices (vendor supplied):
1) As specified in Section 11358 and as indicated on the Drawings.

E. PLC/OIS Functions:
1. Controls:
a. System:
1) The Centrifuge System control screen in the PLC/OIS shall allow for control and adjustment of various ancillary equipment and process parameters necessary for control of the Centrifuges which in turn shall be communicated to the COP. These include the Sludge Homogenizing Tanks, Centrifuge Sludge Feed Pumps, Centrifuge Polymer Feed Pumps and shall be as follows:
a) Homogenizing Tank Selection to Feed to Centrifuge.
(1) The status/availability of each tank shall be displayed on the Centrifuge SCADA screen.
b) Centrifuge Sludge Feed Pump Selection.
(1) If a Feed Pump is selected without the correct valve configuration in place, an "OPEN CENTRIFUGE FEED PUMP BYPASS VALVE" Alarm shall be annunciated.
c) Sludge Feed Rate Setpoint Selection.
d) Polymer Feed Pump Selection.
(1) If a Feed Pump is selected without the correct valve configuration in place, an "OPEN CENTRIFUGE POLYMER FEED PUMP BYPASS VALVE" Alarm shall be annunciated.
e) Polymer Feed Rate Setpoint Selection.
2) Centrifuge:
a) Centrifuge Auto Shutdown Initiation Switch. This switch shall allow the operator to initiate an auto shut-down of the Centrifuge through SCADA.
b) After a start-up has been completed through the COP and the Centrifuge is in operation, the operator shall be capable of entering a shutdown time in SCADA to end a process run. At the end of the run time the COP control system will automatically begin a shutdown and cleaning cycle.
c) Centrifuge Pause mode – Pause refers to the temporary stopping and starting of the process pumps (polymer and sludge feed). This feature shall be available through SCADA allowing the sludge and polymer feed to temporarily stop. The operator may also select a Bin change pause in which the sludge and polymer shall stop, the diverter gate shall close, and the washwater valves will open for a variable time to push the majority of the material out the solids end of the machine. Once the wash water de-energizes, spillage will be at a minimum allowing a cleaner method of changing cake bins. In

either case, depressing the Resume push button, the process pumps shall restart at the previous settings.

d) Additionally, all operator interface parameters from the COP PLC shall be made available through Ethernet connection in PLC-19. This shall allow each COP to be accessible through the PLC-19 HMIs. However, startup of the Centrifuge through the PLC-19 HMIs shall not be made available.

e) The following control outputs shall be provided from each COP to PLC-19.

(1) Selected polymer feed pump run command.

(2) Selected sludge feed pump run command.

(3) Cake conveyor system run command.

2. Screen Indicators and Alarms at PLC/OIS:

a. Centrifuge System: All the alarms and indicators available in the COP OIT shall be made available in SCADA. Additionally, provide the following:

1) Fail Alarm: A common centrifuge fail alarm shall be annunciated in SCADA if there is a loss of communication with the COP or if one of the Centrifuge Shutdown Alarms as defined in Section 11358 occurs.

2) Trouble Alarm: This alarm shall be annunciated if an ancillary related alarm as defined in Section 11358 occurs.

3) Centrifuge Run indication.

4) Centrifuge Run time meter: SCADA shall accumulate total centrifuge run time for each centrifuge for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month and total runtime.

5) Homogenizing Tank Status for each Homogenizing Tank.

6) Selected Centrifuge Feed Pump Flow Indication.

7) Selected Polymer Feed Pump Flow Indication.

8) OPEN/CLOSE status for Washwater Influent Valve.

9) OPEN/CLOSE status for Diverter Gate Washwater Valve.

10) OPEN/CLOSE status for Diverter Gate.

b. Software Interlocks:

1) As described in Section 11358 including but not limited to the following:

a) Conveyor No. 1 or No. 2 Fail Alarm or shutdown shall trigger a shutdown of all Centrifuges.

F. Special Considerations:

1. Power Outages and Restore Operation:

a. Power Outage and Restore Operation: During Power Outage the Centrifuge System will de-energize and stop due to loss of power. During Power Outage the alarms associated with the Centrifuge Systems will be de-activated at SCADA. Upon Power Restore the Centrifuge Systems will remain Stopped and await Operator local Reset and manual initiate to restart system. Also when Power Restored the Centrifuge Systems alarms will be re-activated at SCADA.

3.09 CENTRIFUGE SYSTEM CONVEYORS AND TRUCK LOADING

A. References:

1. Process Area: Centrifuge System Conveyors and Truck Loading.
2. P&ID Drawing: F19N-07, F19N-08 and F19N-09.
3. Mechanical Drawings: F19N-08, and F19M-09.
4. Specification Sections: 14556, 13448.

B. Mechanical Equipment:

Tag Number	Equipment Name
19DSCON101	Conveyor No. 1
19DSCON102	Conveyor No. 2
19DSCON103	Truck Loading Bay Conveyor
19DSG187	Conveyor Slide Gate No. 1
19DSG193	Conveyor Slide Gate No. 2
19DSG194	Conveyor Slide Gate No. 3
19DSG199	Conveyor Slide Gate No. 4
19DSG198	Conveyor Slide Gate No. 5
19DSG197	Conveyor Slide Gate No. 6

C. General Description:
1. Conveyor No. 1, Conveyor No, 2, and the Truck Loading Bay Conveyor and associated motor actuated gates, shall be provided for conveyance of Dewatered Sludge, or "cake", from the Centrifuges located in the Dewatering Building to the Truck Loading Area or to the Sludge Drying Bed area. All three Centrifuges discharge into Conveyor No. 1 which in turn can discharge into either Conveyor No. 2 or into the Truck Loading Bay Conveyor depending on the gate positions.

D. Local Controls and Instrumentation:
1. System:
   a. Instruments and Protective Devices: Vendor supplied as specified in Section 14556.
   b. E-STOP (Vendor supplied per 14556).
2. Local Control Panel:
   a. A Vendor Control Panel (VCP) shall be supplied for each conveyor as specified in Section 14556.
   b. Gate actuator controls shall be vendor supplied as specified in Section 14556 and 13448.

E. MCC Controls and Instrumentation:
1. None.

F. PLC/OIS Functions:
1. Conveyor Controls:
   a. When the HAND/OFF/REMOTE selector switches at the VCPs are in the REMOTE position and IN SERVICE, the Conveyors shall start and stop based on commands from the Plant PLC/OIS.
   b. The Auto/Manual selector switch in the PLC/OIS shall allow the conveyors to be started either manually or automatically from the PLC/OIS.
      1) Remote Manual Mode:
         a) In Manual Mode the operator may START or STOP individual conveyors remotely from SCADA.
         b) With conveyor gates in manual mode, the operator may OPEN or CLOSE selected gates remotely from SCADA.

2) Remote Auto Mode:
   a) In Auto Mode the PLC shall automatically start and stop Conveyor No. 1 and Conveyor No. 2 to operate in conjunction with the Centrifuges.
   b) When a Centrifuge is called to start, the signal from the COP to start the conveyors shall be transmitted to the Plant PLC and from the Plant PLC shall be transmitted to the VCP of the conveyors.
   c) RUN status of each Conveyor shall be transmitted from the VCP to the SCADA/HMI for indication. The Centrifuges shall not be allowed to start until RUN status is received from both Conveyors No. 1 and No. 2.
   d) From SCADA, the Operator shall be able to select Truck Loading mode. This selection shall automatically start the Truck Loading Bay Conveyor and Open gate 19DSG-101 to allow sludge to be conveyed to the truck loading bay. Conveyors No. 1 and No. 2 shall continue to run in this mode.

2. Screen Indicators and Alarms at PLC/OIS:
   a. Conveyors:
      1) RUNNING Status.
      2) READY Status.
      3) OUT OF SERVICE.
      4) FAIL (motor overload) Alarm.
      5) ZERO SPEED Alarm.
      6) Run Time Meter- The PLC shall accumulate total Conveyor Run Time for each conveyor for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, previous 14 days, and previous calendar month.
   b. Gate Actuators:
      1) OPEN Status.
      2) CLOSED Status.
      3) In REMOTE Status.
      4) FAIL Status.
3. Software Interlocks:
   a. As indicated in Centrifuge Control Strategy.

G. Special Considerations:
   1. Power Outages and Restore Operation:
      a. Power Outage and Restore Operation: During Power Outage the Centrifuge System Conveyors will de-energize and stop due to loss of power. During Power Outage the alarms associated with the Centrifuge Systems Conveyors will be de-activated by the Plant PLC. Upon Power Restore the Centrifuge System Conveyors will remain Stopped and await Operator local Reset and manual initiate to restart system. Also when Power Restored the Centrifuge System Conveyors alarms will be re-activated by the Plant PLC.

3.10 CENTRATE PUMPS

A. References:
   1. Process Area: Centrate Pumps.
   2. P&ID Drawing: F19N-10.

3. Mechanical Drawings: F19M-15, F19M-16, F19M-17, and F19M-18.
4. Specification Sections: 11312K.

B. Mechanical Equipment:

Tag Number	Equipment Name
19DSP101	Centrate Pump No. 1
19DSP102	Centrate Pump No. 2
19DSP105	Centrate Pump No. 3
19DSP106	Centrate Pump No. 4

C. General Description:
1. The Centrate pumps in Centrate Wetwell No. 1 shall pump the centrate flow from the centrifuges to the thickener splitter box. The pumps shall be supplied with a Vendor Control Panel. The second set of centrate pumps in Centrate Wetwell No. 2, shall pump the centrate flow from the centrifuges to the sanitary sewer forcemain. The pumps shall operate based on level control in the centrate wet-well.

D. Local Controls and Instrumentation:
1. System:
   a. Instruments and Protective Devices:
      1) Ultrasonic level transducer (vendor supplied).
      2) Moisture detection switch alarm (each pump).
      3) Motor high temperature switch alarm (each pump).
      4) Level FLOOD switch (vendor supplied).
      5) High Discharge Pressure switch (each pump).
      6) Magnetic Flowmeter.
2. Pumps:
   a. Pumps shall be supplied with a VCP as specified in Section 11312K.

E. MCC Controls and Instrumentation:
1. None.

F. PLC/OIS Functions:
1. Controls:
   a. None.
2. Screen Indicators and Alarms at PLC/OIS:
   a. System:
      1) HIGH-HIGH LEVEL ALARM (Wetwell Flood Alarm).
      2) Wetwell level indication.
      3) Level Instrument Fail ALARM.
      4) Discharge Flow and Totalize Flow Indication.
   b. Pumps:
      1) COMMON FAIL ALARM: An alarm shall be transmitted to SCADA for motor over temperature, motor moisture, motor starter overload, E-STOP Activation, and excessive starts per hour.
         a) Excessive starts per hour setpoint shall initially be set at 8 starts per hour (0-20 starts per hour).
      2) Run indication.
      3) Run time meter: SCADA shall accumulate total pump run time for each pump for the current day (reset at midnight), previous calendar

day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month, and total runtime.

4) READY status (each pump): The status shall be transmitted to SCADA when a common alarm is not activated, and pump is ready to run.

5) OUT OF SERVICE

c. Software Interlocks:

1) None.

G. Special Considerations:

1. Power Outages and Restore Operation:

a. During power outages the Centrate pumps will not operate due to loss of power. The Centrate pumps station COMMON FAIL alarms will be de-activated at SCADA during power outages, but FLOOD alarms will remain active. Upon restoration of power the pumps will operate as called for based on level setpoints. Alarms will be re-activated at SCADA upon restoration of power.

3.11 DEWATERING POLYMER MAKEUP AND AGING (BATCHING) SYSTEM.

A. References:

1. Process Area: Dewatering Polymer Makeup And Aging (Batching) System.
2. P&ID Drawing: F19N-11, F19N-12, F19N-13, and F19N-14.
3. Mechanical Drawings: F19M-10, and F19M-11.
4. Specification Sections: 11256.

B. Mechanical Equipment:

Tag Number	Equipment Name
19PDP715	Emulsion Polymer Pump No. 1
19PDS710	Dry Polymer Blower
19PDFDR001	Dry Polymer Feeder
19PDMOV001	Dry Polymer Diverter Valve
19PDP740	Utility Water Booster Pump
19PDMIX730	Polymer Mixer No. 1
19PDMIX735	Polymer Mixer No. 2
19PDMIX740	Polymer Mixer No. 3
19PDMOV731	Polymer Tank No. 1 Drain Valve
19PDMOV736	Polymer Tank No. 2 Drain Valve
19PDMOV741	Polymer Tank No. 3 Drain Valve

C. General Description:

1. The Dewatering Polymer Batching System is provided to prepare Dry or Emulsion Polymer into a dilute solution to serve as a dewatering aid to the Gravity Thickeners and Centrifuges. The Polymer Feed Pumps will deliver the polymer solution from the Polymer Tanks to the Thickeners or Centrifuges. All equipment including the vendor supplied Polymer Vendor Control Panel (19-VCP-16) shall be supplied by the vendor as specified in Section 11256.

D. Local Controls and Instrumentation:

1. System:

a. Instruments and Protective Devices (provided by the vendor):

1) As specified in Section 11256 and as indicated on the Drawings.

b. Control Devices: All Polymer Batching System components shall be controlled through the VCP as specified in Section 11256.
   1) As recommended by vendor. Refer to specification Section 11256.
c. Logic:
   1) System Logic shall reside in the system PLC located in the VCP as specified in Section 11256.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC/OIS Functions:
   1. Controls:
      a. None.
   2. Screen Indicators and Alarms at PLC/OIS:
      a. System
         1) The polymer system control panel shall include the following alarms and indications which shall be communicated to SCADA:
            a) Polymer System in AUTO.
            b) Polymer System RUN Status.
            c) Polymer System OUT OF SERVICE.
            d) Polymer System RUN time indication.
            e) Emulsion Polymer Low Level (when in Emulsion Feed Mode Only).
            f) Emulsion Polymer Weight Scale Indication.
            g) Dry Polymer Blower READY status.
            h) Dry Polymer Blower OUT OF SERVICE.
            i) Dry Polymer Blower LOW Air Pressure Alarm.
            j) Emulsion Polymer READY status.
            k) Emulsion Polymer RUN status.
            l) Emulsion Polymer OUT OF SERVICE.
            m) Loss of Emulsion Polymer Flow Alarm (Based on Emulsion Polymer Pump FAIL Alarm).
            n) High Hopper Level Alarm.
            o) Low Hopper Level Alarm.
            p) Dry Polymer Feeder RUN status
            q) Dry Polymer Feeder OUT OF SERVICE.
            r) Dry Polymer Feeder FAIL Alarm.
            s) Dry Polymer Feeder READY status.
            t) Polymer Flow Rate and Totalizer (calculated in Vendor PLC).
            u) Dry Polymer Diverter Valve Position Indication.
            v) Dry Polymer Diverter Valve FAIL Alarm.
            w) Dry Polymer Diverter Valve READY status.
            x) Utility Water Booster Pump READY status.
            y) Utility Water Booster Pump RUN status.
            z) Utility Water Booster Pump Run Time Indication.
            aa) Utility Water Booster Pump OUT OF SERVICE.
            bb) Utiltiy Water Booster Pump FAIL Alarm.
            cc) Utility Water System Pressure Indication.
            dd) Utility Water Systel LOW Pressure Alarm.
            ee) For Each Polymer System Motor Actuated Valve Provide the Following:
               (1) High Torque Alarm.

(2) OPEN/CLOSE status.
(3) FAIL Alarm.

ff) For Each Polymer Tank Provide the Following Indications and Alarms:
(1) Mixer RUN status.
(2) Mixer FAIL Alarm.
(3) Mixer READY status.
(4) Mixer OUT OF SERVICE.
(5) Tank HIGH Level Alarm.
(6) Tank Level Indication.
(7) Tank Low Level Alarm.

b. Software Interlocks:
1) If all Polymer Tanks have a Low Level status, all Thickener Polymer Feed and Centrifuge Polymer Feed Pumps shall be shut down and a "POLYMER SYSTEM EMPTY" Alarm shall be annunciated in SCADA.

G. Special Considerations:
1. Power Outages and Restore Operation:
a. During power outages the Centrate pumps will not operate due to loss of power. The thickener overflow pump station COMMON FAIL alarms will be de-activated at SCADA during power outages, but FLOOD alarms will remain active. Upon restoration of power the pumps will operate as called for based on level setpoints. Alarms will be re-activated at SCADA upon restoration of power.

3.12 CENTRIFUGE POLYMER FEED SYSTEM

A. References:
1. Process Area: Centrifuge and Thickener Polymer Feed Systems.
2. P&ID Drawings: F19N-15.
3. Mechanical Drawings: F19M-11.
4. Specification Sections: 11312I.

B. Mechanical Equipment:

Tag Number	Equipment Name
19PDP750	Polymer Feed Pump No.1
19PDP755	Polymer Feed Pump No.2
19PDVLV753	Centrifuge No. 1 Polymer Feed Valve
19PDVLV754	Centrifuge Polymer Feed Bypass Valve
19PDVLV758	Centrifuge No. 2 Polymer Feed Valve

C. General Description:
1. Two Centrifuge Polymer Feed Pumps (19PDP-750, and 19PDP-755) are provided for feeding Polymer to two Centrifuges. The vendor supplied Centrifuge Polymer Feed Vendor Control Panel (19-VCP-17) has a PLC and shall control both Pumps.

D. Local Controls and Instrumentation:
1. System:
a. Instruments and Protective Devices:
1) Electrical magnetic flow meters.

b. Indicators and Alarms:
   1) Flow rate indication.
   2) Position Indication for each valve.

2. Polymer Feed Pumps:
   a. A Vendor Control Panel shall be supplied to serve the three pumps as specified in Section 11312I. Pump VFDs shall also be housed in the VCP.
   b. Logic:
      1) As specified in Section 11312I.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC OIS Functions:
   1. Polymer Feed Pumps:
      a. Remote Manual Control Mode:
         1) None.
      b. Remote Automatic Control Mode:
         1) When the HAND/OFF/REMOTE switch for the centrifuge polymer feed pump is in the REMOTE position, and IN SERVICE the pump shall start and stop automatically and ramp up or down based on signal from PLC-19. The pump flow (polymer feed) setpoint can be adjusted at either the Centrifuge Operating Panel (COP) or in the SCADA Centrifuge Screen. The pump start and stop signals shall be based on the signal from the COP as described in the Centrifuge Systems section of this specification Section.
         2) The Centrifuge Feed Pump associated with a particular Centrifuge shall be determined by the manual valve position feedback of the Centrifuge Polymer Feed and Bypass Valves to PLC-19. PLC-19 shall communicate the Feed Pump that is positioned to operate with the associated Centrifuge and the flow setpoint (selectable in gph) to that Centrifuge which has been selected through SCADA.
         3) Pump RUN status shall be transmitted to SCADA and to the COP for indication.
         4) Flowrate and Totalization of polymer flow from the Centrifuge Polymer Feed Pump shall be indicated at SCADA from the flow meter via Ethernet. Flow indication shall be transmitted from SCADA to the Centrifuge Operating Panel via Modbus protocol.
   2. Screen Indicators and Alarms at PLC/OIS:
      a. System:
         1) Polymer Flow Indication shall be provided in the Centrifuge SCADA screen.
      b. Pumps:
         1) RUN indication (each pump).
         2) COMMON FAIL ALARM (each pump).
         3) Motor speed indication (each pump).
         4) Pump READY indication (each pump).
         5) Pump speed setpoint indication (each pump).
      c. Software Interlocks:
         1) If a Centrifuge Polymer Feed Pump is selected to feed to a particular Centrifuge and the Feed and Bypass Valve position is not correct, an "OPEN POLYMER FEED BYPASS VALVE" Alarm shall be annunciated.

2) If all Polymer Tanks have a Low Level status, all Polymer Feed Pumps shall be shut down and a "POLYMER SYSTEM EMPTY" Alarm shall be annunciated in SCADA.

G. Special Considerations
1. Power Outage and Restore Operation:
a. During power outage, the Centrifuge Polymer Feed Pumps will de-energize and stop due to loss of power. During power outage the alarms associated with the Centrifuge Polymer Feed Pumps will be de-activated at SCADA. Upon Power Restore the Centrifuge Polymer Feed Pumps will restart as long as local switches are still in HAND position, or REMOTE position with request to run from Centrifuge COP. Also when power is restored, the Centrifuge Polymer Feed Pump alarms will be re-activated at SCADA.

3.13 THICKENER POLYMER FEED PUMPS

A. References:
1. Process Area: Centrifuge and Thickener Polymer Feed Systems
2. P&ID Drawings: F19N-15.
3. Mechanical Drawings: F19M-11.
4. Specification Sections: 11312I.

B. Mechanical Equipment:

Tag Number	Equipment Name
19PDP765	Polymer Feed Pump No. 3
19PDP770	Polymer Feed Pump No. 4

C. General Description:
1. Two Thickener Polymer Feed Pumps (19PDP765 and 19PDP770) are provided for feeding Polymer to the Gravity Thickener Splitter Box to enhance sludge thickening. One pump shall be operated at a time with the second pump serving as a backup. The vendor supplied Thickener Polymer Feed Vendor Control Panel (19-VCP-20) has a PLC and shall serve both Metering Pumps.

D. Local Controls and Instrumentation:
1. System:
a. Instruments and Protective Devices:
1) Electrical magnetic flow meter.
b. Indicators and Alarms:
1) Flow rate indication (to be displayed on Gravity Thickener SCADA Screen).
2. Local Control Panel:
a. A Vendor Control Panel shall be supplied to serve both pumps as specified in Section 11312I. Pump VFDs shall also be housed in the VCP.

E. MCC Controls and Instrumentation:
1. None.

F. PLC/OIS Functions:
1. Controls:
a. SCADA Manual Control Mode:

1) When the pump HOR selector switch is in REMOTE, the Pumps shall be started manually through SCADA.
2) The operator shall select a polymer flow setpoint (Range 4-420 gph) for the thickeners.

b. SCADA Automatic Control Mode:
1) None.

2. Screen Indicators and Alarms at PLC/OIS:
a. System:
1) Thickener Polymer Flow Rate

b. Pumps:
1) RUN indication (each pump).
2) COMMON FAIL Alarm (each pump).
3) Motor speed indication (each pump).
4) READY indication (each pump).
5) OUT OF SERVICE (each pump)
6) Pump speed setpoint indication (each pump).
7) Run Time Meter: SCADA shall accumulate total Thickener Polymer Pump Run Time for each Thickener Polymer Pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, and previous calendar month and total runtime.

c. Software Interlocks:
1) If all Polymer Tanks have a Low Level status, all Polymer Feed Pumps shall be shut down and a "POLYMER SYSTEM EMPTY" Alarm shall be annunciated in SCADA.

G. Special Considerations
1. Power Outage and Restore Operation:
a. During power outage, the Thickener Polymer Feed Pumps will de-energize and stop due to loss of power. During power outage the alarms associated with the Thickener Polymer Feed Pumps will be de-activated at SCADA. Upon Power Restore the Thickener Polymer Feed Pumps will restart as long as local switches are still in HAND position, or REMOTE position with request to run from Centrifuge COP. Also when power is restored, the Thickener Polymer Feed Pump alarms will be re-activated at SCADA.

3.14 DEWATERING BUILDING SUMP PUMP SYSTEM

A. References:
1. Process Area: Dewatering Sump Pump System.
2. P&ID Drawing: F19N-16.
3. Mechanical Drawings:
4. Specification Sections: 11312L.

B. Mechanical Equipment:

Tag Number	Equipment Name
19DWP505	Dewatering Sump Pump No. 1
18DWP510	Dewatering Sump Pump No. 2

C. General Description:

1. The dewatering building sump pumps shall pump the area floor drainage to the existing Plant Drain System. The pumps shall be supplied with a Vendor Control Panel 19-VCP-19. The pumps shall operate based on the level in the sump.

D. Local Controls and Instrumentation:
   1. System:
      a. Instruments and Protective Devices:
         1) Capacitance probe type level transducer (provided by the vendor).
         2) FLOOD Alarm Level Float switch.
   2. Pumps:
      a. Pumps shall be supplied with a VCP as specified in Section 11312J.

E. MCC Controls and Instrumentation:
   1. None.

F. PLC/OIS Functions:
   1. Controls:
      a. None.
   2. Screen Indicators and Alarms at PLC/OIS:
      a. System:
         1) HIGH-HIGH LEVEL ALARM.
      b. Pumps:
         1) COMMON FAIL ALARM: An alarm shall be transmitted to SCADA for, motor starter overload, activated disconnect switch excessive runtime, and excessive starts per hour.
            a) Excessive runtime setpoint shall initially be set at 300 minutes (0-600 minutes).
            b) Excessive starts per hour setpoint shall initially be set at 8 starts per hour (0-60 starts per hour).
         2) Run indication.
         3) Run time meter: SCADA shall accumulate total pump run time for each pump for the current day (reset at midnight), previous calendar day (midnight to midnight), previous 7 days, current week, month to date, previous calendar month, and total runtime.
      c. Software Interlocks:
         1) None.

G. Special Considerations:
   1. Power Outages and Restore Operation:
      a. During power outages the sump pumps will not operate due to loss of power. The sump pump station COMMON FAIL alarms will be de-activated at SCADA during power outages, but FLOOD alarms will remain active. Upon restoration of power the pumps will operate as called for based on level setpoints. Alarms will be re-activated at SCADA upon restoration of power.

3.15 DEMONSTRATION AND TRAINING

A. As specified in Section 17050.

END OF SECTION

EXHIBIT B

PROFESSIONAL SERVICES AGREEMENT FOR DESIGN PROFESSIONALS

FEE SCHEDULE/MANNER OF PAYMENT

1. **CONTRACTOR's Compensation.** The total of all fees paid to the CONTRACTOR for the performance of all services set forth in Exhibit A, including normal revisions (hereafter the "Services"), and for all authorized Reimbursable Expenses, shall not exceed the total sum of $889,625.00.

2. **Billable Rates.** CONTRACTOR shall be paid for the performance of Services on an hourly rate, daily rate, flat fee, lump sum or other basis, as set forth in Attachment 1 to Exhibit B, attached hereto and incorporated herein.

3. **CONTRACTOR's Reimbursable Expenses.** Reimbursable Expenses shall be limited to actual expenditures of CONTRACTOR for expenses that are necessary for the proper completion of the Services and shall only be payable if specifically authorized in advance by CITY.

4. **Payments to CONTRACTOR.**

   A. Payments to CONTRACTOR shall be made within a reasonable time after receipt of CONTRACTOR's invoice, said payments to be made in proportion to services performed or as otherwise specified in Attachment 1 to Exhibit B. CONTRACTOR may request payment on a monthly basis. CONTRACTOR shall be responsible for the cost of supplying all documentation necessary to verify the monthly billings to the satisfaction of CITY.

   B. All invoices submitted by CONTRACTOR shall contain the following information:

      (1) Job Name
      (2) Description of services billed under this invoice, and overall status of project
      (3) Date of Invoice Issuance
      (4) Sequential Invoice Number
      (5) CITY's Purchase Order Number
      (6) Total Contract Amount
      (7) Amount of this Invoice (Itemize all Reimbursable Expenses)
      (8) Total Billed to Date
      (9) Total Remaining on Contract
      (10) Updated project schedule. This shall identify those steps that shall be taken to bring the project back on schedule if it is behind schedule.

   C. Items shall be separated into Services and Reimbursable Expenses. Billings that do not conform to the format outlined above shall be returned to CONTRACTOR for correction. CITY shall not be responsible for delays in payment to CONTRACTOR resulting from CONTRACTOR's failure to comply with the invoice format described below.

D. Requests for payment shall be sent to:

City of Sacramento, Dept. of Utilities
1395 35th Avenue, Sacramento, CA 95822
(916) 808-1910 / 808-1497 / ipietz@cityofsacramento.org
Attn: Ian Pietz

5. **Additional Services.** Additional Services are those services related to the scope of services of CONTRACTOR set forth in Exhibit A but not anticipated at the time of execution of this Agreement. Additional Services shall be provided only when a Supplemental Agreement authorizing such Additional Services is approved by CITY in accordance with CITY's Supplemental Agreement procedures. CITY reserves the right to perform any Additional Services with its own staff or to retain other consultants to perform said Additional Services.

6. **Accounting Records of CONTRACTOR.** During performance of this Agreement and for a period of three (3) years after completing all Services and Additional Services hereunder, CONTRACTOR shall maintain all accounting and financial records related to this Agreement, including, but not limited to, records of CONTRACTOR's costs for all Services and Additional Services performed under this Agreement and records of CONTRACTOR's Reimbursable Expenses, in accordance with generally accepted accounting practices, and shall keep and make such records available for inspection and audit by representatives of the CITY upon reasonable written notice.

7. **Taxes.** CONTRACTOR shall pay, when and as due, any and all taxes incurred as a result of CONTRACTOR's compensation hereunder, including estimated taxes, and shall provide CITY with proof of such payment upon request. CONTRACTOR hereby agrees to indemnify CITY for any claims, losses, costs, fees, liabilities, damages or injuries suffered by CITY arising out of CONTRACTOR's breach of this Section 7.

405 30th Street
Sacramento, CA 95816
Tel: (916) 448-3776
Fax: (916) 448-3778
Email: jspautomation@sbcglobal.net

JSP AUTOMATION

PROFESSIONAL SERVICES
2013 FEES AND RATE SCHEDULE

PROFESSIONAL SERVICES RATES

Senior Design Engineer	$ 125/hr
Senior Systems Engineer	$ 125/hr
Senior Control Engineer	$ 125/hr
Technical Project Manager	$ 125/hr
Construction Support (Design Engineer)	$ 115/hr
Construction Support (Technician)	$ 105/hr
Construction Support (Inspection)	$ 95/hr
Design Engineer (Communications)	$ 105/hr
Design Engineer (Electrical)	$ 105/hr
Design Engineer (Controls)	$ 105/hr
Systems Analyst/Programmer	$ 115/hr
PLC/SCADA Programmer	$ 125/hr
Software/Applications Engineer	$ 125/hr
CAD Technician	$ 75/hr
Engineering Support	$ 75/hr

PLC Programming - Brian Patton		2050	$125.00	$256,250.00
SCADA Programming – Shawn Sherwood		2050	$125.00	$256,250.00
Field Controls Technician – Steve Harlan		760	$95.00	$72,200.00
Engineering Controls Technician - Gilbert Rosette		760	$105.00	$79,800.00
Engineering - Jim Phillips		1125	$125.00	$140,625.00
Project Manager - Jim Phillips		580	$125.00	$72,500.00
Training		16	$125.00	$2,000.00
Factory Testing		80	$125.00	$10,000.00
	HOURS TOTAL	7421	TOTALS	$889,625.00

EXHIBIT C

PROFESSIONAL SERVICES AGREEMENT FOR DESIGN PROFESSIONALS

FACILITIES AND EQUIPMENT TO BE PROVIDED BY CITY

CITY shall [*check one*]

__X__ Not furnish any facilities or equipment for this Agreement; or

_____ furnish the following facilities or equipment for the Agreement; [*list, if applicable*]

EXHIBIT D

PROFESSIONAL SERVICES AGREEMENT FOR DESIGN PROFESSIONALS

GENERAL PROVISIONS

1. **Independent Contractor**.

A. It is understood and agreed that CONTRACTOR (including CONTRACTOR's employees) is an independent contractor and that no relationship of employer-employee exists between the parties hereto for any purpose whatsoever. Neither CONTRACTOR nor CONTRACTOR's assigned personnel shall be entitled to any benefits payable to employees of CITY. CITY is not required to make any deductions or withholdings from the compensation payable to CONTRACTOR under the provisions of this Agreement, and CONTRACTOR shall be issued a Form 1099 for its services hereunder. As an independent contractor, CONTRACTOR hereby agrees to indemnify and hold CITY harmless from any and all claims that may be made against CITY based upon any contention by any of CONTRACTOR's employees or by any third party, including but not limited to any state or federal agency, that an employer-employee relationship or a substitute therefor exists for any purpose whatsoever by reason of this Agreement or by reason of the nature and/or performance of any Services under this Agreement. (As used in this Exhibit D, the term "Services" shall include both Services and Additional Services as such terms are defined elsewhere in this Agreement.)

B. It is further understood and agreed by the parties hereto that CONTRACTOR, in the performance of its obligations hereunder, is subject to the control and direction of CITY as to the designation of tasks to be performed and the results to be accomplished under this Agreement, but not as to the means, methods, or sequence used by CONTRACTOR for accomplishing such results. To the extent that CONTRACTOR obtains permission to, and does, use CITY facilities, space, equipment or support services in the performance of this Agreement, this use shall be at the CONTRACTOR's sole discretion based on the CONTRACTOR's determination that such use will promote CONTRACTOR's efficiency and effectiveness. Except as may be specifically provided elsewhere in this Agreement, the CITY does not require that CONTRACTOR use CITY facilities, equipment or support services or work in CITY locations in the performance of this Agreement.

C. If, in the performance of this Agreement, any third persons are employed by CONTRACTOR, such persons shall be entirely and exclusively under the direction, supervision, and control of CONTRACTOR. Except as may be specifically provided elsewhere in this Agreement, all terms of employment, including hours, wages, working conditions, discipline, hiring, and discharging, or any other terms of employment or requirements of law, shall be determined by CONTRACTOR. It is further understood and agreed that CONTRACTOR shall issue W-2 or 1099 Forms for income and employment tax purposes, for all of CONTRACTOR's assigned personnel and subcontractors.

D. The provisions of this Section 1 shall survive any expiration or termination of this Agreement. Nothing in this Agreement shall be construed to create an exclusive

relationship between CITY and CONTRACTOR. CONTRACTOR may represent, perform services for, or be employed by such additional persons or companies as CONTRACTOR sees fit provided that CONTRACTOR does not violate the provisions of Section 5, below.

2. **Licenses; Permits, Etc.** CONTRACTOR represents and warrants that CONTRACTOR has all licenses, permits, City Business Operations Tax Certificate, qualifications, and approvals of whatsoever nature that are legally required for CONTRACTOR to practice its profession or provide any services under the Agreement. CONTRACTOR represents and warrants that CONTRACTOR shall, at its sole cost and expense, keep in effect or obtain at all times during the term of this Agreement any licenses, permits, and approvals that are legally required for CONTRACTOR to practice its profession or provide such Services. Without limiting the generality of the foregoing, if CONTRACTOR is an out-of-state corporation, CONTRACTOR warrants and represents that it possesses a valid certificate of qualification to transact business in the State of California issued by the California Secretary of State pursuant to Section 2105 of the California Corporations Code.

3. **Time.** CONTRACTOR shall devote such time and effort to the performance of Services pursuant to this Agreement as is necessary for the satisfactory and timely performance of CONTRACTOR's obligations under this Agreement. Neither party shall be considered in default of this Agreement, to the extent that party's performance is prevented or delayed by any cause, present or future, that is beyond the reasonable control of that party.

4. **CONTRACTOR Not Agent.** Except as CITY may specify in writing, CONTRACTOR and CONTRACTOR's personnel shall have no authority, express or implied, to act on behalf of CITY in any capacity whatsoever as an agent. CONTRACTOR and CONTRACTOR's personnel shall have no authority, express or implied, to bind CITY to any obligations whatsoever.

5. **Conflicts of Interest.** CONTRACTOR covenants that neither it, nor any officer or principal of its firm, has or shall acquire any interest, directly or indirectly, that would conflict in any manner with the interests of CITY or that would in any way hinder CONTRACTOR's performance of Services under this Agreement. CONTRACTOR further covenants that in the performance of this Agreement, no person having any such interest shall be employed by it as an officer, employee, agent or subcontractor, without the written consent of CITY. CONTRACTOR agrees to avoid conflicts of interest or the appearance of any conflicts of interest with the interests of CITY at all times during the performance of this Agreement. If CONTRACTOR is or employs a former officer or employee of the CITY, CONTRACTOR and any such employee(s) shall comply with the provisions of Sacramento City Code Section 2.16.090 pertaining to appearances before the City Council or any CITY department, board, commission or committee.

6. **Confidentiality of CITY Information.** During performance of this Agreement, CONTRACTOR may gain access to and use CITY information regarding inventions, machinery, products, prices, apparatus, costs, discounts, future plans, business affairs, governmental affairs, processes, trade secrets, technical matters, systems, facilities, customer lists, product design, copyright, data, and other vital information (hereafter collectively referred to as "City Information") that are valuable, special and unique assets of the CITY. CONTRACTOR agrees to protect all City Information and treat it as strictly confidential, and further agrees that CONTRACTOR shall not at any time, either directly or indirectly, divulge, disclose or communicate in any manner any City Information to any third party without the prior written consent of CITY. In addition,

CONTRACTOR shall comply with all CITY policies governing the use of the CITY network and technology systems, as set forth in applicable provisions of the City of Sacramento Administrative Policy Instructions # 30. A violation by CONTRACTOR of this Section 6 shall be a material violation of this Agreement and shall justify legal and/or equitable relief.

7. CONTRACTOR Information.

A. CITY shall have full ownership and control, including ownership of any copyrights, of all information prepared, produced, or provided by CONTRACTOR pursuant to this Agreement. In this Agreement, the term "information" shall be construed to mean and include: any and all work product, submittals, reports, plans, specifications, and other deliverables consisting of documents, writings, handwritings, typewriting, printing, photostatting, photographing, computer models, and any other computerized data and every other means of recording any form of information, communications, or representation, including letters, works, pictures, drawings, sounds, or symbols, or any combination thereof. CONTRACTOR shall not be responsible for any unauthorized modification or use of such information for other than its intended purpose by CITY.

B. CONTRACTOR shall fully defend, indemnify and hold harmless CITY, its officers and employees, and each and every one of them, from and against any and all claims, actions, lawsuits or other proceedings alleging that all or any part of the information prepared, produced, or provided by CONTRACTOR pursuant to this Agreement infringes upon any third party's trademark, trade name, copyright, patent or other intellectual property rights. CITY shall make reasonable efforts to notify CONTRACTOR not later than ten (10) days after CITY is served with any such claim, action, lawsuit or other proceeding, provided that CITY's failure to provide such notice within such time period shall not relieve CONTRACTOR of its obligations hereunder, which shall survive any termination or expiration of this Agreement.

C. All proprietary and other information received from CONTRACTOR by CITY, whether received in connection with CONTRACTOR's proposal to CITY or in connection with any Services performed by CONTRACTOR, will be disclosed upon receipt of a request for disclosure, pursuant to the California Public Records Act; provided, however, that, if any information is set apart and clearly marked "trade secret" when it is provided to CITY, CITY shall give notice to CONTRACTOR of any request for the disclosure of such information. The CONTRACTOR shall then have five (5) days from the date it receives such notice to enter into an agreement with the CITY, satisfactory to the City Attorney, providing for the defense of, and complete indemnification and reimbursement for all costs (including plaintiff's attorney fees) incurred by CITY in any legal action to compel the disclosure of such information under the California Public Records Act. The CONTRACTOR shall have sole responsibility for defense of the actual "trade secret" designation of such information.

D. The parties understand and agree that any failure by CONTRACTOR to respond to the notice provided by CITY and/or to enter into an agreement with CITY, in accordance with the provisions of subsection C, above, shall constitute a complete waiver by CONTRACTOR of any rights regarding the information designated "trade secret" by CONTRACTOR, and such information shall be disclosed by CITY pursuant to applicable procedures required by the Public Records Act.

8. **Standard of Performance.** CONTRACTOR shall perform all Services required pursuant to this Agreement in the manner and according to the standards currently observed by a competent practitioner of CONTRACTOR's profession in California. All products of whatsoever nature that CONTRACTOR delivers to CITY pursuant to this Agreement shall be prepared in a professional manner and conform to the standards of quality normally observed by a person currently practicing in CONTRACTOR's profession, and shall be provided in accordance with any schedule of performance specified in Exhibit A. CONTRACTOR shall assign only competent personnel to perform Services pursuant to this Agreement. CONTRACTOR shall notify CITY in writing of any changes in CONTRACTOR's staff assigned to perform the Services required under this Agreement, prior to any such performance. In the event that CITY, at any time during the term of this Agreement, desires the removal of any person assigned by CONTRACTOR to perform Services pursuant to this Agreement, because CITY, in its sole discretion, determines that such person is not performing in accordance with the standards required herein, CONTRACTOR shall remove such person immediately upon receiving notice from CITY of the desire of CITY for the removal of such person.

9. **Term; Suspension; Termination.**

A. This Agreement shall become effective on the date that it is approved by both parties, set forth on the first page of the Agreement, and shall continue in effect until both parties have fully performed their respective obligations under this Agreement, unless sooner terminated as provided herein.

B. CITY shall have the right at any time to temporarily suspend CONTRACTOR's performance hereunder, in whole or in part, by giving a written notice of suspension to CONTRACTOR. If CITY gives such notice of suspension, CONTRACTOR shall immediately suspend its activities under this Agreement, as specified in such notice.

C. CITY shall have the right to terminate this Agreement at any time by giving a written notice of termination to CONTRACTOR. If CITY gives such notice of termination, CONTRACTOR shall immediately cease rendering Services pursuant to this Agreement. If CITY terminates this Agreement:

(1) CONTRACTOR shall, not later than five days after such notice of termination, deliver to CITY copies of all information prepared pursuant to this Agreement.

(2) CITY shall pay CONTRACTOR the reasonable value of Services rendered by CONTRACTOR prior to termination; provided, however, CITY shall not in any manner be liable for lost profits that might have been made by CONTRACTOR had the Agreement not been terminated or had CONTRACTOR completed the Services required by this Agreement. In this regard, CONTRACTOR shall furnish to CITY such financial information as in the judgment of the CITY is necessary for CITY to determine the reasonable value of the Services rendered by CONTRACTOR. The foregoing is cumulative and does not affect any right or remedy that CITY may have in law or equity.

10. **Indemnity.**

A. Indemnity: CONTRACTOR shall defend, hold harmless and indemnify CITY, its officers and employees, and each and every one of them, from and against any and all claims, actions, damages, costs, liabilities, demands, losses, judgments, penalties and expenses of every type and description, including, but not limited to, any fees and/or costs reasonably incurred by CITY's staff attorneys or outside attorneys and any fees and expenses incurred in enforcing this provision (hereafter collectively referred to as "Claims"), including but not limited to Claims arising from personal injury or death, damage to personal, real, or intellectual property, or the environment, contractual or other economic damages, or regulatory penalties, that arise out of, pertain to, or relate to any negligent act or omission, recklessness, or willful misconduct of CONTRACTOR, its sub-consultants, subcontractors, or agents, and their respective officers and employees, in connection with performance of or failure to perform this Agreement, whether or not such Claims are litigated, settled, or reduced to judgment; provided that the foregoing indemnity does not apply to liability for damages for death or bodily injury to persons, injury to property, or other loss, damage, or expense to the extent arising from (i) the sole negligence or willful misconduct of, or defects in design furnished by, CITY, its agents, servants, or independent contractors who are directly responsible to CITY, or (ii) the active negligence of CITY.

B. Insurance Policies; Intellectual Property Claims: The existence or acceptance by CITY of any of the insurance policies or coverages described in this Agreement shall not affect or limit any of CITY's rights under this Section 10, nor shall the limits of such insurance limit the liability of CONTRACTOR hereunder. This Section 10 shall not apply to any intellectual property claims, actions, lawsuits, or other proceedings subject to the provisions of Section 7.B., above. The provisions of this Section 10 shall survive any expiration or termination of this Agreement.

11. Insurance Requirements. During the entire term of this Agreement, CONTRACTOR shall maintain the insurance coverage described in this Section 11.

Full compensation for all premiums that CONTRACTOR is required to pay for the insurance coverage described herein shall be included in the compensation specified for the Services provided by CONTRACTOR under this Agreement. No additional compensation will be provided for CONTRACTOR's insurance premiums.

It is understood and agreed by the CONTRACTOR that its liability to the CITY shall not in any way be limited to or affected by the amount of insurance coverage required or carried by the CONTRACTOR in connection with this Agreement.

A. Minimum Scope & Limits of Insurance Coverage

(1) Commercial General Liability Insurance, providing coverage at least as broad as ISO CGL Form 00 01 on an occurrence basis for bodily injury, including death, of one or more persons, property damage and personal injury, with limits of not less than one million dollars ($1,000,000) per occurrence. The policy shall provide contractual liability and products and completed operations coverage for the term of the policy.

(2) Automobile Liability Insurance providing coverage at least as broad as ISO Form CA 00 01 on an occurrence basis for bodily injury, including death, of one or more persons, property damage and personal injury, with limits of not less than one million dollars ($1,000,000) per occurrence. The policy shall provide coverage for owned, non-owned and/or hired autos as appropriate to the operations of the CONTRACTOR.

No automobile liability insurance shall be required if CONTRACTOR completes the following certification:

> "I certify that a motor vehicle will not be used in the performance of any work or services under this agreement." _____ (CONTRACTOR initials)

(3) Workers' Compensation Insurance with statutory limits, and Employers' Liability Insurance with limits of not less than one million dollars ($1,000,000). The Worker's Compensation policy shall include a waiver of subrogation for contracts involving construction or maintenance, or if required by the CITY by selecting the option below:

> __X__ Workers' Compensation waiver of subrogation in favor of the City is required for all work performed by the CONTRACTOR.

No Workers' Compensation insurance shall be required if CONTRACTOR completes the following certification:

> "I certify that my business has no employees, and that I do not employ anyone. I am exempt from the legal requirements to provide Workers' Compensation insurance." _____ (CONTRACTOR initials)

(4) Professional Liability Insurance providing coverage on a claims made basis for errors, omissions or malpractice with limits of not less than one million ($1,000,000) dollars if required by the CITY under Exhibit A, Section 2.

B. Additional Insured Coverage

(1) Commercial General Liability Insurance: The CITY, its officials, employees and volunteers shall be covered by policy terms or endorsement as additional insureds as respects general liability arising out of activities performed by or on behalf of CONTRACTOR, products and completed operations of CONTRACTOR, and premises owned, leased or used by CONTRACTOR. The general liability additional insured endorsement must be signed by an authorized representative of the insurance carrier for contracts involving construction or maintenance, or if required by the CITY by selecting the option below:

> __X__ Additional insured endorsement must be signed by an authorized representative of the insurance carrier.

If the policy includes a blanket additional insured endorsement or contractual additional insured coverage, the above signature requirement may be fulfilled by submitting that document with a signed declaration page referencing the blanket endorsement or policy form.

(2) Automobile Liability Insurance: The CITY, its officials, employees and volunteers shall be covered by policy terms or endorsement as additional insureds as respects auto liability.

C. Other Insurance Provisions

The policies are to contain, or be endorsed to contain, the following provisions:

(1) Except for professional liability, CONTRACTOR's insurance coverage shall be primary insurance as respects CITY, its officials, employees and volunteers. Any insurance or self-insurance maintained by CITY, its officials, employees or volunteers shall be in excess of CONTRACTOR's insurance and shall not contribute with it.

(2) Any failure to comply with reporting provisions of the policies shall not affect coverage provided to CITY, its officials, employees or volunteers.

(3) Coverage shall state that CONTRACTOR's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

(4) CITY will be provided with thirty (30) days written notice of cancellation or material change in the policy language or terms.

D. Acceptability of Insurance

Insurance shall be placed with insurers with a Bests' rating of not less than A:V. Self-insured retentions, policy terms or other variations that do not comply with the requirements of this Section 11 must be declared to and approved by the CITY Risk Management Division in writing prior to execution of this Agreement.

E. Verification of Coverage

(1) CONTRACTOR shall furnish CITY with certificates and required endorsements evidencing the insurance required. The certificates and endorsements shall be forwarded to the CITY representative named in Exhibit A. Copies of policies shall be delivered to the CITY on demand. Certificates of insurance shall be signed by an authorized representative of the insurance carrier.

(2) The CITY may withdraw its offer of contract or cancel this Agreement if the certificates of insurance and endorsements required have not been provided prior to execution of this Agreement. The CITY may withhold payments to CONTRACTOR and/or cancel the Agreement if the insurance is canceled or CONTRACTOR otherwise ceases to be insured as required herein.

F. Subcontractors

CONTRACTOR shall require and verify that all sub-consultants and subcontractors maintain insurance coverage that meets the minimum scope and limits of insurance coverage specified in subsection A, above.

12. Equal Employment Opportunity. During the performance of this Agreement, CONTRACTOR, for itself, its assignees and successors in interest, agrees as follows:

A. Compliance With Regulations: CONTRACTOR shall comply with the Executive Order 11246 entitled "Equal Opportunity in Federal Employment", as amended by Executive Order 11375 and 12086, and as supplemented in Department of Labor regulations (41 CFR Chapter 60), hereinafter collectively referred to as the "Regulations".

B. Nondiscrimination: CONTRACTOR, with regards to the work performed by it after award and prior to completion of the work pursuant to this Agreement, shall not discriminate on the ground of race, color, religion, sex, national origin, age, marital status, physical handicap or sexual orientation in selection and retention of subcontractors, including procurement of materials and leases of equipment. CONTRACTOR shall not participate either directly or indirectly in discrimination prohibited by the Regulations.

C. Solicitations for Subcontractors, Including Procurement of Materials and Equipment: In all solicitations either by competitive bidding or negotiations made by CONTRACTOR for work to be performed under any subcontract, including all procurement of materials or equipment, each potential subcontractor or supplier shall be notified by CONTRACTOR of CONTRACTOR's obligation under this Agreement and the Regulations relative to nondiscrimination on the ground of race, color, religion, sex, national origin, age, marital status, physical handicap or sexual orientation.

D. Information and Reports: CONTRACTOR shall provide all information and reports required by the Regulations, or by any orders or instructions issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information and its facilities as may be determined by the CITY to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of CONTRACTOR is in the exclusive possession of another who fails or refuses to furnish this information, CONTRACTOR shall so certify to the CITY, and shall set forth what efforts it has made to obtain the information.

E. Sanctions for Noncompliance: In the event of noncompliance by CONTRACTOR with the nondiscrimination provisions of this Agreement, the CITY shall impose such sanctions as it may determine to be appropriate including, but not limited to:

(1) Withholding of payments to CONTRACTOR under this Agreement until CONTRACTOR complies;

(2) Cancellation, termination, or suspension of the Agreement, in whole or in part.

F. Incorporation of Provisions: CONTRACTOR shall include the provisions of subsections

A through E, above, in every subcontract, including procurement of materials and leases of equipment, unless exempted by the Regulations, or by any order or instructions issued pursuant thereto. CONTRACTOR shall take such action with respect to any subcontract or procurement as the CITY may direct as a means of enforcing such provisions including sanctions for noncompliance; provided, however, that in the event CONTRACTOR becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, CONTRACTOR may request CITY to enter such litigation to protect the interests of CITY.

13. **Entire Agreement.** This document, including all Exhibits, contains the entire agreement between the parties and supersedes whatever oral or written understanding they may have had prior to the execution of this Agreement. No alteration to the terms of this Agreement shall be valid unless approved in writing by CONTRACTOR, and by CITY, in accordance with applicable provisions of the Sacramento City Code.

14. **Severability.** If any portion of this Agreement or the application thereof to any person or circumstance shall be held invalid or unenforceable, the remainder of this Agreement shall not be affected thereby and shall be enforced to the greatest extent permitted by law.

15. **Waiver.** Neither CITY acceptance of, or payment for, any Service or Additional Service performed by CONTRACTOR, nor any waiver by either party of any default, breach or condition precedent, shall be construed as a waiver of any provision of this Agreement, nor as a waiver of any other default, breach or condition precedent or any other right hereunder.

16. **Enforcement of Agreement.** This Agreement shall be governed, construed and enforced in accordance with the laws of the State of California. Venue of any litigation arising out of or connected with this Agreement shall lie exclusively in the state trial court or Federal District Court located in Sacramento County in the State of California, and the parties consent to jurisdiction over their persons and over the subject matter of any such litigation in such courts, and consent to service of process issued by such courts.

17. **Assignment Prohibited.** The expertise and experience of CONTRACTOR are material considerations for this Agreement. CITY has a strong interest in the qualifications and capability of the persons and entities that will fulfill the obligations imposed on CONTRACTOR under this Agreement. In recognition of this interest, CONTRACTOR shall not assign any right or obligation pursuant to this Agreement without the written consent of the CITY. Any attempted or purported assignment without CITY's written consent shall be void and of no effect.

18. **Binding Effect.** This Agreement shall be binding on the heirs, executors, administrators, successors and assigns of the parties, subject to the provisions of Section 17, above.

19. **Use Tax Requirements.** During the performance of this Agreement, CONTRACTOR, for itself, its assignees and successors in interest, agrees as follows:

    A. Use Tax Direct Payment Permit: For all leases and purchases of materials, equipment, supplies, or other tangible personal property used to perform the Agreement and shipped from outside California, the Contractor and any subcontractors leasing or purchasing such materials, equipment, supplies or other tangible personal property shall

obtain a Use Tax Direct Payment Permit from the California State Board of Equalization ("SBE") in accordance with the applicable SBE criteria and requirements.

B. Sellers Permit: For any construction contract and any construction subcontract in the amount of $5,000,000 or more, Contractor and the subcontractor(s) shall obtain sellers permits from the SBE and shall register the jobsite as the place of business for the purpose of allocating local sales and use tax to the City. Contractor and its subcontractors shall remit the self-accrued use tax to the SBE, and shall provide a copy of each remittance to the City.

C. The above provisions shall apply in all instances unless prohibited by the funding source for the Agreement.

EXHIBIT E

REQUIREMENTS OF THE NON-DISCRIMINATION IN EMPLOYEE BENEFITS CODE

INTRODUCTION

The Sacramento Non-Discrimination In Employee Benefits Code (the "Ordinance"), codified as Sacramento City Code Chapter 3.54, prohibits City contractors from discriminating in the provision of employee benefits between employees with spouses and employees with domestic partners, and between the spouses and domestic partners of employees.

APPLICATION

The provisions of the Ordinance apply to any contract or agreement (as defined below), between a Contractor and the City of Sacramento, in an amount exceeding $100,000.00. The Ordinance applies to that portion of a contractor's operations that occur: (i) within the City of Sacramento; (ii) on real property outside the City of Sacramento if the property is owned by the City or if the City has a right to occupy the property; or (iii) at any location where a significant amount of work related to a City contract is being performed.

The Ordinance does not apply: to subcontractors or subcontracts of any Contractor or contractors; to transactions entered into pursuant to cooperative purchasing agreements approved by the Sacramento City Council; to legal contracts of other governmental jurisdictions or public agencies without separate competitive bidding by the City; where the requirements of the ordinance will violate or are inconsistent with the terms or conditions of a grant, subvention or agreement with a public agency or the instructions of an authorized representative of any such agency with respect to any such grant, subvention or agreement; to permits for excavation or street construction; or to agreements for the use of City right-of-way where a contracting utility has the power of eminent domain.

DEFINITIONS

As set forth in the Ordinance, the following definitions apply:

"Contract" means an agreement for public works or improvements to be performed, or for goods or services to be purchased or grants to be provided, at the expense of the City or to be paid out of moneys deposited in the treasury or out of the trust money under the control or collected by the City. "Contract" also means a written agreement for the exclusive use ("exclusive use" means the right to use or occupy real property to the exclusion of others, other than the right reserved by the fee owner) or occupancy of real property for a term exceeding 29 days in any calendar year, whether by singular or cumulative instrument, (i) for the operation or use by others of real property owned or controlled by the City for the operation of a business, social, or other establishment or organization, including leases, concessions, franchises and easements, or (ii) for the City's use or occupancy of real property owned by others, including leases, concessions, franchises and easements.

"Contract" shall not include: a revocable at-will use or encroachment permit for the use of or encroachment on City property regardless of the ultimate duration of such permit; excavation, street construction or street use permits; agreements for the use of City right-of-way where a contracting utility has the power of eminent domain; or agreements governing the use of City property that constitute a public forum for activities that are primarily for the purpose of espousing or advocating causes or ideas

and that are generally protected by the First Amendment to the United States Constitution or that are primarily recreational in nature.

"Contractor" means any person or persons, firm, partnership, corporation, company, or combination thereof, that enters into a Contract with the City. "Contractor" does not include a public entity.

"Domestic Partner" means any person who has a currently registered domestic partnership with a governmental entity pursuant to state or local law authorizing the registration.

"Employee Benefits" means bereavement leave; disability, life, and other types of insurance; family medical leave; health benefits; membership or membership discounts; moving expenses; pension and retirement benefits; vacation; travel benefits; and any other benefit given to employees. "Employee benefits" shall not include benefits to the extent that the application of the requirements of this chapter to such benefits may be preempted by federal or state.

CONTRACTOR'S OBLIGATION TO PROVIDE THE CITY WITH DOCUMENTATION AND INFORMATION

Contractor shall provide the City with documentation and information verifying its compliance with the requirements of the Ordinance within ten (10) days of receipt of a request from the City. Contractors shall keep accurate payroll records, showing, for each City Contract, the employee's name, address, Social Security number, work classification, straight time pay rate, overtime pay rate, overtime hours worked, status and exemptions, and benefits for each day and pay period that the employee works on the City Contract. Each request for payroll records shall be accompanied by an affidavit to be completed and returned by the Contractor, as stated, attesting that the information contained in the payroll records is true and correct, and that the Contractor has complied with the requirements of the Ordinance. A violation of the Ordinance or noncompliance with the requirements of the Ordinance shall constitute a breach of contract.

EMPLOYER COMPLIANCE CERTIFICATE AND NOTICE REQUIREMENTS

(a) All contractors seeking a Contract subject to the Ordinance shall submit a completed Declaration of Compliance Form, signed by an authorized representative, with each proposal, bid or application. The Declaration of Compliance shall be made a part of the executed contract, and will be made available for public inspection and copying during regular business hours.

(b) The Contractor shall give each existing employee working directly on a City contract, and (at the time of hire), each new employee, a copy of the notification provided as Attachment "A."

(c) Contractor shall post, in a place visible to all employees, a copy of the notice provided as Attachment "B."

Attachment A to EXHIBIT E

YOUR RIGHTS UNDER THE CITY OF SACRAMENTO'S NON-DISCRIMINATION IN EMPLOYEE BENEFITS CODE

On ..... (date), your employer (the "Employer") entered into a contract with the City of Sacramento (the "City") for ..... (contract details), and as a condition of that contract, agreed to abide by the requirements of the City's Non-Discrimination In Employee Benefits Code (Sacramento City Code Section 3.54).

The Ordinance does not require the Employer to provide employee benefits. The Ordinance does require that if certain employee benefits are provided by the Employer, that those benefits be provided without discrimination between employees with spouses and employees with domestic partners, and without discrimination between the spouse or domestic partner of employees.

The Ordinance covers any employee working on the specific contract referenced above, but only for the period of time while those employees are actually working on this specific contract.

The included employee benefits are:

- Bereavement leave
- Disability, life and other types of insurance
- Family medical leave
- Health benefits
- Membership or membership discounts
- Moving expenses
- Pension and retirement benefits
- Vacation
- Travel benefits
- Any other benefits given to employees

(Employee Benefits does not include benefits that may be preempted by federal or state law.)

If you feel you have been discriminated or retaliated against by your employer in the terms and conditions of your application for employment, or in your employment, or in the application of these employee benefits, because of your status as an applicant or as an employee protected by the Ordinance, or because you reported a violation of the Ordinance, and after having exhausted all remedies with your employer,

You May . . .

- Submit a written complaint to the City of Sacramento, Contract Services Unit, containing the details of the alleged violation. The address is:

  City of Sacramento
  Procurement Services Division
  5730 24th Street, Bldg. 1
  Sacramento, CA 95822

- Bring an action in the appropriate division of the Superior Court of the State of California against the Employer and obtain the following remedies:

  - Reinstatement, injunctive relief, compensatory damages and punitive damages

  - Reasonable attorney's fees and costs

Attachment B to EXHIBIT E

YOUR RIGHTS UNDER THE CITY OF SACRAMENTO'S NON-DISCRIMINATION IN EMPLOYEE BENEFITS CODE

If your employer provides employee benefits, they must be provided to those employees working on a City of Sacramento contract without discriminating between employees with spouses and employees with domestic partners.

The included employee benefits are:

- Bereavement leave
- Disability, life and other types of insurance
- Family medical leave
- Health benefits
- Membership or membership discounts
- Moving expenses
- Pension and retirement benefits
- Vacation
- Travel benefits
- Any other benefits given to employees

If you feel you have been discriminated against by your employer . . .

You May . . .

O Submit a written complaint to the City of Sacramento, Contract Services Unit, containing the details of the alleged violation. The address is:

City of Sacramento
Procurement Services Division
5730 24th Street, Bldg. 1
Sacramento, CA 95822

O Bring an action in the appropriate division of the Superior Court of the State of California against the employer and obtain reinstatement, injunctive relief, compensatory damages, punitive damages and reasonable attorney's fees and costs.

Discrimination and Retaliation Prohibited.

If you feel you have been discriminated or retaliated against by your employer in the terms and conditions of your application for employment, or in your employment, because of your status as an applicant or as an employee protected by the Ordinance, or because you reported a violation of this Ordinance . . .

You May Also . . .

Submit a written complaint to the City of Sacramento, Contract Services Unit, at the same address, containing the details of the alleged violation.

ATTACHMENT 5

LOCAL BUSINESS ENTERPRISE (LBE) PREFERENCE PROGRAM FORM

LOCAL BUSINESS ENTERPRISE (LBE) PREFERENCE PROGRAM

NOTE: Proposers must provide responses to the following items. Failure to provide a response to each of the items in this section may be grounds for rejection of the proposal.

1. LBE TWO PERCENT (2%) BID EVALUATION PREFERENCE

On April 3, 2012, the Sacramento City Council adopted a Local Business Enterprise Preference program to provide enhanced opportunities for the participation of local business enterprises (LBEs) in the City's contracting and procurement activities.[1] A bid or quotation submitted by a firm that is located within Sacramento city and/or the unincorporated county of Sacramento will receive a two percent (2%) bid evaluation preference for the purpose of determining the lowest responsible bidder. If, after applying the 2% bid evaluation preference, the bid of an LBE firm receiving such preference is determined to be the lowest responsible bid, the award will be made for the actual amount bid. To receive this bid evaluation preference, a firm must be a qualified as a LBE prior to the time bids are received.

Local Business Enterprise means a business enterprise, including but not limited to, a sole proprietorship, partnership, limited liability company, corporation, or other business entity that has a legitimate business presence in the city or unincorporated county of Sacramento. Evidence of legitimate business presence in the city or unincorporated county of Sacramento shall include:

1. Having a current City of Sacramento Business Operation Tax or County of Sacramento Business License; and
2. Having either of the following types of offices or workspace operating legally within the city or unincorporated county of Sacramento:
    a. The LBE's principle business office or workspace; or
    b. The LBE's regional, branch or satellite office with at least one full time employee located in the city or unincorporated county of Sacramento.

A. LOCAL BUSINESS ENTERPRISE (LBE)

Is the firm submitting the bid qualified as a local business enterprise? Check the appropriate box below:

[X] **YES** - the firm submitting the bid is qualified as a local business enterprise.

[ ] **NO** - the firm submitting the bid is not qualified as a local business enterprise.

If the response to the above is YES, provide the City of Sacramento Business Operations Tax Certificate Number and/or County of Sacramento Business License Number:

102662

If the response to the above is YES, provide a current copy of the City of Sacramento Business Operations Tax Certificate and/or County of Sacramento Business License.

If the response to the above is YES, provide business office or workspace address*:

405 30th Street

Sacramento, CA 95816

* Address must be a physical address for the basis of location, this excludes P.O. Box addresses.

[1] The LBE Program provides for a two percent (2%) preference on all City procurement opportunities under $100,000. For professional service contracts only, this preference also applies to procurement opportunities of $100,000 or more.

DGS CALIFORNIA DEPARTMENT OF GENERAL SERVICES

Governor Edmund G. Brown Jr.

Jan 30, 2013

SB APP

Supplier #1749891
JSP Communications & Engineering Inc
405 30th Street
SACRAMENTO CA 95816

Dear Business Person:

Congratulations on your Small Business (SB) certification with the State of California. Your business is now entitled to compete in the State's goal to spend 25 percent of its annual contracting dollars with small businesses. Each certified SB receives a five percent bid preference on applicable solicitations. This certification also guarantees higher interest penalties for late payment of undisputed invoices. You may purchase a rubber stamp by completing the Prompt Payment Rubber Stamp Order form at www.documents.dgs.ca.gov/pd/smallbus/ppstampreq.pdf. For more information or to verify certification status, visit www.eprocure.dgs.ca.gov.

Certification Period

From Jan 30, 2013 to Jan 31, 2015

Business Types

Service

Conflict of Interest for Current and Former State Employees

Prior to contract award, agencies will assure the vendor is in compliance with Public Contract Code, Section 10410 et seq. addressing conflict of interest for State employees or former employees.

Annual Submission Requirement

Submit copies of the ENTIRE federal tax return to the Office of Small Business and DVBE Services (OSDS). If you have been granted a tax filing extension with the Internal Revenue Service, submit a copy of the extension form and annual financial statements; then, submit a copy of the tax return once filed. If you have employees, include the California Employment Development Department's "Quarterly Contribution Return and Report of Wages (Continuation)" (Form DE9C). If you have out-of-state employees, submit the employee documentation comparable to Form DE9C. These annual submissions also apply to all affiliated businesses.

Maintaining Your Online Certified Firm Profile

Visit www.eprocure.dgs.ca.gov/default.htm to update your certification profile. You may report changes to the following: mailing and principal office address; contact information; keywords and service areas; United Nations Standard Products and Services Codes, North American Industry Classification System (applicable only to

Manufacturers). This certification may be impacted if you update information beyond the aforementioned. To report changes by mail, complete a "Certification Information Change" form located at www.documents.dgs.ca.gov/pd/smallbus/certchange.pdf.

Certification Renewal

Please complete an online application at www.eprocure.dgs.ca.gov 90 days prior to the expiration date whether or not you receive a renewal notice. If you hold dual certifications, SB and DVBE certifications, you must renew both certifications at the same time. Please contact us at 800.559.5529, 916.375.4940 or by

Form **W-9**
(Rev. December 2011)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

Give Form to the requester. Do not send to the IRS.

Print or type
See Specific Instructions on page 2.

Name (as shown on your income tax return)
JSP Communication & Engineering, INC.

Business name/disregarded entity name, if different from above
JSP Automation

Check appropriate box for federal tax classification:
☐ Individual/sole proprietor ☐ C Corporation ☑ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶ S

☐ Other (see instructions) ▶

☐ Exempt payee

Address (number, street, and apt. or suite no.)
405 30th Street

Requester's name and address (optional)

City, state, and ZIP code
Sacramento, CA 95816

List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on the "Name" line to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the chart on page 4 for guidelines on whose number to enter.

Social security number
☐☐☐ - ☐☐ - ☐☐☐☐

Employer identification number
4 5 - 4 4 0 8 1 7 0

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and
3. I am a U.S. citizen or other U.S. person (defined below).

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 4.

Sign Here Signature of U.S. person ▶ Date ▶ 01/01/13

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Purpose of Form

A person who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA.

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN to the person requesting it (the requester) and, when applicable, to:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income.

Note. If a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien,
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States,
- An estate (other than a foreign estate), or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax on any foreign partners' share of income from such business. Further, in certain cases where a Form W-9 has not been received, a partnership is required to presume that a partner is a foreign person, and pay the withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid withholding on your share of partnership income.

YEAR

CALIFORNIA FORM

2013 Withholding Exemption Certificate 590

This form can only be used to certify exemption from nonresident withholding under California Revenue and Taxation Code (R&TC) Section 18662. Do not use this form for exemption from wage withholding.

File this form with your withholding agent. (Please type or print)

Withholding agent's name: The City of Sacramento

Payee's name: JSP Communication & Engineering, INC. DBA JSP Automation

Payee's ☐ SSN or ITIN ☑ FEIN ☐ CA corp. no. ☐ CA SOS file no: 45-4408170

Address (number and street, PO Box, or PMB no.): 405 30th Street

Apt. no./ Ste. no.:

City: Sacramento

State: CA

ZIP Code: 95816

Read the following carefully and check the box that applies to the payee.

I certify that for the reasons checked below, the payee named on this form is exempt from the California income tax withholding requirement on payment(s) made to the entity or individual.

☐ **Individuals — Certification of Residency:**
I am a resident of California and I reside at the address shown above. If I become a nonresident at any time, I will promptly notify the withholding agent. See instructions for General Information D, Who is a Resident, for the definition of a resident.

☑ **Corporations:**
The above-named corporation has a permanent place of business in California at the address shown above or is qualified through the California Secretary of State (SOS) to do business in California. The corporation will file a California tax return and withhold on payments of California source income to nonresidents when required. If this corporation ceases to have a permanent place of business in California or ceases to do any of the above, I will promptly notify the withholding agent. See instructions for General Information F, What is a Permanent Place of Business, for the definition of permanent place of business.

☐ **Partnerships or limited liability companies (LLC):**
The above-named partnership or LLC has a permanent place of business in California at the address shown above or is registered with the California SOS, and is subject to the laws of California. The partnership or LLC will file a California tax return and will withhold on foreign and domestic nonresident partners or members when required. If the partnership or LLC ceases to do any of the above, I will promptly inform the withholding agent. For withholding purposes, a limited liability partnership (LLP) is treated like any other partnership.

☐ **Tax-Exempt Entities:**
The above-named entity is exempt from tax under California Revenue and Taxation Code (R&TC) Section 23701 _____ (insert letter) or Internal Revenue Code Section 501(c) _____ (insert number). The tax-exempt entity will withhold on payments of California source income to nonresidents when required. If this entity ceases to be exempt from tax, I will promptly notify the withholding agent. Individuals cannot be tax-exempt entities.

☐ **Insurance Companies, Individual Retirement Arrangements (IRAs), or Qualified Pension/Profit Sharing Plans:**
The above-named entity is an insurance company, IRA, or a federally qualified pension or profit-sharing plan.

☐ **California Trusts:**
At least one trustee and one noncontingent beneficiary of the above-named trust is a California resident. The trust will file a California fiduciary tax return and will withhold on foreign and domestic nonresident beneficiaries when required. If the trustee becomes a nonresident at any time, I will promptly notify the withholding agent.

☐ **Estates — Certification of Residency of Deceased Person:**
I am the executor of the above-named person's estate. The decedent was a California resident at the time of death. The estate will file a California fiduciary tax return and will withhold on foreign and domestic nonresident beneficiaries when required.

☐ **Nonmilitary Spouse of a Military Servicemember:**
I am a nonmilitary spouse of a military servicemember and I meet the Military Spouse Residency Relief Act (MSRRA) requirements. See instructions for General Information E, MSRRA.

CERTIFICATE: Please complete and sign below.

Under penalties of perjury, I hereby certify that the information provided in this document is, to the best of my knowledge, true and correct. If conditions change, I will promptly notify the withholding agent.

Payee's name and title (type or print) James Phillips, President Daytime telephone no. (916) 448-3776

Payee's signature ▶ _____ Date 06/28/2013

For Privacy Notice, get form FTB 1131.

7061133

Form 590 C2 2012

MUST BE POSTED IN CONSPICUOUS PLACE

CITY OF SACRAMENTO

BUSINESS OPERATIONS TAX CERTIFICATE

102662

102662

		FROM Mo. Day Yr.	TO Mo. Day Yr.
Business Name	JSP AUTOMATION		
Business Address	405 30TH ST		
Owner	JAMES S PHILLIPS	10/01/2012	09/30/2013
Type of Business	ENGINEERING		
Tax Classification	402A		Expires

TOTAL PAID: $420.00

JSP AUTOMATION
225 30TH ST
SACRAMENTO, CA 95816

CITY OF SACRAMENTO
VOID
SEP 19 2012
VALIDATED
PAID

THIS STUB MAY BE FOLDED/DETACHED BEFORE POSTING

This certificate is not to be construed as a business license or imply that the City of Sacramento has investigated, or approves or recommends, the holder of this certificate. Any representation to the contrary is fraudulent. (This certificate must be renewed within 30 days of expiration).

JSPAU-1 OP ID: SF

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 05/14/13

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
United Valley Ins. Svcs./
Mulholland Insurance Agency
2358 Maritime Dr., Suite 100
Elk Grove, CA 95758
Brian Mulholland

Phone: 916-691-5555
Fax: 916-691-0555

CONTACT NAME:
PHONE (A/C, No, Ext):
FAX (A/C, No):
E-MAIL ADDRESS:

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : State Compensation Ins. Fund	35076
INSURER B :	
INSURER C :	
INSURER D :	
INSURER E :	
INSURER F :	

INSURED
JSP Automation
James Phillips
225 30th St, Ste 305
Sacramento, CA 95816

COVERAGES CERTIFICATE NUMBER: REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	GENERAL LIABILITY						EACH OCCURRENCE	$
	COMMERCIAL GENERAL LIABILITY						DAMAGE TO RENTED PREMISES (Ea occurrence)	$
	CLAIMS-MADE OCCUR						MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$
							GENERAL AGGREGATE	$
	GEN'L AGGREGATE LIMIT APPLIES PER: POLICY PRO-JECT LOC						PRODUCTS - COMP/OP AGG	$
								$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$
	ANY AUTO						BODILY INJURY (Per person)	$
	ALL OWNED AUTOS / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	HIRED AUTOS / NON-OWNED AUTOS						PROPERTY DAMAGE (Per accident)	$
								$
	UMBRELLA LIAB / OCCUR						EACH OCCURRENCE	$
	EXCESS LIAB / CLAIMS-MADE						AGGREGATE	$
	DED RETENTION $							$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N/A	X	16361022011	04/30/13	04/30/14	X WC STATU-TORY LIMITS / OTH-ER	
							E.L. EACH ACCIDENT	$ 1,000,000
							E.L. DISEASE - EA EMPLOYEE	$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	$ 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

CERTIFICATE HOLDER

CITYSAC

City of Sacramento, Dept.
of Utilities
1395 35th Avenue
Sacramento, CA 95822

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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ENDORSEMENT AGREEMENT
WAIVER OF SUBROGATION

1636102-13
RENEWAL
NF
0-12-13-70
PAGE 1

HOME OFFICE
SAN FRANCISCO

ALL EFFECTIVE DATES ARE AT 12:01 AM PACIFIC STANDARD TIME OR THE TIME INDICATED AT PACIFIC STANDARD TIME

EFFECTIVE MAY 14, 2013 AT 12.01 A.M.
AND EXPIRING APRIL 30, 2014 AT 12.01 A.M.

JSP AUTOMATION

405 30TH ST
SACRAMENTO, CA 95816

ANYTHING IN THIS POLICY TO THE CONTRARY NOTWITHSTANDING, IT IS AGREED THAT THE STATE COMPENSATION INSURANCE FUND WAIVES ANY RIGHT OF SUBROGATION AGAINST,

CITY OF SACRAMENTO

WHICH MIGHT ARISE BY REASON OF ANY PAYMENT UNDER THIS POLICY IN CONNECTION WITH WORK PERFORMED BY,

JSP AUTOMATION

IT IS FURTHER AGREED THAT THE INSURED SHALL MAINTAIN PAYROLL RECORDS ACCURATELY SEGREGATING THE REMUNERATION OF EMPLOYEES WHILE ENGAGED IN WORK FOR THE ABOVE EMPLOYER.

IT IS FURTHER AGREED THAT PREMIUM ON THE EARNINGS OF SUCH EMPLOYEES SHALL BE INCREASED BY 03%.

NOTHING IN THIS ENDORSEMENT CONTAINED SHALL BE HELD TO VARY, ALTER, WAIVE OR EXTEND ANY OF THE TERMS, CONDITIONS, AGREEMENTS, OR LIMITATIONS OF THIS POLICY OTHER THAN AS STATED. NOTHING ELSEWHERE IN THIS POLICY SHALL BE HELD TO VARY, ALTER, WAIVE OR LIMIT THE TERMS, CONDITIONS, AGREEMENTS OR LIMITATIONS OF THIS ENDORSEMENT.

COUNTERSIGNED AND ISSUED AT SAN FRANCISCO: MAY 17, 2013 2570

AUTHORIZED REPRESENTATIVE

PRESIDENT AND CEO

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 05/21/2013

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

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PRODUCER

Marsh U.S. Consumer
a service of Seabury & Smith, Inc.
P.O. Box 8146
Des Moines, IA 50306-8146

CONTACT NAME:
PHONE (A/C, No):
EMAIL ADDRESS:
FAX (A/C, No):
PRODUCER CUSTOMER ID:

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A: Certain Underwriters at Lloyd's of London	1122000
INSURER B:	
INSURER C:	
INSURER D:	
INSURER E:	
INSURER F:	

INSURED

JSP Communication & Engineering, Inc.
405 30th Street
Sacramento, CA 95816

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INS LETR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	GENERAL LIABILITY						EACH OCCURRENCE	$
	☐ COMMERICAL GENERAL LIABILITY						DAMAGE TO RENTED PREMISES (Ea occurrence)	$
	☐ ☐ CLAIMS-MADE ☐ OCCUR						MED EXP (Any one person)	$
	☐						PERSONAL & ADV INJURY	$
	☐						GENERAL AGGREGATE	$
	GEN'L AGGREGATE LIMIT APPLIES PER:						PRODUCTS - COMP/OP AGG	$
	☐ POLICY ☐ PROJECT ☐ LOC							$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Each Occurrence)	$
	☐ ANY AUTO						BODILY INJURY (Per person)	$
	☐ ALL OWNED AUTOS						BODILY INJURY (Per accident)	$
	☐ SCHEDULED AUTOS						PROPERTY DAMAGE (Per accident)	$
	☐ HIRED AUTOS							$
	☐ NON-OWNED AUTOS							$
	☐							
	☐ **UMBRELLA LIAB** ☐ OCCUR						EACH OCCURRENCE	$
	☐ **EXCESS LIAB** ☐ CLAIMS-MADE						AGGREGATE	$
	☐ DEDUCTIBLE							$
	☐ RETENTION $							$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N ☐						☐ WC STATUTORY LIMITS ☐ OTHER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? **(Mandatory in NH)** If yes, describe under DESCRIPTION OF OPERATIONS below	N/A					E.L. EACH ACCIDENT	$
							E.L. DISEASE - EA EMPLOYEE	$
							E.L. DISEASE - POLICY LIMIT	$
A	OTHER ENGINEERS PROFESSIONAL LIABILITY INSURANCE RETRO DATE: 04/15/2001			6000131	04/15/2013	04/15/2014	DEDUCTIBLE: PER CLAIM	$0
							LIMITS: PER CLAIM	$1,000,000
							AGGREGATE	$2,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

CLAIMS MADE POLICY

CERTIFICATE HOLDER

City of Sacramento
1395 35th Avenue
Sacramento, CA 95822

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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JSPCO-1 OP ID: RG

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 05/20/13

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

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PRODUCER
Aaron Telford Insurance Agency
3001 Douglas Blvd. Ste. 142
Roseville, CA 95661
916-798-9541
916-436-2610

CONTACT NAME: Aaron Telford Insurance Agency
PHONE (A/C, No, Ext): FAX (A/C, No):
E-MAIL ADDRESS:

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : Mid-Century Insurance Company	
INSURER B :	
INSURER C :	
INSURER D :	
INSURER E :	
INSURER F :	

INSURED
JSP Communications & Engineering Inc
James Phillips
405-30th Street
Sacramento, CA 95816

COVERAGES CERTIFICATE NUMBER: REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	GENERAL LIABILITY							
A	X COMMERCIAL GENERAL LIABILITY	X		605091485	04/17/13	04/17/14	EACH OCCURRENCE	$ 2,000,000
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 75,000
							MED EXP (Any one person)	$ 5,000
							PERSONAL & ADV INJURY	$ Included
	X EPLI			100,000	04/17/13	04/17/14	GENERAL AGGREGATE	$ 4,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						PRODUCTS - COMP/OP AGG	$ 2,000,000
	POLICY PRO-JECT LOC							$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
A	ANY AUTO	X		605091485	04/17/13	04/17/14	BODILY INJURY (Per person)	$
	ALL OWNED AUTOS / X SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	X HIRED AUTOS / X NON-OWNED AUTOS						PROPERTY DAMAGE (Per accident)	$
								$
	UMBRELLA LIAB / OCCUR						EACH OCCURRENCE	$
	EXCESS LIAB / CLAIMS-MADE						AGGREGATE	$
	DED / RETENTION $							$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY						WC STATU-TORY LIMITS / OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N (Mandatory in NH)	N/A					E.L. EACH ACCIDENT	$
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$
							E.L. DISEASE - POLICY LIMIT	$
A	Cyber Liability			605091485 50,000	04/17/13	04/17/14		

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)
Cancellation exception: 10 days notice of cancellation for non payment of premiums.Certificate holder is listed as additional insured as respects to general and auto liability. Job:Engineering, design and Consulting for the City of Sacramento

CERTIFICATE HOLDER

CITY-12

City of Sacramento
its officials,employees and volunteers
1395-35th Avenue
Sacramento, CA 95822

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

E4277
1st Edition

Policy Number: 60509-14-85

POLICY CHANGES

Effective Date of Change: 05/15/13 Expiration Date: 04/17/14

Change Endorsement No.: 009 Agent: 95-37-336

Named Insured: JSP COMMUNICATIONS &
SEE E0002
405 30TH STREET

SACRAMENTO CA 95816-3359

The following item(s):

	Insured's Name		Insured's Mailing Address
	Policy Number		Company
	Effective / Expiration Date		Insured's Legal Status / Business of Insured
	Payment Plan		Premium Determination
X	Additional Interested Parties		Coverage Forms and Endorsements
	Limits / Exposures		Deductibles
	Covered Property / Location Description		Classification / Class Codes
	Rates		Underlying Insurance

is (are) changed to read {**See Additional Page(s)**}:

The above amendments result in a change in the premium as follows:

X	No Changes		To Be Adjusted At Audit	Additional Premium	Return Premium
				$	$
Authorized Representative Signature:					

FARMERS

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Policy Changes Endorsement Description

ADD ADDITIONAL INTEREST
ADDITIONAL INSURED -BP04480197
DESIGNATED PERSON OR ORGANIZATION
CITY OF SACRAMENTO
1395 35TH AVE
SACRAMENTO, CA 95822
LOCATION : 405 30TH STREET
SACRAMENTO, CA 95816

Removal Permit If Covered Property is removed to a new location that is described on this Policy Change, you may extend this insurance to include that Covered Property at each location during the removal. Coverage at each location will apply in the proportion that the value at each location bears to the value of all Covered Property being removed. This permit applies up to 10 days after the effective date of this Policy Change: after that, this insurance does not apply at the previous location.

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THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED - DESIGNATED PERSON OR ORGANIZATION

This endorsement modifies insurance provided under the following:

BUSINESSOWNERS POLICY

SCHEDULE*

Name Of Person Or Organization:
CITY OF SACRAMENTO

* Information required to complete this Schedule, if not shown on this endorsement, will be shown in the Declarations.

The following is added to Paragraph **C. Who Is An Insured** in the Businessowners Liability Coverage Form:

4. Any person or organization shown in the Schedule is also an insured, but only with respect to liability arising out of your ongoing operations or premises owned by or rented to you.

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THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

E4277
1st Edition

Policy Number: 60509-14-85

POLICY CHANGES

Effective Date of Change: 05/20/13

Expiration Date: 04/17/14

Change Endorsement No.: 022

Agent: 95-37-336

Named Insured: JSP COMMUNICATIONS &
SEE E0002
405 30TH STREET

SACRAMENTO CA 95816-3359

The following item(s):

	Insured's Name		Insured's Mailing Address
	Policy Number		Company
	Effective / Expiration Date		Insured's Legal Status / Business of Insured
	Payment Plan		Premium Determination
X	Additional Interested Parties		Coverage Forms and Endorsements
	Limits / Exposures		Deductibles
	Covered Property / Location Description		Classification / Class Codes
	Rates		Underlying Insurance

is (are) changed to read {**See Additional Page(s)**}:

The above amendments result in a change in the premium as follows:

X	No Changes		To Be Adjusted At Audit	Additional Premium	Return Premium
				$	$

Authorized Representative Signature:

FARMERS

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Policy Changes Endorsement Description

ADD ADDITIONAL INTEREST
ADDITIONAL INSURED - CA20480299
ADDITIONAL INSURED-DESIGNATED INSURED
CITY OF SACRAMENTO,ITS
OFFICIALS,EMPLOYEES AND
1395 35TH AVE
SACRAMENTO, CA 95822
2005 ACURA MDX TOURIN
VIN: 2HNYD18945H529903
2004 DODGE RAM 1500 Q

Removal Permit If Covered Property is removed to a new location that is described on this Policy Change, you may extend this insurance to include that Covered Property at each location during the removal. Coverage at each location will apply in the proportion that the value at each location bears to the value of all Covered Property being removed. This permit applies up to 10 days after the effective date of this Policy Change: after that, this insurance does not apply at the previous location.

Includes Copyrighted Material, Insurance Services Office, Inc., with its permission.

BUSINESS AUTO DECLARATIONS

☐ POLICY
☒ COVERAGE PART

MID-CENTURY INSURANCE COMPANY
MEMBERS OF FARMERS INSURANCE GROUP OF COMPANIES
HOME OFFICE: 4680 WILSHIRE BLVD., LOS ANGELES, CALIFORNIA 90010

ITEM ONE

NAMED INSURED: JSP COMMUNICATIONS & SEE E0002
MAILING ADDRESS: 405 30TH STREET
SACRAMENTO CA 95816-3359

AC51545 — Account Number
Prod. Count
95-37-336 — Agent
60509-14-85 — Policy Number

The named insured is an individual unless otherwise stated: ☐ Partnership ☒ Corp. ☐ Joint Venture ☐ Organization (Other than Partnership or joint venture)

Type of Business ENGINEERING SERVICES

Policy Period from 05/20/13 (not prior to time applied for) to 04/17/14 12:01 AM Standard Time

If this policy replaces other coverages that end at noon standard time on the same day this policy begins, this policy will not take effect until the other coverage ends. This policy will continue for successive policy periods as follows: If we elect to continue this insurance, we will renew this policy if you pay the required renewal premium for each successive policy period subject to our premiums, rules and forms then in effect.

ITEM TWO SCHEDULE OF COVERAGES AND COVERED AUTOS

*This policy provides only those coverages where a charge is shown in the premium column below. Each of these coverages will apply only to those "autos" shown as covered "autos". "Autos" are shown as covered "autos" for a particular coverage by the entry of one or more of the symbols from the COVERED AUTO Section of the Business Auto Coverage Form next to the name of the coverage.

COVERAGES	*COVERED AUTOS	LIMIT THE MOST WE WILL PAY FOR ANY ONE ACCIDENT OR LOSS (LIMITS SHOWN IN THOUSANDS)	PREMIUM
LIABILITY	7 8 9	$ 1000/1000/1000	2,496.00
PERSONAL INJURY PROTECTION (or equivalent No-Fault Coverage)		SEPARATELY STATED IN EACH PIP ENDORSEMENT	
ADDED PERSONAL INJURY PROTECTION (or equivalent added no-fault cov.)		SEPARATELY STATED IN EACH ADDED PIP ENDORSEMENT	
PROPERTY PROTECTION INSURANCE (Michigan only)		SEPARATELY STATED IN THE P.P.I. ENDORSEMENT MINUS $ DEDUCTIBLE FOR EACH ACCIDENT	
AUTO MEDICAL PAYMENTS	7	$ SEE SCHEDULE	198.00
UNINSURED MOTORIST	7	$ SEE SCHEDULE	196.00
UNINSURED MOTORIST PROPERTY DAMAGE		$	
UNDERINSURED MOTORISTS (When not incl. in Uninsured Motorists Coverage)	7	$	
PHYSICAL DAMAGE COMPREHENSIVE COVERAGE	7	Actual Cash Value or Cost of Repair, whichever is less minus $ SEE SCHEDULE Ded. for Each Covered Auto. But no Deductible Applies to Loss Caused by Fire or Lightning. See Item Four for hired or borrowed "autos".	133.00
PHYSICAL DAMAGE SPECIFIED CAUSES OF LOSS COVERAGE	7	Actual Cash Value or Cost of Repair, whichever is Less Minus $25 Ded. for Each Covered Auto for loss Caused by Mischief or Vandalism. See Item Four for hired or borrowed "Autos".	
PHYSICAL DAMAGE COLLISION COVERAGE	7	Actual Cash Value or Cost of Repair whichever is less minus $ SEE SCHEDULE Ded. for Each Covered Auto. See item four for hired or borrowed "Autos".	519.00
PHYSICAL DAMAGE TOWING AND LABOR	7	$ 500 for each disablement of a covered "auto." (ACTUAL LIMIT)	54.00
		PREMIUM FOR ENDORSEMENTS	92.00
		ESTIMATED TOTAL PREMIUM	3,688.00

FARMERS

60509-14-85
Policy Number

USINESS AUTO DECLARATIONS (Continued)
EM THREE
CHEDULE OF COVERED AUTOS YOU OWN

Covered Auto No.	DESCRIPTION: Year, Model, Trade Name, Body Type Serial Number (S) Vehicle Identification Number (VIN)	PURCHASED: Original Cost New	PURCHASED: Actual Cost & New (N) USED (U)	TERRITORY: Town & State where Covered Auto will be principally garaged
1	05 ACURA MDX TOURIN 2HNYD18945H529903	43775		SACRAMENTO CA 364
2	04 DODGE RAM 1500 Q 1D3HU18D24J166533	28001		SACRAMENTO CA 364

Covered Auto No.	CLASSIFICATION: Radius of Operation	Business use s - service r - retail c - commercial	Size GVW, GCW or Veh. Seating Capacity	Age Group	Primary Rating Factor: Liab.	Primary Rating Factor: Phy. Dam.	Secondary Rating Factor	Code	Except for towing, all physical damage loss is payable to you and the loss payee named below as interests may appear at the time of the loss.
1	50		10000	9					
2	50		10000	A					

COVERAGES-PREMIUMS, LIMITS AND DEDUCTIBLES (Absence of a deductible or limit entry in any column below means that the limit or deductible entry in the corresponding ITEM TWO column applies instead)

Covered Auto No.	LIABILITY *Limit	LIABILITY Premium	PERSONAL INJURY PROTECTION: Limit stated in each P.I.P. End. minus deductible shown below	PERSONAL INJURY PROTECTION Premium	ADDED P.I.P.: Limit stated in each Added P.I.P. End.	ADDED P.I.P. Premium	PROP. PROT. (Mich. only): Limit stated in P.P.I. end. minus deduct. shown below	PROP. PROT. (Mich. only) Premium
1	1000/1000/1000	1,171.00						
2	1000/1000/1000	1,171.00						
Total Premium		2,342.00						

COVERAGES-PREMIUMS, LIMITS AND DEDUCTIBLES (Absence of a deductible or limit entry in any column below means that the limit or deductible entry in the corresponding ITEM TWO column applies instead)

Covered Auto No.	AUTO MED. PAY *Limit	AUTO MED. PAY Premium	UNINSURED MOTORISTS *Limit	UNINSURED MOTORISTS Premium	UNINSURED MOTORIST PROPERTY DAMAGE *Limit	UNINSURED MOTORIST PROPERTY DAMAGE Premium	UNDERINSURED MOTORISTS *Limit	UNDERINSURED MOTORISTS Premium
1	1	99.00	1000/1000	98.00				
2	1	99.00	1000/1000	98.00				
Total Premium		198.00		196.00				

COVERAGES-PREMIUMS, LIMITS AND DEDUCTIBLES (Absence of a deductible or limit entry in any column below means that the limit or deductible entry in the corresponding ITEM TWO column applies instead)

Covered Auto No.	COMPREHENSIVE: Limit stated in ITEM TWO minus deductible shown below	COMPREHENSIVE Premium	SPECIFIED CAUSES OF LOSS: Limit stated in ITEM TWO Premium	COLLISION: Limit stated in ITEM TWO minus deduct. shown below	COLLISION Premium	TOWING LABOR: Limit Per Disablement	TOWING LABOR Premium
1	250	72.00		500	314.00	500	27.00
2	250	61.00		500	205.00	500	27.00
Total Premium		133.00			519.00		54.00

***(LIMITS SHOWN IN THOUSANDS)**

60509-14-85
Policy Number

BUSINESS AUTO DECLARATIONS (CONTINUED)
ITEM FOUR
SCHEDULE OF HIRED OR BORROWED COVERED AUTO COVERAGE AND PREMIUMS

LIABILITY COVERAGE RATING BASIS, COST OF HIRE

STATE	ESTIMATED COST OF HIRE FOR EACH STATE	RATE PER EACH $100 COST OF HIRE	FACTOR(If liab. COV. IS PRIMARY)	PREMIUM
CA				87.00
			PREMIUM	

Cost of hire means the total amount you incur for the hire of "autos" you don't own (not including "autos" you borrow or rent from your employees or their family members). Cost of hire does not include charges for services performed by motor carriers of property or passengers.

PHYSICAL DAMAGE COVERAGE

COVERAGES	LIMIT OF INSURANCE THE MOST WE WILL PAY DEDUCTIBLE	ESTIMATED ANNUAL COST OF HIRE	RATES PER EACH $100 COST OF HIRE	PREMIUM
COMPREHENSIVE	ACTUAL CASH VALUE, COST OF REPAIRS OR $ WHICHEVER IS LESS MINUS $ DED. FOR EACH COVERED AUTO. BUT NO DEDUCTIBLE APPLIES TO LOSS CAUSED BY FIRE OR LIGHTNING.			
SPECIFIED CAUSES OF LOSS	ACTUAL CASH VALUE, COST OF REPAIRS OR $ WHICHEVER IS LESS MINUS $25 DED. FOR EACH COVERED AUTO FOR LOSS CAUSED BY MISCHIEF OR VANDALISM.			
COLLISION	ACTUAL CASH VALUE, COST OF REPAIRS OR $ WHICHEVER IS LESS MINUS $ DED. FOR EACH COVERED AUTO			
			PREMIUM	

ITEM FIVE
SCHEDULE FOR NON-OWNERSHIP LIABILITY

NAMED INSURED'S BUSINESS	RATING BASIS	NUMBER	PREMIUM
Other than a Social Service Agency	Number of Employees	5	$ 67.00
	Number of Partners		$
Social Service Agency	Number of Employees		$
	Number of Volunteers		$

IN RETURN FOR THE PAYMENT OF THE PREMIUM, AND SUBJECT TO ALL THE TERMS OF THIS POLICY, WE AGREE WITH YOU TO PROVIDE THE INSURANCE AS STATED IN THIS POLICY.

Premium shown is payable: $ 3,688.00 at inception.

ENDORSEMENTS ATTACHED TO THIS POLICY: IL 00 21-Broad form Nuclear Exclusion (Not applicable in New York)

CA00010310	CA00381202	CA01430507	CA20480299	CA21071293	CA21540909	CA23840106
CA23940306	CA99230310	CA99270187	E0207-ED1	E2013-ED1	E2015-ED2	E2016-ED1
E3027-ED1	IL00210498	IL02700908	J6738-ED1	25-2614ED4	25-2984ED2	

LOSS PAYEE

COUNTERSIGNED _____ BY _____
(Date) Authorized Representative

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

DESIGNATED INSURED

This endorsement modifies insurance provided under the following:

BUSINESS AUTO COVERAGE FORM
GARAGE COVERAGE FORM
MOTOR CARRIER COVERAGE FORM
TRUCKERS COVERAGE FORM

With respect to coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by this endorsement.

This endorsement identifies person(s) or organization(s) who are "insureds" under the Who Is An Insured Provision of the Coverage Form. This endorsement does not alter coverage provided in the Coverage Form.

This endorsement changes the policy effective on the inception date of the policy unless another date is indicated below.

Endorsement Effective: 05/20/13	Countersigned By:
Named Insured: JSP COMMUNICATIONS &	(Authorized Representative)

SCHEDULE

Name of Person(s) or Organization(s): CITY OF SACRAMENTO,ITS

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to the endorsement.)

Each person or organization shown in the Schedule is an "insured" for Liability Coverage, but only to the extent that person or organization qualifies as an "insured" under the Who Is An Insured Provision contained in **Section II** of the Coverage Form.

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