TITLE PAGE

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT
SOUTH PUMP STATION AUTOMATION PROJECT

Lodi, California

Submitted May 10, 2018

Responding to Funding Opportunity Announcement No. BOR-DO-18-F006
WaterSMART Grants: Water and Energy Efficiency Grants for Fiscal Year 2018

Applicant:

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South Pump Station Automation Project

Grant Application

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I. Technical Proposal

A. Executive Summary

May 10, 2018
NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT
LODI, SAN JOAQUIN COUNTY, CALIFORNIA

North San Joaquin Water Conservation District's (NSJWCD) South Pump Station was constructed in the 1960's. The South Pump Station was designed to deliver surface water from the Mokelumne River to irrigated farmland in the district. The South Pump Station is at the end of its useful life. NSJWCD is constructing a new, modern pump station during 2018. However, the cost to equip the new pump station with meters, SCADA, automated controls and a Variable Frequency Drive (VFD) exceeds the district's available funds. Therefore, the district is only constructing a non-automated, single-speed drive pump station in 2018 with the goal of adding the meters, VFD and automated control features in 2019 or as soon as full funding is obtained. Funds available through this grant opportunity would enable the district to fund the meters, VFD and automated control features. These advanced automation features and downstream flow controls will enable the district to operate the South Pump Station more efficiently, reduce uncontrolled spills, and facilitate better on-farm water management. As a result, the district will conserve water and reduce the cost of surface water deliveries, making it more economical for farmers in the district to meet irrigation needs with surface water instead of groundwater pumped from the overdrafted Eastern San Joaquin groundwater basin.

The South Pump Station Automation Project refers to the design, installation and programming of the meter(s), VFD, SCADA automated controls and related instrumentation for the South Pump Station. This project will take six to twelve months to complete and could be complete by the end of 2019.The proposed project is not located on a Federal facility.

B. Background Data

NSJWCD is a special district organized to address groundwater overdraft by delivering surface water to irrigated farmland. NSJWCD has a surface water right to divert 20,000 acre-feet per year from the Mokelumne River known as Permit 10477. Permit 10477 was issued by the State Water Resources Control Board in 1948 and is one of the most-junior water rights on the river. As a result, water is only available under Permit 10477 in normal to wet years (typically 5 out of 10 years). Average annual water supply is 10,000 AF, but in reality, supply is either 20,000 AF in wetter years and nothing in drier years.

NSJWCD has five approved points of diversion and related conveyance systems for its water right. Four of these points of diversion are used to deliver water to agricultural lands for irrigation and groundwater recharge, and the fifth point of diversion is used to deliver water to the City of Lodi for municipal purposes. Of the four points of diversion that are used to deliver water for irrigation and groundwater recharge, the largest is the South

System, relevant here. The South Pump Station was originally designed to pump up to 40 cfs. The updated South Pump Station being constructed in the fall of 2018 will have the same diversion capability and can deliver about 10,000 acre-feet per annum (AFA).

Historically the South Pump Station was used to deliver unpressurized surface water to landowners through a pipeline, unlined ditch, Bear Creek, and Pixley Slough where the water was used for flood irrigation. Over time, most of the landowners along the pipeline have converted to drip or micro-sprinkler pressurized irrigation systems. The pipeline system, which was constructed with three float valves in key locations to assure enough head for deliveries, developed large leaks over time and had gate controls with unmetered discharges to the channels that provided relatively poor demand response capability. This has caused a significant increase in water loss due to uncontrolled operational spills. Thus, the district does not currently have the ability to refine the diversions at the South Pump Station to match landowner demands without the Project.

Without the ability to control operational losses, the cost of delivering water to landowners from the existing South Pump Station is too high to make it economical for them to use surface water, as compared to the cost to pump groundwater. This is driving down the demand for surface water on the South System, which is making the groundwater overdraft problem in the district worse. Adding a VFD, RTU and real-time measurement equipment to the pump station will allow it to operate more efficiently and allow the district to deliver surface water economically, as well as conserve water.

NSJWCD has previously received funding from Reclamation to assist in the construction of two of its other diversion facilities. In 2006, the district received a Cal-Fed Grant to install a new pump station on the north side of the Mokelumne River for a pilot groundwater recharge project (Project # R10AC20574). In 2011, the district received a WaterSMART Grant for its Tracy Lake Groundwater Recharge Project (Project # R11AP20096), which located on the north side of the Mokelumne River downstream of the City of Lodi. The Tracy Lake Project was completed in 2015 and will operate in 2018 (2016 operations were prevented by drought conditions and 2017 operations by high-water conditions).

In 2017, NSJWCD was awarded a $1 million grant under Funding Opportunity Announcement No. BOR-MP-17-F002 (along with a $3 million state grant) in order to reconstruct the South System Pipeline and install new grower-turnouts. However, a landowner election required to impose assessments for the approximately $15 million in cost-share funding resulted in a “no” vote, meaning that the district was unable to move forward under the 2017 grant agreement with Reclamation.

C. Project Location

NSJWCD’s service area includes 150,000-acres located in northeastern San Joaquin County. See Figure 1. The South Pump Station is located within NSJWCD’s service area on the south bank of the Mokelumne River, approximately 3.5 miles east of the City of Lodi. The latitude and longitude of the existing pump station is 38° 9'13.47"N,

121°10'54.14"W. The proposed project involves installation of a new meter, SCADA-system, automated controls, and a Variable Frequency Drive (VFD) on the new pump station (approximately 38° 9'12.77"N, 121°11'4.53"W) that is scheduled to be installed during late-summer of 2018.

The conveyance system that is used to deliver water is located south of the river, branching into two different sections at Brandt Road and terminating in Pixley Slough at a location east of Alpine Road. See Figure 2.

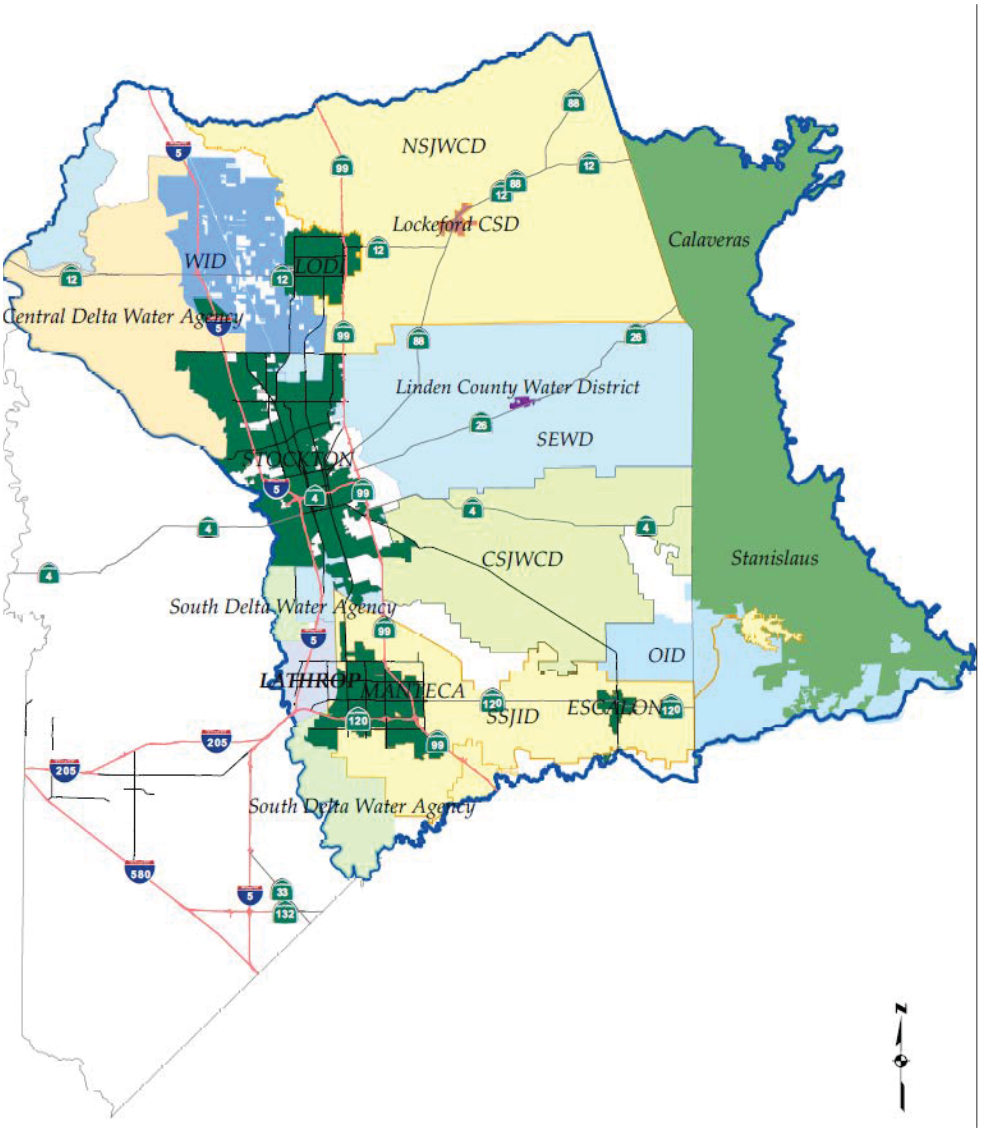


Figure 1. NSJWCD Map.

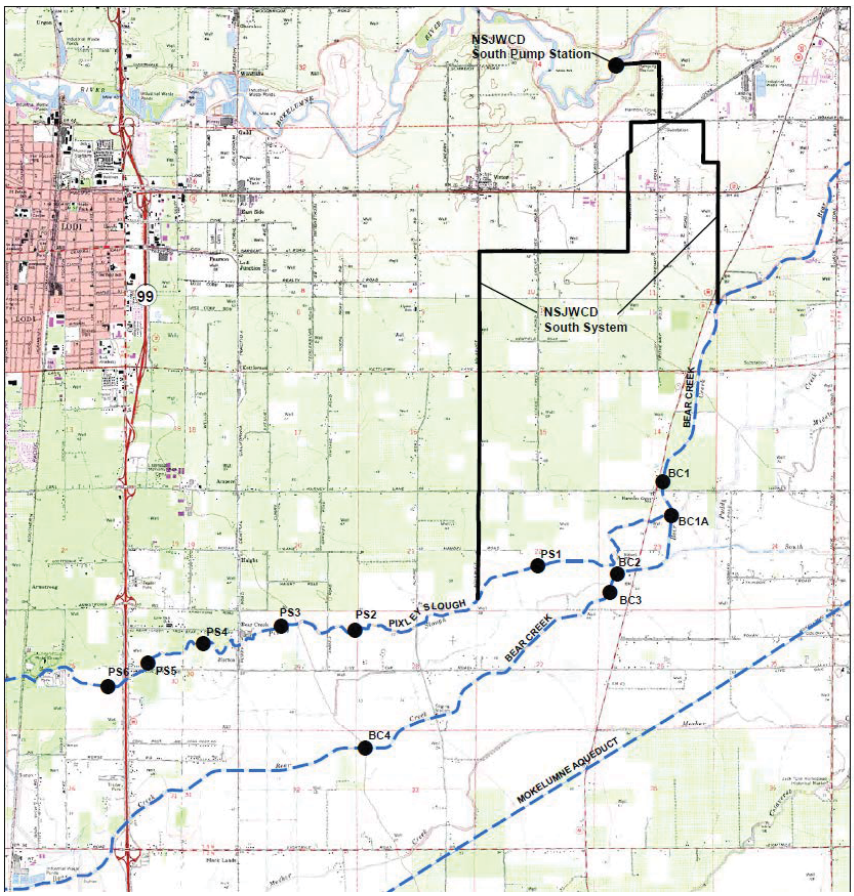


Figure 2. Map of NSJWCD South System.

D. Technical Project Description

The existing South Pump Station is manually operated and utilizes single speed motors. The existing flow meter has been deemed inoperable and does not have telemetry. The South Pump Station Automation Project would include adding:
:

- One Variable Frequency Drive (VFD) and related components including sensors, alarms, and a Programmable Logic Controller (PLC) which allow for pump operations to respond to variable downstream demands or alarms based either upon programmed responses that control pump speed (and thus flows) using pre-programmed ladder-logic.
- A Remote Telemetry Unit (RTU) to transmit data to the operator that allows real-time meter data management and operator response to alarms indicating changes in demand or other changes.
- Electric wiring, cabinets and other infrastructure required
- Meters (an Insertion Magnetic Flow Meter, Ultrasonic Level Transmitter, Pressure Indicating Transmitter) to allow for measurement in real time and feed into the PLC.

The Plans and Specifications for these components are included in Attachments A and B, prepared by KSN Engineers.

Variable frequency Drives (VFDs) are used in most industries as they allow the pump to be operated along the pump curve without wasting energy for the flow required by the system. VFDs also save on energy demand charges and hydraulic surges on the pipeline by ramping the pump up to speed (or ramped down) at a slower rate than a traditional motor starter. These devices, along with the instrumentation and automation components, allow for pipeline pressures and flows to be closely controlled, resulting in better system operations. The VFDs specified are 6 Pulse Width Modulation (PWM) technology drives that will be mounted in a flanged arrangement to allow the VFD heat losses to be directly vented outside to save energy and environmental conditioning costs. The drive includes a hybrid harmonic filter to reduce harmonic distortion to under IEEE 519 limits.

The instrumentation and automation components include a PLC and telemetry to link this remote site to the district's office. This allows for accurate measurement and control of the irrigation system process variables, including system pressure. This will allow the district to remotely monitor, store, and process instrumentation readings as well as remotely operate the system. The SCADA components include a Programmable Logic Control (PLC) with a local Human Machine Interface (HMI). The PLC is linked via cellular telemetry to the district office to allow for remote monitoring and control through the secure connection.

The project includes a high accuracy flow meter to allow for flow measurement. This flow meter will allow the flow readings to be captured in real time by the PLC, which will then transmit them to the SCADA system in the District's office. A pressure transmitter will also be implemented to allow the pipeline operations to be monitored. This instrument will also be useful in leak detection. The instruments information will also be collected through the PLC to be passed to the SCADA system.

II. Evaluation Criteria

1. Quantifiable Water Savings

Describe water savings:

The Project is expected to save an average of 1,000 AFA during each year of operation. This is ten percent of the 10,000 AFA average water available for diversion from the river to the South System in the years when water is available.

Without the Project, the new South Pump Station would only have manual controls and a non-real-time meter that would limit responses to changes in downstream demand to two options: (1) turn the pump off; or, (2) bypass some or all of the pump's flow back to the river. Furthermore, meter readings would be taken manually by an operator who would visit the site daily. This manner of operation, which relies heavily on bypasses back to the river at the pump station and/or spills at the end of the pipeline in order to match changes in system demands, is typical of pump stations before the advent of VFD, SCADA, and

real-time metering technology. Therefore, absent the grant-funded improvements, relatively large quantities of water would continue to be lost back to the river at the upper end as well as through uncontrolled spills at the end of the pipeline system.

Describe current losses:

In above normal and wet water years (the type of years river water is available to NSJWCD) water spilled back to the River is lost through evaporation, phreatophyte losses, and to the ocean. In these water year types outflows consist of flood flows that are not necessary for environmental purposes or salinity control. Furthermore, uncontrolled spills to the channels ultimately leave the District via Bear Creek and Pixely Sloughs into Delta sloughs that back up in response to tides. That water is also lost to the same fate (evaporation, phreatophyte losses, or to the ocean) for the same reason.

Describe the support/documentation of estimated water savings:

Michael J. Day (Registered Civil Engineer No. 39,494) of Provost & Pritchard Consulting Group, Inc., who has 30 years of experience studying and designing water distribution systems for irrigation districts, reviewed KSN's plans and specifications for the Project and field-reviewed the existing pump station, key water control points and spill sites on the pipeline. He also reviewed available literature related to the effectiveness of automation projects for water savings (bibliography is provided in Attachment D). Unfortunately, there are no hard and fast rules for estimating the water savings that could be expected from automating operation of the South System pump station (most studies relate to districts dominated by canal distribution or focus only on energy savings). Instead, Mr. Day relied upon experience throughout his career and the attached literature. Past losses in the South System have not been measured (typical of 1960's era systems), but likely have been on the order of at least 15 to 20%. Building the pump station without automation and real-time metering would likely reduce losses to the 10 to 15% range. Whereas the South System Automation Project is expected to reduce losses to the 5-10% range (or less). Thus, a ten percent savings is expected. As is explained below, most of the ten percent estimate would be due to automation (versus metering).

Automation of the pump station is part of an overall downstream control system automation plan (not an isolated project) that will include metered water deliveries, automation and water measurement at key water control structures within the system as well as automation and water measurement at the end of the pipeline system (where it discharges to channels) to minimize losses. The ten percent estimate factors the net difference between a non-automated pump station without real-time water measurement versus the pump station with proposed automation and real-time water measurement.

Some of the ten percent savings would be due to improved water measurement (real time versus daily readings or spot checks). Studies of urban water savings resulting purely from automating meter reading and meter data management of delivery meters document savings of about eight percent. However, no relevant studies of savings resulting from implementing real-time flow metering were found during the literature for agricultural water

agencies. Therefore, the component of water savings due to real-time metering of the pump station alone could not be determined.

The current South Pump Station is metered but the meter is not reliable, so flows were estimated based on periodic pump tests and pump run times. Although existing plans for the new South Pump Station involve installation of a flow meter, the meter that will be installed if the District does not receive grant funding will not have real-time measurement and reporting capability.

The proposed meter is a submersible insertion magnetic flow meter connected to RTU and motor controls so real-time metering data is used to control pump flows and to provide remote readings and meter data management by operators. Specifications for the meters are provided in Attachment B. Annual farm delivery volumes are likely to be reduced as a result of metering, but that could not be quantified. Actual water savings will be determined after the project by engineer's review of actual meter readings taken at the pump station, key water control structures, on-farm turnouts, and end of pipeline meters to audit for actual water losses. The audit will confirm actual losses in the 5-10% range or less.

2. Water Supply Reliability

NSJWCD overlies a critically overdrafted groundwater basin. This means that on average the amount of groundwater pumped from the basin exceeds the amount that is replenished, causing groundwater levels to decline.

NSJWCD is participating with other water agencies that overlie the same basin to create a "Groundwater Sustainability Plan" pursuant to the relatively new California law called the Sustainable Groundwater Management Act (SGMA). A key component of that plan is to maximize the efficient use of surface water, when it is available, to reduce groundwater pumping demand.

NSJWCD is the largest water agency overlying the subbasin. However, NSJWCD has one of the smallest and most junior surface water rights in the subbasin. In the past, the fact that surface water was only available in about 50% of years made NSJWCD landowners reluctant to invest in surface water delivery infrastructure. The outdated South Pump Station was inefficient and expensive to operate, with significant system losses – causing the cost of delivered surface water to be generally higher than the cost of pumping groundwater. However, with SGMA in place, declining groundwater levels and increasing electricity costs have caused landowners to be much more interested in using available surface water to reduce groundwater pumping. The district has experienced a significant increase in landowner interest to see the South System Pump Station modernized and automated so that surface water can be delivered efficiently and affordably and they can, in turn, reduce groundwater pumping.

By delivering surface water efficiently, the district can provide surface water to landowners at the same or a lower cost than the expense of pumping groundwater – which leads to use of surface water when it is available, thus reducing groundwater pumping. This reduced pumping will alleviate groundwater overdraft and help improve the overall

reliability of water supplies for the district and the region. Notably, this project does not involve providing irrigation water for new development. Rather, this project will help meet, and reduce, existing demand for irrigation water from lands in the district that are already fully developed into irrigated agriculture.

Numerous other water agencies, cities and community organizations recognize the importance of efficient delivery and use of surface water in NSJWCD, which is why so many have provided letters of support for this project. See Attachment E. One of the supporters is the California Sport Fishing Alliance. This environmental interest organization works collaboratively with other interest groups on the Mokelumne River to improve fishery conditions. A modernized, automated pump station will allow NSJWCD to ensure its operations do not interfere with fishery flow releases, which assists with species recovery goals for salmon and steelhead.

Also, there are disadvantaged communities within NSJWCD that rely on groundwater wells for their domestic water supplies. See Figure 3. Continuing groundwater level declines increase the cost of supplying domestic water for these communities and can even cause wells to fail. This project will help reduce groundwater demand by agriculture, improving groundwater conditions for domestic supply wells for these communities.

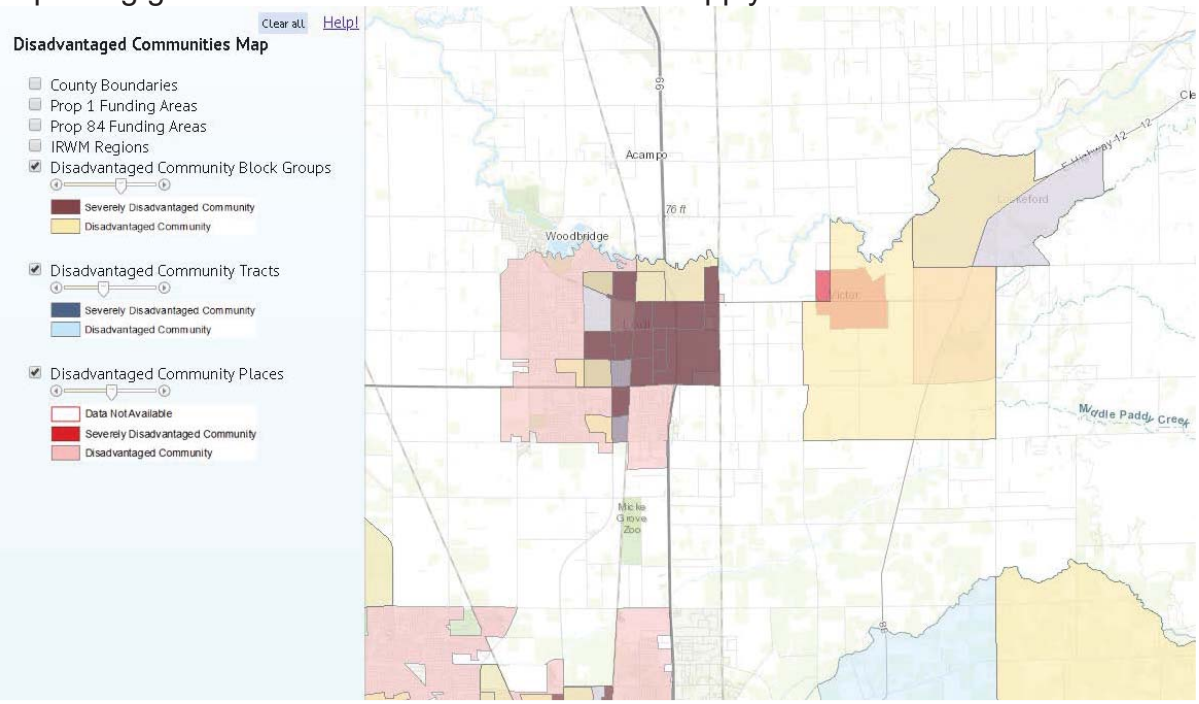


Figure 3. Map of Disadvantaged Communities in Project Area. (Source: Disadvantaged Communities Mapping Tool, DEPARTMENT OF WATER RESOURCES (list visited May 8, 2018) available at https://gis.water.ca.gov/app/dacs/)

3. **Implementing Hydropower -** The project does not implement hydropower.

4. Complementing On-Farm Irrigation Improvements

The majority of the irrigated acres served by the NSJWCD South System are drip-irrigated vineyards or cherry or nut orchards irrigated with micro-sprinklers. Many of the landowners within the District have previously utilized NRCS funding programs, such as EQUIP, when installing these low-volume irrigation systems.

The NSJWCD South Pump Station Automation Project will allow surface water to be delivered to these lands at a lower cost per acre-foot due to increased energy efficiency and reduction in system losses. This reduced cost of surface water will make it more-economical for farmers to invest in the on-farm booster pumps and flow meters necessary to take delivery of the district's surface water (NSJWCD will require that a landowner's turnout be equipped with a meter to receive deliveries). Additionally, NSJWCD will require landowners to agree to coordinate irrigation scheduling with the district in order to maximize the efficiency of operations. NRCS funding could be used to assist landowners in acquiring and installing flow meters, booster pumps, and related infrastructure, as well as obtaining the necessary training to coordinate with the district on automated scheduling and delivery of district water. (See Attachment F.)

Notably, no surface water was available under the NSJWCD water right in 2012-2016 due to drought, and the South Pump Station was not operable in 2017 due to extreme flood conditions. In 2011, when the system was last operated, the district did not require that landowner diversions be individually metered. Thus, landowners on the South System have not utilized their on-farm surface water diversion facilities in at least seven years, however, as is explained below, the South Pump Station Automation Project will act as an incentive for these landowners to make the kinds of on-farm improvements that are currently eligible for NRCS grants. (*See, e.g.,* Fiscal Year 2018 Upper San Joaquin Water Conservation EQIP Fund Pool.)

5. Department of the Interior Priorities

The project will modernize NSJWCD's South Pump Station so that it can be operated efficiently using state-of-the art technology to match water supply to demand. The automated control and metering system will enable the diversion information to be made available in real-time to a web-based portal. This will allow NSJWCD to share the data with the public and with other interested parties on the river, including East Bay Municipal Utility District and Woodbridge Irrigation District, the United States Fish and Wildlife Service and the California Department of Fish and Wildlife. These entities and agencies work together collaboratively on the river to maintain and improve conditions for salmon and steelhead trout. NSJWCD's ability to refine and control its irrigation water diversions from the river, and make this information available to others who work to manage the river, will assist in this collaborative effort to balance use of the resource for multiple purposes.

NSJWCD's proposed refurbishment of the South System has been in the planning stages for many years and has consistently been identified as one of the most high-priority projects for increasing water reliability on the Mokelumne River. Two separate integrated

regional water management plans discuss the importance of retrofitting the South System and resuming surface water deliveries for irrigation: (A) the 2015 Mokelumne Watershed Interregional Sustainability Evaluation (MokeWISE) Program; and (B) the 2014 Eastern San Joaquin Integrated Regional Water Management Plan. Additionally, NSJWCD has consistently identified refurbishment of the South System as one of the District's primary priorities in state-required annual water rights reports since the completion of the Tracy Lakes Diversion in 2015.

The anticipated benefits from the project are discussed on in Appendix 4a of the MokeWISE Final Report.
(http://www.mokewise.org/docs/MokeWISE%20Final%20Report%20June%202015.pdf)
NSJWCD's South System Project was also discussed in Section 10.3.15-.17 of the 2014 Eastern San Joaquin Integrated Regional Water Management Plan ("ESJ IRWM") as a project that promotes several key Integrated Regional Water Management Strategies.
(http://www.gbawater.org/IRWMP/2014-IRWMP-Update)

6. Implementation and Results

The Project, coupled with the district's requirement that all water deliveries to landowners be individually metered, will enable the district to specifically measure all water diverted from the river, all water delivered on-farm, and resulting system losses. These measurements can be compared to district records on estimated water deliveries and river diversions to confirm water savings of 10-15%. The district has past records of diversions from the river at the South Pump Station, prior to when the current meter stopped working, and records of how many acres ordered and received water from the district in prior years, to use for comparative purposes.

7. Nexus to Reclamation Project Activities

The project is not directly connected with Reclamation land or project activities, however it is in the same basin as two different Reclamation projects/activities.

New Melones Project: NSJWCD is the largest water district (150,000 acres) overlying the Eastern San Joaquin groundwater basin, which is critically overdrafted. NSJWCD's neighboring districts to the south are Stockton East Water District and Central San Joaquin Water Conservation District, who contract with the United States for water from the New Melones Project on the Stanislaus River. Like NSJWCD, Stockton East and Central generally do not have access to surface water under their New Melones contracts in dry years. Thus, it is critical that NSJWCD, Stockton East and Central all develop projects that fully utilize the available surface water supplies in wetter years, so that the groundwater overdraft problem in the basin can be corrected. All three districts overlie the same groundwater basin.

American River/Folsom South Canal: In the 1950's there was a Reclamation plan to extend the Folsom South Canal into San Joaquin County to provide water to NSJWCD.

Figure 4 depicts where the Folsom South Canal would have intercepted the NSJWCD delivery systems.

Due to changes in federal priorities for the American River, the Folsom South Canal was never extended into NSJWCD and Reclamation never contracted with NSJWCD for an American River supply. Thus, NSJWCD's only surface water supply is its relatively modest 20,000 afa Permit 10477 water right on the Mokelumne River, which is junior to East Bay Municipal Utility District (EBMUD) and Woodbridge Irrigation District - meaning that water is only available under Permit 10477 in about 50% of year types.

In 2006, EBMUD entered into a contract with the United States for American River water diverted at Freeport and conveyed through the Folsom South Canal to a new EBMUD pipeline. The pipeline carries the American River water south to the EBMUD Mokelumne Aqueduct in San Joaquin County so that it can be delivered to EBMUD customers in dry years, which reduces EBMUD's reliance on the Mokelumne River.

In recent years, EBMUD and NSJWCD have been working cooperatively with San Joaquin County on a pilot groundwater banking project that would enable EBMUD to deliver extra EBMUD surface water from the Mokelumne River in wetter years to NSJWCD for in-lieu groundwater recharge/banking, and then extract and export a portion of that banked water in dry years for delivery to EBMUD's customers through the EBMUD Mokelumne Aqueduct. The pilot project is called the DREAM Project, and utilizes the NSJWCD South Pump Station. Thus, the proposed South Pump Automation Project will also benefit the DREAM Project and make potential future expanded groundwater banking projects with EBMUD more cost effective by reducing energy costs and water loss through conveyance. These groundwater banking projects offer a means for EBMUD to further guard against and prepare for drought within its service area, which in turn, reduces pressure on Reclamation's American River/Folsom South Canal project.

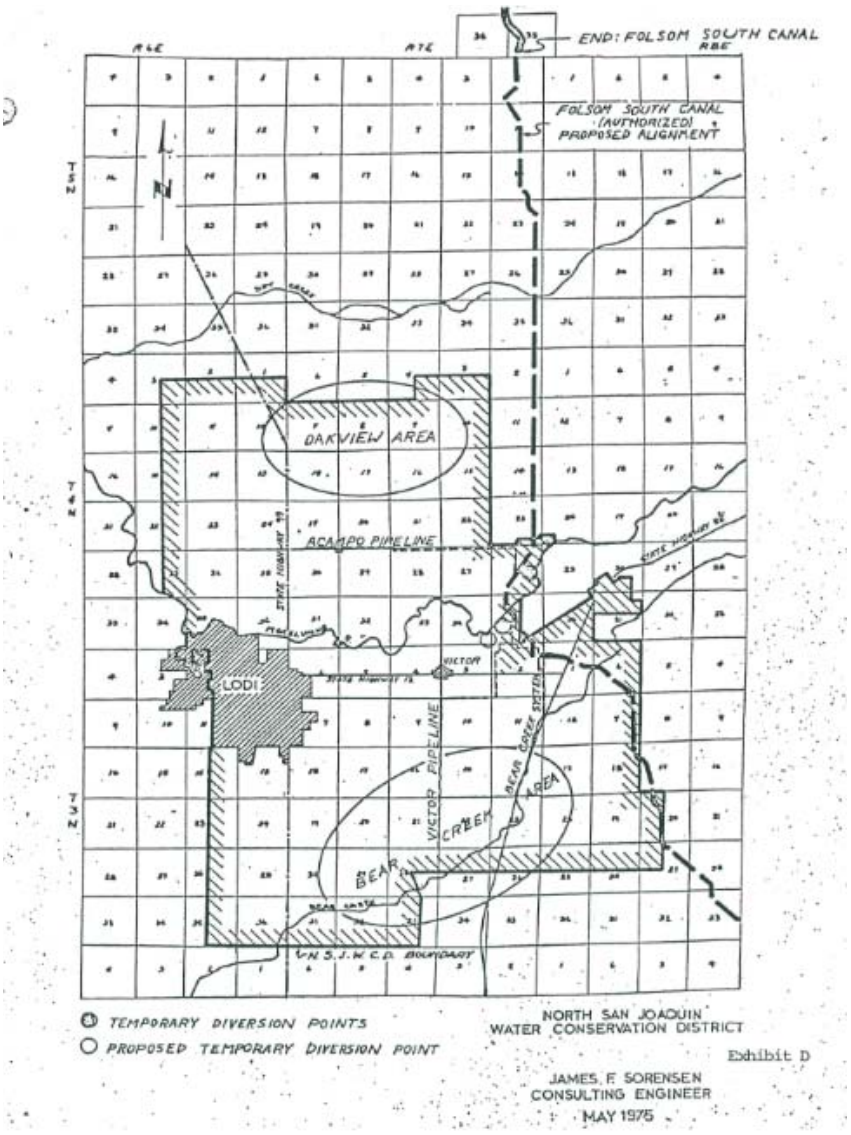


Figure 4. Proposed Folsom South Canal Alignment.

8. Additional Non-Federal Funding

The total project cost is $746,700, including a 10% contingency. The district is requesting federal funding of $300,000.00 and are using non-federal (district reserve) funds of $446,700. The ratio of non-federal funding to total project cost is **60%.**

446,700/746,700 = 60%

Notably, NSJWCD has already fully designed this project, put it out to bid, and negotiated a construction contract for the installation/construction. The costs associated with the design, bidding and contracting are another approximately $65,000. If these costs were accounted for, the non-federal funding ratio for the project would be even higher.

II. Project Budget

A. Funding plan and letters of commitment

The total project budget, including a 10% contingency is $746,700. NSJWCD has existing reserves of approximately $500,000 that can be used to fund the non-federal share of the project cost (up to $446,700). NSJWCD is also in the process of establishing a new assessment to raise money for capital improvements for the South System. NSJWCD will either use its existing reserves or revenue from the new assessment to fund the non-federal share of the project cost.

No other outside funding is needed for this project. Letters of commitment are not applicable.

Table 1. Summary of Non-Federal and Federal Funding Sources

FUNDING SOURCES	AMOUNT
Non-Federal Entities	
1. NSJWCD reserves, existing revenue sources	$446,700
Non-Federal Subtotal	
Other Federal Entities: N/A	$ 0
REQUESTED RECLAMATION FUNDING	$300,000
TOTAL BUDGET:	**$746,700**

B. Budget proposal

BUDGET ITEM DESCRIPTION	COMPUTATION		Quantity Type	TOAL COST
	$/Unit	Quantity		
Salaries/Wages/Contractors(1)				
1. General Legal Counsel	$275/hr	10	hours	$2,750
2. District Engineer/Manager	$150/hr	20	hours	$3,000
3. Project Manager	$75/hr	50	hours	$3,000
4. Deputy Secretary	$40/hr	20	hours	$800
Fringe Benefits/Travel	none			$0
Equipment(2)				
1600 amp, 480 Volt Main Switchboard	$78,100	1		$78,100
Motor Control Center	$165,000	1		$165,000
PLC Control Panel	$55,000	1		$55,000
Instrumentation	$75,000	1		$75,000
Spare Parts	$5,000	1		$5,000
Tax & Freight	25,000	1		$25,000
Supplies and Materials(2)				
3'x5' Traffic Rated PG&E Utility Pullbox	$5,000	1		$5,000
106"x90" Precast Transfer Pad	$4,500.00	1		$4,500
2-4" PVC-80 Underground Conduits PG&E Utility Primary	$25	730		$18,250
5-5" PVC-80 Underground Conduits PG&E Utility Secondary	$50	30		$1,500
4-4" PVC-40 Underground Conduits from MMS to PP	$50	320		$16,000
¾" Rigid Conduits – LOT	$5,000	1		$5,000
1" Rigid Conduits – LOT	$5,000	1		$5,000
3" Rigid Conduits – LOT	$5,000	1		$5,000
#14 Insulated Copper Conductor – LOT	$5,000	1		$5,000
#12 Insulated Copper Conductor – LOT	$5,000	1		$5,000
#10 Insulated Copper Conductor – LOT	$5,000	1		$5,000
#8 Insulated Copper Conductor – LOT	$5,000	1		$5,000
#4 Insulated Copper Conductor – LOT	$5,000	1		$5,000
#16 TSPR Cable – LOT	$5,000	1		$5,000
#3/0 Aluminum Conductors	$12	350		$4,200
#750 MCM- Aluminum Conductors	$15	1050		$15,750
#250 VFD Rated Cable – LOT	$4,500	1		$4,500
Lighting – LOT	$2,500	1		$2,500
Contractual/Construction(2)				
Professional engineering/programming	$90,000	1	n/a	$90,000
Trenching, bedding, backfill for conduit	$40.00/ft	1100	feet	$44,000
Other(3)				
Design Engineer KSN			Contract	$15,000
Environmental Compliance				$0
TOTAL DIRECT COSTS				$678,850
Indirect Costs				
10% Contingency	10%			$67,850
TOTAL ESTIMATED PROJECT COSTS				**$746,700**

Table 2. Budget Proposal. **(1)** NSJWCD does not have employees. It has contracts with independent contractors for General Counsel, Project Manager, District Engineer/Manager and Deputy Secretary services. **(2)** Equipment, Supplies & Materials and Contractual/Construction are components of the subcontractor proposal provided as Attachment C. **(3)** The design engineer (KSN) will need to review submittals for construction, assist with issues during installation, and prepare as-built drawings.

C. Budget narrative

Salaries/Wages/Contracted Services

NSJWCD does not have employees. It has contracts with independent contractors to provide legal services, district engineer/manager services and project manager services.

The district's general counsel will need to review and advise the district board regarding the grant contract, the construction/installation contract and the project reporting, and prepare necessary district resolutions. Her services are $275/hour and 10 hours are estimated for the work.

The district's manager/engineer will work with the contractor in preparation for installation of the project equipment and to learn the programming of the installed equipment for district operation after installation. His services are $150/hour and 20 hours are estimated for this work.

The district's project manager will manage the construction/installation of the project including pre-construction meetings, interface with the contractor and subcontractor, site visits, and post-installation inspections. His services are $75/hour and 20 hours are estimated for this work.

The district's deputy secretary will prepare required reports under the grant. Her services are $40/hour and 20 hours are estimated, for $800.

Equipment, Supplies and Materials and Contractual/Construction

Equipment, supplies and materials and contractual/construction noted in Table 2 are all components of the subcontractor proposal (Attachment C). The switchboard, motor control center, PLC and instrumentation, and tax & freight are listed under "Equipment" in Table 2. The professional services for engineering and programming the automation equipment and RTU ($90,000), and trenching the conduit ($44,000) are listed under "contractual/construction." The utility pullbox, conduit, wire, cable, lighting, conducts and pad are listed under "Supplies and Materials".

Other

NSJWCD will contract with the design engineer, KSN, Inc. to review submittals from the contractor and ensure as-built designs are prepared after construction/installation. This work is budgeted at $15,000.

No environmental compliance costs are expected because the project does not require any permits and is simply an add-on to a previously constructed pump station, with no significant construction or ground disturbance.

Indirect Costs - A ten percent contingency is included as indirect costs.

III. Environmental and Cultural Resources Compliance

The South Pump Station Automation project is a post-construction add-on to the District's South Pump Station Replacement Project, which has already been subject to rigorous environmental and cultural resources review, including preparation of an Initial Study/ Mitigated Negative Declaration (IS/MND) pursuant to the California Environmental Quality Act (CEQA). Because this proposed project only involves adding equipment to an existing facility, the potential environmental impacts that can result from this project are minimal. Below are answers to each of the questions in the FOA regarding potential cultural and environmental impacts of the South System Automation Project.

(1) Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.

The South Pump Station Automation project involves the installation of additional equipment on a pump station that will already have been constructed as part of a separate project. As a result, there will be no earth disturbance from the South Pump Station Automation project other than possible minimal trenching of electrical conduit in an existing dirt road that is part of the district's easement. Furthermore, because all work will be limited to installation of pre-fabricated equipment on a pre-existing facility that will not require excavation, tree removal, or other direct ecological disturbance, the project is not anticipated to affect air, water, or animal habitat in the area.

(2) Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?

Section 3.4 of the IS/MND analyzes potential impacts to threated or endangered species and designated critical habitat in the project area. Based on a Biological Assessment of the project area, it was determined that likelihood of occurrence of listed, candidate, and other special-status species in the project area is low. Any potential impacts that would occur will be avoided by timing construction/installation to avoid sensitive times of year such as nesting season. Based on the low-likelihood of occurrence of listed, candidate, and special-status species, and the fact the project involves installation of small-scale equipment on a pre-existing facility, is unlikely that the work will have any impact.

(3) Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "Waters of the United States?" If so, please describe and estimate any impacts the proposed project may have.

No work proposed under the South Pump Station Automation Project will take place in areas that fall under Clean Water Act jurisdiction as Waters of the United States.

(4) When was the water delivery system constructed?

The South System has been constructed in phases. The initial phase of the project, which included the original pump station and cast-in-place concrete conveyance system, was first constructed in the early-1960s and has been modified over time. The district will be removing the existing pumps and constructing its new pump station during August-October 2018. The South Pump Station Automation Project, which is the subject of this grant, will be an add-on to the new pump station.

(5) Will the proposed project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.

The proposed project will result in minor modifications to a pump (adding VFD) and the pipeline that connects that connects the pump with the irrigation system (adding flow meter). The features that are proposed to be modified pursuant to this project have not yet been installed, but are proposed to be installed (i.e. the project involves the acquisition and installation of modernized equipment onto the newly constructed pump station). No headgates, canals, flumes or pipelines will be modified.

(6) Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.

NSJWCD's boundaries contain over 150,000 acres of land within San Joaquin County. The District has not undertaken a survey of all cultural resources located within is service area. However, as is discussed below, there are no known archeological sites or cultural resources in the project area.

(7) Are there any known archeological sites in the proposed project area?

A cultural resources report was prepared to analyze potential impacts of the South System Pump Station Replacement Project on cultural resources. That report determined that there are no archeological sites or cultural resources located in the proposed project area. Additionally, because the project will be taking place in an area that has already been subject to disturbance, any anticipated impacts would have already been subject to evaluation and mitigation.

(8) Will the proposed project have a disproportionately high and adverse effect on low income or minority populations?

The proposed project will not have a disproportionately high and adverse effect on low income or minority populations.

(9) Will the proposed project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?

The proposed project will not limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands.

(10) Will the proposed project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?

The proposed project will not contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area.

IV. Required Permits or Approvals

No permits or approvals are required for this project because it consists of installing pre-fabricated equipment on an existing elevated metal pump station that is located within an existing utility and pipeline easement. There will be no earth disturbance, no potential impacts to endangered species, and no contact with waters under the jurisdiction of the United States. The District has already acquired all necessary permits and approvals for construction of the elevated metal pump station and installation of the new pipeline and utility features in the easement area, all of which would be completed prior to the project contemplated to be funded through this grant.

V. Letters of Support

NSJWCD received the following letters of support for this project and grant application, included in Attachments E and F.

#	Agency / Legislative	Landowners
1	Amador Water Agency	Robert Caffese
2	Assmb. Eggman	Diane J. Hirasuna
3	Assmb. Cooper	John Bava & Sons, Inc.
4	Byron-Bethany Irrigation District	Kautz Farms
5	Banta-Carbona Irrigation District	Go Bears Ranch, LLC
6	Calaveras County Water District	Larry D. Miller
7	California Sportfishing Protection Alliance	Ron and Michiko Oye
8	City of Lodi	Joseph Petersen
9	East Bay Municipal Utility District	John Podesta Farms
10	Sen. Galgiani	Jim Quashnick
11	South Delta Water Agency	TKH, LLC
12	Stockton East Water District	
13	Westside Irrigation District	

VI. Official Resolution

The NSJWCD Resolution approving this grant application is provided as Attachment G.

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

SOUTH PUMP STATION AUTOMATION PROJECT

GRANT APPLICATION

MAY 10, 2018

ATTACHMENT A

UTILITY DIVISION OF WORK		
	RESPONSIBILITY	
	CONTRACTOR	UTILITY
POWER POLES		X
PRIMARY CONDUITS	X	
PRIMARY CONDUCTORS		X
TRANSFORMER PAD	X	
TRANSFORMER		X
BOLLARDS	X	
SECONDARY CONDUITS	X	
SECONDARY CONDUCTORS		X
TRANSFORMER CONNECTIONS		X
UTILITY METER		X
C/T ENCLOSURE		X
CURRENT AND VOLTAGE XFMRS		X
PULLBOXES / VAULTS	X	
LOAD BREAK SWITCHES	X	
	X - INDICATES RESPONSIBILITY	

UTILITY INFORMATION	
UTILITY	Pacific Gas & Electric
UTILITY PROJECT NUMBER	
POINT OF CONTACT	Sandy Crane
ADDRESS	5555 Florin-Perkins Road
CITY,STATE, ZIP	Sacramento, CA 95826
VOICE	209-942-1491
FAX	
EMAIL	SAC0@pge.com

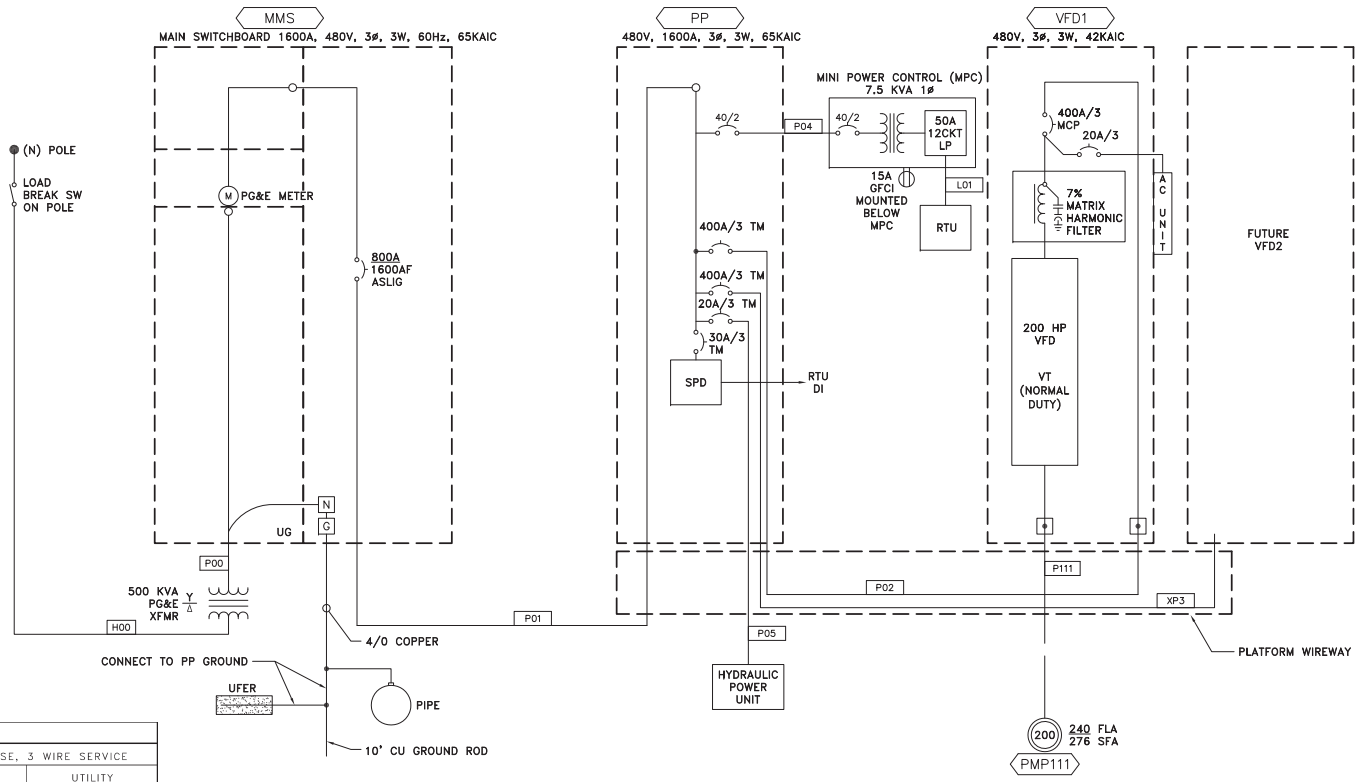
NOTES

1) All work performed by the Contractor under this section must conform to the utility standards. If a conflict between the Utility standards and details shown on this plan set exist, the Utility standards and requirements shall take precedence.

2) Contractor shall review the Utility Engineered Drawings prior to commencing work for the Utility service. No change orders or charges will be accepted or allowed if Contractor begins work prior to reviewing and meeting with Utility Representatives onsite.

3) Contractor shall submit service entrance equipment and conduits for Utility review and acceptance prior to ordering. The approval of this equipment must be submitted to the owner as proof of acceptance by the Utility.

4) The Contractor shall schedule, coordinate and attend all required inspections, tests or meetings, as required by the Utility. All work must be performed in full compliance with Utility requirements or directives. These inspections, tests and meetings are in addition to any items required under this contract but shall be covered by the Contractor.



LOAD CALCULATION

LOAD CENTER: MMS/ PP — 480 VAC, 3 PHASE, 3 WIRE SERVICE

FED FROM: UTILITY

EQUIPMENT NUMBER	HP	VFD SIZE	MOTOR CONTROL	EQUIPMENT DESCRIPTION	CONNECTED LOAD (AMPS)	CONNECTED QTY	CONNECTED LOAD (KVA)	UTILITY RUN QTY	UTILITY RUN (KVA)
	200	200	VFD	Irrigation Pump	240.0	1	199.5	1	199.5
	7.5KVA		CB	Xfmr / LP	16.3	1	13.6	1	13.6
	3		CB	HPU – FISH SCREEN	4.8	1	4.0	1	4.0
SUBTOTAL							217.08		217.08
LARGEST MOTOR @ 25%					200	HP			49.88
TOTAL									266.96
DIVERSITY FACTOR					100.0%				

3 PHASE CURRENT	321 AMPS
	80% MAXIMUM LOAD CURRENT (80% OR 100%
THERMAL DERATING	90% Assume 90% for Outdoor
CALCULATED SERVICE SIZE	446 AMPS
MAIN BREAKER TRIP UNIT	800 AMPS
MAIN BREAKER FRAME SIZE	1,600 AMPS
% MAIN BREAKER LOAD	55.7%

Notes: Trip Unit selected is sized to operate up to two 200 HP VFD pumps continously.	Frame	Standard Trip Units
	1600	800, 1000, 1200, 1250, 1400, 1500, 1600

PANEL SCHEDULE - MPC / LP

LOCATION Outside — MAIN BKR 50A
VOLTAGE 120/240 — SYSTEM 1Φ, 3W
TRIM SURFACE — BUS RATING 50A

CKT	LOAD	VA	CB	PHASE LOADS A	PHASE LOADS B	CB	VA	LOAD	CKT
1	RTU	1000	20/1	1000		20/1		RECEPTACLE MOUNTED BELOW MPC	2
3	LIGHTS		20/1		0	20/1		SPARE	4
5		6000	40/2	6000		20/1		SPARE	6
7	HVAC	6000	(H)		0	20/1		SPARE	8
9	SPARE		20/1	0		20/1		SPARE	10
11	SPARE		20/1		0	20/1		SPARE	12

NOTES	A	B	100%	DIVERSITY FACTOR
(L) ALL CBs SHALL HAVE LOCKOUT PROVISIONS	7000 VA	0 VA	3.5 KVA	9.7 A
	PHASE LOADS		AVERAGE	
(H) HVAC RATED BREAKER	200%	0%	3.5 KVA	LOAD

CONFORMED DRAWINGS
THIS SET OF CONFORMED DRAWINGS INCORPORATE ADDENDA NO. 1, 2, 5, AND 6.

1670 Broadway St, Suite 3400
Denver, CO 80202
303-764-1520

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT
SOUTH SYSTEM PUMP STATION REPLACEMENT PROJECT
LOCKEFORD, CALIFORNIA

PUMP STATION AND PIPELINE
SINGLE LINE DIAGRAM

Revisions					
No.	Description	Date	By	Apvd. By	

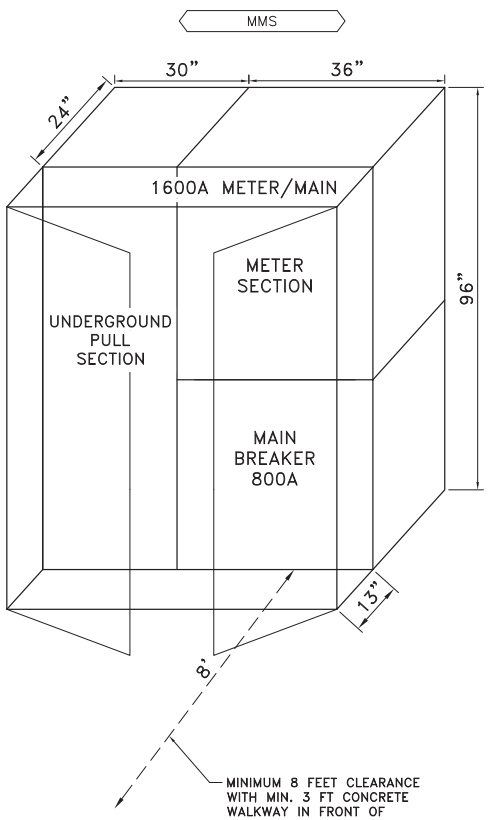
Design WPC
Drawn –
Check WPC

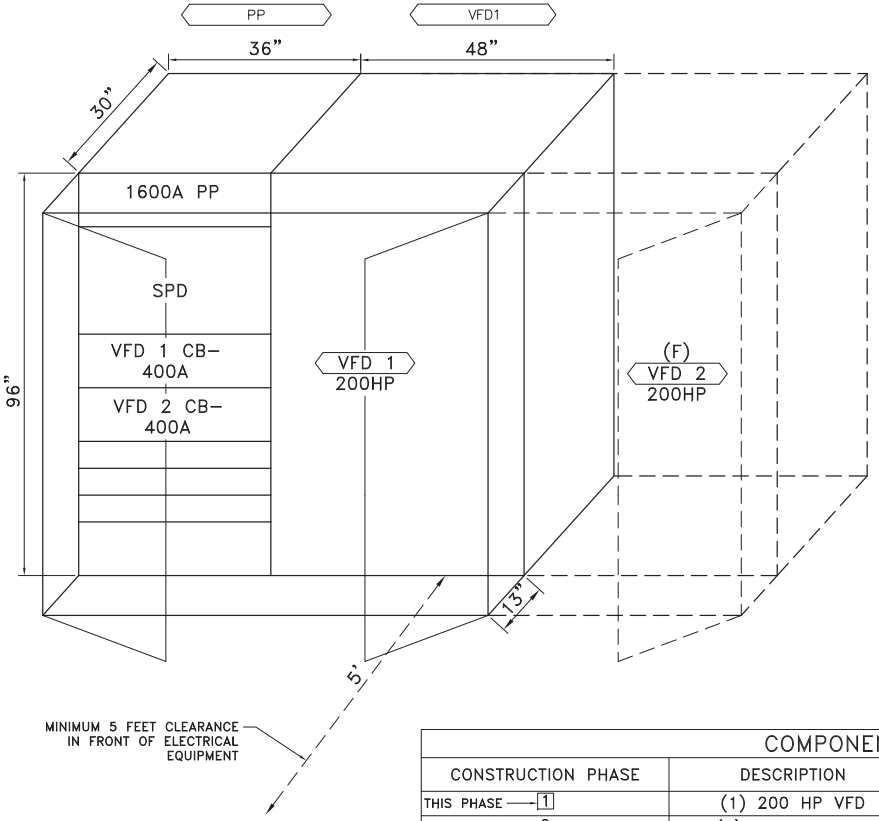
Scale NTS
Original Drawing Scale 0 ½" 1"

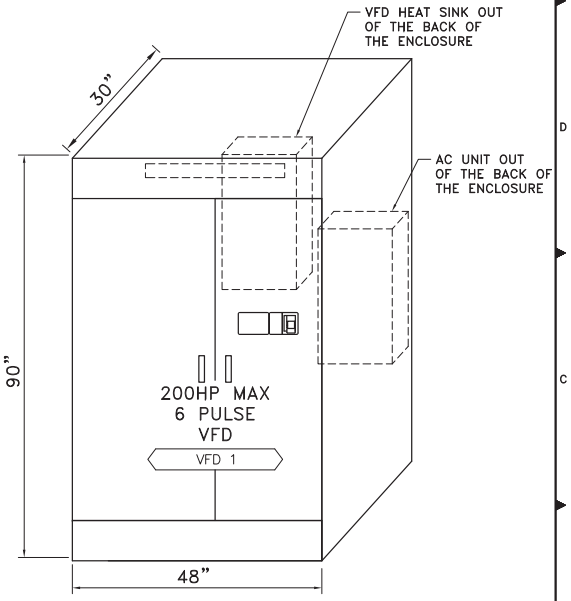
Date JULY 2016
Sheet Number 24 Of 32
Project File No. 2175-0040

E1.02

NSJWCD022







TYPICAL VFD ELEVATION
(INNER ELEVATION)

COMPONENT INFORMATION			
CONSTRUCTION PHASE	DESCRIPTION	LINEUP DIMENSIONS	ESTIMATED WEIGHT (LBS)
THIS PHASE — 1	(1) 200 HP VFD	96x84x43	2300
2	(2) 200 HP VFDs	96x132x43	3500
3	(2) 600 HP VFDs	96x180x43	8000

CONFORMED DRAWINGS
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Denver, CO 80202
303-764-1520

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT
SOUTH SYSTEM PUMP STATION REPLACEMENT PROJECT
LOCKEFORD, CALIFORNIA

PUMP STATION AND PIPELINE
ELECTRICAL ELEVATIONS

Revisions				
No.	Description	Date	By	Apvd. By

Design WPC
Drawn —
Check WPC
Scale NTS
Original Drawing Scale 0 ½" 1"
Date JULY 2016
Sheet Number 25 Of 32
Project File No. 2175-0040

E1.03

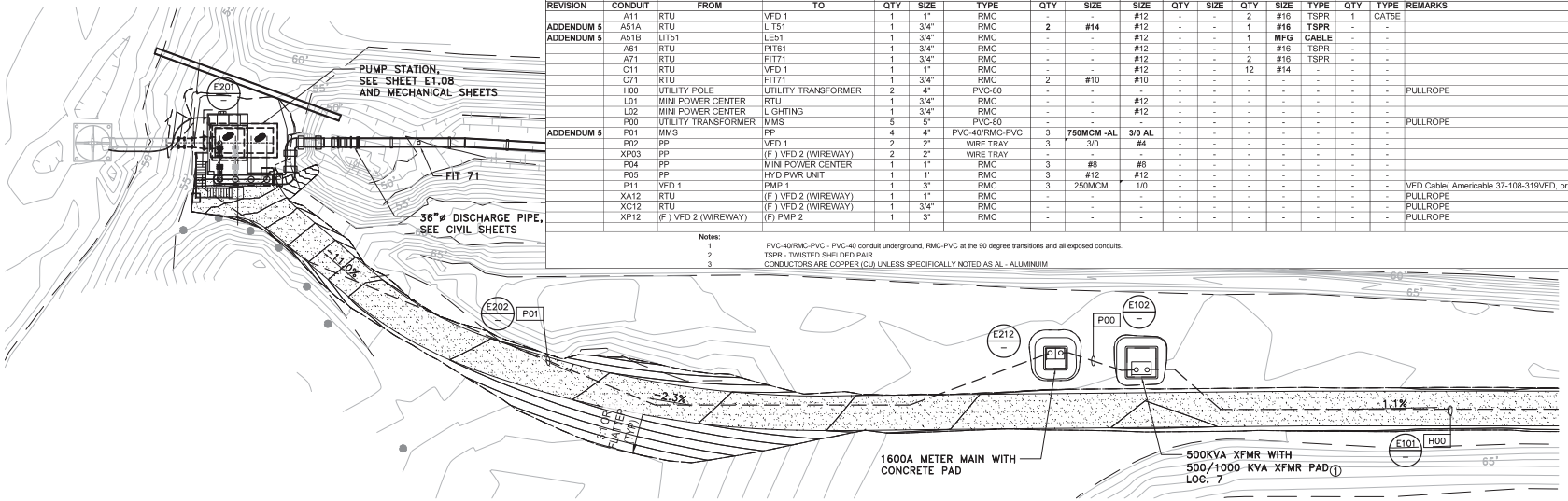
NSJWCD023

CONDUIT AND WIRE LIST

Note: Not all conduits and wires are shown. Conduit and wires for lighting, receptacles, HVAC and other Lighting Panel (LP) loads are shown with the circuit number designation #nn where nn is the LP circuit number. (Example #4 is LP circuit 4) In the case of 2 or 3 pole breakers, the LP circuit is the lowest circuit number of the set. Minimum wire size shall be (2) #12 THHN + #12 Ground or larger based on the full amperage of the OCPD shown on the LP Schedule. Exposed Conduits shall be labelled with the conduit or circuit designations. Receptacles or switches shall be engraved or have a nameplate / label with the circuit number at each recepatacle or switch.

				CONDUIT			POWER		GROUND	CONTROL		SIGNAL			DATA		
REVISION	CONDUIT	FROM	TO	QTY	SIZE	TYPE	QTY	SIZE	SIZE	QTY	SIZE	QTY	SIZE	TYPE	QTY	TYPE	REMARKS
	A11	RTU	VFD 1	1	1"	RMC	-	-	#12	-	-	2	#16	TSPR	1	CAT5E	
ADDENDUM 5	A51A	RTU	LIT51	1	3/4"	RMC	2	#14	#12	-	-	1	#16	TSPR	-	-	
ADDENDUM 5	A51B	LIT51	LE51	1	3/4"	RMC	-	-	#12	-	-	1	MFG	CABLE	-	-	
	A61	RTU	PIT61	1	3/4"	RMC	-	-	#12	-	-	1	#16	TSPR	-	-	
	A71	RTU	FIT71	1	3/4"	RMC	-	-	#12	-	-	2	#16	TSPR	-	-	
	C11	RTU	VFD 1	1	1"	RMC	-	-	#12	-	-	12	#14	-	-	-	
	C71	RTU	FIT71	1	3/4"	RMC	2	#10	#10	-	-	-	-	-	-	-	
	H00	UTILITY POLE	UTILITY TRANSFORMER	2	4"	PVC-80	-	-	-	-	-	-	-	-	-	-	PULLROPE
	L01	MINI POWER CENTER	RTU	1	3/4"	RMC	-	-	#12	-	-	-	-	-	-	-	
	L02	MINI POWER CENTER	LIGHTING	1	3/4"	RMC	-	-	#12	-	-	-	-	-	-	-	
	P00	UTILITY TRANSFORMER	MMS	5	5"	PVC-80	-	-	-	-	-	-	-	-	-	-	PULLROPE
ADDENDUM 5	P01	MMS	PP	4	4"	PVC-40/RMC-PVC	3	750MCM -AL	3/0 AL	-	-	-	-	-	-	-	
	P02	PP	VFD 1	2	2"	WIRE TRAY	3	3/0	#4	-	-	-	-	-	-	-	
	XP03	PP	(F) VFD 2 (WIREWAY)	2	2"	WIRE TRAY	-	-	-	-	-	-	-	-	-	-	
	P04	PP	MINI POWER CENTER	1	1"	RMC	3	#8	#8	-	-	-	-	-	-	-	
	P05	PP	HYD PWR UNIT	1	1"	RMC	3	#12	#12	-	-	-	-	-	-	-	
	P11	VFD 1	PMP 1	1	3"	RMC	3	250MCM	1/0	-	-	-	-	-	-	-	VFD Cable(Americable 37-108-319VFD, or Equal)
	XA12	RTU	(F) VFD 2 (WIREWAY)	1	1"	RMC	-	-	-	-	-	-	-	-	-	-	PULLROPE
	XC12	RTU	(F) VFD 2 (WIREWAY)	1	3/4"	RMC	-	-	-	-	-	-	-	-	-	-	PULLROPE
	XP12	(F) VFD 2 (WIREWAY)	(F) PMP 2	1	3"	RMC	-	-	-	-	-	-	-	-	-	-	PULLROPE

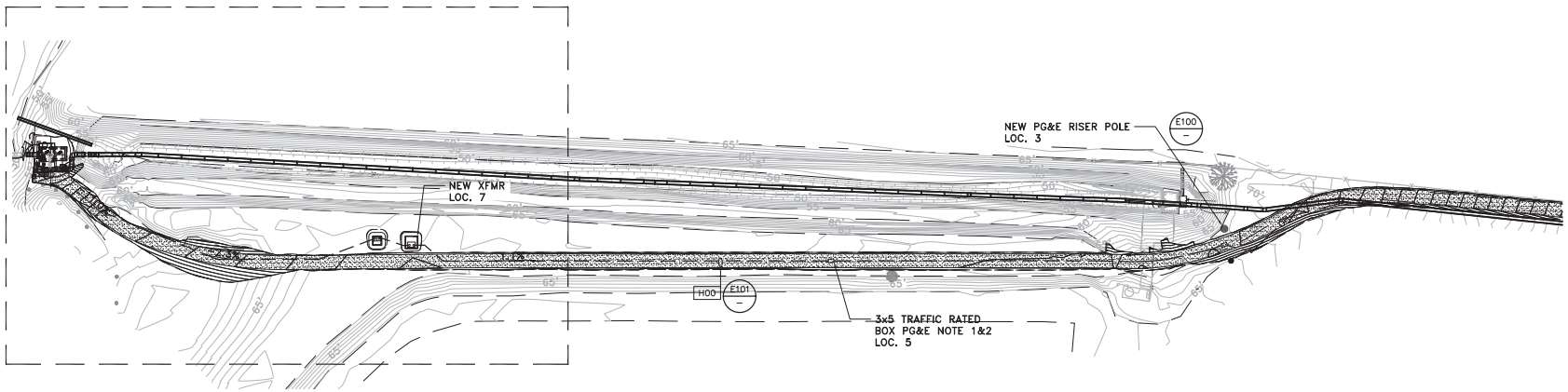
Notes:
1. PVC-40/RMC-PVC - PVC-40 conduit underground, RMC-PVC at the 90 degree transitions and all exposed conduits.
2. TSPR - TWISTED SHELDED PAIR
3. CONDUCTORS ARE COPPER (CU) UNLESS SPECIFICALLY NOTED AS AL - ALUMINUM



1" = 50'

NOTES:
① XFMR PAD TO BE PRECAST PER PG&E REQUIREMENTS, OLD CASTLE, PTPGE, OR EQUAL

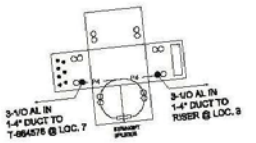
② REMOVE TREES ALONG CONDUIT PATH AT LEAST 10' FROM CONDUITS.



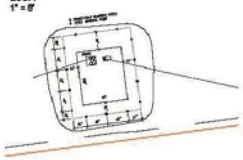
PG&E NOTES:

1. CONTRACTOR TO TRENCH & INSTALL 1–4" CONDUIT FROM S/E QUADRANT OF POLE @ LOC. 3 TO NEW SPICE BOX AT LOC. 5 – AND FROM SPICE BOX TO NEW TRANSFORMER PAD @ LOC. 7
2. CONTRACTOR TO INSTALL 3'x5' FULL–TRAFFIC BOX @ LOC. 5 (CODE# 041668) – SEE DETAIL BELOW.
3. CONTRACTOR TO INSTALL 106"x90" TRANSFORMER PAD (CODE# 040292) @ LOC. 7 – SEE DETAIL BELOW.
4. CONTRACTOR TO INSTALL 5–5" CONDUITS FROM TRANSFORMER PAD @ LOC 7 TO NEW 1600AMS.
5. ALL TRENCHING & SUBSTRUCTURES REQUIRE PG&E INSPECTION PRIOR TO CONSTRUCTION SCHEDULING.
6. PLEASE CALL 209–942–1786 OR FAX 209–942–1788, TO REQUEST PRE–CONSTRUCTION MEETING & INSPECTION APPOINTMENTS.
7. 48 HRS. ADVANCE NOTICE IS REQUIRED FOR PRE–CONSTRUCTION & INSPECTION APPTS.

SPLICE BOX DETAIL
LOC. 5



TRANSFORMER PAD DETAIL
LOC. 7
1" = 8'



E1.07

CONFORMED DRAWINGS
THIS SET OF CONFORMED DRAWINGS INCORPORATE ADDENDA NO. 1, 2, 5, AND 6.

1670 Broadway St, Suite 3400
Denver, CO 80202
303-764-1520

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT
SOUTH SYSTEM PUMP STATION REPLACEMENT PROJECT
LOCKEFORD, CALIFORNIA

TRANSMISSION PIPELINE
ELECTRICAL PLAN

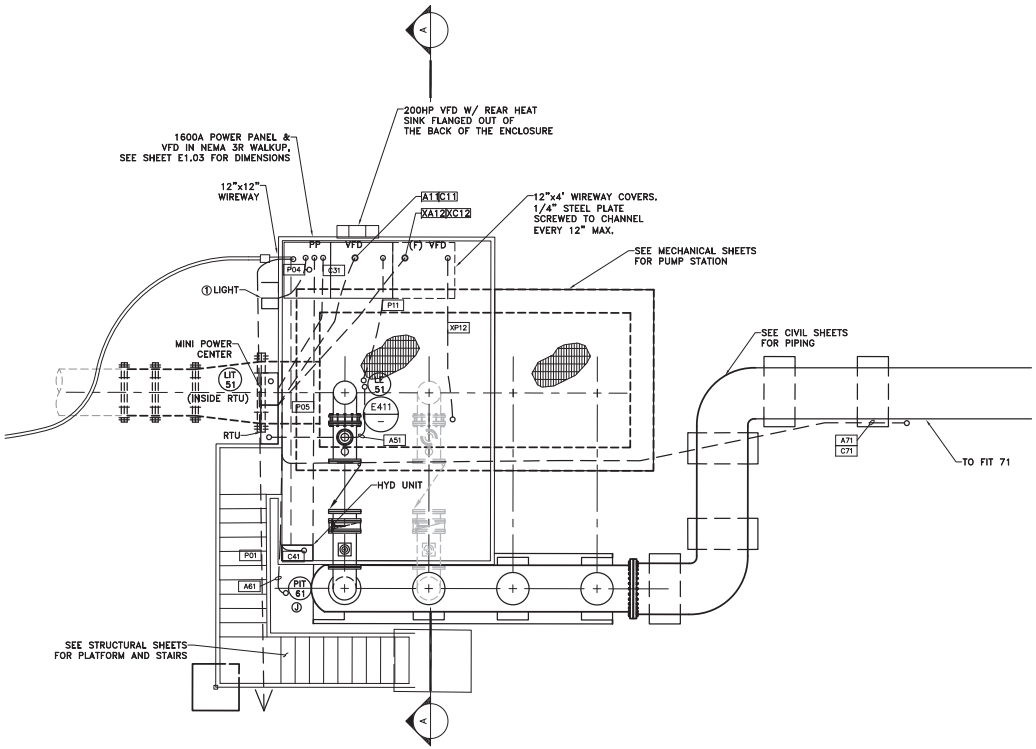
Revisions				
No.	Description	Date	By	Aprvd. By

Design WPC
Drawn –
Check WPC

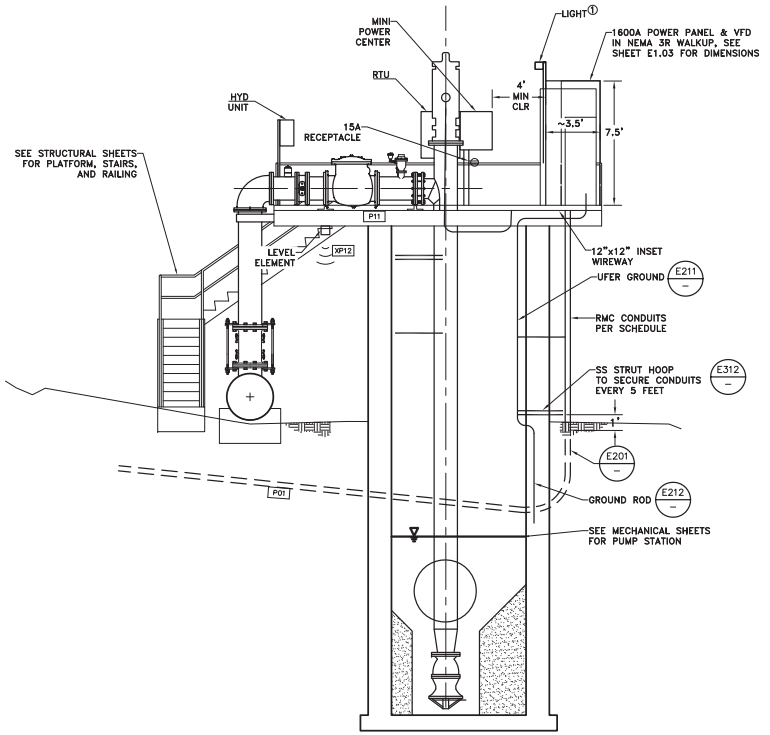
Scale AS NOTED
Original Drawing Scale 0 ½" 1"

Date JULY 2016
Sheet Number 29 Of 32
Project File No. 2175–0040

NSJWCD024



PLAN



SECTION A-A

NOTES:
①LITHENIA TDD LED SECURITY LIGHT, OR EQUAL.
MOUNT @ 9.5 FT ABOVE DECK.

CONFORMED DRAWINGS
THIS SET OF CONFORMED DRAWINGS INCORPORATE ADDENDA NO. 1, 2, 5, AND 6.

1670 Broadway St, Suite 3400
Denver, CO 80202
303-764-1520

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT
SOUTH SYSTEM PUMP STATION REPLACEMENT PROJECT
LOCKEFORD, CALIFORNIA

PUMP STATION
ELECTRICAL PLAN AND SECTION

Revisions				
No.	Description	Date	By	Apvd. By

Design WPC
Drawn –
Check WPC

Scale HORIZ: 1" = 4'
VERT: 1"=4'
Original Drawing Scale 0 ½" 1"

Date DECEMBER 2017
Sheet Number 30 Of 32
Project File No. 2175-0040

E1.08

FILE SPEC: C:\Users\oolver\Desktop\0958_E1.08.dwg
PLOT DATE: Dec 11, 2017 - 10:45am

NSJWCD025

ABBREVIATIONS

A	AMPERES, AMBER	ISR	INTRINSICALLY SAFE RELAY
AC	ALTERNATING CURRENT	KW	KILOWATTS
ACU	AIR CONDITIONING UNIT	LOR	LOCAL/OFF/REMOTE
ADR	AIR DRYER	LOS	LOCK-OUT STOP
AER	AERATOR	LP AIR	LOW PRESSURE AIR
AFD	ADJUSTABLE FREQUENCY DRIVE	mA	MILLIAMPERES
AGR	AGITATOR	MIN	MINIMUM
AI	ANALOG INPUT	MOA	MANUAL-OFF-AUTO
AO	ANALOG OUTPUT	MOT	MOTOR OVERTEMP SENSOR
ATM	ATMOSPHERE	MOV	MOTOR OPERATED VALVE
B	BLUE	MTU	MODULAR TREATMENT UNIT
BKR	BREAKER	MUX	MULTIPLEXER
BLR	BLOWER	MWR	MOTORIZED WEIR
C	CLOSE, CONTROL	MXR	MIXER
CB	CIRCUIT BREAKER	N	NEUTRAL
CFE	CLEARWELL FILTER EFFLUENT	NC	NORMALLY CLOSED
CLR	CLARIFIER	NO	NORMALLY OPEN
CMP	COMPRESSOR	O	OPEN
CPT	CONTROL POWER TRANSFORMER	OAC	OPEN-AUTO-CLOSE
CR	CONTROL RELAY	OCA	OPEN-CLOSE-AUTO
CT	CURRENT TRANSFORMER	OP	OUTPUT
CTF	CENTRIFUGE	PB	PUSHBUTTON
d	DIFFERENTIAL	pH	HYDROGEN ION CONCENTRATION
DC	DIRECT CURRENT	PID	PROPORTIONAL - INTEGRAL - DERIVATIVE
(DDM)	DIGITAL DISPLAY MODULE	PLC	PROGRAMMABLE LOGIC CONTROLLER
DI	DIGITAL INPUT	PMP	PUMP
DO	DIGITAL OUTPUT	PNL	PANEL
DPDT	DOUBLE POLE DOUBLE THROW	POT	POTENTIOMETER
DRV	DRIVE	POV	PNEUMATIC OPERATED VALVE
DS	DISCONNECT SWITCH	PS	PRESSURE SWITCH
(E)	EXISTING	PRV	PRESSURE RELIEF VALVE
ES, ESTOP	EMERGENCY STOP	PTT	PUSH TO TEST
ETM	ELAPSED TIME METER	PV	PROCESS VARIABLE
(F)	FUTURE	R	RED
FAN	FAN	(R)	EXISTING TO BE REMOVED OR RELOCATED
FC	FAIL CLOSED	REF	REFERENCE
FDR	FEEDER	RVSS	REDUCED VOLTAGE SOLID STATE
FE	FLOW METER ELEMENT	S	SWITCH
FLA	FULL LOAD AMPS	(SIM)	SIGNAL INPUT MODULE
FLC	FLOCCULATOR	SCR	SILICON CONTROLLED RECTIFIER
FLP	FAIL LAST POSITION	(SOM)	SIGNAL OUTPUT MODULE
FLT	FILTER	SP	SETPOINT
FO	FAIL OPEN	SPD	SURGE PROTECTION DEVICE
FS	FLOAT SWITCH	SVM	SERVICE VOLTAGE MONITOR
FVNR	FULL VOLTAGE NON-REVERSING STARTER	TDD, TDE	TIME DELAY RELAY
		TWP	TWISTED PAIR
G	GREEN	TWSP	TWISTED SHIELDED PAIR
G, GND	GROUND	TYP	TYPICAL
GNR	MACERATOR/GRINDER	UVC	ULTRAVIOLET CHANNEL
HMI	HUMAN MACHINE INTERFACE	V	VOLTS, VOLTAGE
HP	HORSE POWER	VFD	VARIABLE FREQUENCY DRIVE
HP AIR	HIGH PRESSURE AIR	VLV	VALVE
HOA	HAND-OFF-AUTO	WD	WIRING DIAGRAM
HOG	HYDRAULIC OPERATED GATE		
I	INTERLOCK		
I/O	INPUT/OUTPUT		

MECHANICAL/PROCESS

SYMBOL	DESCRIPTION
	HARDWIRE CONNECTION
	EXISTING ELECTRIC SIGNAL
	ELECTRICAL SIGNAL
	ELECTRIC POWER/CONTROL
	PNEUMATIC SIGNAL
	CAPILLARY TUBING (FILLED SYSTEM)
	HYDRAULIC SIGNAL
ES AS	SONIC OR ELECTROMAGNETIC SIGNAL
	LOGIC SIGNAL
	DATA SIGNAL
	MAIN PROCESS LINE
	SECONDARY PROCESS LINE
	AUXILIARY PROCESS LINE
	DIRECTION OF FLOW
	MANUFACTURER'S PRE-WIRING
ES AS	ELECTRIC SUPPLY OR AIR SUPPLY
M	MOTOR
	CENTRIFUGAL PUMP
	BLOWER OR FAN
	COMPRESSOR
	SUBMERSIBLE/WALL PUMP
	VERTICAL PUMP
	ROTARY LOBE OR GEAR PUMP
	METERING PUMP
	MIXER
	PROGRESSIVE CAVITY PUMP
SV	SOLENOID VALVE
	AUDIBLE ALARM (BUZZER OR HORN)
D	DRAIN
I2	PAGE THAT LINE IS CONTINUED ON
	REDUCER
	BLIND FLANGED END
	CAPPED END
	TELEPHONE

SYMBOL	DESCRIPTION
	DIAPHRAGM VALVE
	VALVE ACTUATOR
P	VALVE POSITIONER
	GLOBE VALVE
	GATE VALVE OR PINCH VALVE (NORMALLY OPEN)
	GATE VALVE OR PINCH VALVE (NORMALLY CLOSED)
	PLUG VALVE (NORMALLY OPEN)
	PLUG VALVE (NORMALLY CLOSED)
	BALL VALVE (NORMALLY OPEN)
	BALL VALVE (NORMALLY CLOSED)
	BALL CHECK VALVE
	BUTTERFLY VALVE
	CHECK VALVE
	SLUICE GATE (NORMALLY OPEN)
	SLUICE GATE (NORMALLY CLOSED)
	SLIDE GATE (NORMALLY OPEN)
	SLIDE GATE (NORMALLY CLOSED)
	VACUUM RELIEF VALVE
	AIR RELIEF VALVE
	AIR/VACUUM RELIEF VALVE
	DIAPHRAGM SEAL
	PULSATION DAMPENER
	QUICK CONNECT W/CHECK
	PRESSURE REDUCING VALVE
	ARV
M	MAGNETIC FLOW METER
X MAG	MAGNETIC FLOW TUBE (X=SIZE OF TUBE)

SYMBOL	DESCRIPTION
	GROUND
X	SHEET NOTE TAG
XXX	FIELD MOUNTED INSTRUMENT
XXX / XXX	FACE MOUNTED INSTRUMENT ON LOCAL PANEL, OPERATOR ACCESSIBLE
XXX / XXX	INSTRUMENT MOUNTED IN LOCAL PANEL, OPERATOR INACCESSIBLE
XXX / XXX	FACE MOUNTED INSTRUMENT ON FIELD PANEL, OPERATOR ACCESSIBLE
XXX / XXX	INSTRUMENT MOUNTED IN FIELD PANEL, OPERATOR INACCESSIBLE
I DWG#	OPERATION PERFORMED WITH LOGIC OR HARDWIRED DEVICES - REFERENCE ELEMENTARY DWG. #
X	LAMP INDICATION (STATUS OR ALARM)
XXXXX	PLC I/O TAG
	DISCRETE INPUT
	DISCRETE OUTPUT
	ANALOG INPUT
	ANALOG OUTPUT
XX *	INSTRUMENT PANEL MOUNTED WITH COMPUTING, CONVERTING FUNCTION

CONVERT: E - VOLTAGE; H - HYDRAULIC; I - CURRENT; O - ELECTROMAGNETIC, SONIC; P - PNEUMATIC; R - RESISTANCE (ELECT.); A - ANALOG; D - DIGITAL; B - BINARY

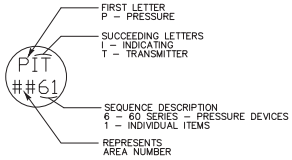
COMPUTE: SUMMING (Σ); AVERAGING (P/n); SUBTRACTOR (−); RATIO (I-I); MULTIPLYING (X); DIFFERENCE (Δ); DIVIDING (÷); HIGH SELECTING (>); ROOT EXTRACTION (√); LOW SELECTING (<); PROPORTIONAL (P); INTEGRAL (I); DERIVATIVE (D); INTERLOCK

XXXX	VALVE/GATE NUMBER
XXXXX	EQUIPMENT NUMBER
XXX / XXX	PLC OR COMPUTER FUNCTION PERFORMING OPERATION WITH VISUAL INDICATION
XXX / XXX	PLC OR COMPUTER FUNCTION PERFORMING OPERATION WITH VISUAL ALARM INDICATION
XXX / XXX	PLC OR COMPUTER PERFORMING INTERNAL OPERATION
XXX / XXX	PLC OR COMPUTER PERFORMING INTERNAL ALARM OPERATION
	AUTODIALER PRIORITY # PC BASED SOFTWARE

INSTRUMENTATION/AUTOMATION

NUMBERING SEQUENCE

SEQUENCE NUMBER	DESCRIPTION
00	COMMON ALARM
01-09	INDIVIDUAL ITEMS
10	MECHANICAL
20	MECHANICAL
30	MECHANICAL
40	MECHANICAL
50	LEVEL DEVICES
60	PRESSURE DEVICES
70	FLOW DEVICES
80	ANALYTICAL DEVICES
90	SAFETY & SECURITY DEVICES



P&ID INSTRUMENT IDENTIFICATION EXAMPLE

P & I DIAGRAM
IDENTIFICATION LETTERS

CODE LETTER	FIRST LETTER(S) MEASURED OR INITIATING VARIABLE	FIRST LETTER(S) MODIFIER	SUCCEEDING LETTER(S) READOUT OR PASSIVE FUNCTION	SUCCEEDING LETTER(S) OUTPUT FUNCTION	SUCCEEDING LETTER(S) MODIFIER
A	ANALYSIS		ALARM		AUTO
B	BURNER FLAME				
C	CHLORINE			CONTROL	CLOSE
D	DENSITY	DIFFERENTIAL	DIRECTION		
E	VOLTAGE		ELEMENT, SENSOR		
F	FLOW	RATIO	FUEL		FAILURE
G	GAUGING		VIEWING DEVICE		
H	HAND				HIGH/HAND
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		PILOT LIGHT		LOW/LOCAL
M	MOISTURE/MOTOR	MOMENTARY	MOTOR		MIDDLE/MANUAL
N	STATUS				
O	OPERATOR		ORIFICE		OPEN/OVERLOAD
P	PRESSURE		POINT		
Q	EVENT	TOTALIZE	TOTAL		
R	RESET		RECORD		RUNNING/REMOTE
S	SPEED	SAFETY		SWITCH	STOP/SPEED
T	TEMPERATURE		TEST	TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION		
V	VIBRATION/VALVE			VALVE	
W	FORCE, WEIGHT		WELL		
X	PLC COMMAND				
Y	COMPUTER INTERFACE			COMPUTE/RELAY/CONVERTER	
Z	POSITION			ACTUATE	POSITION

PER ISA-5.1 W/MODDIFICATIONS

I1.01

CONFORMED DRAWINGS
THIS SET OF CONFORMED
DRAWINGS INCORPORATE
ADDENDA NO. 1, 2, 5, AND 6.

4/10/18

1670 Broadway St, Suite 3400
Denver, CO 80202
303-764-1520

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT
SOUTH SYSTEM PUMP STATION REPLACEMENT PROJECT
LOCKEFORD, CALIFORNIA

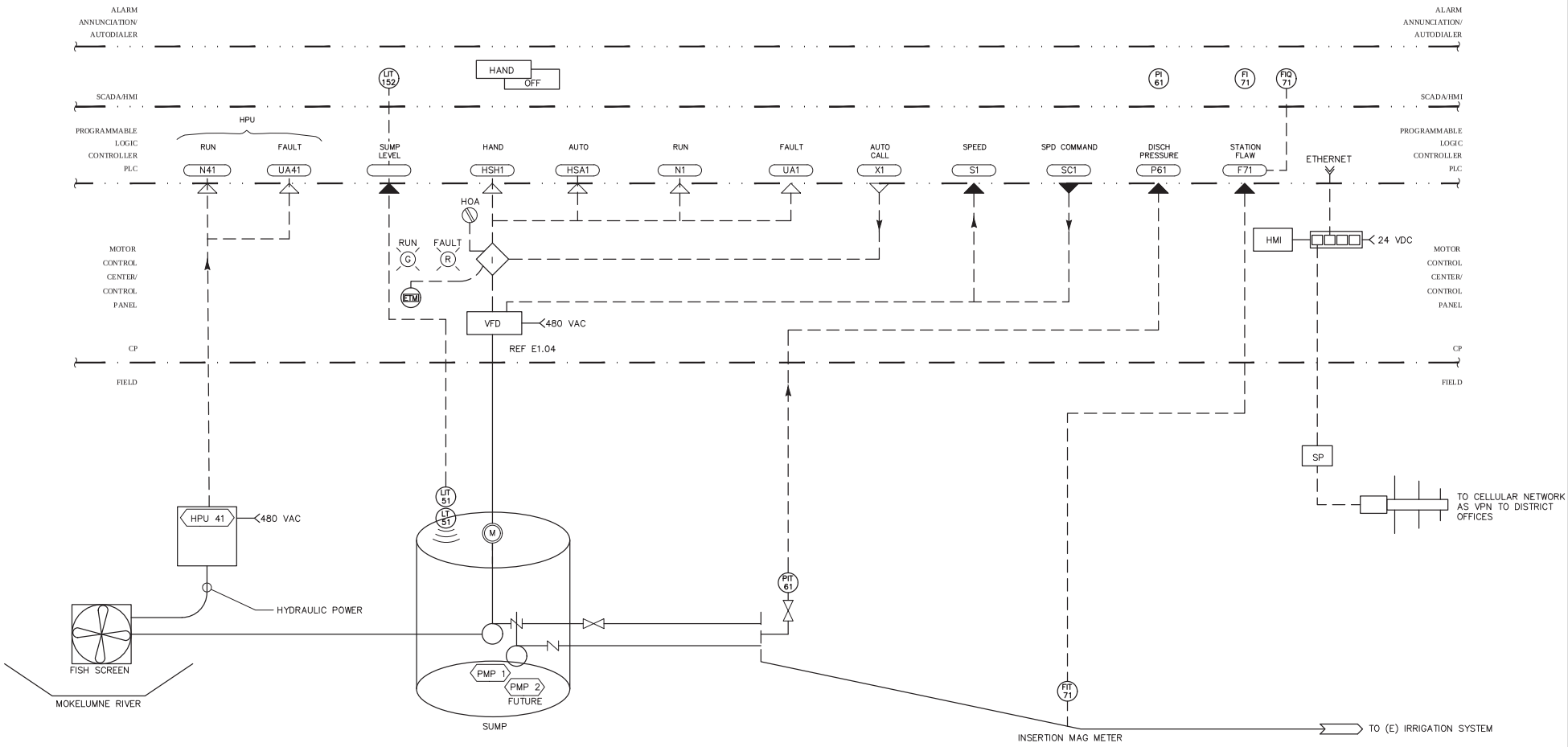
INSTRUMENTATION SYMBOLS AND ABBREVIATIONS

Revisions No.	Description	Date	By	Apvd. By

Design: WPC
Drawn: —
Check: WPC
Scale: NTS
Original Drawing Scale: 0 ½" 1"
Date: DECEMBER 2017
Sheet Number: 31 Of 32
Project File No.: 2175-0040

FILE SPEC: C:\Users\oolver\Desktop\E1.08, I1.01-1.02\0958_E1.08.dwg
PLOT DATE: Apr 20, 2018 - 1:35pm

NSJWCD026



CONFORMED DRAWINGS
THIS SET OF CONFORMED DRAWINGS INCORPORATE ADDENDA NO. 1, 2, 5, AND 6.

4/10/18

1670 Broadway St, Suite 3400
Denver, CO 80202
303-764-1520

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT
SOUTH SYSTEM PUMP STATION REPLACEMENT PROJECT
LOCKEFORD, CALIFORNIA

PROCESS AND INSTRUMENTATION DIAGRAM

Revisions				
No.	Description	Date	By	Apvd. By

Design: WPC
Drawn: —
Check: WPC
Scale: NTS
Original Drawing Scale: 0 ½" 1"
Date: DECEMBER 2017
Sheet Number: 32 Of 32
Project File No.: 2175-0040

I1.02

FILE SPEC: C:\Users\aoliver\Desktop\E1.08, I1.01-1.02\0958_E1.08.dwg
PLOT DATE: Apr 20, 2018 - 1:34pm

NSJWCD027

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

SOUTH PUMP STATION AUTOMATION PROJECT

GRANT APPLICATION

MAY 10, 2018

ATTACHMENT B

SECTION 16483
VARIABLE FREQUENCY DRIVES

PART 1 – GENERAL

1.1 SUMMARY

A. This specification describes the electrical, mechanical, environmental, agency and reliability requirements for three-phase, Variable Frequency Drives (VFDs) as specified herein and as shown on the contract drawings.

B. Related Sections: All Specification Sections that include Electrical and Instrumentation Work shall be considered as part of Division 16 Work. This applies to minor or major work required for a complete and working system. The following are examples of subsections that mare related.
   1. Division 16 – Electrical

1.2 REGULATIONS, CODES AND STANDARDS

A. The Variable Frequency Drives and all components shall be designed, manufactured and tested in accordance with the latest applicable standards.
   1. Institute of Electrical and Electronic Engineers (IEEE)
      a. IEEE 519-1992: Guide for harmonic content and control
   2. Underwriters Laboratories (UL508C: Power Conversion Equipment)
      b. UL
      c. CUL
   3. National Electrical Manufacturer's Association (NEMA)
      d. ICS 7.0: Industrial Controls & Systems for VFD.
   4. IEC 61800-2 and –3. EN 50082-1 and –2
      e. Fulfill all EMC immunity requirements

B. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

1.3 SUBMITTALS - FOR REVIEW/APPROVAL

A. The following information shall be submitted to the Engineer.
   1. Dimensioned outline drawing
   2. Schematic diagram
   3. Power and control connection diagram(s)
   4. Descriptive Catalog Cuts / Bulletins
   5. Product sheets and detailed catalog numbers with options
   6. Harmonic Analysis including methods to meet IEEE 519-1992 requirements.

B. Submitals shall be per requirements of 0330 and 16050.

1.4 SUBMITTALS-FOR CLOSEOUT

A. The following information shall be submitted for record purposes prior to final payment.
   1. Final as-built drawings and information for items listed section in 1.04.
   2. Installation information.

1.5 QUALIFICATIONS

A. The supplier of the assembly shall be the manufacturer of the electromechanical power components used within the assembly, such as bypass contactors when specified.

B. For the equipment specified herein, the manufacturer shall be ISO 9001 certified.

C. The supplier of this equipment shall have produced similar electrical equipment for a minimum period of ten (10) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

D. Variable Frequency Drives shall be on the basis of Cutler-Hammer SVX9000 Series for function and quality. Products that are in compliance with the specification and manufactured by others will be considered as “Approved Equal” only if pre-approved by the Engineer fourteen (14) days prior to bid date. Alternate suppliers shall submit documentation showing itemized compliance to the specifications and experience specific to the proposed VFD including a list showing details of the installation, application, location, contact name and telephone number of at least 5 users.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

1.7 OPERATION AND MAINTENANCE MANUALS

A. Operation and maintenance manuals shall include the following information:
   1. Instruction books
   2. Recommended renewal parts list
   3. Drawings and information required by Section 1.06.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Allen Bradley

B. Eaton

C. Square D

D. Or Approved Equal

E. Naming specific venders does not imply acceptance of their standard products nor relieve them from meeting these specifications in their entirety

2.2 VARIABLE FREQUENCY DRIVES (VFD)

A. The Variable Frequency Drives shall have the following features:
   1. The VFD shall be rated for 480 VAC. The VFD shall provide microprocessor-based control for three-phase induction motors. The controller’s full load output current rating shall be based on 40° C ambient and 3.6 kHz switching frequency to reduce motor noise and avoid

increased motor losses. Alternative noise reduction schemes with lower switching frequencies will also be allowed. The minimum swithing frequency shall be 2 khZ.

2. The VFD shall be of the Pulse Width Modulated (PWM) design converting the utility input voltage and frequency to a variable voltage and frequency output via a two-step operation. Adjustable Current Source VFD are not acceptable. Insulated Gate Bipolar Transistors (IGBT's) shall be used in the inverter section. Bipolar Junction Transistors, GTO's or SCR's are not acceptable. The VFD shall run at the above listed switching frequency.
3. The VFD shall have efficiency at full load and speed that exceeds 97%. The efficiency shall exceed 90% at 50% speed and load.
4. The VFD shall maintain the line side displacement power factor at no less than 0.96, regardless of speed and load.
5. The VFD shall have a one (1) minute overload current rating of 150% and a two (2) second overload current rating of 250% for constant torque drives. The VFD shall have a one (1) minute overload current rating of 110% for variable torque drives.
6. The VFD shall be capable of operating any NEMA design B squirrel cage induction motor, regardless of manufacturer, with a horsepower and current rating within the capacity of the VFD.
7. The VFD shall have an integral EMI/RFI filter as standard.

B. Harmonic Distortion Mitigation Methods
   1. The VFD shall limit harmonic distortion reflected onto the utility system to a voltage and current level as defined by IEEE 519 for general systems applications, by utilizing the standard 3% nominal impedance integral AC three-phase line reactor integrally mounted in the VFD enclosure and additional filtering as shown on the one line diagram.
   2. Any harmonic calculations shall be done based on the kVA capacity, X/R ratio and the impedance of the utility transformer feeding the installation, as noted on the drawings, and the total system load. The calculations shall be made with the point of common coupling being the point where the utility feeds multiple customers.
   3. Total harmonic distortion shall be calculated under worst-case conditions in accordance with the procedure outlined in IEEE standard 519-2014. Copies of these calculations are to be submitted. The Owner shall provide any needed information to the VFD supplier three (3) weeks prior to requiring harmonic calculations.
   4. The system containing the VFD shall comply with the 5% level of total harmonic distortion of line voltage and the line current limits as defined in IEEE 519-2014. If the system cannot meet the harmonic levels with the VFD provided with the standard input line reactor or optional input isolation transformer, the VFD manufacturer shall supply an eighteen pulse, multiple bridge rectifier AC to DC conversion section with phase shifting transformer. This eighteen-pulse rectifier converter shall result in a multiple pulse current waveform that will more nearly approximate a true sine-wave to reduce voltage harmonic content on the utility line. The phase shifting transformer shall be of a single winding type to optimize its KVA rating and harmonic cancellation capability.
   5. Option 1 – 6 Pulse VFD with harmonic mitigation as specified. The external VFD filters shall be with optional contactor to provide a maximum 5% harmonic distortion at full load.
      a. Specific Requirements include:
         1) The harmonic filter shall be a Matrix AP Filter as manufactured by MTE Corporation, HG7 Harmonic Filter manufactured by Trans Coil or approved equal
         2) The harmonic filter shall treat all characteristic low frequency harmonics generated by a three phase full wave converter load (5th, 7th, 11th, 13th, etc.)
         3) The characteristic harmonics shall be suppressed without need for individual tuning or the requirement to phase shift against other harmonic sources.

4) The harmonic filter shall be an adaptive passive series connected low pass filter consisting of an inductor capacitor network.
5) The harmonic filter model supplied shall be capable of feeding a three phase input rectifier with or without line reactors, with or without a DC link choke, with or without a combination line reactor and DC link choke.
6) The harmonic filter model supplied shall be capable of feeding a rectifier composed of diodes, thyristors or any combination thereof.
7) The harmonic filter shall meet the harmonic performance specification with a three percent phase voltage unbalance as defined in ANSI C-84.1-2011.
8) The harmonic filter shall not resonate with the power distribution system nor attract harmonics from other sources.
9) The filter shall be suitable for use with either a single nonlinear load or multiple nonlinear loads
10) The filter shall be listed per UL-508.
11) In the operating range from full load to 30% load the power factor shall be .98 lagging to .85 leading.
12) The harmonic filter in combination with the variable frequency drive shall meet all requirements specified in the 2014 edition of IEEE standard 519 for individual and total harmonic voltage and current distortion. The Point of Common Coupling (PCC) for all voltage and current harmonic calculations and measurements shall be the input terminals of the harmonic filter.
13) Total Demand Distortion (TDD) of the current at the input terminals of the harmonic filter shall not exceed the limits defined in IEEE-519-2014.
14) The filter shall include the optional contactor that will disconnect the capacitors from the filter when the VFD is not running. This shall be wired into the run contact of the VFD.

b. Harmonic filter to be integrated / mounted within the overall VFD enclosure.
c. The overall enclosure may be provided directly through the VFD manufacturer or via a UL508 panel shop for the overall enclosure. The warranty responsibility will be through the VFD manufacturer.

6. Option 2 – 18 Pulse VFD – VFD manufacturer shall supply an eighteen pulse, multiple bridge rectifier AC to DC conversion section with phase shifting transformer for all drives. This eighteen-pulse rectifier converter shall result in a multiple pulse current waveform that will more nearly approximate a true sine-wave to reduce voltage harmonic content on the utility line. The phase shifting transformer shall be of a single winding type to optimize its KVA rating and harmonic cancellation capability.
7. The VFD shall be able to start into a spinning motor (flying start). The VFD shall be able to determine the motor speed in any direction and resume operation without tripping. If the motor is spinning in the reverse direction, the VFD shall start into the motor in the reverse direction, bring the motor to a controlled stop, and then accelerate the motor to the preset speed.
8. Standard operating conditions shall be:
   a. Incoming Power: Three-phase, 380 – 500VAC (+10% to -15%) and 50/60 Hz (+/-5 Hz) power to a fixed potential DC bus level.
   b. Frequency stability of +/-0.05% for 24 hours with voltage regulation of +/-1% of maximum rated output voltage.
   c. Speed regulation of +/- 0.5% of base speed.
   d. Load inertia dependant carryover (ride-through) during utility loss.

e. Insensitive to input line rotation.
f. Humidity: 0 to 95% (non-condensing and non-corrosive).
g. Altitude: 4500 feet above sea level.
h. Ambient Temperature: 0 to 40 °C.
i. Storage Temperature: -25 to 550 °C.

9. Control Functions
   a. Frequently accessed VFD programmable parameters shall be adjustable from a digital operator keypad (Human Machine Interface) located on the front of the VFD. The VFD shall have a 4 line alphanumeric programmable display with status indicators. Keypads must use plain English words for parameters, status, and diagnostic messages. Keypads that are difficult to read or understand are not acceptable, and particularly those that use alphanumeric code and tables. Keypads shall be adjustable for contrast with large characters easily visible in normal ambient light.
   b. The keypad shall include a Local/Remote pushbutton selection. Both start/ stop source and speed reference shall be independently programmable for Keypad, Remote I/O, or Field Bus.
   c. Upon initial power up of the VFD, the keypad shall display a start up guide that will sequence all the necessary parameter adjustments for general start up.
   d. Standard advanced programming and trouble-shooting functions shall be available by using a personal computer's Ethernet or USB port and Windows™ 7 based software. The manufacturer shall supply the required software. An easily understood instruction manual and software help screens shall also be provided. The computer software shall be used for modifying the drive setup and reviewing diagnostic and trend information as outlined in this section. Provide one copy of the advanced programming software.
   e. The operator shall be able to scroll through the keypad menu to choose between the following:
      1) Monitor
      2) Operate
      3) Parameter setup
      4) Actual parameter values
      5) Active faults
      6) Fault history
      7) LCD contrast adjustment
      8) Information to indicate the standard software and optional features software loaded.
   f. The following setups and adjustments, at a minimum, are to be available:
      1) Start command from keypad, remote or communications port
      2) Speed command from keypad, remote or communications port
      3) Motor direction selection
      4) Maximum and minimum speed limits
      5) Acceleration and deceleration times, two settable ranges
      6) Critical (skip) frequency avoidance
      7) Torque limit
      8) Multiple attempt restart function
      9) Multiple preset speeds adjustment

10) Catch a spinning motor start or normal start selection
11) Programmable analog output
12) DC brake current magnitude and time
13) PID process controller

10. The VFD shall have the following system interfaces:
    a. Inputs – A minimum of six (6) programmable digital inputs, two (2) analog inputs and Ethernet communications interface shall be provided with the following available as a minimum:
        1) Remote manual/auto
        2) Remote start/stop
        3) Remote forward/reverse
        4) Remote preset speeds
        5) Remote external trip
        6) Remote fault reset
        7) Process control speed reference interface, 4-20mA DC (HOA in Auto)
        8) Potentiometer and 4-20mA speed reference interface (HOA in Hand)
        9) Ethernet programming and operation interface port

C. Outputs – A minimum of two (2) discrete programmable digital outputs and one (1) programmable analog output shall be provided, with the following available at minimum.
    1. Programmable relay outputs with one (1) set of Form C contacts for each, selectable with the following available at minimum:
        a. Fault
        b. Run
        c. Ready
        d. Reversed
        e. Jogging
        f. At speed
        g. Torque Limit Supervision
        h. Motor rotation direction opposite of commanded
        i. Over-temperature
    2. Programmable analog output signal, selectable with the following available at minimum:
        a. Motor current
        b. Output frequency
        c. Frequency reference
        d. Motor speed
        e. Motor torque
        f. Motor power
        g. Motor voltage
        h. DC-bus voltage
        i. AI1 (Analog Input 1)
        j. AI2 (Analog Input 2)
        k. PT100 temperature
        l. FB digital input 4 (Field Bus Input)
    3. Monitoring and Displays
        a. The VFD Human Machine Interface (HMI) display shall be a LCD type capable of displaying four (4) lines of text and the following thirteen (13) status indicators:
            1) Run

2) Forward
3) Reverse
4) Stop
5) Ready
6) Alarm
7) Fault
8) Input/Output (I/O) terminal
9) Keypad
10) Bus/Communication
11) Local (LED)
12) Remote (LED)
13) Fault (LED)

4. The VFD keypad shall be capable of displaying the following monitoring functions at a minimum:
   a. Output frequency
   b. Frequency reference
   c. Motor speed
   d. Motor current
   e. Motor torque
   f. Motor power
   g. Motor voltage
   h. DC-bus voltage
   i. Unit temperature
   j. Calculated motor temperature
   k. Voltage level of analog input
   l. Current level of analog input
   m. Digital inputs status
   n. Digital and relay outputs status
   o. Analog Input
5. Protective Functions
   a. The VFD shall include the following protective features at minimum:
      1) Over-current
      2) Over-voltage
      3) Inverter fault
      4) Under-voltage
      5) Input phase loss
      6) Output phase loss
      7) Under-temperature
      8) Over-temperature
      9) Motor stalled
      10) Motor over-temperature
      11) Motor under-load
      12) Logic voltage failure
      13) Microprocessor failure

b. The VFD shall provide ground fault protection during power-up, starting, and running. VFD with no ground fault protection during running are not acceptable.

6. Diagnostic Features
   a. Fault History
      1) Record and log faults
      2) Indicate the most recent first, and store up to 30 faults
7. Additional features to be included with the VFD system:
   a. Thermal Magnetic (TM) breaker to provide a disconnect means. Operating handle shall protrude through the door. The disconnect shall not be mounted on the door. The handle position shall indicate ON, OFF, and TRIPPED condition. The handle shall have provisions for padlocking in the OFF position with at least three (3) padlocks. Interlocks shall prevent unauthorized opening or closing of the VFD door with the disconnect handle in the ON position. Door handle interlock can be defeated by qualified maintenance personnel.
   b. 120 VAC control to allow VFD to interface with remote dry contacts.
   c. Motor dv/dt filter
      1) The dv/dt filter shall be located within the overall VFD enclosure. It shall reduce the dv/dt by clamping any voltage overshoots of the VFD output. It will return the energy in the voltage overshoots to the VFD DC bus. A power dissipative resistance device is not acceptable. Filter shall be a Cutler-Hammer MotorRxtype, TCI V1K, MTE dv/dt series A, or equal.
      2) This is an optional component. Include the additional cost for this item and whether it is mounted within the overall enclosure or external with the bid documents.
   d. Operator Interface with keypad
      1) The operator interface shall consist of a LCD keypad located on the front of the VFD. Features shall include:
      2) Nine (9) pushbuttons for selection, display, and modification of the VFD characteristics as follows:
         a) Scroll left
         b) Scroll right
         c) Scroll up/increase
         d) Scroll down/decrease
         e) Enter
         f) Reset
         g) Start
         h) Stop
         i) Local/Remote
      3) The keypad LCD panel shall provide a choice of 3-line 16 character/line, backlit alphanumeric LCD display.
      4) The operator shall be able to scroll through the keypad menu to choose between the following screens:
         a) Parameters
         b) Keypad control
         c) Active faults
         d) Fault history

e) System menu
f) Expander boards
g) Monitor
h) Operate menu

D. Communication Interface
   1. Ethernet interface with Modbus TCP/IP shall be provided with the drive. The use of a Modbus RTU serial port and third party Modbus RTU to Modbus TCP/IP module such as a Lantronix XPress-DR-IAP, or equal is allowable.
   2. Provide detailed memory map of the drive parameters with read or read/write access, format, offsets… to allow OWNER programmers to be able to integrate the VFDs into the overall SCADA system.

E. Provide an input EMI filter to minimize conducted electrical noise to meet the requirements of IEC 61800-3.

2.3 VFD OVERALL ENCLOSURE

A. The VFD enclosure shall be NEMA 3R welded steel enclosure with integral flanged disconnect. It shall house the VFD, Harmonic Mitigation control equipment (i.e. 18 pulse transformer or harmonic filters), flanged disconnect circuit breaker, control power transformer and other ancillary items such as relays, terminal blocks and the like.

B. The Human Machine Interface (HMI)l lights and operators of the VFD shall be mounted on a dead front door behind a solid outer door of the overall enclosure at a working height of approximately 62” above the enclosure floor.

C. The enclosure shall utilize a flanged disconnect main circuit breaker arrangement that interlocks opening the door while the disconnect is on. The use of a door mounted disconnect shall not be acceptable in lieu of the flanged disconnect.

D. Wiring Standards:
   1. Provide a minimum of 20 installed blank terminal blocks (TBs) in the enclosure.
   2. All wires shall be labelled on both ends of each wire within the VFD enclosure using tubular wire labels for wires less than #10 AWG. Roll on or sleeve wires may be used for larger wires.
   3. The major components shall be affixed to the back panel with tapped screws or studs. Minimum bolt size shall be 1/4x20 for items weighing more than 100 pounds, or as recommended by the component manufacturer.
   4. Wire color for cabinets will use the below table

Wire Color	Use
Black	120 VAC AC Hot
Red	120 VAC Switched AC
Yellow	AC / Power form other source

White	Neutral
Red W/White Stripe	Switched Neutral
Green or Green W/Yellow Stripe	Ground
Blue	24VDC
White W/Blue Stripe	DC Common
Brown Orange Yellow	480VAC 3PH -PH A, PH B, PH C
2 Cond Shielded Red+ Black -	Current Loop Signal
2 Cond Shielded Clear+ Black -	Current Loop Signal
3 Cond Shield Red Power Clear + Black -	Current Loop Signal

a. All current 4-20mA control loop wiring may be no smaller than 18AWG within the panel.
b. Panel shop wiring standards using different standards will be considered prior to beginning fabrication. Panels shipped directly from the VFD manufacturer's factory do not have to adhere to the wire color requirements.

E. VFD mounting: Due to the inherent heat load of a VFD, only flanged mounted VFDs with rear heat sinks outside the enclosure will be considered if the VFD is mounted within an overall enclosure.

2.4 SPARE PARTS

A. Fuses – 1 complete set of fuses including VFD semiconductor fuses.

B. Cooling Fans – 1 complete set for each VFD size, VFD and enclosure cooling fans and filters.

C. The VFD manufacturer shall maintain, as part of a national network, service facilities within 100 miles of project to provide start-up service, emergency service calls, repair work, service contracts, maintenance and training of customer personnel.

PART 3 – EXECUTION

3.1 FACTORY TESTING

A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.
   1. All printed circuit boards shall be functionally tested via automatic test equipment prior to unit installation.
   2. After all tests have been performed, each VFD shall undergo a burn-in test. The drive shall be burned in at 100% inductive or motor load without an unscheduled shutdown.
   3. After the burn-in cycle is complete, each VFD shall be put through a motor load test before inspection and shipping.

B. The manufacturer shall provide three (3) certified copies of factory test reports.

3.2 INSTALLATION

A. The VFDs shall be installed within the PCP as shown on the drawings with the operators and controls on the drawings.

3.3 FIELD QUALITY CONTROL

A. Provide the services of a qualified manufacturer's employed Field Service Engineer to assist the Contractor in installation and start-up of the equipment specified under this section. Field Service personnel shall be factory trained with periodic updates and have experience with the same model of VFD on the job site. Sales representatives will not be acceptable to perform this work. The manufacturer's service representative shall provide technical direction and assistance to the Contractor in general assembly of the equipment, installation as specified in manufacturer's installation instructions, wiring, application dependant adjustments, and verification of proper VFD operation.

B. The Contractor under the technical direction of the manufacturer's service representative shall perform the following minimum work.
   1. Inspection and final adjustments.
   2. Operational and functional checks of VFD and spare parts.
   3. The contractor shall certify that he has read the drive manufacturer's installation instructions and has installed the VFD in accordance with those instructions.

C. The Contractor shall provide three (3) copies of the manufacturer's field start-up report before final payment is made.

3.4 MAINTENANCE / WARRANTY SERVICE

A. Warranty to commence 24 months from the date of start-up, not to exceed 36 months from the date of shipment, and include all parts, labor, and travel time.

3.5 FIELD TESTING

A. The VFD manufacturer shall perform harmonic measurements at the point where the utility feeds multiple customers (PCC) to verify compliance with IEEE519-1992. A report of the voltage THD and current TDD shall be sent to the engineer. The contractor shall provide labor, material, and protection as needed to access the test points. The readings shall be taken with all drives and all other loads at full load, or as close as field conditions allow.

3.6 TRAINING

A. The Contractor shall provide a training session for up to 6 owner's representatives for 0.25 normal workday with a maximum of 1 trip at a job site location determined by the owner. Training and instruction time shall be in addition to that required for start-up service.

B. The manufacturer's qualified representative shall conduct the training.

C. The training program shall consist of the following:
   1. Instructions on the proper operation of the equipment.
   2. Instructions on the proper maintenance of the equipment.

***** END OF SECTION 16483*****

SECTION 16931
PROCESS CONTROL AND INSTRUMENTATION SYSTEM

PART 1 – GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall provide all Process Control and Instrumentation Systems (PCIS), complete and operable, in accordance with the Contract Documents. It is the intent of these Specifications to have the System Supplier be singularly responsible for selecting, and verifying correct operation of compatible hardware to provide a functional PCIS.

B. Due to the complexities associated with the interfacing of numerous control system devices, it is the intent of these Specifications that the System Supplier be responsible to the Contractor for the integration of the PCIS with devices provided under other sections, with the objective of providing a completely integrated control system free of signal incompatibilities.

C. Minimum System Supplier Scope: The exact contractual relationship and scope definition shall be established exclusively between the Contractor and the System Supplier. It is the intent of these Specifications that the System Supplier, under the direction of the Contractor, shall assume full responsibility for the following, as a minimum:

1. Procurement of all hardware required to conform to these Specifications.
2. Design and submit PCIS hardware, and spare parts submittals.
3. Perform all required PCIS hardware tests, adjustments, and calibrations.
4. Furnish all required PCIS tools, test equipment, spare parts, supplies, operations and maintenance manuals, and reproducible record drawings as specified herein.
5. Implementation of the PCIS
    a. Prepare hardware submittals including shop drawings
    b. Edit contract loop drawings and control panel designs to show any and all changes to the design
    c. Prepare the test plan, the training plan, and the spare parts submittals
    d. Procure hardware and instrumentation
    e. Control panel design and fabrication
    f. Prepare and conduct witnessed factory panel testing
    g. Oversee and certify hardware installation
    h. Oversee, document, and certify loop testing
    i. Prepare Technical Manuals related to the PCIS
    j. Prepare edited set of record drawings
6. System Supplier Qualifications: The System Supplier shall have the resources, space, and personnel needed to perform this project. The System Supplier shall meet the following minimum qualifications:
    a. Panel Fabrication
        1) The System Supplier shall have been in the business of building panels and bonding the construction of these panels for at least 5 years. The bonding shall be under the name and ownership of the company fabricating the panels for this project.
        2) The System Supplier shall build the panels to UL standard 508A, and shall attach a UL label on all new panels, or an equivalent Nationally Recognized Testing Laboratory (NRTL) standard.
        3) The System Supplier shall make all wiring changes to new and existing control panels and MCC. The changes shall be made to UL standard 508, or equal standard.

b. Field Assistance
   1) The System Supplier shall have experienced startup personnel to assist the field installation by others.

7. Other Items
   a. OR EQUAL - If the Contractor uses an 'or equal' item that requires additional electrical or instrumentation installation labor, resources or equipment, this shall be an internal issue for the Contractor's team to work out without involving the Engineer or Owner for any additional costs, engineering, or other services under this Project.
   b. Intelligent equipment - Meters, devices, relays and such shall be configured, programmed, addressed and / or setup by the Supplier as part of the base bid. If no control sequence or requirements are found or alluded to in the Contract Documents, the Supplier shall provide a basic operable system for the equipment supplied to allow for full operations in manual and automatic (as applicable). The Owner or Engineer may then direct or change setpoints with or without direct support to fine tune the system operation during or after startup.
   c. Additional devices and Minor Changes – The following are examples of items which may need to supplied or changed due to differences in manufacturers, voltages, current ratings, options or other reasons that shall be corrected as required without any cost adjustment to the Contract:
      1) Isolation Relays – Solid State or Electromechanical as required
      2) Contacts – Change from Normally Open (NO) to Normally Closed (NC) and vice versa.
      3) Signal or process fluid isolators
         a) Flexible conduits, cord whips and other final connection appurtenances.

1.2 REFERENCE STANDARDS

A. The Work of this Section and all sections in Division 16 shall comply with the following, as applicable:

NEC (NFPA 70)	National Electrical Code
NETA	International Electrical Testing Association
NEMA 250	Enclosure for Electrical Equipment (1000 Volts Maximum)
NFPA 79	Electrical Standard for Industrial Machinery

Local Electrical Code amendments to the NEC.

B. Electrical equipment shall be listed by and shall bear the label of Underwriters' Laboratories, Inc. (UL).

C. Installation of electrical equipment and materials shall comply with OSHA Safety and Health Standards, state building standards, and applicable local codes and regulations.

D. Where the requirements of the specifications conflict with UL, NEMA, NFPA, or other applicable standards, the more stringent requirements shall govern.

1.8 CHANGE ORDERS

A. Change Orders shall be itemized to true costs. Lump sum change orders without complete details are not allowed or acceptable. The PCIS shall show true costs including actual labor costs, true overhead, materials and other costs. The use of standard rates is not acceptable.

B. The labor and materials shall be broken down by reasonable tasks or items. The Engineer shall review and may discuss the costs and appropriate estimates for each task.

PART 2 – PRODUCTS

2.1 GENERAL

A. Code and Regulatory Compliance: PCIS Work shall conform to or exceed the applicable requirements of the National Electrical Code and local building codes.

B. Current Technology: Meters, instruments, and other components shall be the most recent field-proven models marketed by their manufacturers at the time of submittal of the Shop Drawings, unless otherwise required to match existing equipment.

C. Hardware Commonality: Instruments which utilize a common measurement principle (for example, d/p cells, pressure transmitters, level transmitters which monitor hydrostatic head) shall be furnished by a single manufacturer. Panel-mounted instruments shall have matching style and general appearance. Instruments performing similar functions shall be of the same type, model, or class, and shall be from a single manufacturer.

D. Loop Accuracy: The accuracy of each instrumentation system or loop shall be determined as a probable maximum error; this shall be the square-root of the sum of the squares of certified "accuracies" of the designated components in each system, expressed as a percentage of the actual span or value of the measured variable. Each individual instrument shall have a minimum accuracy of plus and minus 2 percent of full scale and a minimum repeatability of plus and minus 1 percent of full scale when installed in the field, unless otherwise indicated. Instruments that do not conform to or improve upon these criteria are not acceptable.

E. Instrument and Loop Power: Power requirements and input/output connections for all components shall be verified. Power for transmitted signals shall, in general, originate in and be supplied by the control panel devices. The use of "2-wire" transmitters is preferred, and use of "4-wire" transmitters shall be minimized. Individual loop or redundant power supplies shall be provided as required by the manufacturer's instrument load characteristics to ensure sufficient power to each loop component. Power supplies shall be mounted within control panels or in the field at the point of application.

F. Loop Isolators and Converters: Signal isolators shall be provided as required to ensure adjacent component impedance match where feedback paths may be generated, or to maintain loop integrity during the removal of a loop component. Dropping precision wirewound resistors shall be installed at all field side terminations in the control panels to ensure loop integrity. Signal conditioners and converters shall be provided where required to resolve any signal level incompatibilities or provide required functions.

G. Environmental Suitability: Indoor and outdoor control panels and instrument enclosures shall be suitable for operation in the ambient conditions associated with the locations designated in the Contract Documents. Heating, cooling, and dehumidifying devices shall be provided in order to maintain all instrumentation devices 20 percent within the minimums and maximums of their rated environmental operating ranges. The Contractor shall provide power wiring for these

devices. Enclosures suitable for the environment shall be furnished. All instrumentation in hazardous areas shall be suitable for use in the particular hazardous or classified location in which it is to be installed.

H. Signal Levels: Analog measurements and control signals shall be as indicated herein, and unless otherwise indicated, shall vary in direct linear proportion to the measured variable. Electrical signals outside control panels shall be 4 to 20 mA DC, except as indicated. Signals within enclosures may be 1-5 VDC. Electric signals shall be electrically or optically isolated from other signals. Pneumatic signals shall be 3 to 15 psig, with 3 psig equal to 0 percent, and 15 psig equal to 100 percent.

I. Alternative Equipment and Methods: Equipment or methods requiring redesign of any project details are not acceptable without prior written approval of the Engineer through the "or equal" process of Section 01600 – Products, Materials, Equipment, and Substitutions. Any proposal for approval of alternative equipment or methods shall include evidence of improved performance, operational advantage and maintenance enhancement over the equipment or method indicated, or shall include evidence that an indicated component is not available. To match existing equipment and future equipment being installed under other contracts, equipment substitutions for equipment specified as no equal will not be accepted.

J. Instrument Brackets and Mounting Hardware: All instrument brackets and mounting hardware shall be stainless steel.

2.2 OPERATING CONDITIONS

A. The PCIS shall be designed and constructed for satisfactory operation and long, low maintenance service under the following conditions:

1. Environment - Water facility
2. Indoor Temperature Range - 32 through 84 degrees F
3. Outdoor Temperature Range - 19 through 108 degrees F
4. Relative Humidity - 20 through 90 percent, non-condensing
5. Seismic - Zone 4

2.3 SEISMIC ZONE

A. Panels, instruments, conduits, and pipes shall be anchored to meet seismic restraint requirements.

2.4 CONTROL ENCLOSURES

A. Each Control Panel and its corresponding I/O modules, power supply module(s), communication interface device(s), peripheral equipment, and radio communications shall be mounted inside suitable enclosures. All I/O wiring from the field to the I/O modules shall be terminated on terminal blocks in the enclosure.

2.5 CONTROL RELAYS

A. Relays shall be of blade construction with a plug in style relay base. The coil voltage shall be 24VDC for all PLC DO outputs and 120VAC for power applications.

B. Relay sockets shall have the coil terminals (A) and (B) on one side of the base and the Common (C), Normally Closed (NC), Normally Open (NO) contact terminations on the other side to allow the relay to be the point of common coupling between the panel and the field wiring systems without additional terminal blocks and wires.

C. Detailed Specifications:
   1. Poles and Configuration: DPDT rated at 8A Resistive, 4A Inductive allowable switching current at 250VAC / 30VDC
   2. Coil Voltages available shall include: 12VDC, 24VDC, 120VAC minimum.
   3. Operational Life: 200K at full resistive load AC and 50 million cycles, no load.
   4. LED: Green or Red to indicate coil is energized.
   5. Socket: Coil and Contact separation required.
   6. Relays shall be:
      a. Schneider Electric / Magnecraft 782XBX2M4L series with 70-782EL8-1 socket
      b. IDEC RJ2S-CL series with SJ2S-07L socket
      c. Allen Bradley 700HB series with 700-HN153 socket
      d. Or approved Equal.

2.6 INSERTION MAGNETIC FLOW METER

A. The Insertion Magnetic Flow Meter(s) shall consist of an electrode assembly attached to 316 stainless steel housing and shaft, with all necessary interconnecting cables and conduits. The insertion magnetic flow meter shall be of the low frequency electromagnetic induction type and shall produce a DC pulse signal directly proportional and linear to the flow rate, with the duration not less than 100 milliseconds. The meter shall be suitable for bidirectional flow with full scale flow rates from 1 to 32 feet per second. Complete zero stability shall be an inherent characteristic of the metering system. Meters requiring field zero adjustment will not be acceptable. The meter accuracy shall not be affected by changes in fluid pressure, temperature, viscosity, or conductivity.

B. The insertion magnetic meter shall be supplied with a 2-inch male NPT-equipped stainless steel adaptor and compression nut & locking system to restrain the meter shaft.

C. The converter electronics shall be mounted remotely as shown on the Drawings. The converter shall be microprocessor controlled, utilizing digital signal processing with automatic zero correction to provide a linear 4-20 mA signal proportional to the forward and reverse flow rate specified. Range ability shall be field adjustable over a 100 to 1 range. Field adjustable signal dampening shall be provided. Low flow cutoff shall be provided to eliminate flow transients when no flow is present in the pipe. A rate indicator and totalizer scaled in engineering units shall be provided and shall be viewable on a LCD display(s) through a clear window in the enclosure. The converter shall have self diagnostics which constantly check for proper operations. If a failure occurs, a fault indication shall be provided to notify the operator of a problem. The converter shall contain a self test mode to allow the operator to manually simulate the output 4-20 mA signal to any value between 0% and 100% to check out any driven devices in the loop. The converter shall be rated to operate in an ambient temperature range from 14° F to 122 °F.

D. The meter, converter, and associated components shall be designed for operation from a power source of 24 VDC, with a power consumption of less than 20 watts.

E. When converter electronics is mounted remotely, additional special cabling (Cabling between flow element and remote mounted flow indicating transmitter), mounting hardware, and devices necessary to complete the installation shall be provided by the manufacturer at no additional cost to the Owner. Electronics shall be provided in NEMA rated enclosures as specified in the Drawings.

F. The meter shall be hydraulically calibrated at a facility located in the United States and the calibration shall be traceable to the National Bureau of Standards. A certified copy of the calibration test results shall be submitted to the Owner prior to shipment of the meter.

G. The accuracy of the complete metering system including flow tube and converter electronics shall be 0.5% of rate over the range settings of 1 to 32 feet per second. Variations in temperature, voltage, and frequency within the ranges listed herein shall not affect the accuracy in excess of 0.5% of flow rate. The flowmeter shall be submergence proof continuous to 30 feet of water per IP 68. Conduits between flowmeter element and electronics shall be sealed to retain submergence rating per flowmeter manufacturer's requirements.

H. The flow element and cable shall be rated IP68 to 30 feet indefinitely.

I. The flowmeter manufacturer shall supply the cable without splices from the flowtube to the remote electronics. The flow element end of the cable shall be factory sealed to prevent leakage.

J. The flow meter shall be:

1. McCrometer FPI Mag Sensor (IP68 rating and factory cable) and M series Converter.

2. or other equal system.

2.7 ULTRASONIC LEVEL TRANSMITTER

A. The ultrasonic level transmitter shall consist of an ultrasonic level transducer mounted in the vault and an ultrasonic level transmitter to be mounted in the electrical room.

B. Transmitter Detailed Specifications:
1. Power: 100-230VAC 60Hx, 36VA / 17W
2. Points of Measurement: single (minimum)
3. Measurement range: 1 to 50 feet
4. Accuracy: 0.25% of range, or 0.24" , whichever is greater
5. Resolution: 0.1% of program range, or 0.08" , whichever is greater
6. Display: Multiline LCD with backlighting
7. Communications: Modbus RTU via RS-232 or 485
8. Outputs: (2) 0-20 or 4-20mA analog outputs
9. Inputs: (2) discrete inputs
10. Enclosure: Wall mount, Type 4X
11. Operating temperature: -20 to 50 C
12. Approvals: Class 1 Div 1 and 2
13. The transmitter shall be a Siemens HydroRanger 200, or approved equal

C. Transducer
1. Measurement range: 1 to 26 feet
2. Frequency: 44khz
3. Operating temperature: -40 to 95 C
4. Beam Angle: 12 degrees
5. Process Enclosure: 1" NPT
6. Approval: Class 1 Div 1 /2 approved
7. Enclosure: PVDF
8. The transducer shall be Siemens XPS-5, or approved equal

2.8 PRESSURE INDICATING TRANSMITTER

A. The pressure indication transmitter shall be a digital design with a high accuracy strain gage technology. Pressure shall be gauge type in PSI.

B. Transmitter Detailed Specifications:
1. Power: 24VDC nominal – Loop Powered

2. Measurement range: -14.7 to 800 PSIG
3. Accuracy: 0.065% of range
4. Stability: 0.1% of range
5. Display: LCD Display with local operator interface
6. Communications: HART
7. Output: 4-20mA analog output with HART
8. Enclosure: Type 4X
9. Operating temperature: -20 to 50 C
10. Approvals: NSF Approved Option (DW Option)
11. Mounting: On Pipe
12. The transmitter shall be a Rosemount 2051TG3A2,BA,B4,M4,DW, or approved equal.

2.9 REMOTE TELEMTRY UNIT

A. The Remote Telemetry Unit (RTU) shall be a PLC based with a color HMI within a dead front door enclosure. The Remote Telemetry Unit (RTU) shall be a PLC based with a color HMI within a dead front door enclosure. The RTU shall communicate over a cellular VPN to the office with a secure cellular gateway. The office shall utilize a standard PC with HTML based internet access (Internet Explorer, Firefox, Safari…) to securely connect to the PLC and HMI in the field.

B. Enclosure – The enclosure shall be a painted light grey steel NEMA 3R or 4 (with drip shield). The enclosure details:
   1. Sized for the PLC and other components but shall be a minimum of 30” wide, 30” tall and 10 inches deep.
   2. Provided with an inner door that is painted white and shall hold the HMI and any operators.
   3. Supplied with a LED door switch activated light.
   4. Provided with exhaust and filtered air intake with cooling thermostat.
   5. Provided with thermostatically controlled heater (minimum 200W) for climate control. Heater shall be selected based on enclosure size with record lows for the area.
   6. Terminal blocks (TB) shall be boxed style, screw clamped type. Spring type TBs are not permitted.

C. The RTU shall be powered from a 120VAC circuit. The PLC and all applicable instruments shall be 24VDC powered with a 50 Amp-Hour sealed lead acid battery as a backup for power loss. DC power shall be auctioneered using a diode based redundancy module or full wave bridge rectifier (20A minimum rating).

D. Programmable Logic Controller – The PLC shall be an Ethernet based PLC from a national supplier.
   1. Technical Details
      a. Power Supply: 24VDC
      b. Operating Temp range: 0 to 60C
      c. Communications: Ethernet TCP/IP or Modbus TCP/IP
      d. Onboard Digital Inputs: 20 DC DIs
      e. Onboard Digital Outputs: 12 Relay outputs
      f. Onboard Analog Inputs: 4 Voltage
      g. Expansion AI Module: 4 Channel AI module w/ 4-20mA inputs
      h. Real Time Clock: embedded
      i. Serial ports: (2) RS232 and RS232/485
      j. Memory: 10KB Program and 10KB User data
      k. Mode switch: Run/Remote/Program
      l. Display: LCD with keypad
      m. Programming Software: Include a full license for the OWNER
      n. PID Instruction: Onboard

2. Restrictions: The Manufacturer of the PLC cannot also be the programmer, supplier or otherwise involved in the system integration effort.
3. The PLC shall be an Allen Bradley MicroLogix 1400, 1766-L32BXBA w/ 1762-IF4 module, or Approved Equal.

E. RTU Human Machine Interface (HMI) – The RTU HMI shall be an Ethernet based HMI from a national supplier.
1. Technical Details
    a. Power Supply: 24VDC
    b. Operating Temp range: 0 to 50C
    c. Communications: Ethernet TCP/IP or Modbus TCP/IP
    d. Screen Size: 6 inch, 320x240 minimum TFT
    e. Touchscreen: Required
    f. Color: 64K Color
    g. Memory Card: SD, USB
    h. Log File Format: Plain Text, viewable in MS Excel
    i. Tags per log file:16
    j. Sample rate Variable but shall include: 1,5,60 seconds or minutes
    k. Minimuim Data point capability: 500 million
    l. Graphics: Yes
    m. Programming Software: Include a full license for the OWNER

2. Restrictions: The Manufacturer of the HMI cannot also be the programmer, supplier or otherwise involved in the system integration effort.
3. The HMI shall be mounted on an inner door for security and to limit exposure to direct sunlight.
4. The HMI shall be: C-More EA9-T6CL, EZ Automation EZD-T6C-SE or Approved Equal.

F. Cellular Gateway - The HMI shall be an Ethernet based HMI from a national supplier.
1. Technical Details
    a. Power Supply: 24VDC
    b. Operating Temp range: -25 to 70C
    c. Communications: Ethernet TCP/IP or Modbus TCP/IP
    d. Cellular network: 3G+
    e. Antenna Connection: Female SMA
    f. Website: Embedded web interface
    g. Custom WebServer HMI GUI: Required ViewON4 to provide web access to smart phones and other devices (or approved equal)
    h. SD Card reader: Standard
    i. Router: IP Filtering, IP Forwarding, NAT, Proxy, DHCP Client, Routing table
    j. Mounting: DIN Rail
    k. Antenna: External Antenna with frequency dependent on the carrier, surge protection and coax to complete assembly
    l. VPN: Yes with SSL/TLS security
    m. Alarm Notification: email, sms, ftp including low, low low, high, high high with setpoints, dead bands and time delays
    n. Programming Software: Include a full license for the OWNER

2. The Cellular Gateway shall:
    a. Contain a flexible router.
    b. Utilize a Web-based configuration system.
    c. Utilize a fully secure SSL-based VPN tunnel for all traffic. The information exchanged during the communication is encrypted via SSL (2048-bit key) allowing only authenticated users to connect to the Cellular Gateway. This service shall be offered

by the device manufacturer only. The Owner shall be listed as the user and shall hold all connection rights unless otherwise authorized by the owner. The connection shall be through a free secure web portal such as M2Web.

d. Detailed connection reports shall be available to view usage and other information.
e. Have integrated Wi-Fi and cellular connectivity.
f. The Cellular Gateway shall be an eWon Flexy201 with FLB3202 3G+ extension card or Approved Equal.

G. Programming: The systems shall be delivered fully integrated and programmed. The system shall be an operator intuitive graphical system. The system shall operate via the HMI or web interface.

1. The irrigation pump station shall operate and control based on flow with pressure backup or pressure only controls using a PID logic blocks.

2. Alarm processing shall include:
    a. Time delay to activate in seconds to prevent alarm bouncing
    b. Alarm Disable bit (also an alarm) to lockout nuisance alarms. This will require a supervisory login on the HMI to disable.
    c. All alarm settings shall be accessible and displayed through the HMI. Setpoint and other changes shall require a supervisory login and password to change.

3. Pumps shall be operated through the PLC with the ability to remotely turn the irrigation pumps on or off from the local HMI or via a remote cellular gateway.

4. The following are examples of indications, shutdowns and controls to be included in the software design:
    a. High pressure lockout
    b. High flow alarm and lockout
    c. Low level shutdown
    d. Real time indication of flows, pressures, levels…
    e. Flow and pump runtime totalization
    f. Pump / VFD statuses and information such as running, off, fault
    g. Trends showing station parameters over time.

5. WebServer HMI Graphical User Interface: The Cellular Gateway shall include a WebServer HMI from the Cellular Gateway manufacturer that shall be programmed to have a read only graphical representation of the pump station. The representation shall include real time and historical information such as process variables, pump statuses and alarms. This WebServer HMI is separate from the the RTU HMIThe RTU HMI panel shall be remotely viewable and controllable through the secure Cellular gateway to the District's office or other computer. The WebServer HMI shall be an eWON ViewOn4 WebServer HMI or approved equal. There shall not be any additional cost to the Owner for maintenance or use of the Web Server HMI for a period of 5 years.

6. Custom Programming time – The supplier shall include time and resources in their offering including at least 3 sit down meetings. These meetings are expected to be attended by the programmer(s), Engineer and Owner representatives at the District's offices. The three meetings shall be:
    a. Pre-programming: This meeting will have the supplier displaying of previous work, explaining orally and in a plain English document how the station will operate to the attending personnel. The another attendees will review and provide additional guidance to the programmer(s).These changes shall be included under this contract

b. Pre-Startup – After the panel is built and delivered to the site, the second meeting will review with screen shots and other items exactly how the station can be operated and any issues the programmer(s) are having or to answer preferences or questions of operations.
c. Post startup – this meeting will occur after the station is started up to discuss items to be added, deleted or changed.
d. Training: The supplier shall provide 16 hours of training, up to 8 hours per session.
e. The supplier shall include and additional 40 hours of time in the field to make any programming changes as requested by the Engineer or Owner. Travel time shall not be included in this time allowance but shall be included in the base bid. Two trips shall be included under this work.

PART 3 – EXECUTION

3.1 GENERAL

A. All materials and all PICS equipment furnished under this Contract shall be new, free from defects, of first quality, and produced by manufacturers regularly engaged in the manufacture of these products.

B. Hardware Commonality: Where there is more than one item of similar equipment being furnished all such similar equipment shall be the product of a singular manufacturer.

3.2 PRODUCT HANDLING

A. Shipping Precautions: After completion of shop assembly, factory test, and approval, equipment, cabinets, panels, and consoles shall be packed in protective crates and enclosed in heavy-duty polyethylene envelopes or secured sheeting to provide complete protection from damage, dust, and moisture. Dehumidifiers shall be placed inside the polyethylene coverings. The equipment shall then be skid-mounted for final transport. Lifting rings shall be provided for moving without removing protective covering. Boxed weight shall be shown on shipping tags together with instructions for unloading, transporting, storing, and handling at the Site.

B. Special Instructions: Special instructions for proper field handling, storage, and installation required by the manufacturer shall be securely attached to each piece of equipment prior to packaging and shipment.

C. Tagging: Each component shall be tagged to identify its location, instrument tag number, and function in the system. A permanent stainless steel tag firmly attached and stamped with the instrument tag number, as given in the tabulation, shall be provided on each piece of equipment in the PCIS. Identification shall be prominently displayed on the outside of the package.

D. Storage: Equipment shall not be stored outdoors. Equipment shall be stored in dry, permanent shelters, including in-line equipment, and shall be adequately protected against mechanical injury. If any apparatus has been damaged, such damage shall be repaired by the Contractor. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through tests as directed by the Engineer. If such tests reveal defects, the equipment shall be replaced.

3.3 PCIS PANEL WIRING STANDARDS

A. Panels shall be wired in accordance with NFPA 79 standards.

B. Panels shall be labeled as UL standard 508A.

C. Panel arrangement shall be logical with PLC and internal components at the top part of the enclosure and the field wiring connections at the bottom of the enclosure. Field wiring shall be separated from panel wiring using terminal blocks or relay bases. Wiring shall be arranged so field wiring is on the outside or bottom of the panel.

D. PLC Wiring Standards:
   1. All inputs and outputs shall be fully wired out to terminal blocks or relays.
   2. Use UL1077 CBs for all singular loads such as the PLC, HMI, Power Supplies, batteries to allow for load segregation and ease of troubleshooting and repair. CBs shall be sized in accordance with NFPA 70 guidelines. Fuses shall not be used as Over Current Protective Devices (OCPD) except for analog loops.
   3. Provide an UL1077 CB sized at 1A as the wetting voltage source with a minimum of one terminal block for wetting voltage per Digital Input point. Provide one CB for each block of DI points such as the base unit or DI module.
   4. All Digital Outputs shall be isolated with an electro-mechanical relay. Power feeding the outputs to the coil shall have a UL1077 CB sized at 1A or 125% of the maximum current draw of all DO coils on together will draw. Provide one CB for each block of DO points such as the base unit or DO module.
   5. Analog Inputs shall have the following terminals to accommodate 2, 3 or 4 wire inputs. Provide per AI point:
      a. 24VDC lighted fuse block with 250mA fuse per loop
      b. AI + and AI – termination blocks
      c. Shield Drain TB as ground point. The PLC shall be the point of the shield drain for all AI and AO points.
   6. Analog Outputs shall have the following terminals per point:
      a. AO+ and AO– terminal blocks
      b. Shield Drain TB as ground point. The PLC shall be the point of the shield drain for all AI and AO points.
      c. Wire Colors per 16120 - Wire
      d. Provide GFIC Convenience Outlet, LED panel light with motion switch.
      e. Wiring Standards:
         1) Field terminals shall be designed so that a single field wire will be on each terminal block. The only exception shall be shield wires may have two wires per field terminal block.
         2) Internal connections shall be designed so that a maximum of two wires per connection point shall be observed. Jumpers on Terminal blocks shall be mechanical screw type, supplied from the manufacturer only.
         3) Wire labeling – Tube style with computer or machine printed wire designations as depicted on the wiring diagrams. DI (and DO) points shall be labeled DI(DO)-nn where nn is the point number from 0 to the maximum installed point of that type. All wires except short (≤ 3”) exposed jumpers shall be labeled.
         4) Spares:
            a) 20% spare TBs
            b) 2 DC fuse holders
            c) 2 CBs – 1A and 6A

3.4 INSTALLATION

A. The Contractor shall utilize qualified personnel to accomplish, or supervise the physical installation of all elements, components, accessories, or assemblies that it provides. The Contractor shall employ installers who are skilled and experienced in the installation and connection of all elements, components, accessories, and assemblies it provides.

B. All components of the PCIS, including all communication cabling, shall be the installation responsibility of the Contractor unless specifically noted otherwise. The installation of the communication network shall be the complete installation responsibility of the Contractor, including all cables, connectors, transceivers, antennas, and any required electrical grounds. Grounding shall be shown on submittal drawings. After installation of the PCIS is completed, the installation shall be inspected jointly by the Contractor and the Equipment Manufacturer's representatives. Any problems shall be corrected, and when both are satisfied with the installation, a written certification of the installation shall be delivered to the Engineer. The certification shall state that all PLC communication and I/O modules, modems, system grounds, communication network, and all other components of the PCIS System have been inspected and are installed in accordance with the Manufacturer's guidelines.

C. General
1. Equipment Locations: The monitoring and control system configurations indicated are diagrammatic. The locations of equipment are approximate. The exact locations and routing of wiring and cables shall be governed by structural conditions and physical interferences and by the location of electrical terminations on equipment. Equipment shall be located and installed so that it will be readily accessible for operation and maintenance. Where job conditions require reasonable changes in approximated locations and arrangements, or when the OWNER exercises the right to require changes in location of equipment which do not impact material quantities or cause material rework, the Contractor shall make such changes without additional cost to the Owner.

D. Conduit, Cables, and Field Wiring
1. Conduit shall be provided under Division 16.
2. Process equipment control wiring, 4-20 mA signal circuits, signal wiring to field instruments, PLC & remote input and output (I/O) wiring and other field wiring and cables shall be provided under Division 16.
3. PLC equipment cables, data highway communication networks shall be provided under this section.

E. Instrumentation Tie-Downs: Instruments, control panels, and equipment shall be anchored by methods that comply with seismic requirements applicable to the Site.

F. Ancillary Devices: The Contract Documents show all necessary conduit and instruments required to make a complete instrumentation system. The Contractor shall be responsible for providing any additional or different type connections as required by the instruments and specific installation requirements. Such additions and such changes, including the proposed method of installation, shall be submitted to the Engineer for approval prior to commencing the Work. Such changes shall not be a basis of claims for extra work or delay.

G. Installation Criteria and Validation: Field-mounted components and assemblies shall be installed and connected according to the requirements below:
1. Installation personnel have been instructed on installation requirements of the Contract Documents.
2. Technical assistance is available to installation personnel at least by telephone.
3. Installation personnel have at least one copy of the approved Shop Drawings and data.
4. Instrument process sensing lines shall be installed under Section 15015 – Piping and Tubing Systems.
5. Flexible cables and capillary tubing shall be installed in flexible conduits. The lengths shall be sufficient to withdraw the element for periodic maintenance.
6. Power and signal wires shall be terminated with crimped type lugs.
7. Connectors shall be, as a minimum, watertight.
8. Wires shall be mounted clearly with an identification tag that is of a permanent and reusable nature.

9. Wire and cable shall be arranged in a neat manner and securely supported in cable groups and connected from terminal to terminal without splices, unless specifically approved by the Engineer. Wiring shall be protected from sharp edges and corners.
10. Mounting stands and bracket materials and workmanship shall comply with requirements of the Contract Documents.
11. Verify the correctness of each installation, including polarity of electric power and signal connections, and make sure process connections are free of leaks. The Contractor shall certify in writing that discrepancies have been corrected for each loop or system checked out.
12. The Owner will not be responsible for any additional cost of rework attributable to actions of the Contractor or the Instrumentation Supplier.

3.5 CALIBRATION, TESTING, AND INSTALLATION PROCEDURES

A. Calibration: All analog inputs and outputs of the PLC shall have their calibration checked at a minimum of two points to verify consistency with the balance of the analog loop. This calibration check shall be done in conjunction with the analog loop tests.

B. The Contractor shall submit to the Engineer a system testing completion report when each process system and all aspects of the configuration software have been successfully tested as described herein. The report shall note any problems encountered and what action was required to correct them. It shall include a clear and unequivocal statement that the process systems have been thoroughly tested and are complete and functional in accordance with all Specification requirements.

3.6 CALIBRATION

A. General: Devices provided shall be calibrated according to the manufacturer's recommended procedures to verify operational readiness and ability to meet the indicated functional and tolerance requirements.

B. Calibration Points: Each instrument shall be calibrated at 20, 60, and 100 percent of span using test instruments to simulate inputs. The test instruments shall have accuracies traceable to National Institute of Testing Standards.

C. Bench Calibration: Instruments that have been bench-calibrated shall be examined in the field to determine whether any of the calibrations are in need of adjustment. Such adjustments, if required, shall be made only after consultation with the Engineer.

D. Field Calibration: Instruments that were not bench-calibrated shall be calibrated in the field to insure proper operation in accordance with the instrument loop diagrams or specification data sheets.

E. Analyzer Calibration: Each analyzer system shall be calibrated and tested as a workable system after installation. Testing procedures shall be directed by the manufacturers' technical representatives. Samples and sample gases shall be furnished by the manufacturers.

F. Calibration Sheets: Each instrument calibration sheet shall provide the following information and a space for sign-off on individual items and on the completed unit:
1. Project name
2. Loop number
3. Tag number
4. Manufacturer
5. Model number
6. Serial number

7. Calibration range
8. Calibration data: Input, output, and error at 20 percent, 60 percent and 100 percent of span
9. Switch setting, contact action, and dead band for discrete elements
10. Space for comments
11. Space for sign-off by Instrumentation Supplier and date
12. Test equipment used and associated serial numbers

G. Calibration Tags: A calibration and testing tag shall be attached to each piece of equipment or system at a location determined by the Engineer. The Contractor shall have the Instrumentation Supplier sign the tag when calibration is complete. The Engineer will sign the tag when the calibration and testing has been accepted.

3.7 LOOP TESTING

A. General: Individual instrument loop diagrams per ISA Standard S5.4 - Instrument Loop Diagrams, expanded format, shall be submitted to the Engineer for review prior to the loop tests. The Contractor shall notify the Engineer of scheduled tests a minimum of 30 days prior to the estimated completion date of installation and wiring of the PCIS. After the Engineer's review of the submitted loop diagrams for correctness and compliance with the Specifications, loop testing shall proceed. The loop check shall be witnessed by the Engineer.

B. Control Valve Tests: Control valves, cylinders, drives and connecting linkages shall be stroked from the operator interface units as well as local control devices and adjusted to verify proper control action, hand switch action, limit switch settings, torque settings, remote control actions, and remote feedback of valve status and position. Control valve actions and positioner settings shall be checked with the valves in place to insure that no changes have occurred since the bench calibration.

C. Instrument and Instrument Component Validation: Each instrument shall be field-tested, inspected, and adjusted to its indicated performance requirement in accordance with manufacturer's specifications and instructions. Any instrument which fails to meet any Contract requirement, or, in the absence of a Contract requirement, any published manufacturer performance specification for functional and operational parameters, shall be repaired or replaced, at the discretion of the Engineer and at the Contractor’s expense.

D. Loop Validation: Controllers and electronic function modules shall be field-tested and exercised to demonstrate correct operation of the hardware and wiring. Control loops shall be checked under simulated operating conditions by impressing input signals at the primary control elements and observing appropriate responses at register in the PLC processor. Actual signals shall be used wherever available. Following any necessary corrections, the loops shall be retested.

E. Loop Validation Sheets: The Contractor shall prepare loop confirmation sheets for each loop covering each active instrumentation and control device including simple hand switches and lights. Loop confirmation sheets shall form the basis for operational tests and documentation. Each loop confirmation sheet shall cite the following information and shall provide spaces for sign-off on individual items and on the complete loop by the Instrumentation Supplier:
1. Project name
2. Loop number
3. Tag number, description, manufacturer and model number for each element
4. Installation bulletin number
5. Specification sheet number
6. Adjustment check
7. Space for comments
8. Space for loop sign-off by Instrumentation Supplier and date

9. Space for Engineer witness signature and date

F. Loop Certifications: When installation tests have been successfully completed for all individual instruments and all separate analog control networks, a certified copy of each test form signed by the Engineer or the Engineer's representative as a witness, with test data entered, shall be submitted to the Engineer together with a clear and unequivocal statement that the instrumentation has been successfully calibrated, inspected, and tested.

3.8 PERFORMANCE TEST

A. The entire PCIS hardware, field instruments, power supplies, and wiring shall operate for 30 days without failure.

B. The Contractor shall furnish support staff as required to satisfy the repair or replacement requirements.

C. If any component, other than field instruments, fails during the performance test, it shall be repaired or replaced and the PCIS shall be restarted for another 30-day period.

3.9 SPARE PARTS

A. Fuses:
1. Control: 5 spare fuses of each type and rating installed.

B. Power Supplies:
1. Provide one spare DC power supply of each type or size installed.

C. Instruments:
1. Provide a spare Level Transmitter
2. Provide one spare Level Float.

3.10 REQUIREMENTS FOR SUBSTANTIAL COMPLETION

A. For the purpose of this Section, the following conditions, in addition to the requirements in other sections, shall be fulfilled before the Work is considered substantially complete:
1. Submittals have been completed and approved.
2. The PCIS has been installed, calibrated, and loop tested.
3. Spare parts and expendable supplies and test equipment have been delivered to the Owner.
4. The performance test has been successfully completed.
5. Punch-list items have been corrected.
6. Record drawings in both hard copy and electronic format have been submitted.
7. Revisions to the Technical Manuals that may have resulted from the field tests have been made and reviewed.
8. Debris associated with installation of instrumentation has been removed.
9. Probes, elements, sample lines, transmitters, tubing, and enclosures have been cleaned and are in like-new condition.
10. Instrument Equipment Summary Forms have been accepted by the Owner.

***** END OF SECTION 16931 *****

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

SOUTH PUMP STATION AUTOMATION PROJECT

GRANT APPLICATION

MAY 10, 2018

ATTACHMENT C

Bockmon & Woody
ELECTRIC CO., INC.

1528 El Pinal Drive • P.O. Box 1018 • Stockton, CA 95201-1018
PHONE: (209) 464-4878 • FAX: (209) 464-2615
CA Lic. No. C10-588308 • DIR No. 1000002789

Date: October 12, 2017
Attention: Bidders
Company:
Project: North San Joaquin Water Conservation District South System Pump Station

Ladies and Gentlemen:

Bockmon & Woody Electric Co., Proposes to bid on the references project as a subcontractor for the electrical portion of the work required under the general contract and any modifications.

Our Proposal is according to the provisions and terms of the contract documents. Our bid price will be per the Plans and Specifications, sales tax included.

The specification sections for the scope of work quoted by Bockmon & Woody Electric Co., Inc., are as follows: Division 16 - Electrical sections and Electrical plans Dated 3/21/2017

Bockmon & Woody Electric Co., Inc., recognizes Addendum's: #1, #2, #3, #4, #5, #6 (Per previous Bids)
**This bid proposal is good for 30 days.
**Work to be completed on a reasonable schedule.
**Subcontractor shall not be responsible for safety violations by others.

Description	Qty	Unit Price	Extended Total
Base Bid	**1**	**$ 654,300.00**	**$ 654,300.00**
		Total	**$ 654,300.00**

Scope of Work: F&I new PG&E Primary & Secondary Infrastructure. F&I Switchgear and MCC. F&I Controls and Intrumentation. Provide all trenching, backfill, and compaction.

Exclusions:

1. Cost of permits, fees, & bonds
2. SCADA Programming & hardware
3. Excavation and backfill of contaiminated Soils
4. Future VFD
5. Plywood Backboards
6. Rock Exacation, and using any others means than a Backhoe to Excacte trenches
7. Demolition, Safe off only
8. Access Doors

North San Joaquin Water Conservation District
South System Pump Station Replacement Project

Electrical and Intrumentaiton Pricing Breakdown

DESCRIPTION OF WORK	UNITS	UNIT COST	TOTAL COST
1600 amp, 480 Volt Main Switchboard	1	$ 78,100.00	$ 78,100.00
Motor Control Center	1	$ 165,000.00	$ 165,000.00
PLC Control Panel	1	$ 55,000.00	$ 55,000.00
Intrumentation	1	$ 75,000.00	$ 75,000.00
Spare Parts	1	$ 5,000.00	$ 5,000.00
Professional Services (engineering, Programming, etc)	1	$ 90,000.00	$ 90,000.00
Tax & Freight	1	$ 25,000.00	$ 25,000.00
Trenching, bedding, & Backfill	1100	$ 40.00	$ 44,000.00
3'x5' Traffic Rated PG&E Utility Pullbox	1	$ 5,000.00	$ 5,000.00
106"x90" precast transformer pad	1	$ 4,500.00	$ 4,500.00
2-4" PVC-80 underground conduits PG&E Utility Primary	730	$ 25.00	$ 18,250.00
5-5" PVC-80 underground conduits PG&E Utility Secondary	30	$ 50.00	$ 1,500.00
4-4" PVC-40 Undergound conduits from MMS to PP	320	$ 50.00	$ 16,000.00
3/4" Rigid Conduits - LOT	1	$ 5,000.00	$ 5,000.00
1" Rigid Conduits - LOT	1	$ 5,000.00	$ 5,000.00
3" Rigid Conduits - LOT	1	$ 5,000.00	$ 5,000.00
#14 Insulated Copper conductor - LOT	1	$ 5,000.00	$ 5,000.00
#12 Insulated Copper conductor - LOT	1	$ 5,000.00	$ 5,000.00
#10 Insulated Copper conductor - LOT	1	$ 5,000.00	$ 5,000.00
#8 Insulated Copper conductor - LOT	1	$ 5,000.00	$ 5,000.00
#4 Insulated Copper conductor - LOT	1	$ 5,000.00	$ 5,000.00
#16 TSPR Cable - LOT	1	$ 5,000.00	$ 5,000.00
#3/0 Aluminium conductors	350	$ 12.00	$ 4,200.00
#750 MCM -Aluminium conductors	1050	$ 15.00	$ 15,750.00
#250 VFD Rated Cable - LOT	1	$ 4,500.00	$ 4,500.00
Lighitng - LOT	1	$ 2,500.00	$ 2,500.00
			$ 654,300.00

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

SOUTH PUMP STATION AUTOMATION PROJECT

MAY 10, 2018

ATTACHMENT D

Bibliography of References Reviewed for Water Savings Calculation for Application for USBR Agricultural Water Conservation and Efficiency Grant

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Brogan, Dale “Delano-Earlimart Irrigation District Variable Frequency Drive Study”, Report to California Energy Commission, March 1995

Feist, Kyle, Burt Charles M., and Pierce, Robert “Case Study: West Stanislaus Irrigation District Modernization”, Irrigation and Training Center of California Polytechnic State University San Luis Obispo, CA, 2017

Irrigation and Training Center of California Polytechnic State University San Luis Obispo, CA “Estimating the Payback for an Electrical VFD Application in a Pumping Plant Which Presently Spills Excess Pumpage”, Farm Energy Assistance Loan Program California Energy Commission, November 1994

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NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

SOUTH PUMP STATION AUTOMATION PROJECT

GRANT APPLICATION

MAY 10, 2018

ATTACHMENT E

A Public Agency

12800 Ridge Road, Sutter Creek, CA 95685-9630 • www.amadorwater.org • OFFICE: (209) 223-3018
FAX: (209) 257-5281

May 2, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

Dear Mr. Darrel Olson:

The Amador Water Agency provides treated water to all five cities in Amador County and to Central Amador along the Highway 88 corridor and 100% of this water is diverted from the Mokelumne River. Efficient and effective use of water supplies from the Mokelumne River and local ground water sources are critical to meeting water supply demands.

The purpose of this letter is to support the North San Joaquin Water Conservation District's grant application for funds to help pay for the South Pump Station Automation Project. Adding a variable frequency drive, new meters and a remote telemetry unit to the South Pump Station will allow the District to improve the efficiency of its operations and reduce operational spills and system losses. This, in turn, will allow the District to deliver surface water at a lower cost, which will reduce landowner reliance on groundwater and help improve groundwater overdraft conditions in the Eastern San Joaquin Subbasin.

Also, the District works collaboratively with other stakeholders on the Mokelumne River to help manage and protect fishery flows. An automated South Pump Station will help the district in this collaborative effort by providing additional flexibility and control for river diversions from the South Pump Station.

Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Sincerely,

Gene Mancebo
General Manager

STATE CAPITOL
P.O. BOX 942849
SACRAMENTO, CA 94249-0013
(916) 319-2013
FAX (916) 319-2113

DISTRICT OFFICE
31 EAST CHANNEL STREET, SUITE 306
STOCKTON, CA 95202
(209) 948-7479
FAX (209) 465-5058

Assembly
California Legislature

COMMITTEES
APPROPRIATIONS
BUSINESS AND PROFESSIONS
NATURAL RESOURCES
UTILITIES AND ENERGY

SUSAN TALAMANTES EGGMAN, PH.D.
CHAIR, ASSEMBLY COMMITTEE ON ACCOUNTABILITY AND ADMINISTRATIVE REVIEW
ASSEMBLYMEMBER, THIRTEENTH DISTRICT

May 2, 2018

Darren Olson, Grants Management Specialist
Bureau of Reclamation
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Dear Mr. Olson:

I am writing to express my support for the North San Joaquin Water Conservation District's application for funds to help pay for the South Pump Station Automation Project on the south side of the Mokelumne River, east of Lodi, California.

As you may know, the South Pump system delivered Mokelumne River water to agricultural lands in northern San Joaquin County. It has not been operated since the 2012-2015 drought because the current system is very inefficient. The North San Joaquin Water Conservation District has set aside $1.75 million to rebuild the system with water efficiency features that will allow the District to deliver surface water at a lower cost, reduce reliance on groundwater, protect fishery flows and improve groundwater overdraft conditions in the Eastern San Joaquin Subbasin. A Water and Energy Efficiency grant from the Bureau of Reclamation would allow the District to complete this important project.

Thank you for considering the District's application. If you have questions, feel free to contact my District Director, Anne Baird, at 209-948-7479.

Sincerely,

SUSAN TALAMANTES EGGMAN
Assemblymember, 13th District

NSJWCD061

STATE CAPITOL
P.O. BOX 942849
SACRAMENTO, CA 94249-0009
(916) 319-2009
FAX (916) 319-2109

DISTRICT OFFICE
9250 LAGUNA SPRINGS DRIVE, SUITE 220
ELK GROVE, CA 95758
(916) 670-7888
FAX (916) 670-7893

Assembly
California Legislature

JIM COOPER
CHAIR: BUDGET SUBCOMMITTEE NO. 4 ON STATE ADMINISTRATION
ASSEMBLYMEMBER, NINTH DISTRICT

COMMITTEES
BUDGET
GOVERNMENTAL ORGANIZATION
INSURANCE
PUBLIC EMPLOYEES, RETIREMENT, AND SOCIAL SECURITY

SELECT COMMITTEES
CHAIR: COMMUNITY AND LAW ENFORCEMENT RELATIONS AND RESPONSIBILITIES

May 8, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

To Whom It May Concern:

I am writing this letter in support for the North San Joaquin Water Conservation District's grant application for funds to help pay for the South Pump Station Automation Project.

The North San Joaquin Water Conservation District delivers water to the agricultural lands located east of Lodi. As the City of Lodi's representative in the California State Assembly, I recognize the need for the modernization of the District's surface water delivery systems upon which many of my constituents depend.

A grant from the Bureau of Reclamation would provide the District with the means to greatly improve the efficiency of its operations and would subsequently allow the District to deliver surface water at a lower cost. These improvements will reduce landowner reliance on groundwater in my district, thus easing the financial burden that many of my constituents in the agricultural sector face.

Thank you for your consideration of the North San Joaquin Water Conservation District's application and this letter of strong support.

Sincerely,

JIM COOPER
Assemblymember, 9th District

NSJWCD062

BYRON BETHANY IRRIGATION DISTRICT

7995 Bruns Road
Byron, California 94514-1625

Telephone
(209) 835-0375
Fax
(209) 835-2869

General Manager
Secretary
Rick Gilmore

May 2, 2018

Mr. Darren Olson, MS 84-27814
Bureau of Reclamation
P.O. Box 25007
Denver, CO 80225

Subject: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project – Letter of Support.

The purpose of this letter is to advise the Bureau of Reclamation of the Byron Bethany Irrigation District's (BBID) support for the North San Joaquin Water Conservation District's (NSJWCD or District) grant application for funds to help pay for the South Pump Station Automation Project. BBID is a multi-county special district serving parts of Alameda, Contra Costa and San Joaquin counties across 47 square miles and 30,000 acres. BBID is also a CVP Contractor.

With respect to NSJWCD's project, adding a variable frequency drive, new meters and a remote telemetry unit to the South Pump Station will allow the District to improve the efficiency of its operations and reduce operational spills and system losses. This, in turn, will allow NSJWCD to deliver surface water at a lower cost, thus reducing landowner reliance on groundwater and improve groundwater overdraft conditions in the Eastern San Joaquin Subbasin.

Also, NSJWCD has worked collaboratively with other stakeholders on the Mokelumne River to help manage and protect fishery flows. An automated South Pump Station will help the District in this collaborative effort by providing additional flexibility and control for river diversions from the South Pump Station.

Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Very Truly Yours,

Rick Gilmore
General Manager

BANTA – CARBONA IRRIGATION DISTRICT

3514 West Lehman Road • Tracy, California 95304
Phone (209) 835-4670 • Fax (209) 835-2009

May 1, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Letter of Support for Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

Dear Mr. Olsen,

The purpose of this letter is to support for the North San Joaquin Water Conservation District's grant application for funds to help pay for the South Pump Station Automation Project. The Banta-Carbona Irrigation District (BCID) serves about 17,000 acres of agricultural land within San Joaquin County in the southern Sacramento-San Joaquin Delta. The BCID has been using pump station automation for the past thirteen years and recommends that other districts invest in it as well. The automation systems are robust and are reliable for several years with minimal maintenance. Pump station automation allows for greater flexibility in providing water to growers in a timely manner hence decreasing waste through over irrigation or through operational spills. By eliminating or decreasing those losses more water remains in the river system to help meet environmental purposes. It also decreases energy use as less water is pumped.

Adding a variable frequency drive, new meters and a remote telemetry unit to the South Pump Station will allow the District to improve the efficiency of its operations and reduce operational spills and system losses. This, in turn, will allow the District to deliver surface water at a lower cost, which will reduce landowner reliance on groundwater and help improve groundwater overdraft conditions in the Eastern San

Joaquin Subbasin. By using less groundwater this also reduces energy use as the depth to water is great. The existing surface water supply requires much less energy than the groundwater wells.

Also, the District works collaboratively with other stakeholders on the Mokelumne River to help manage and protect fishery flows. An automated South Pump Station will help the district in this collaborative effort by providing additional flexibility and control for river diversions from the South Pump Station.

Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Sincerely,

David Weisenberger
General Manager

CALAVERAS COUNTY WATER DISTRICT

120 Toma Court • P O Box 846 • San Andreas, CA 95249 • (209) 754-3543

May 2, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

Dear Mr. Olsen:

On behalf of the Calaveras County Water District (CCWD), I am writing in support of the grant proposal for the South Pump Station Automation Project submitted by the Northern San Joaquin Water Conservation District (NSJWCD). CCWD is a county-wide water district that provides agricultural supplies and water service to approximately 21,000 residents throughout Calaveras County. Calaveras County is located in the heart of the Sierra Nevada, east of the Northern San Joaquin Valley between Lake Tahoe and Yosemite National Park, spanning more than 1,000 square miles of three watersheds of the Sacramento/San Joaquin Bay-Delta, including the upper reaches of the Mokelumne, Calaveras and Stanislaus Rivers, from an elevation range of more than 8,000 feet at mountain crest to 200 feet in the foothills near the Central Valley floor. CCWD also manages and supplies municipal water from a portion of the Eastern San Joaquin groundwater subbasin extending into Calaveras County.

NSJWCD's South Pump Station Automation Project will help maximize the local use of Mokelumne River supplies. Adding a variable frequency drive, new meters and a remote telemetry unit to the South Pump Station will allow NSJWCD to improve the efficiency of its operations and reduce operational spills and system losses. This, in turn, will allow the District to deliver surface water at a lower cost, reducing landowner reliance on groundwater and help improve groundwater overdraft conditions in the Eastern San Joaquin groundwater subbasin. CCWD is a participating groundwater sustainability agency within the Eastern San Joaquin groundwater subbasin and there is a mutual interest with NSJWCD in alleviating the existing overdraft conditions over time.

Further, NSJWCD works collaboratively with other water agencies on the Mokelumne River to help manage and protect fishery flows. An automated South Pump Station will help the district in this collaborative effort by providing additional flexibility and control for river diversions from the South Pump Station.

I encourage you to give favorable consideration of the application from NSJWD. If you have any questions or would like more information about our support for the project, please do not hesitate to contact me at (209) 754-3094 or peterm@ccwd.org.

CALAVERAS COUNTY WATER DISTRICT

Peter Martin
Manager of Water Resources

California Sportfishing Protection Alliance

"An Advocate for Fisheries, Habitat and Water Quality"

Chris Shutes, Water Rights Advocate
1608 Francisco St., Berkeley, CA 94703
Tel: (510) 421-2405 E-mail: blancapaloma@msn.com
http://calsport.org/news/

May 6, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

Dear Mr. Olsen:

The California Sportfishing Protection Alliance (CSPA) respectfully submits this letter in support of North San Joaquin Water Conservation District's application for a grant to help pay for its South Pump Station Automation Project. The grant will allow the District to improve its water delivery efficiency, reducing costs and allowing it to more fully exercise its water rights to reduce groundwater overdraft.

CSPA is a statewide organization that seeks to improve conditions for fisheries and recreational fishing, and is a longstanding advocate for the fisheries of the lower Mokelumne River. Over the past several years, CSPA has been pleased to see the District's leadership become a more active and collaborative partner with other stakeholders on the river. The District's planned infrastructure upgrades, including new metering and remote telemetry, will contribute to a more effective management of the lower Mokelumne River. In addition, these improvements to the District's diversion works will provide an example of modernization that CSPA supports for water users statewide.

Thank you for considering the application of the North San Joaquin Water Conservation District and this letter of support.

Respectfully submitted,

Chris Shutes
Water Rights Advocate
California Sportfishing Protection Alliance

CITY OF LODI

CITY HALL, 221 WEST PINE STREET
P.O. BOX 3006
LODI, CALIFORNIA 95241-1910
(209) 333-6702 / FAX (209) 333-6807
www.lodi.gov cityclerk@lodi.gov

May 1, 2018

Bureau of Reclamation
Attn: Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

The City of Lodi is one of a number of users of the aquifer we share with the North San Joaquin Water Conservation District (NSJWCD). We have been a leader in increasing sustainable yield of surface water in the aquifer, purchasing over 7,000 acre feet of surface water a year and constructing a $32 million surface water treatment plant.

The purpose of this letter is to express support for the NSJWCD's grant application for funds to help pay for the South Pump Station Automation Project. Adding a variable frequency drive, new meters and a remote telemetry unit to the South Pump Station will allow the District to improve the efficiency of its operations and reduce operational spills and system losses. This, in turn, will allow the District to deliver surface water at a lower cost, which will reduce landowner reliance on groundwater and help improve groundwater overdraft conditions in the Eastern San Joaquin sub basin.

Also, the District works collaboratively with other stakeholders on the Mokelumne River to help manage and protect fishery flows. An automated South Pump Station will help the district in this collaborative effort by providing additional flexibility and control for river diversions from the South Pump Station.

We are encouraged to see NSJWCD take an active role in continuing that effort and fully support its efforts to create a more sustainable groundwater aquifer in our region. Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Sincerely,

Alan Nakanishi
Mayor, City of Lodi

EAST BAY
MUNICIPAL UTILITY DISTRICT

RICHARD G. SYKES
DIRECTOR OF WATER AND NATURAL RESOURCES
(510) 287-1629
rsykes@ebmud.com

May 2, 2018

United States Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

Dear Mr. Olson:

The East Bay Municipal Utility District (EBMUD) is a public utility that provides water to 1.4 million customers in the East San Francisco Bay Area. EBMUD's main water supply is Mokelumne River water from its Pardee and Camanche Reservoirs. EBMUD also partners with agencies in San Joaquin County on projects related to groundwater banking, watershed protection, and managing fishery resources in the Mokelumne River.

The purpose of this letter is to express EBMUD's support for the North San Joaquin Water Conservation District (District)'s grant application, which would provide funds for the South Pump Station Automation Project. Adding a variable frequency drive, new meters, and a remote telemetry unit to the South Pump Station will allow the District to improve the efficiency of its operations and reduce operational spills and system losses. This, in turn, will allow the District to deliver surface water at a lower cost, which will reduce landowner reliance on groundwater and help improve groundwater overdraft conditions in the Eastern San Joaquin Subbasin.

In addition, EBMUD and the District are partners on several projects in San Joaquin County. The agencies work with other stakeholders on the Mokelumne River to help manage and protect fishery flows. An automated South Pump Station will help the District in this collaborative effort by providing additional flexibility and control for river diversions from the South Pump Station. EBMUD and the District are also partnering on a pilot groundwater banking project in San Joaquin County. Improvements to the South Pump Station could enable future groundwater banking projects in this critically over-drafted basin.

Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Sincerely,

Michael T. Tognolini
Manager of Water Supply Improvements

375 ELEVENTH STREET . OAKLAND . CA 94607-4240 . FAX (510) 287-0541
P.O. BOX 24055 . OAKLAND . CA 94623-1055

STATE CAPITOL
ROOM 5097
SACRAMENTO, CA 95814
TEL (916) 651-4005
FAX (916) 651-4905

STOCKTON DISTRICT OFFICE
31 EAST CHANNEL STREET
SUITE 440
STOCKTON, CA 95202
TEL (209) 948-7930
FAX (209) 948-7993

MODESTO DISTRICT OFFICE
1010 10TH STREET
SUITE 5800
MODESTO, CA 95354
TEL (209) 576-6273
FAX (209) 576-6277

California State Senate

SENATOR
CATHLEEN GALGIANI
FIFTH SENATE DISTRICT

STANDING COMMITTEES

AGRICULTURE
CHAIR

INVASIVE SPECIES
CHAIR

BUSINESS, PROFESSIONS & ECONOMIC DEVELOPMENT

EDUCATION

GOVERNMENTAL ORGANIZATION

INSURANCE, BANKING & FINANCIAL INSTITUTIONS

May 01, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

Dear Mr. Olson,

I am pleased to write to give my support to the North San Joaquin Water Conservation District's grant application for the South Pump Station Automation Project. My district is at the heart of California's water system, the Sacramento-San Joaquin Delta. Water efficiency is critical to our area and the entire state. This project is a good example of the extensive efforts by many of our water districts to operate more efficiently and conserve water.

Adding a variable frequency drive, new meters and a remote telemetry unit to the South Pump Station will allow the District to improve the efficiency of its operations and reduce operational spills and system losses. This, in turn, will allow the District to deliver surface water at a lower cost, which will reduce landowner reliance on groundwater and help improve groundwater overdraft conditions in the Eastern San Joaquin Sub-basin.

Also, the District works collaboratively with other stakeholders on the Mokelumne River to help manage and protect fishery flows. An automated South Pump Station will help the district in this collaborative effort by providing additional flexibility and control for river diversions from the South Pump Station.

I believe the North San Joaquin Water Conservation District proposal demonstrates their ongoing commitment to improving water conservation and best practices. I strongly support their efforts and appreciate your thoughtful consideration of their grant application.

Sincerely,

Cathleen Galgiani

Cathleen Galgiani
Senator, 5th District

SOUTH DELTA WATER AGENCY

1806 KETTLEMAN LANE SUITE L
LODI, CALIFORNIA 95242
TELEPHONE (209) 224-5854
FAX (209) 224-5887
E-MAIL Jherrlaw@aol.com

May 1, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

South Delta Water Agency is statutorily mandated to protect the quality and quantity of the water in the channels of the southern Delta for beneficial uses on the surrounding lands. As part of our efforts we are involved in many county- and state-wide processes and efforts dealing with the protection of water rights and the allocation and use of water.

The purpose of this letter is to support for the North San Joaquin Water Conservation District's grant application for funds to help pay for the South Pump Station Automation Project. Adding a variable frequency drive, new meters and a remote telemetry unit to the South Pump Station will allow the District to improve the efficiency of its operations and reduce operational spills and system losses. This, in turn, will allow the District to deliver surface water at a lower cost, which will reduce landowner reliance on groundwater and help improve groundwater overdraft conditions in the Eastern San Joaquin Sub-basin.

Also, the District works collaboratively with other stakeholders on the Mokelumne River to help manage and protect fishery flows. An automated South Pump Station will help the district in this collaborative effort by providing additional flexibility and control for river diversions from the South Pump Station.

Thank you for taking the time to consider North San Joaquin's application and this letter of support. Feel free to contact me if you have any questions.
Mr. Darren Olson

Very truly yours,

JOHN HERRICK

STOCKTON
EAST WATER
DISTRICT
PROVIDING SERVICE SINCE 1948
www.sewd.net

Phone 209-948-0333
Fax 209-948-0423

E-mail sewd@sewd.net

6767 East Main Street
Stockton, CA 95215

Post Office Box 5157
Stockton, CA 95205

April 30, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

The Stockton East Water District provides surface water for both agricultural and urban uses. By providing surface water for agricultural irrigation, the District supports San Joaquin County's agricultural industry, which is the area's leading economic activity. SEWD also supplies wholesale treated surface water, which is retailed to Stockton area customers by the California Water Service Company, the City of Stockton, and San Joaquin County. Since 1978, the SEWD Drinking Water Treatment Plant has produced over a million acre-feet of water for urban use; enough to cover the City of Stockton's 56.5 square mile area over 25-feet deep in water.

The purpose of this letter is to support for the North San Joaquin Water Conservation District's grant application for funds to help pay for the South Pump Station Automation Project. Adding a variable frequency drive, new meters and a remote telemetry unit to the South Pump Station will allow the District to improve the efficiency of its operations and reduce operational spills and system losses. This, in turn, will allow the District to deliver surface water at a lower cost, which will reduce landowner reliance on groundwater and help improve groundwater overdraft conditions in the Eastern San Joaquin Subbasin.

Also, the District works collaboratively with other stakeholders on the Mokelumne River to help manage and protect fishery flows. An automated South Pump Station will help the district in this collaborative effort by providing additional flexibility and control for river diversions from the South Pump Station.

Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Sincerely,

Scot A. Moody, General Manager
Stockton East Water District

THE WEST SIDE IRRIGATION DISTRICT

1320 N. Tracy Boulevard
P.O. Box 177
Tracy, California 95378-0177

Telephone (209) 835-0503
Fax (209) 835-2702

May 2, 2018

Mr. Darren Olson, MS 84-27814
Bureau of Reclamation
P.O. Box 25007
Denver, CO 80225

Subject: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project – Letter of Support.

The purpose of this letter is to advise the Bureau of Reclamation of The West Side Irrigation District's (TWSID) support for the North San Joaquin Water Conservation District's (NSJWCD or District) grant application for funds to help pay for the South Pump Station Automation Project. TWSID is a special district serving 6,500 acres within San Joaquin County. TWSID is also a CVP Contractor.

With respect to NSJWCD's project, adding a variable frequency drive, new meters and a remote telemetry unit to the South Pump Station will allow the District to improve the efficiency of its operations and reduce operational spills and system losses. This, in turn, will allow NSJWCD to deliver surface water at a lower cost, thus reducing landowner reliance on groundwater and improve groundwater overdraft conditions in the Eastern San Joaquin Subbasin.

Also, NSJWCD has worked collaboratively with other stakeholders on the Mokelumne River to help manage and protect fishery flows. An automated South Pump Station will help the District in this collaborative effort by providing additional flexibility and control for river diversions from the South Pump Station.

Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Very Truly Yours,

Rick Gilmore
General Manager

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

SOUTH PUMP STATION AUTOMATION PROJECT

GRANT APPLICATION

MAY 10, 2018

ATTACHMENT F

Lodi District Grape Growers Association, Inc.

May 7, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

Dear Mr. Olson,

On behalf of the Lodi District Grape Growers Association (LDGGA), I am writing in support of the North San Joaquin Water Conservation District's grant application for funds to help pay for the South Pump Station Automation Project.

The Lodi District Grape Growers Association (LDGGA) represents wine grape growers and associated businesses in California Crush District 11. Crush District 11 includes 110,000 acres of premium winegrapes northern San Joaquin County and southern Sacramento County. Approximately 44,000 of those acres are grown within the boundaries of the North San Joaquin Water Conservation District, accounting for about 70% of the irrigated farmland in the North San Joaquin's District.

Adding a variable frequency drive, new meters and a remote telemetry unit to the South Pump Station will allow the District to improve the efficiency of its operations and reduce operational spills and system losses. This, in turn, will allow the District to deliver surface water at a lower cost, which will reduce landowner reliance on groundwater and help improve groundwater overdraft conditions in the Eastern San Joaquin Subbasin.

Also, the North San Joaquin Water Conservation District works collaboratively with other stakeholders on the Mokelumne River to help manage and protect fishery flows. An automated South Pump Station will help the district in this collaborative effort by providing additional flexibility and control for river diversions from the South Pump Station.

Thank you for taking the time to consider North San Joaquin's application and this letter of support. Should you have any questions, please feel free to contact me at (209) 339-8246 or info@ldgga.org.

Sincerely,

amy Blagg

Amy Blagg
LDGGA Executive Director

SAN JOAQUIN FARM BUREAU FEDERATION

MEETING TODAY'S CHALLENGES / PLANNING FOR TOMORROW

May 9, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

The San Joaquin Farm Bureau Federation is a private, not for profit, volunteer organization and San Joaquin County's oldest agriculture organization, dedicated to the advancement of agriculture for over 100 years. We are committed to the protection of the natural resources that our industry depends on, including land and water. As such, we are pleased to support this grant application to improve and preserve our resources.

The purpose of this letter is to support for the North San Joaquin Water Conservation District's grant application for funds to help pay for the South Pump Station Automation Project. Adding a variable frequency drive, new meters and a remote telemetry unit to the South Pump Station will allow the District to improve the efficiency of its operations and reduce operational spills and system losses. This, in turn, will allow the District to deliver surface water at a lower cost, which will reduce landowner reliance on groundwater and help improve groundwater overdraft conditions in the Eastern San Joaquin Subbasin.

Also, the District works collaboratively with other stakeholders on the Mokelumne River to help manage and protect fishery flows. An automated South Pump Station will help the district in this collaborative effort by providing additional flexibility and control for river diversions from the South Pump Station.

Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Sincerely,

Jim Ferrari
President

3290 NORTH AD ART ROAD • STOCKTON, CA • 95215 • (209) 931-4931 • (209) 931-1433 Fax

WWW.SJFB.ORG

COCOA FARMS, LP
11292 N. ALPINE ROAD * STOCKTON, CA 95212

May 10, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

I am an agricultural landowner who farms within North San Joaquin Water Conservation District's service area and my property is located adjacent to the South System. The purpose of this letter is to support for the North San Joaquin's grant application for funds to help pay for the automation project for the South Pump Station. Adding a variable frequency drive, new meters and a remote telemetry unit will allow the District to improve the efficiency of its operations and make delivering surface water to my farm more efficient, and thus more affordable for my operation.

Once the improvements to the District's South Pump Station are completed, I plan to retrofit my irrigation system with a booster pump and flow meter so that I can receive surface water deliveries from the District. I plan to look at the NRCS funding assistance opportunities available for these on-farm facilities.

Because of the significant declines in groundwater levels in the area surrounding my property, it is becoming increasingly important to reduce dependence on groundwater use whenever possible. This project represents a unique and valuable opportunity to improve local groundwater levels without sacrificing the number of acres currently being used for agricultural production.

Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Sincerely,

Jeff J. Colombini

Jeff J. Colombini
General Partner

Telephone (209) 948-0792

Cotta Ferreira Custom Farming
7651 E 8 Mile Road
Stockton, CA 95212

May 10, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District

To Whom it May Concern:

I own and farm land in North San Joaquin Water Conservation District. Groundwater levels have continued to the decline in the district and I strongly support the district's efforts to conserve water and modernize its South System to provide surface water more efficiently. The purpose of this letter is to show my support for the North San Joaquin grant application seeking financial assistance for improvements to the South Pump Station. Adding a variable frequency drive, new meters and a remote telemetry unit will allow the District to improve the efficiency of its operations and make delivering surface water to my farm more efficient, and thus more affordable for my operation.

Once the improvements to the District's South Pump Station are completed, I plan to retrofit my irrigation system, as needed, and add a flow meter so that I can receive surface water deliveries from the District. I plan to look at the NRCS funding assistance opportunities available for these on-farm facilities.

Because of the significant declines in groundwater levels in the area surrounding my property, it is becoming increasingly important to reduce dependence on groundwater use whenever possible. This project represents a unique and valuable opportunity to improve local groundwater levels without sacrificing the number of acres currently being used for agricultural production.

Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Sincerely,

John Ferreira

May 10, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

I am an agricultural landowner who farms within North San Joaquin Water Conservation District's service area and my property is located adjacent to the South System. The purpose of this letter is to support for the North San Joaquin's grant application for funds to help pay for the automation project for the South Pump Station. Adding a variable frequency drive, new meters and a remote telemetry unit will allow the District to improve the efficiency of its operations and make delivering surface water to my farm more efficient, and thus more affordable for my operation.

Once the improvements to the District's South Pump Station are completed, I plan to retrofit my irrigation system with a booster pump and flow meter so that I can receive surface water deliveries from the District. I plan to look at the NRCS funding assistance opportunities available for these on-farm facilities.

Because of the significant declines in groundwater levels in the area surrounding my property, it is becoming increasingly important to reduce dependence on groundwater use whenever possible. This project represents a unique and valuable opportunity to improve local groundwater levels without sacrificing the number of acres currently being used for agricultural production.

Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Sincerely,

Robert Pappas

May 10, 2018

Bureau of Reclamation

ATTN: Mr. Darren Olsen
P.O. Box 25007, MS 84-27814
Denver, CO 80225

RE: Water and Energy Efficiency Grant Application
by North San Joaquin Water Conservation District
for the South Pump Station Automation Project

I am an agricultural landowner who farms within North San Joaquin Water Conservation District's service area and my property is located adjacent to the South System.

The purpose of this letter is to support the North San Joaquin's grant application for funds to help pay for the automation project for the South Pump Station. Adding a variable frequency drive, new meters and a remote telemetry unit will allow the district to improve the efficiency of its operations and make delivering surface water to my farm more efficient, and thus more affordable for my operation.

Once the improvements to the district's South System Pump Station are completed I plant retrofit my irrigation system with a booster pump and flow meter so that I can receive surface water deliveries from the water district. I plan to look at the NRCS funding assistance opportunities available for these on-farm facilities.

Because of the significant declines in groundwater levels in the area surrounding my property, it is becoming increasingly important to reduce dependence on groundwater use whenever possible.

This project represents a unique and valuable opportunity to improve local groundwater levels without sacrificing the number of acres currently being used for agricultural production.

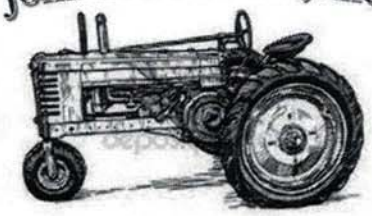
Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Sincerely,

Diane J. Hirasuna

DIANE J. HIRASUNA

John Bava & Son, Inc.



April 28, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

Dear Mr. Olsen,

I am an agricultural landowner who farms within North San Joaquin Water Conservation District's service area and my property is located adjacent to the South System, more specifically, along the Bear Creek canal.

The purpose of this letter is to show my support for the North San Joaquin's grant application for funds to help pay for the automation project for the South Pump Station. Adding a variable frequency drive, new meters and a remote telemetry unit will allow the District to improve the efficiency of its operations and make delivering surface water to my farm more efficient, and thus more affordable for my operation.

Once the improvements to the District's South Pump Station are completed, I would be able to utilize my existing pump station that is on the canal to irrigate my ranch with the surface water provided by North San Joaquin.

Due to the slow, but steady (roughly 1 foot per year) decline in groundwater levels in the area surrounding my property, it is becoming increasingly important to reduce our dependence on groundwater. This project represents a unique and valuable opportunity to improve local groundwater levels without sacrificing the number of acres currently being used for agricultural production.

Thank you for taking the time to consider North San Joaquin's application and this letter of support

If you should have any questions, feel free to contact me at petek@avantinut.com or on my cell phone-209-479-3865.

Sincerely,

12022 E. Comstock Rd. Stockton CA 95215 Ph. 209-479-3865 Fax. 209-931-4441 NSJWCD079

Pete Katzakian
Vice President, John Bava and Son Inc.

KAUTZ FARMS

Diversified Farming

May 10, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

I am an agricultural landowner who farms within North San Joaquin Water Conservation District's service area and my property is located adjacent to the South System. The purpose of this letter is to support for the North San Joaquin's grant application for funds to help pay for the automation project for the South Pump Station. Adding a variable frequency drive, new meters and a remote telemetry unit will allow the District to improve the efficiency of its operations and make delivering surface water to my farm more efficient, and thus more affordable for my operation.

Once the improvements to the District's South Pump Station are completed, I plan to retrofit my irrigation system with a booster pump and flow meter so that I can receive surface water deliveries from the District. I plan to look at the NRCS funding assistance opportunities available for these on-farm facilities.

Because of the significant declines in groundwater levels in the area surrounding my property, it is becoming increasingly important to reduce dependence on groundwater use whenever possible. This project represents a unique and valuable opportunity to improve local groundwater levels without sacrificing the number of acres currently being used for agricultural production.

Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Sincerely,

5490 E. Bear Creek Road, Lodi, CA 95240-7213 • U.S.A. • 209.334.4786 • 931.0782 • Fax 209.339.1689

GO BEARS RANCH, LLC
6488 E. EIGHT MILE ROAD
STOCKTON, CALIFORNIA 95212

May 3, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
PO Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

We are agricultural landowners who farm within North San Joaquin Water Conservation District's service area and our property is located adjacent to the South System. The purpose of this letter is to support for the North San Joaquin's grant application for funds to help pay for the automation project for the South Pump Station. Adding a variable frequency drive, new meters and a remote telemetry unit will allow the District to improve the efficiency of its operations and make delivering surface water to our farm more efficient, and thus more affordable for our operation.

Once the improvements to the District's South Pump Station are completed we plan to retrofit our irrigation system with a booster pump and flow meter so that we can receive surface water deliveries from the District. We plan to look at the NRCS funding assistance opportunities available for these on-farm facilities.

Because of the significant declines in groundwater levels in the area surrounding our property, it is becoming increasingly important to reduce dependence on groundwater use whenever possible. This project represents a unique and valuable opportunity to improve local groundwater levels without sacrificing the number of acres currently being used for agricultural production.

Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Sincerely,

Lance Leffler

Ronn Leffler

May 10, 2018

Bureau of Reclamation

ATTN: Mr. Darren Olsen
P.O. Box 25007, MS 84-27814
Denver, CO 80225

RE: Water and Energy Efficiency Grant Application
by North San Joaquin Water Conservation District
for the South Pump Station Automation Project

I am an agricultural landowner who farms within North San Joaquin Water Conservation District's service area and my property is located adjacent to the South System.

The purpose of this letter is to support the North San Joaquin's grant application for funds to help pay for the automation project for the South Pump Station. Adding a variable frequency drive, new meters and a remote telemetry unit will allow the district to improve the efficiency of its operations and make delivering surface water to my farm more efficient, and thus more affordable for my operation.

Once the improvements to the district's South System Pump Station are completed I plant retrofit my irrigation system with a booster pump and flow meter so that I can receive surface water deliveries from the water district. I plan to look at the NRCS funding assistance opportunities available for these on-farm facilities.

Because of the significant declines in groundwater levels in the area surrounding my property, it is becoming increasingly important to reduce dependence on groundwater use whenever possible.

This project represents a unique and valuable opportunity to improve local groundwater levels without sacrificing the number of acres currently being used for agricultural production.

Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Sincerely,

Larry D Miller

May 1, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
PO Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

I live and farm within the area of North San Joaquin Water Conservation District. I attended a meeting not too long ago that discussed the need for the water district to upgrade its' South Pump Station to be more efficient. This requires adding a variable frequency drive to its' pump, new meters, and a remote telemetry unit which would improve the District's ability to deliver surface water to my farm in an efficient and affordable manner.

Since my property is adjacent to Pixley Slough, I would be able to benefit from the surface water after the temporary dam is rebuilt and a booster pump installed. I am planning to check with NRCS for funding assistance for these farm improvements.

My understanding is that the aquifer under our property has decreased to a lower level. Thus it is becoming more evident that the surface water needs to be utilized when available and save our underground water for years when we experience drought conditions. This project gives me an opportunity to be involved with the District to improve the local ground water level without sacrificing our orchard acreage.

Thank you for considering the North San Joaquin's application and reading this letter of support.

Sincerely,

Ron and Michiko Oye

May 5, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

Mr. Olsen:

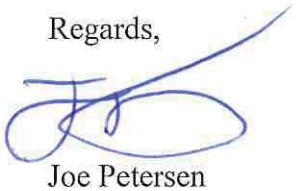
I am an agricultural landowner who farms within North San Joaquin Water Conservation District's service area and my property is located adjacent to the South System. The purpose of this letter is to support for the North San Joaquin's grant application for funds to help pay for the automation project for the South Pump Station. Adding a variable frequency drive, new meters and a remote telemetry unit will allow the District to improve the efficiency of its operations and make delivering surface water to my farm more efficient, and thus more affordable for my operation.

I have already installed a booster pump and flow meter so that I can receive surface water deliveries from the District. I would like to irrigate significantly more acres than can currently be serviced by my existing facilities. If the district system is improved, I plan to look at the NRCS funding assistance opportunities available for these additional improvements.

I am a true believer in reducing our dependence on groundwater use whenever possible. This project represents a unique and valuable opportunity to improve local groundwater levels without sacrificing the number of acres currently being used for agricultural production.

Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Regards,



Joe Petersen
(209) 210-8010

JOHN PODESTA FARMS

9206 N. Hildreth Lane
Stockton, CA 95212

May 10, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

I am an agricultural landowner who farms within North San Joaquin Water Conservation District's service area and my property is located adjacent to the South System. The purpose of this letter is to support for the North San Joaquin's grant application for funds to help pay for the automation project for the South Pump Station. Adding a variable frequency drive, new meters and a remote telemetry unit will allow the District to improve the efficiency of its operations and make delivering surface water to my farm more efficient, and thus more affordable for my operation.

Once the improvements to the District's South Pump Station are completed, I plan to retrofit my irrigation system with a booster pump and flow meter so that I can receive surface water deliveries from the District. I plan to look at the NRCS funding assistance opportunities available for these on-farm facilities.

Because of the significant declines in groundwater levels in the area surrounding my property, it is becoming increasingly important to reduce dependence on groundwater use whenever possible. This project represents a unique and valuable opportunity to improve local groundwater levels without sacrificing the number of acres currently being used for agricultural production.

Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Sincerely,

John Podesta II

May 10, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

I am an agricultural landowner who farms within North San Joaquin Water Conservation District's service area and my property is located adjacent to the South System. The purpose of this letter is to support for the North San Joaquin's grant application for funds to help pay for the automation project for the South Pump Station. Adding a variable frequency drive, new meters and a remote telemetry unit will allow the District to improve the efficiency of its operations and make delivering surface water to my farm more efficient, and thus more affordable for my operation.

Once the improvements to the District's South Pump Station are completed, I plan to retrofit my irrigation system with a booster pump and flow meter so that I can receive surface water deliveries from the District. I plan to look at the NRCS funding assistance opportunities available for these on-farm facilities.

Because of the significant declines in groundwater levels in the area surrounding my property, it is becoming increasingly important to reduce dependence on groundwater use whenever possible. This project represents a unique and valuable opportunity to improve local groundwater levels without sacrificing the number of acres currently being used for agricultural production.

Thank you for taking the time to consider North San Joaquin's application and this letter of support.

Sincerely,

Jim Quaschnick
Quaschnick Farms

TKH, LLC
8400 E. HANDEL ROAD
LODI, CA 95240

Phone: (209) 367-0882

Fax: (209) 367-3961
westwindfarms@msn.com

May 10, 2018

Bureau of Reclamation
Attn: Mr. Darren Olson
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Subject: Water and Energy Efficiency Grant Application by North San Joaquin Water Conservation District for the South Pump Station Automation Project

I am co-trustee with the majority member of TKH, LLC. TKH, LLC owns and farms 120 Acres of cherries within North San Joaquin Water Conservation District's service area and the property is located adjacent to the South System. Jim Quaschnick is our ranch manager and he farms the property for TKH, LLC.

The purpose of this letter is to support the North San Joaquin's grant application for funds to help pay for the automation project for the South Pump Station. Adding a variable frequency drive, new meters and remote telemetry unit will allow the district to improve the efficiency of its operations and make delivering surface water to this farm more efficient, and thus more affordable for the operation.

Once the improvements to the District's South Pump Station are completed, we plan to retrofit the irrigation system with a booster pump and flow meter on the ranch so that we can receive surface water delivers from the District. We plan to look at the NRCS funding assistance opportunities available for these on-farm facilities.

Because of the significant declines in groundwater levels in the area surrounding the property, it is becoming increasingly important to reduce dependence on groundwater use whenever possible. This project represents a unique and valuable opportunity to improve local groundwater levels without sacrificing the number of acres currently being used for agricultural production.

Thank you for taking the time to consider North San Joaquin's application and this letter of support

Sincerely

Rudy G. Croce
TKH, LLC

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

SOUTH PUMP STATION AUTOMATION PROJECT

GRANT APPLICATION

MAY 10, 2018

ATTACHMENT G

NSJWCD Resolution 2018-05

RESOLUTION OF THE BOARD OF DIRECTORS OF THE NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT TO APPLY FOR A WATER AND ENERGY EFFICIENCY GRANT FOR THE SOUTH SYSTEM AUTOMATION PROJECT

WHEREAS, the United States Bureau of Reclamation's (Reclamation) Water and Energy Efficiency Grants provide funding to increase water supply reliability by partnering with non-federal entities to undertake projects that result in quantifiable and sustained water savings and support broader water reliability benefits.

WHEREAS, Reclamation requires that each Water and Energy Efficiency Grant applicant adopt a resolution verifying (1) the identity of the official with legal authority to enter into agreement, (2) the board of directors, governing body, or appropriate official who has reviewed and supports the application submitted, (3) the capability of the applicant to provide the amount of funding and/or in-kind contributions specified in the funding plan, and (4) that the applicant will work with Reclamation to meet established deadlines for entering into a cooperative agreement.

WHEREAS, North San Joaquin Water Conservation District (NSJWCD or District) desires to apply for a Water and Energy Efficiency Grant to assist the District with the South System Automation Project, a project designed to improve water use efficiency by modernizing the existing South System pump station.

NOW, THEREFORE BE IT HEREBY RESOLVED by the Board of Directors of North San Joaquin Water Conservation District as follows:

1. The Board of Directors finds that it is in the best interests of NSJWCD to apply for a Water and Energy Efficiency Grant in order to help fund the South System Automation Project, a project designed to improve water use efficiency by modernizing the existing South System pump station.

2. The Board of Directors has reviewed and supports the Water and Energy Efficiency Grant application package and directs staff to prepare and submit an application for funding. The Board of Directors authorizes Directors Valente and Wilbur to review and approve the final grant application for submittal.

3. The Board of Directors finds it is capable of providing the amount of funding and/or in-kind contributions specified in the funding plan, subject to compliance with Proposition 218.

4. The Board of Directors agrees to work with Reclamation to meet established deadlines for entering into a cooperative agreement.

5. The Board of Directors authorizes the Board President to do and cause to be done any and all acts necessary or convenient to carry out the purpose and intent of this resolution to the extent that any such acts do no need to be taken by the Board of Directors.

Moved by Director Wilbur, seconded by Director Flinn, that the foregoing resolution be adopted.

Upon roll call the following vote was had:

Ayes: 5 Directors Wilbur, Starn, Simpson, Valente, Flinn

Noes: 0 Directors

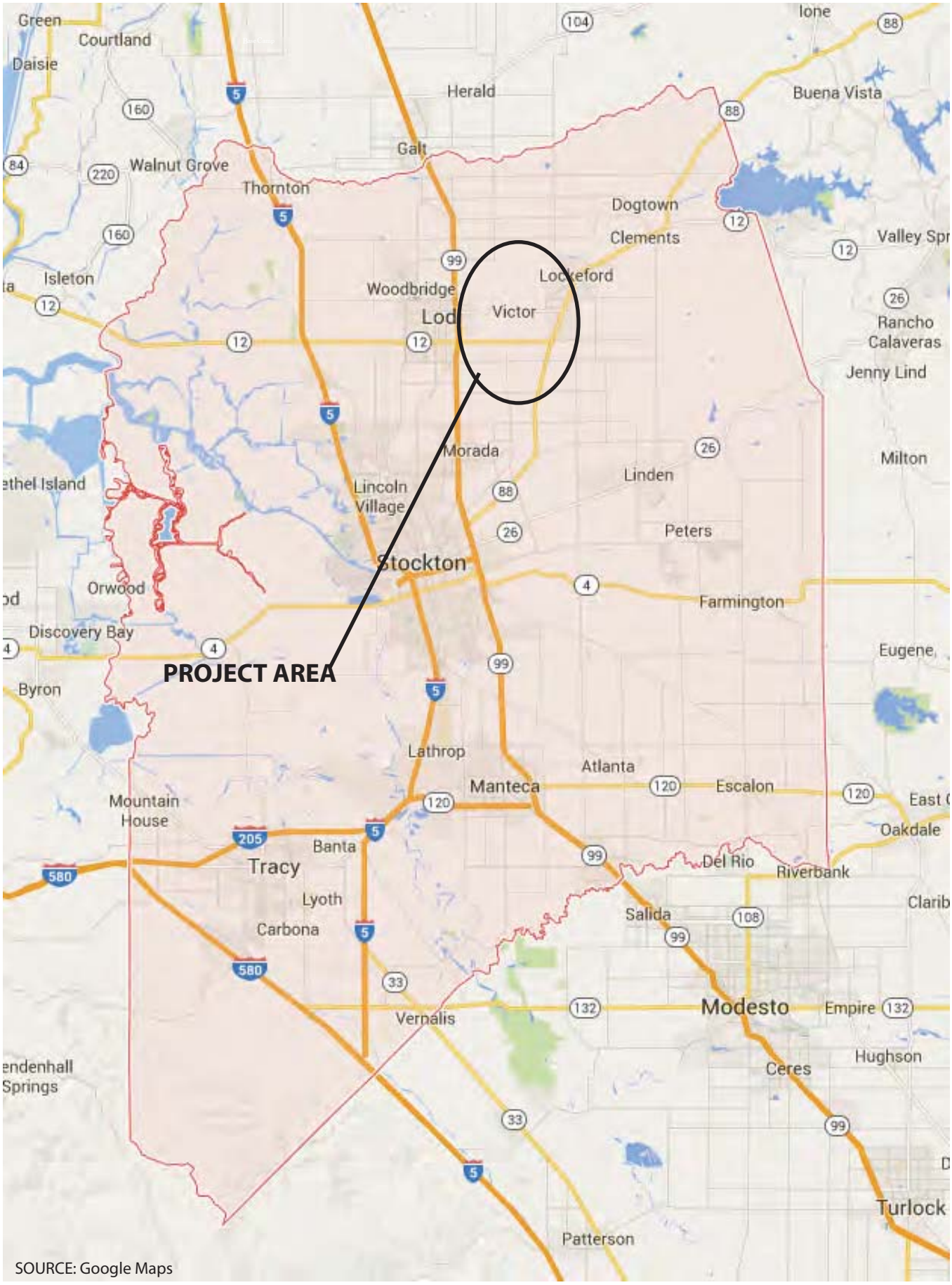
Absent: 0 Directors

Abstain: 0 Director

The President declared the resolution passed.

I, David Simpson, Secretary of the Board of Directors of the NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT, do hereby CERTIFY that the foregoing is a full, true and correct copy of a resolution duly adopted at an adjourned regular meeting of said Board of Directors held the 30th day of April 2018.

Figure 1-1
REGIONAL MAP



SOURCE: Google Maps

Figure 1-2
LOCATION MAP

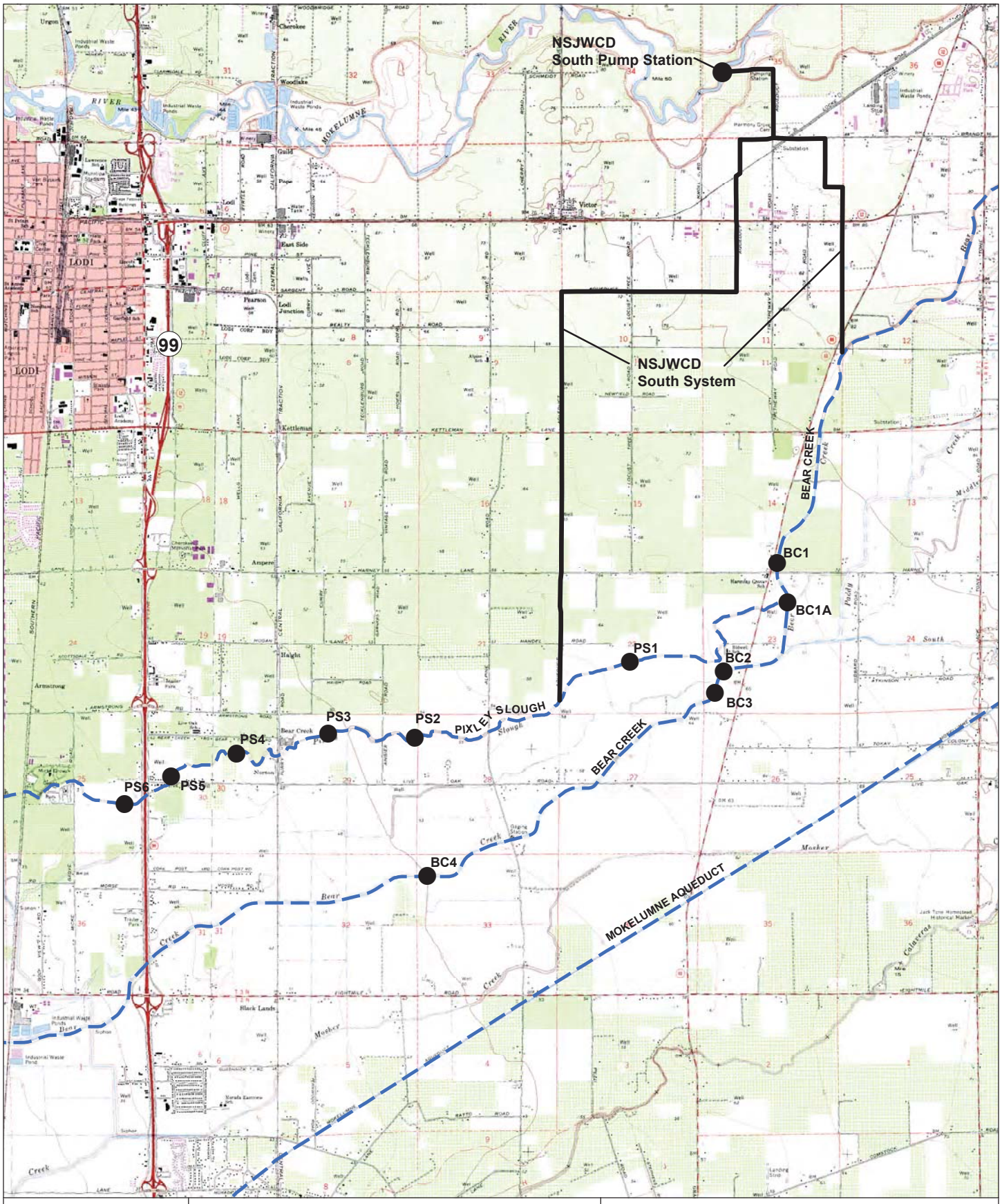


Figure 1-3

0 2,500 5,000

1 inch = 5,000 feet

N
W E
S

Map Date: 02/10/2016

BaseCamp Environmental

PROJECT LOCATION

DREAM Project + NSJWCD
South System Improvements

San Joaquin County, CA