ENGINEERING AND OPERATIONS COMMITTEE MEETING  
Tuesday, September 18, 2018 at 3:30 p.m.

CALL TO ORDER

PLEDGE OF ALLEGIANCE

PUBLIC COMMENTS

Items Not on the Agenda: Members of the public are invited to address the Board on items which are not on the agenda. Each speaker is limited to three minutes. The Board will set aside 30 minutes for public comments.

Items on the Agenda: Members of the public may comment on agenda items before action is taken, or after the Board has discussed the item. Each speaker is limited to three minutes. The Board will set aside 60 minutes for public comments.

CONSENT CALENDAR ITEMS:
Approve all matters under the Consent Calendar by one motion unless a Board member, staff, or a member of the public requests a separate action.

1. Developer Project Status Report
2. Mesa Water and Other Agency Projects Status Report
3. Water Quality Call Report
4. Committee Policy & Resolution Review
5. Water Operations Status Report

ACTION ITEMS:

6. Administration Building and HVAC Improvements Project
7. Programmable Logic Controllers and Supervisory Computer System Assessment

PRESENTATION AND DISCUSSION ITEMS:

Items recommended for approval at this meeting may be agendized for approval at a future Board meeting.

8. Water System Operations Update

REPORTS:

10. Directors’ Reports and Comments
INFORMATION ITEMS:

11. Well Automation and Rehabilitation Project Update

ADJOURNMENT
<table>
<thead>
<tr>
<th>FILE NO.</th>
<th>PROJECT ADDRESS</th>
<th>PROJECT DESCRIPTION</th>
<th>PROJECT NOTES/STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FILE NO.</td>
<td>PROJECT ADDRESS</td>
<td>PROJECT DESCRIPTION</td>
<td>PROJECT NOTES/STATUS</td>
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<tr>
<td>C0024-17-01</td>
<td>1989 Orange</td>
<td>Meter Upgrade</td>
<td>Plans received and plan check fees paid on 3/27/17. Fees paid and permit issued on 4/25/17. Site visit on 10/30/17, and again on 5/30/18; homes currently under construction. Meter installed on 6/21/18. Flow thru check on 7/12/18. Project in process of closing. (9/11/18)</td>
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<tr>
<td>C0027-17-01</td>
<td>231 Flower Street</td>
<td>Meter Upgrade</td>
<td>Plans received and plan check fees paid on 3/23/17. Fees paid and permit issued on 4/21/17. Site visit on 10/30/17, and again on 5/30/18; no progress to report. Site visit on 8/20/18 with no activity. (9/11/18)</td>
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<tr>
<td>FILE NO.</td>
<td>PROJECT ADDRESS</td>
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<td>PROJECT NOTES/STATUS</td>
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<tr>
<td>C0035-18-01</td>
<td>146 18th Street</td>
<td>2 Single Family Homes</td>
<td>Plans received and plan check fees paid on 8/8/17. Fees paid and permit issued on 9/21/17. Meters installed and locked on 10/20/17. Site visit on 1/9/18; Awaiting call for backflow testing to complete project. (9/11/18)</td>
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<tr>
<td>C0039-18-01</td>
<td>172/174 Costa Mesa Street</td>
<td>2 Single Family Homes</td>
<td>Plans received and plan check fees paid on 8/22/17. Fees paid and permit issued on 8/29/17. Awaiting call for initial inspections. Construction to start in October. (9/11/18)</td>
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<tr>
<td>C0040-18-01</td>
<td>365 Costa Mesa Street</td>
<td>Meter Upgrade</td>
<td>Plans received and plan check fees paid on 8/22/17. Awaiting final fee payment. Site check on 8/20/18 to verify progress and house is currently being built. (9/11/18)</td>
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<tr>
<td>C0042-18-01</td>
<td>335 &amp; 337 16th Place</td>
<td>2 Single Family Homes</td>
<td>Plans received and plan check fees paid on 10/26/17. Awaiting final fee payment. Site visit on 8/20/18 to verify that work had not been started without our knowledge; contractor still grading the area. (9/11/18)</td>
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<tr>
<td>C0044-18-01</td>
<td>276 E 19th Street</td>
<td>Meter Upgrade</td>
<td>Plans received and plan check fees paid on 1/21/18. Awaiting final fee payment. (9/11/18)</td>
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<td>FILE NO.</td>
<td>PROJECT ADDRESS</td>
<td>PROJECT DESCRIPTION</td>
<td>PROJECT NOTES/STATUS</td>
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<tr>
<td>C0048-18-01</td>
<td>235 Baker</td>
<td>Commercial Building</td>
<td>Plans received and plan check fees paid on 2/15/18. Fees paid and permit issued on 4/13/18. Site visit on 8/20/18 to verify no work had been done without our knowledge; no construction happening at all. (9/11/18)</td>
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<td>C0049-18-01</td>
<td>428 E 17th</td>
<td>Restaurant</td>
<td>Plans received and plan check fees paid on 1/26/18. Fees paid and permit issued on 5/4/18. Pressure test on 5/25/18. Shutdown for tee cut-in on 6/5/18. One fire service is active, the other is stubbed to property. Awaiting call for fireline pressure test and samples. Water service manifold stubbed to property. Pressure test and Bac-T tests done on 9/7/18, 9/11/18. (9/11/18)</td>
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<td>C0052-18-01</td>
<td>302 Cabrillo</td>
<td>2 Single Family Homes</td>
<td>Plans received and plan check fees paid on 2/26/18. Fees paid and permit issued on 5/7/18. Awaiting initial calls for inspections. (9/11/18)</td>
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<tr>
<td>C0053-18-01</td>
<td>1908 Tustin</td>
<td>Single Family Home</td>
<td>Plans received and plan check fees paid on 3/18/18. Fees paid and permit issued on 3/13/18. Awaiting initial calls for inspections. (9/11/18)</td>
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<tr>
<td>C0054-18-01</td>
<td>3505 Cadillac Unit O-101</td>
<td>Commercial Building</td>
<td>Plans received and plan check fees paid on 5/7/18. Fees paid and permit issued on 5/22/18. Tapping sleeve, and hot tapping done on 5/2/18. Thrustblock placement inspections on 5/2/18, 6/6/18, and 7/9/18. Pressure test done on 7/9/18. (9/11/18)</td>
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<tr>
<td>C0056-18-01</td>
<td>2033 Republic Ave</td>
<td>Single Family Home Service &amp; Meter Upgrade</td>
<td>Plans received and plan check fees paid on 6/19/18. Comments returned for second plan check review on 7/26/18. (9/11/18)</td>
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<tr>
<td>FILE NO.</td>
<td>PROJECT ADDRESS</td>
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<td>PROJECT NOTES/STATUS</td>
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<tr>
<td>C0058-18-01</td>
<td>585 &amp; 595 Anton Blvd.</td>
<td>Apartment Complex</td>
<td>Plans received and plan check fees paid on 6/8/18. Currently in plan check. Meeting scheduled with owner on 9/12/18 to go over questions they have. (9/11/18)</td>
</tr>
<tr>
<td>C0059-18-01</td>
<td>365 Esther St</td>
<td>Single Family Home Meter Upgrade</td>
<td>Plans received and plan check fees paid on 8/2/18. Awaiting final payment of fees. (9/11/18)</td>
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<tr>
<td>C0060-19-01</td>
<td>3505 Cadillac Ave Unit F-9</td>
<td>Commercial Building New Fire Line</td>
<td>Plans received and plan check fees paid on 7/23/18. Currently in plan check and awaiting information from owner to proceed. (9/11/18)</td>
</tr>
</tbody>
</table>
Project Title: OC-44 Replacement and Rehabilitation Evaluation and Cathodic Protection Study

File No.: M 2034

Description: Evaluate potential repair and replacement options

Status: The Habitat Mitigation and Monitoring Plan (HMMP) has been updated by Michael Baker (former RBF) to reflect the USACE’s process and submitted to Mesa Water for review on 1/8/16. Once the HMMP is revised and approved (1/19/16) it will be forwarded to all agencies, including the Coastal Commission. Draft 1602 Streambed Permit obtained on 12/18/15. Final 1602 Streambed Permit pending CDFW will be issued while HMMP is accepted. U.S. Army Corps of Engineers’ 404 permit received on 2/10/16. Revised HMMP sent to CCC for review and approval. Project is pending CCC’s approval at an upcoming hearing. On 2/29/16, a meeting with Fletcher Jones Motorcars, City of Newport Beach, MBI (former RBF), and City of Huntington Beach was held to discuss issues associated with proposed construction activities. Traffic Plan prepared and submitted to the City of Newport Beach for approval on 6/29/16. Per request of CCC a dewatering plan was prepared and submitted for approval. Mesa Water staff, MBI and CCC met on 10/6/16 and discussed mitigation conditions. Project approved at CCC Public Hearing on 12/7/16. MBI is working on finalizing the HMMP and construction plans and will submit them to CCC. Staff met with MBI on 5/1/17 and discussed comments after reviewing the draft final HMMP. New proposed mitigation criteria received from CCC on 7/5/17 reducing mitigation requirements from 1.6 acres to 0.66 acres. Coastal Development Permit for Construction is anticipated in December, 2017. The project re-start meeting was held on 9/7/17. On 10/30/17 met with City of Newport Beach and City of HB to discuss permit requirements and project access. Met with Fletcher Jones, Skender Construction, City of HB, MBI to discuss access to the site and scheduling on November 21, 2017. Reviewing the 100% Design Plans & Specs (received on 11/28/17) along with the Pipeline Design Schedule, Construction Monitoring Treatment Plan (CMTP), and proposal for Natural Resources/Regulatory Services during construction activities. Bid solicitation is scheduled for late January 2018. Project sent out to bid on January 30, 2018. Pre-bid meeting held on 2/15/18. Construction bid solicitation was cancelled due to ongoing coordination issues for the final Coastal Development permit. Project was deferred to FY20. On 8/1/18, Orange County Public Works issued a one-year extension to the previously issued Encroachment Permit. The Caltrans Encroachment Permit extension application is under review as of 8/13/18. The CCC extended the permit a year without hearing. MBI moved forward with the amendment to reduce mitigation. The updated information was forwarded by MBI to CCC in the week of August 6, 2018. The CCC hearing is expected in October 2018. (9/6/18)
Project Title: Well Automation and Rehabilitation

File No.: MC 2101

Description: Rehabilitate all clear water wells and add remote control SCADA capabilities

Status: Construction activities began at Well 5 on October 3, 2016 with demolition and well rehabilitation beginning in the first week. Video of Well 5 showed scale on the louvers, and potential failure of an unused sounding tube and a small area of the louvers potentially requiring swage patches. Repair completed on November 29, 2016. Well 5 rehabilitation resumed on December 3, 2016. Well 5 chemical facility pad has been constructed and is awaiting a weather forecast of 8 days with no predicted rain to apply the chemical-resistant coatings to the concrete. Well 5 pumping development began on January 4, 2017, and produced fine sand at pumping rates above 1100 gpm. Repairs were made to Well 5, and test pumping performed in February showed acceptable well production over 2500 gpm with manageable sand. Construction is substantially complete at the Well 5 site. A start up planning meeting was held on March 29, 2017. Well 5 is running as needed and producing good quality water. Well 7 rehabilitation is complete, The Well 7 pump was installed the week of August 28, 2017, and Well 7 is operational and good quality water. Construction of the Well 3 chemical facilities was begun in July 2017. The concrete for the Well 3 chemical facilities is cured and coated, and the chemical tanks and canopy are currently being installed. Well 3 rehabilitation is complete and test pumping achieved over 1600 gpm. Construction at Well 9 began in October with relocation of the backup generator and chemical facilities construction. Coating of the Well 9 chemical facilities was completed in December, and the chemical tanks and canopy are installed. Witness testing for the new pumps for Wells 3 and 9 was completed January 2018, and pumps were installed the week of June 4. Construction at Well 3 and Well 9 is substantially complete. Flushing and chlorination of Well 3 and Well 9 were conducted during in July 2018. Well 3 initial startup was on July 17, 2018. Well 9 initial startup was on July 30, 2018. Well 3 and Well 9 have completed their seven-day tests. Work at Well 1 began on August 13, 2018. Well 1 site demolition is complete. The video of Well 1 showed a biofilm, and an extensive well rehabilitation program is being planned for October 2018.
**Project Title:** Pipeline Testing Program  
**File No.:** MC 2141  
**Description:** Implement Resolution No. 1442 Replacement of Assets to annually perform non-destructive testing of 1% of the distribution system, and destructive testing of segments that are shown to have less than 70% of original wall thickness by non-destructive testing.  
**Status:** Extraction of six sections of ACP and two sections of CIP are in process for 2017 destructive testing. ACP samples were sent to WSP Canada for destructive testing. Results were received on August 1, 2017. CIP samples will be sent to McWane Ductile’s lab in Ohio for destructive testing. Results were received on June 30, 2017. A Request for Qualifications for consulting services for the Pipeline Integrity Testing Program was released in May 2017. Four Statements of Qualifications were received and a recommendation for contract award to HDR was approved by the E&O Committee on July 20, 2017. ACP test results were received on July 31, 2017. Results have been analyzed, and were presented at the November Committee meeting. Average ACP total useful life is expected to be approximately 142 years. A process for determining when a pipeline has reached the end of its useful life and how much of the pipeline to replace was implemented. One 8" ACP line in Harbor Boulevard from Wilson to 19th Street was recommended for replacement. Kickoff meeting for a close interval survey of the 12" Cast Iron Pipe in 19th Street was held on December 28, 2017, and the Consultant has completed the field work. The report is expected in April 2018. Operations staff has collected four ACP pipe samples during valve replacement projects, and one during an AC mainline repair. The samples have been sent to a laboratory for remaining wall thickness measurements, and the reports show that while they have lost structural thickness, the remaining useful life is still 35 - 53 years. The mainline break sample showed the smallest remaining useful life and shortest total useful life of any AC sample. Additional AC pipe samples from valve replacements are being collected. Echologics performed three miles of non-destructive wall thickness measurements during the week of February 12, 2018. A report of the results was received in March 2018. All non-destructive and destructive test data were added to GIS in April and May 2018. The mainline break map in GIS is currently being updated. A comprehensive review of cathodic protection test stations was performed in April and May 2018. The report and recommendations was received on June 20, 2018, and recommendations are being reviewed. Five AC pipe samples and nine soil samples collected during valve replacements in 2018 were delivered by the contractor and sent to labs for pipe wall thickness measurements and soil corrosivity analysis. Results show that the expected total useful life of AC pipe is approximately 138 years.
### Project Title: Mesa Water Main Office HVAC Study

**File No.:** MC 2171  
**Description:** Evaluate the existing HVAC system and provide recommendations for improved efficiency and operations of the system.  
**Status:** Mesa Water has contracted with Goss Engineering Inc. to perform this study. Kick off meeting was held January 13, 2016. Goss Engineering performed a field survey of both main campus buildings over the course of three days. Draft report with results and recommendations was reviewed by staff. The final report was delivered on June 30, 2016 and was reviewed by staff for completeness. Staff presented the findings and recommendation to the Board of Directors at the July E&O Committee Meeting. Board approved contract to move forward with the design of a complete Variable Refrigerant Flow system. Contract has been executed and returned to Goss Engineering. Project kick-off and notice to proceed was issued on November 30, 2016. 50% drawings have been delivered for review and comments returned. Stakeholder meeting was held on February 2, 2017 to provide comments for the new VRF system 50% design. 90% design drawings and specifications were submitted for Mesa Water review on March 10, 2017. Mesa Water managers met with the Consultant to discuss construction phasing. Roof design has been reviewed by Mesa Water and the consultant. Request for proposals for providing Construction Management during construction was sent out to nine consultants on 8/15/18. Three proposals received on 8/28/18. Held interviews with all three proposers on 9/4/18. Jett Construction Management’s (JCM) approach appeared to be the most comprehensive given their proposed project staff and HVAC and roof construction experience. Bid set documents for construction have been finalized and sent out to bid on 9/6/18. (9/6/18)

### Project Title: Croddy and Chandler Wells and Pipeline Project

**File No.:** M18-113  
**Description:** Design, documentation, and permitting for two new wells located on Chandler Avenue and Croddy Way in the City of Santa Ana and the distribution pipeline connecting the wells to Mesa Water’s supply system.  
**Status:** Tetra Tech has been contracted to complete the design, documentation, and permitting for the Croddy and Chandler Wells and Pipeline Project. Initial data request sent to Tetra Tech on September 7, 2017. Met with Division of Drinking Water regarding well locations on September 20, 2017. Preliminary hydrological evaluation received on September 29, 2017. Board approved demolition of existing structures and dedicated well facility with option to evaluate long-term lease potential as market conditions dictate at both sites at November 2017 E&O. Butier Engineering has been contracted to provide Construction Management Services. Preliminary Design Report (PDR) for the distribution pipeline was reviewed and returned on March 6, 2018. Well site layouts were presented to the Board in May. DDW waiver for 50-foot control zone
is currently being drafted. The revised PDR for the pipeline and the well sites was received in June 2018. A workshop to discuss review comments was held on August 14, 2018. The project is in the final design phase.

**Project Title:** Santa Ana Pressure Reducing Station Refurbishment Project  
**File No.:** M17-002A  
**Description:** The work will involve replacement of three (3) butterfly valves, one (1) existing pressure relief valve, precast concrete discharge structure, reconfiguring four (4) Cla-Val control valves, general refurbishments to the vault interior, and site work.  
**Status:** Mesa Water has contracted with Michael Baker International to perform the design of the project. The design was completed in late January 2018 and the bid package was sent out to bid on February 8, 2018. Pre-bid meetings and site walk were held on 2/20/18 and 3/6/18, respectively. Three bids were received on March 13, 2018. Staff has recommended that the construction contract be awarded to J.R. Filanc, Inc., as the lowest bidder. E&O Committee recommended awarding contract to J.R. Filanc, Inc. on March 20, 2018 and Board approved it on April 12, 2018. The contract was finalized (5/1/18) and signed on 5/3/18. The kick-off meeting was held on May 21, 2018. Project in progress. (9/6/18)

**Project Title:** Meter Technology Evaluation  
**File No.:** MC 2248  
**Description:** The lifespan of a water meter is approximately 15 years. As a meter ages, the accuracy drops off due to wear. In preparation for its annual water meter replacement, staff has been reviewing water meter technology determining what water meter and reading solutions would be the best fit for Mesa Water’s aging register technology. With today’s technology, there are several types of meters and meter reading solutions available. The most common are as follows: Fixed Network, Automatic Meter Reading (AMR) System, Handheld or Touch Technology, and Advanced Metering Analytics - Cellular Endpoint.  
**Status:** Mesa Water is preparing a Technical Memo which would include information of the existing aging metering technology in comparison with proposed new meter reading solutions. (9/6/18)

**Project Title:** Reservoir 1 & 2 Chemical Systems Design  
**File No.:** M18-117  
**Description:** Improve disinfection and mixing in both reservoirs to improve water quality and minimize nitrification.
**Status:** Final Design Contract awarded to Hazen & Sawyer on February 14, 2018. 50% design report received on July 17, 2018. Design review workshop scheduled for September 2018.
Water Quality Call Report
August 2018

Date: 8/1/2018
Source: Phone/Visit
Address: 903 17th St #38
Description: Customer was concerned that there may be a leak in the area of 17th St. and Monrovia and stated “the ground is always wet”. He was concerned about potential contamination from a leak and requested that Mesa Water check one block east and west of 17th St. and Monrovia.

Outcome: Distribution staff checked all 4 ways at the intersection and observed no sign of a water leak. The customer was told that no leak was found.

Date: 8/1/2018
Source: Phone/Visit
Address: 2901 Royal Palm Dr.
Description: Customer concerned about the kitchen faucet water tasting different from all other faucets in the house.

Outcome: Customer was not home during site visit. Checked the hose bib in the front yard and the water was clear with no odor. Field test for pH and total chlorine residual were within normal range. Customer may have internal issue with her kitchen faucet. Called customer to let her know the water was fine and explained to her about Mesa Water’s comprehensive water quality monitoring program. Assured customer that the water meets all state and federal drinking water standards. Customer was satisfied.

Date: 8/6/2018
Source: Phone
Address: 426 16th Place
Description: Customer had the "moldy" smell in clothes with his old washer and still has the smell after purchasing a new top loader washer. Customer suspects it’s the water.

Outcome: Asked customer to fill a glass with cold water and another glass with hot water. Customer says both hot and cold water do not have an odor and customer also confirmed that the odor is not noticed at any faucet throughout the home. Explained to customer that the moldy odor is an internal issue with his washer. Customer will call if he has further questions.
Date: 8/9/2018  
Source: Email  
Address: 2768 Bluebird Cir  
Description: Customer e-mailed asking "What is our water hardness in grains per gallon or does it vary by neighborhood?"

Outcome: Replied to customer's email explaining that water hardness varies from one source to another and changes due to operations of the various sources. Provided customer with the range and average hardness level and sent him a copy of the Annual Water Quality Report.

Date: 8/15/2018  
Source: Phone/Visit  
Address: 2773 Avalon  
Description: Customer concerned about taste of water.

Outcome: Checked the water from the front hose bib which was clear with no odor and pH and total chlorine residual were within normal range. Explained to customer that Mesa Water meets all state and federal drinking water standards.

Date: 8/27/2018  
Source: Phone/Visit  
Address: 1739 Paloma  
Description: Customer noticing sand in hot and cold water.

Outcome: Water from the front hose bib was clear with no sand or debris. Checked pH and total chlorine residual which were within normal range. Water from the shower and tub showed a small amount of debris (not sand) and appears to be an internal issue. The customer will keep an eye on it.

Date: 8/30/2018  
Source: Phone  
Address: 280 E. 20th St  
Description: Customer and her husband were told by their doctor that mercury levels in their blood were high. They suspect the water and want to get it tested.

Outcome: Called and let the customer know that lead is non detect (ND) in all of our water sources. Explained to customer that there are other contributing factors that they should consider and talk to their doctor about. Offered to provide a list of local state certified laboratories if customer wants to get his water tested.
# Policy Assignments for 2018

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<th>Policy Name</th>
<th>Resolution No.</th>
<th>Date Adopted</th>
<th>Revision Schedule</th>
<th>Last Reviewed</th>
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<td>Rules and Regulations for Water Service</td>
<td>1514</td>
<td>07/12/18</td>
<td>Review and update as needed</td>
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<tr>
<td>Standard Specifications and Standard Drawings</td>
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<td>05/03/18</td>
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<td>Urban Water Management Plan</td>
<td>1477</td>
<td>06/09/16</td>
<td>Review and update as required every 5 years</td>
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## Water Operations Status Report
### July 1, 2018 - August 31, 2018

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<th>Act Qty</th>
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<td><strong>01 - HYDRANTS</strong></td>
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<td>WD-0101 - HYDRANT MAINTENANCE</td>
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<td>WD-0201 - DISTRIBUTION VALVE MAINTENANCE</td>
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<td><strong>03 - METERS</strong></td>
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<td>WD-0301 - NEW METER INSTALLATION</td>
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MEMORANDUM

TO: Engineering and Operations Committee
FROM: Phil Lauri, P.E., Assistant General Manager
DATE: September 18, 2018
SUBJECT: Administration Building and HVAC Improvements Project

RECOMMENDATION

Recommend that the Board of Directors award a contract to Jett Construction Management, LLC in the amount of $134,582 and a 10 percent contingency for a not-to-exceed amount of $148,040 to provide Construction Management Services for the Administration Building and HVAC Improvements Project, and authorize execution of the contract.

STRATEGIC PLAN

Goal #2: Practice perpetual infrastructure renewal and improvement.

PRIOR BOARD ACTION/DISCUSION

On November 24, 2015 a contract was signed with Goss Engineering, Inc. to perform a heating, ventilation, and air conditioning (HVAC) system building analysis.

At its August 11, 2016 meeting, the Board of Directors (Board) awarded a contract to Goss Engineering, Inc. for $72,620 and a 10 percent contingency for a not-to-exceed amount of $79,882 to perform design of a new HVAC system for the Administration and Operation Buildings.

At its June 20, 2017 meeting, the Engineering and Operations (E&O) Committee received an information item that a Request for Proposals was being solicited.

At its July 18, 2017 meeting, the E&O Committee approved a contract amendment to Goss Engineering, Inc. in the amount of $52,467 to provide design and documentation for a new roof and skylight on the Administration and Operations Buildings as part of the HVAC Systems Design Project, and authorized execution of the contract amendment.

At its December 19, 2017 meeting, the E&O Committee received an information item that Goss Engineering, Inc. had completed the design drawings, specifications, and contract documents and was soliciting bids for construction.

BACKGROUND

Mesa Water District’s (Mesa Water®) current HVAC system has provided 24 years of service. The HVAC system is a roof top mounted fan-coil type system consisting of seven units placed atop the Operations and Administration Buildings. The system has been periodically maintained throughout the years and various repairs made to accommodate changing office configurations. With an increasing frequency in repairs, a need for more systematic control to address varying thermal conditions within the office environment, changing code compliance requirements, and the age of the current system, Mesa Water engaged Goss Engineering, Inc. (GEI) in July 2015 to perform an assessment of Mesa Water’s HVAC system.
The assessment recommended that Mesa Water replace the rooftop units with a new variable refrigerant flow (VRF) system. VRF systems provide more flexibility with improved zoning ability with the installation of individual cooling units in each occupant’s space. VRF systems consist of interior fan-coil units that can be ducted, ceiling mounted or wall-mounted and rooftop condensing units. The most appropriate fan-coil solution would include a ceiling-mounted approach. Ceiling-mounted units are preferred as they simplify condensate pipe installation and provide a cleaner appearance once installed. Installing a fan-coil unit in each space would allow individual occupant control of temperature in each office or workspace. On October 17, 2046, GEI was awarded a contract to complete the design of a new VRF system. On July 18, 2017, GEI was awarded a contract amendment to include the design for replacing the roof and skylight in the Administration Building and roof in the Operations Building.

GEI has completed the design drawings, specifications, and contract documents and are currently soliciting bids for construction. Bid solicitation results will be brought to a future Engineering and Operations Committee. Copies of the design drawings and specifications are available upon request.

DISCUSSION

The construction process will require the assistance of a qualified construction management consultant with expertise in HVAC systems, roofing replacement, and associated installation requirements. The construction management team will also provide qualified inspection services to ensure all work is compliant with the design documents and building code regulations.

Selection Process

Mesa Water solicited proposals from nine firms to provide the required scope of work. The firms included MWH Global (Stantec), Butler Engineering, TELACU Construction Management, Kitchell CEM, NV5, Inc. (NV5, formerly Civil Source), Cumming, Inc., IEM Construction Management (IEM), Michael Baker International, and Jett Construction Management, LLC (JCM). Three proposals were received on August 28, 2018. The proposing firms included NV5, IEM, and JCM. Proposals were reviewed and evaluated by a selection panel comprised of Mesa Water and Orange County Water District staff. Each proposal was ranked based on qualifications, experience, project understanding, and scope of work approach. All three firms are qualified to perform the work effort and were invited to participate in the interview process on September 4, 2018. While each firm provided a unique and solid approach to the required scope of work, the selection panel determined that JCM’s approach would be most comprehensive given their proposed project staff and HVAC and roof construction experience. While JCM’s overall proposed project cost is slightly higher than NV5 (~7.5%), JCM provides specific experience similar to the Mesa Water project and it is believed that JCM’s experience in managing this type of project will save Mesa Water future costs through reduced change order mitigation. JCM specializes in providing construction management and consulting services for building projects. JCM’s project experience ranges from large office projects, high-rise/mixed-use projects, public works, healthcare, retail, hospitality, renovations, data centers, industrial, infrastructure, and tenant improvements. JCM has worked on multiple projects that include public agencies, water districts, state and county governments, non-profit organizations, and private companies. JCM’s proposal is included as Attachment A. The proposals from NV5 and IEM are available upon request. The results of each firm’s proposal are as follows:
The proposing firms were requested to submit proposals using 829 hours as a budgetary requirement for both the construction management and inspection services portion of work. IEM’s submitted hours of 1,005 without explanation of why additional hours beyond the budget were required. Staff recommends that the Board consider awarding a contract to JCM for $134,582 and a 10 percent contingency for a not-to-exceed amount of $148,040 to provide Construction Management Services for the Administration Building and HVAC Improvements Project.

FINANCIAL IMPACT

In Fiscal Year 2019, $1,808,000 is budgeted for the Administration Building and HVAC Improvements Project; no funds have been spent to date.

ATTACHMENTS

Attachment A: Jett Construction Management, LLC Proposal
Mesa Water District
Administration Building Improvements
And HVAC Replacement Project
Construction Management Services
August 28, 2018

Name of Business: Jett Construction Management, LLC (JCM)
Business/Company Address: 29 Salinger Court, Trabuco Canyon CA 92679
Telephone Number(s): (949) 283-0007
E-mail Address: JettM@JettCM.com
Website Address: www.jettcm.com
Federal Tax ID Number: 83-1569830
Type of Business: Limited Liability Corporation
Number of Years in Business: Jett Construction Management LLC is a recently formed company with 35 years of industry experience. Jett McCormick has worked in the Southern California construction and real estate development market for over 35 years.
Authorized Representative: Jett McCormick, President
Certificate of Insurance: Attached based on currently available endorsements
Mesa Water District
Administration Building Improvements

This proposal provides a comprehensive response to Mesa Water's Request for Proposal for the Administration Building Improvements and HVAC Replacement Project. Jett Construction Management, LLC (JCM) has an excellent understanding of the project scope and requirements. Our team is prepared to provide Mesa Water the required services to ensure the successful implement and completion of the project as outlined in this proposal.

SECTION 1 - FIRM QUALIFICATIONS AND EXPERIENCE

INTRODUCTION TO THE FIRM

After many years working with top-tier construction and real estate development companies in Southern California, Jett McCormick established Jett Construction Management, LLC (JCM) to provide best of class construction management services to his clients. Mr. McCormick has over 35 years of experience with an excellent reputation. This experience includes more than twenty years with general contractors Turner Construction and Rudolph & Sletten. Mr. McCormick's has more than a decade with top Landlord and developer including the Irvine Company as the heading the Office Properties - Campus Office and Industrial Tenant Improvements Group before moving to the Development Group. Most recently, Jett McCormick was with LBA Realty as the Vice President overseeing the design and construction for their 45M SF industrial and office portfolio.

JCM believes in the principle that it is about the client and the client's needs. We want to understand the client's needs and ensure that they are met or exceeded.

STRENGTH AND STABILITY OF FIRM

JCM's founder, Jett McCormick has a solid reputation and has worked in the Southern California construction and real estate development industry for over 35 years. JCM can partner with other firms as needed to provide required services for any project.

JCM is partnering with Reliant Testing Engineers to provide inspection services and commissioning for this project. Reliant was founded in 2004 by Denise DeGroff and Dr. Sanjay Govil, RCE, GE. Reliant Testing Engineers, Inc. provides professional inspection and engineering services in the areas of construction materials and geotechnical engineering, inspection services, forensics commissioning, and all related testing in their full-service laboratory located within minutes of the project site. Reliant provides services with the highest degree of professional excellence and proficiency. They hold certifications from CCRL, ASHTO, AMRL, Cal Trans, City of LA, Newport, Long Beach and San Diego. Their resources of 80 inspectors and licensed engineers and laboratory technicians are well versed in quality assurance and quality control for municipalities. Their teams' certifications, experience, and knowledge in applicable state and county building code requirements combined with their management plans that are custom tailored to each client's needs are all factors contributing to their ability to meet the requirements of this project.
Mesa Water District
Administration Building Improvements

OVERVIEW OF THE FIRM'S CAPABILITIES IN PROJECT SCOPE

JCM specializes in providing construction management and consulting services for building projects. These services include the expertise to manage, support, and coordinate all aspects of your project. JCM’s capabilities include, but are not limited to:

- Ground up Construction
- Major Renovations
- Tenant Improvements
- Contract Management
- Estimating/Budgeting
- Preconstruction
- Value Engineering and Lifecycle Analysis
- Entitlements
- Feasibility Studies
- Agency Review and Permitting
- Constructability Reviews
- Scheduling
- Due Diligence
- Cost Management
- Construction Accounting
- Change Order Resolution
- Sustainable Construction
- Claims Evaluation and Resolution
- Commissioning

Project Types include:

- Commercial Office
- Tenant Improvements
- Major Renovations
- Healthcare/Medical Office
- Retail
- Mixed Use
- Data Centers
- Laboratories
- Infrastructure
- Campus Office
- Land Acquisitions
- Central Plants

JCM will apply this experience to provide best-in-class management services to its clients of all sizes, complexities, and needs. Project experiences range from large office projects, high-rise, mixed-use projects, public works, healthcare, retail, hospitality, renovations, data centers, industrial, infrastructure, and tenant improvements. Specialties: Real estate development and construction, commercial and corporate real estate, pre-construction, sustainable projects, project controls, complicated projects, and more.

PROVIDE A DESCRIPTION OF THREE PROJECTS SIMILAR

JCM has worked on multiple projects that include public agencies, water districts, state and county governments, non-profit organizations, and private companies. The three projects listed below are a sampling of our teams the experience that applies to this project.
Mesa Water District
Administration Building Improvements

4400 Ruffin Road Building Renovation-LBA Realty  Renovation and reconstruction of an office/industrial building. The project included demolition of approximately 200,000 SF of the building replaced by a new 106,000 industrial warehouse. The remaining 130,000 SF of the building was renovated and prepared for new office space. The project included site work, new electrical service, renovations to the mechanical system, new roof, seismic upgrades, new lobbies, elevator, and restroom. Ruffin Road was a multi-phase project with tight budget constraints. The project was completed on time and within budget. Contact: John Garrigan-Principal LBA Realty email: jgarrigan@lbarealty.com

Gonda (Goldschmied) Neuroscience and Genetics Research Center, UCLA - Construction Management services for the construction of a new eight-story laboratory building for UCLA. It was a public project utilizing multiple contractors. As a laboratory building with 40 laboratories, vivariums, and conference areas, the HVAC requirements were significant and complicated. This project was completed on time and within budget. There are no current employees at UCLA that were involved in the project.

Ground Water Replenishment System, Orange County CA - The Groundwater Replenishment (GWR) System is a jointly funded project of the Orange County Water District (OCWD) and Orange County Sanitation District (OCSD) with OCWD as the lead or constructing agency. The GWR System is a water supply project designed to ultimately reuse approximately 140,000 acre-feet per year of advanced treated wastewater (recycled water). The GWR System will supplement existing water supplies by providing a new, reliable, high-quality source of water to recharge the Orange County Groundwater Basin (the Basin) and protect the Basin from further degradation due to seawater intrusion. It will also postpone the need for OCSD to construct a new ocean outfall by treating excess storm flows. The Ground Water Replenishment Project is a public works project. Contact: Mr. Jamine Burrola - MWH America, Inc

OTHER PROJECTS:

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<th>Client</th>
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<td>UCI Medical</td>
<td>Public Agency</td>
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<tr>
<td>Tenant Improvement and Clean room</td>
<td>Medtronics</td>
<td>Private Company</td>
</tr>
<tr>
<td>Tenant Improvements/Seismic Upgrades</td>
<td>K-1 Speed-Irvine</td>
<td>Private Company</td>
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<tr>
<td>Occupied T.I.-19 Technology Dr.</td>
<td>Stantec</td>
<td>Private Company</td>
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<tr>
<td>Pretend City-Children's Museum, Irvine</td>
<td>Pretend City</td>
<td>Non-Profit</td>
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<td>Well 115 Replacement Project</td>
<td>IRWD</td>
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<td>LAC+USC Replacement Hospital</td>
<td>County of Los Angeles</td>
<td>Government</td>
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<tr>
<td>Westwood Replacement Hospital</td>
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Why Jett Construction Management (JCM)

- First, it is about communication. JCM will ensure that lines of communication are kept open between all team members. It will be documented and maintained for future reference. Open discussions are essential for the project to run smoothly and quick issue resolution. No surprises.

- JCM has experience with all facets of the project: design components, type of construction, project delivery system, phased work and managing occupied remodels. Experience also includes work for multiple public agencies including the State of California, Los Angeles County, the UC system, LAX, and Irvine Water District.

- JCM has primarily focused on tenant improvement projects over the past 15 years. This experience included extensive work in similar buildings to this project when occupied. JCM has familiarity with about any issue that could arise during construction and can apply this experience to the problem. This experience will allow us to quickly assess problems and, working with the contractor, design team, and Mesa Water, come up with solutions. This process will minimize any potential delays or potential extra cost.

- The construction industry is a relationship-based business. JCM has extensive experience with the Orange County construction market working with numerous general contractors, subcontractors, architects, engineers, and other agencies. This experience will be invaluable to ensure the project will attract qualified contractors and subcontractor to bid on the project. The long relationships with many of these contractors will also be beneficial to assist with the resolution of any field issues and potential change orders that might arise.

- JCM, being a local business, will ensure that the Mesa Water Administration Building Improvements and HVAC Replacement Project is its top priority. JCM is only successful if this project is successful.

- JCM is partnering with Reliant Testing who has the specific inspection and testing expertise for this type of project. Reliant provides inspection services such as Inspector of Record for OSHPD Project as well as other public agencies where they function at the Owner’s inspection representative in the field. Reliant has provided services on various Federal, state, county, higher education, and other agency projects where the entity provided plan check and inspection services.

- Mr. McCormick had worked with Reliant Testing on various projects when he was at the Irvine Company.
SECTION 2 - STAFF EXPERIENCE

The organization chart below for the project team indicates the hierarchy and reporting structure for the project. The inspectors will report to Jett McCormick as the Construction Manager. Jett will coordinate with Denise Degroff with Reliant for other inspect services that might be required.

![Organization Chart]

Resumes of each team member are attached in Appendix A and include details of their experience, background, and abilities. Listed below are the specific reasons why each team member is individually qualified for this project and the role they will fill.

**Jett McCormick - Construction Manager** - Mr. McCormick has extensive experience in tenant improvement work, mechanical systems, occupied remodel projects and roofing projects. Mr. McCormick has worked with many public agencies.

**Denise Degroff - Reliant Testing Engineers Project Manager** - Ms. Degroff will assist in coordinating the inspection effort for Reliant Testing Engineers. As President for Reliant, she will ensure the quality of service and support as needed. In this role, Ms. Degroff will not be billable to the project, but as an expert in the field, she can provide additional services if required.

**Jack Lucas - Reliant Testing Lead Inspector** – Mr. Lucas, as a Department of State Architect (DSA) - Class I Project Inspector, will be the lead inspector for the project and can provide inspections for all disciplines. Mr. Lucas has 30 years of experience in the construction industry with 15 years as an inspector. He has completed many renovation projects. He his strengths include submittal verification, pre-installation evaluations, inspection documentation, and quality assurance. Mr. Lucas will be responsible for the coordination of specialty inspectors as required to meet ICC requirements.

**Megan Drewen - Reliant Testing Special Inspector** – Ms. Drewen’s experience range from SHPD, DSA, commercial and municipal projects. She has certification for AWS, ICC, ACI and California Building Inspector. Ms. Drewen has over 5 years in the construction industry.
Mesa Water District  
Administration Building Improvements

Nathan Haley - Reliant Testing Special Inspector – Mr. Haley, has certification for AWS, ICC, ACI and California Building Inspector. He will assist Mr. Lucas with inspection as required. Mr. Haley has over 16 years in the construction industry.

**Current workload**

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<tr>
<td>Megan Drewen</td>
<td>ICC &amp; CWI multi carded Inspectors</td>
<td>Included above</td>
<td>10/18</td>
<td>04/19</td>
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<tr>
<td>Nathan Haley</td>
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<tr>
<td></td>
<td>On-call services as needed</td>
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SECTION 3-SCOPE OF WORK UNDERSTANDING AND SCHEDULE

Describe the key challenges associated with the project and the firm's approach to overcoming these challenges.

The drawings were not available for review in response to this proposal but, several issues typically come up with this type of project. Below are some of the significant areas of concern to consider.

- **Occupied Remodel**: Most of the staff in the building may or may not be aware this project will impact them. A phasing plan needs to be developed to identify what areas will be worked in to ensure the minimum disruption to the staff and ongoing operations. The phasing plan would outline how the work will proceed, and the duration of each phase. Temporary workspaces will need to be established to accommodate affected staff members of each stage. If Mesa Water requires computers or phones for the interim space, how will this be done and who will do it? Once the draft plan is complete, it will need to be reviewed with all affected staff consideration to ensure individual requirements and other issues. Once all additional input is incorporated, the final plan will need to be included into the contractor's bid documents and issued out to the Mesa Water staff. Once the project starts; continual updates will need to be sent to Mesa Water staff, so they are aware of affected areas, if they will be temporarily relocated and will have adequate notice of when this will occur. Updates should be in the weekly staff update.

- **Phased Construction**: Construction documents are typically developed assuming the work will proceed in a logical order. However, with an occupied building the project will need to be done in phases which can result in work scheduled for an early phase requiring work planned for a later time. Phasing might require temporary piping or out of sequence work. The review will also make sure the contractor does not have to go back into an area just completed.

- **Unknown Conditions**: When construction documents are being prepared field investigations of concealed areas may not always be performed. These investigations may require looking in those areas compared to the plans to make sure there is nothing that would impact the work to be completed as planned. For this project using a ladder and flashlight and looking above the ceiling would be advisable. This investigation could avoid potential delays and extra cost once the contractor is on board.

- **Phased Roofing**: It is our understanding roofing and equipment replacement are concurrent. This phasing will require temporary measures to be considered and incorporated into the bid documents to ensure that a waterlight roofing system is in place at the end of each day. This condition will also need to be reviewed with the roofing manufacturer to ensure they will warranty the system with this installation method.

- **Documenting scope not currently on the plans**: Since the work will be performed in an occupied building and phases, not all the requirements of the project may be included in the plans. Examples of this would be temporary protection, cleanup requirements, temporary construction, requirements for maintaining the roof system and touch up or minor repair work.

- **Existing conditions**: Not knowing the age of the conditions throughout the building a review of each area of work to determine if additional work will be required. Can the ceiling tiles be matched? Will touch up paint be required? Can the color be matched or does the area need to be repainted? Is there equipment or furniture that will need to be moved to accommodate
Mesa Water District
Administration Building Improvements

the construction? Is there other work that may be impacted such as relocating fire sprinkler heads? Many of these requirements can be documented in writing and would not require additional drawings.

- **Documenting the project requirements in the Bid Documents** - As identified above, there may be several items the bidding contractors need to know up front. It is essential to determine that these items are conveyed in the bid documents for the bidders to consider and incorporate into their bid upfront. If requirements are not precise, missing or in an obscure location in the request for bid, Mesa Water may not get complete bids at bid time. Having full and clearly defined documents at bid time will avoid disagreements, delays and change orders during construction.

- **Cutting-edge technology** - The Variable Refrigerant Flow (VRF) HVAC system is a newer technology. Not all contractors may have the needed experience to install it particularly in a working, phased condition. JCM will reach out to the market to identify contractors and subcontractors who have the proper experience with VRF systems to bid on the project. JCM will ensure these contractors are interested in the project and will keep them up to date regarding the project status, so they are prepared to bid the project when the documents come out. The bid documents need to clear as to ensure bidders have the required experience and JCM will ensure that qualified contractors are bidding. If for some reason a bidding contractor does not have the correct expertise, Mesa Water can find the contractor non-responsive and disqualify them.

**Describe your firm's approach to the work and how it will benefit Mesa Water®.**

*Begin with the end in sight.* Ultimately, it is about completing the project successfully. This process starts by identifying the goals at the being that will make the project successful. Once defined, develop a plan to achieve these goals. We think this will include some of the following:

- One time project completion.
- The final cost is within the budget.
- The improvements meet or exceed MWD's expectations.
- As an occupied remodel, minimize disruptions to the District staff and clients.
- No surprises - ensure Mesa Water kept informed.
- Address any unknown field conditions that may arise quickly and resolve it.
- No accidents, everyone goes home healthy at the end of the day.

Reviewing and identifying Mesa Water's goals would be an initial priority of JCM. A Success Plan will be developed to determine what steps will be taken to achieve the goals. Many of them may have overlapping action items. We will identify the most efficient way to accomplish each task. This Plan will include elements to incorporate in the bid documents for the general contractor, processing of submittals and RFI's, procedures on how to manage potential change orders, the MWD communication plan, and more.

An example of what can be done to achieve these goals is to develop a weekly project update. This update would be distributed to MWD staff keeping them informed of the project status and upcoming work. The report would be a one-page document including the accomplishments from
Mesa Water District
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the past week and the plan for the next week. If critical activities are coming up like staff relocations, highlight them more than a week out. The update would include the status picture(s) or logistics plan. If there are pertinent facts or issues the staff should be aware of, add them. This simple update would keep all informed and engaged in the project. JCM has successfully used this type of update on several projects.

A successful outcome starts with having a clear Success Plan for completion at the beginning of the project outlining what will make this a successful project for Mesa Water.

The Processes to Provide Quality Deliverables

The first step is to understand what Mesa Water wants to receive. Then determine who will provide the deliverable. The contractor would provide many of the standard items like a schedule update, change order logs, submittal and RFI logs. The frequency and detail of these reports would be determined, and incorporate these requirements into the bid documents. JCM will ensure that reports, schedules or logs provided by the contractor are complete and accurate. The contractor will be required to update information that may be incomplete or not accurate.

There are a few deliverables that should come from the construction manager which are typically an evaluation of information from the contractor. Weekly updates from the contractor for the logs, issues, and other information will be reviewed and evaluated with a summary update to MWD.

Monthly status reports should never include surprises. It should be a summary of the information provided in the last month with a projection of the upcoming work. The monthly report would consist of a status update of the Success Plan, issues to be resolved, schedule updates, budget report, cash flow, and other required information. A summary analysis of each is needed to state the status explicitly so, and the reader should not have to interrupt the information included. The monthly report would contain detailed information and would have an executive summary to provide a quick update of the project status. Typically, the executive summary will include all needed information. However, if the additional detailed information is necessary, it would be covered as well.

The typical monthly status reports should start with, “The project is proceeding on schedule, within budget, with no significant issues.” If there are issues requiring resolution, a solution or plan to resolve will also be provided.

Understanding the Scope of Work

Below is JCM’s understanding of the project purpose and scope of work requested for the project. Appendix C to the contract outlines in detail the requirements of the project. Below is a summary of JCM's understanding of the scope of work.

Project Purpose: The project is being undertaken to replace an aging HVAC system with a new Variable Refrigerant Flow (VRF) system in both the Administration and Operations buildings. The Project will include replacing the roof with a new roof and replacing the large skylight in the administration building.
The Scope of Work:

Program Management

- Provide program management that includes conducting regular meetings and providing updates to Mesa Water District as to the status of the project. The CM will ensure open lines of communication with MWD, contractor, and design team. The CM will work under the direction of the MWD project manager and become familiar with the District policies and processes to ensure compliance with the District’s requirements.

- Develop a Success Plan to incorporate Mesa Water’s goals and plan on how to achieve these goals.

- Facilitate and conduct Owner, Architect, Contractor meeting includes the initial kick-off meeting and ongoing weekly progress meetings. The CM will be responsible for the development of the meeting agenda, updates of logs, schedules, and other required information. Ensure the meetings are documented by meeting minutes and promptly distributed.

- Maintain an overall project control process. Track ongoing project costs, change orders and contracts. Review and process all applications for payment including all information required by the contract. Follow for, and review, the contractor’s certified payroll records.

- Prepare and issue monthly reports documenting the project status and any outstanding issues. Provide other documents and information that may be requested by Mesa Water.

- Assist with presentations and presentation information for Board presentation. Assist with presentation material required for staff distribution.

- Develop a Construction Management plan that will include the project organization structure and duties, safety, risk management plan, inspection requirements and process. The Plan will address the document management process and retention, and the closeout process and strategy to complete the closeout quickly.

- The construction manager will perform the scope of work as outlined and other job-specific functions to oversee the construction activities. The work will be conducted on an hourly basis as described.

Construction Administration

- The construction manager will be responsible for the daily management of the project and support the Mesa Water staff.

- CM will be responsible for reviewing, processing, and tracking RFIs and submittals and track for a timely response from the design team.

- Obtain and monitor the contractor’s Quality Assurance program.

- Review and provide recommendations on substitution request considering cost, schedule, and value.

- Review and monitor contractor’s resource projections. Advise Mesa Water if the contractor is not providing proper resources and the proposed corrective action.

- Ensure the contractor has a CAL-OSHA compliant safety program and they are enforcing the program requirements and provide notification of safety issues. CM is to furnish its own PPE.
Mesa Water District
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- Ensure the contractor has an Emergency Response Plan that is CAL-OSHA compliant.
- Conduct regular site security and walks. Ensure the site is safe, notify the contractor if issues are noted, follow up for corrections.
- If environmental issues are present, ensure all required permits are issued and work completed.
- Provide comprehensive cost and schedule controls for the project. This review will include evaluating the contractor's baseline schedule and updates and provide schedule analysis. Maintain a cost control system to track the overall project cost and cash flow.
- Issue monthly reports to provide a comprehensive overall status and corrective actions if issues exist.
- Review and recommend approval of contractor's invoices. Verify it complies with the requirement of the contract.
- Review and recommend action for contractor change order requests including both cost and schedule impacts.
- Monitor the potential of contractor delays or claims. Provide analysis and recommendations on how to minimize any impacts or its validity to Mesa Water. If a claim is submitted, coordinate relevant documentation and analysis. Provide prompt responses and recommendation for acceptance or action.
- Monitor any work performed on a time and material basis.
- Review contractors change order requests and perform an independent estimate of the work, schedule impact, validity of the change, and recommendation for further action.
- The construction manager will be responsible for the written documents, correspondence and maintaining a document management system. These documents will include RFIs, RFCs RFPs, submittals and other correspondence. Receive and provide to Mesa Water project notices. Organize documents in a format approved by Mesa Water.
- Maintain and ensure the contractor is maintaining as-built documentation. Approval of contractor's payment application would be contingent upon the proper documentation of the as-built documents.
- Maintain hard copy records as required, turn over to Mesa Water at project completion.
- Follow for, review, and turn over to Mesa Water O&M manuals, spare parts, attic stock, and other close-out documents.

**Inspection**

- An ICC certified inspector will provide inspection services.

**Equipment and System Testing, Start-Up, and Training**

- Work with the contractor and Mesa Water to provide startup and commissioning plans. Coordinate with the contractor for scheduling the work and documentation of the process. Follow up for any corrective actions.
- Coordinate with the contractor to develop and provide training as required for Mesa Water staff.
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Construction Contract Close Out

- At the onset of the project, request from the contractor a log of all the closeout submittals to be provided. Review with Mesa Water and design team for acceptance. This log shall include warranties, as-builts, attic stock, tools, and training.

- Coordinate a final punch walk within seven days after substantial completion. Verify if the work meets the requirements. If so, develop and issue a final punch list.

- Conduct a final review of as-built documents. Submit to the design team for review within 14 days of Substantial Completion. Follow up with the contractor for any corrections. Transmit the final as-builts to Mesa Water.

- Within seven days after substantial completion, request a final submittal of any outstanding change orders and a final payment application. Resolve as required.

- Finalize the project. Provide a final report document for the project, turnover all documents both digital and hardcopy, including all contractor close-out documents, and demobilize within 14 days after completion.

The typical monthly status reports should start with, “The project is proceeding on schedule, within budget, and no significant issues.” If there are issues requiring resolution, a solution or plan to resolve will also be provided.

Schedule Management

It is critical to the success of a project to monitor and track the project schedule continually. The design team develops plans and specifications to describe for the owner and contractor what the project looks like and how it will function, but they do not tell you how to build the project. As crucial as these documents are, the project schedule is just as important. It will be critical to have a well thought out schedule for the Administration Building Improvements and HVAC Replacement Project. It will require the contractor to work in an occupied building requiring phasing, limited access, and understanding that other activities like relocating employees will affect their work. There is significant time and effort put into developing the design documents. A similar effort is required to create the project schedule. The following steps should be taken to ensure the project schedule is appropriately prepared, tracked, and updated.

1. The Request for Bid issued to the contractor should include all of Mesa Water’s constraints and requirements for the project. The plans and specification include information on the physical work, but generally do not include other conditions such as logistic information, phasing requirements, and on-going operational limitation. Each of these issues will have time and money impacts on the contractor bid. The contractor will evaluate these requirements as they are pricing the project and they must be required to incorporate them into as they are developing their schedule.

2. The requirements of how to develop the schedule must be in the bid documents including types of activities, length, conditions for logic ties, cost loaded, the frequency of updates, changes in the work, report format, and other requirements.

3. After the award of the contract, with items 1 and 2 included in the bid documents, a kick off meeting would be held with the contractor to review the requirements and how they are going to put the schedule together.
4. Review the proposed schedule for conformance to the requirements and that it includes all the work. Activity lengths are not too aggressive, the logic makes sense, there are no unnecessary ties, and owner activities that could affect the work are in the schedule. Include Activities for long lead items and critical submittals. The critical path and subcritical paths should be reviewed in detail as this is where delays will arise. If it is not acceptable or needs correction, return it to the contractor for further action. If accepted, this should be in writing as well. The contractor needs to provide a live, digital file of the approved baseline schedule for its records.

5. Review the schedule on a weekly basis to ensure compliance and what work is coming up in the next few weeks. If there are potential schedule issues that arise, discuss and resolve them as quickly as possible. Agree to any needed changes before they are made.

6. Approval of the contractor's payment application should be contingent with the monthly schedule submittal. Compare the schedule to the baseline schedule, verify actual starts and finish dates, and remaining durations. It needs to be reviewed with the contractor and the Mesa Water's PM to understand any variances, status, and any potential risks. Compare the schedule and the payment application completion percentages. A live digital file should be submitted to Mesa Water once it is accepted.

7. If changes arise, the contractor must notify the owner of any potential impacts to the schedule. This notice should be discussed as a group to determine if there are workarounds to avoid or minimize any effects. The CM should advise Mesa Water of any direction or response to the contractor. This communication should be in writing. When the change order request is submitted, the contractor should provide a schedule fragment of affected activities with a written explanation of the impact.

8. Written notices are important. The contractor is required to notify Mesa Water of any potential delays. It is also essential that Mesa Water and the CM provide written notice to the contractor if they are not following the schedule, they are causing delays, or they take other actions or inactions that could affect the project. By actively monitoring and managing all activities, impacts will be kept to a minimum and avoid potentially more significant problems later.

9. Take pictures. Weekly photos provide visual documentation of that project's status. They can be used to document damage, status, and safety issues. They can provide documentation to review change orders and delays that may come up later.

10. Keep track of submittals. The submittal schedule is a subset of the project schedule. Materials and equipment cannot be released until their submittals are approved. A list of all submittals should be provided immediately after the contract award, so all can agree on the submittal list. The submittal log needs to be tied to the schedule when items are due in the field. Monitor submittals to make sure they are submitted on time or early. For critical or complicated submittals, allow time for resubmissions. Notify contractor if submittal items are late. Monitor the design team to ensure they are reviewing submittals in a timely manner.

11. Create the close-out plan. Make sure the activities required to close out the project in the field are in the schedule including final inspections, punch list and punch list completion, training, and demobilization.

*Actively managing the schedule, starting with the bid documents through completion, will avoid claims, delays, surprises and will minimize change orders.*
Conclusion:

Jett Construction Management (JCM) and Reliant Testing are excited about this opportunity. We look forward to discussing our services with Mesa Water. We have a comprehensive understanding of the project requirements and are the best-qualified team for the project. Our team has extensive experience and looks forward to discussing other creative solutions for the successful completion of the Administration Building Improvements and HVAC Replacement Project.
APPENDIX A
RESUMES OF KEY STAFF

Include resumes of key staff, including subconsultants staff. Limit each resume to two pages. Resumes are not included in overall page count.
Jett McCormick, LEED AP

Jett McCormick founded of Jett Construction Management (JCM) to provide best in class project management and construction management services for its clients putting them first. Mr. McCormick has over 35 years of experience on the Southern California real estate development and construction market.

Skills and Qualifications
- Proven track record of completing projects on time, within budget, and without issue.
- Management of all size projects and complexity ranging from tenant improvements to large multi-phased developments, ground up, and renovations, brownfield, and urban environments.
- Preconstruction experience includes master planning, entitlements, code analysis, due diligence evaluations, design management, estimating, financial analysis and tracking, project scheduling, and issues resolution.
- Experience with multiple project control systems including development and implementation. Successfully managed electronic document imaging and control systems, web-based and multi-organizational systems, job costing, accounting, scheduling, estimating and issues tracking systems.
- Management of large project teams

Accomplishments
- Management projects totaling over $2.0B of multiple types, sizes, and delivery methods.
- Excellent record of managing tight schedules to deliver projects on time and within budget. All projects have met or exceeded financial expectation with most resulting in repeat business.
- Completed largest privately funded LEED-Gold project in the US when constructed.
- Completed other LEED projects for Existing Buildings and Commercial Interior.
- Develop policies and procedures to create more efficient and cost-efficient systems.
- Developed paperless document management and control systems on multiple projects.
- Managed the first construction project to achieve Cal OSHA Voluntary Protection Program Star Status.
- Claims management on multiple projects to manage and resolve contractor claims.

Notable Project Experience

Tenant Improvement Projects
- Blizzard Entertainment Corporate Campus Tenant Improvements (235,000 SF) & site work-Irvine, CA
- Microtherapeutics Headquarter & Manufacturing Cleanroom (96,000 SF) (Medtronic)-Irvine, CA
- Eaton Aerospace Headquarter, R&D and Manufacturing Facility (140,000 SF)-Irvine, CA
- K1 Speed Racing build-out and building seismic improvements-Irvine, CA
- Pretend City-Children’s Museum, Irvine CA
- Broadcom Headquarter Projects Various, Irvine CA
- Printronix Corporate Headquarters and Distribution Facility (85,000 SF)-Irvine CA
- Staco Systems Headquarters, R&D and warehouse Facility, Irvine CA
- Lending Tree, Irvine Various Projects, Irvine CA
- Anchen (Par) Pharmaceutical Headquarter, R&D and Manufacturing Facility, Irvine CA
- Toyota South Campus Tenant Improvements (600,000S F), Torrance CA
- Glendale Adventist Physicians Terrace Office Buildout (70,000 SF)-Glendale CA
- Universal Studios-Mail and Security Facility-Los Angeles, CA
• Numerous ADA and Capital Improvement projects
• Numerous Spec and Market Ready Suites

**Major Renovation Projects**
• One Culver-Major Exterior and Interior Renovations of an 8-store office building, Culver City CA
• 4400 Ruffin Road-Partial Demolition, Renovation & Industrial building addition, San Diego
• Pacific Financial Plaza Campus Redevelopment, Newport Beach Calif.
• Lakeview Technology Park Redevelopment, Irvine CA
• Bake Technology Park Redevelopment, Irvine CA
• Pacific Arts Plaza Campus Redevelopment, Costa Mesa Calif.
• Exodus Communications – LA3 Data Center (106,000 SF), El Segundo,
• LAC+USC Medical Center Campus Northridge Earthquake Recovery

**Ground Up Construction**
• Kaiser Diamond Bar Medical Office Building (35,000 SF), Diamond Bar, Calif.
• Mission Hospital – Education & Conference Center, Mission Viejo, California
• Toyota Motor Sales, South Campus (627K SF and 38 Acres), Torrance, California
• UCLA Gonda Neuroscience Research Center, Los Angeles, California
• San Diego Convention Center-Phase II, San Diego, California
• Harlan Road South Industrial Development (517,000 SF), Layton CA
• Schulte Industrial Development (490,000 SF), Tracey CA
• Glendale Adventist Physician Medical Office Building and Garage, Glendale, California
• San Bernardino Community Hospital Acute Care Addition, San Bernardino, California
• Los Angeles International Airport Terminal 2, Los Angeles, California
• American Honda Corporate Headquarters-Phase I, Torrance, California

**Additional Projects:**
• UCLA Westwood Replacement Hospital, Los Angeles, California
• LAC+USC Medical Center, Los Angeles, California
• LAC+USC Central Support Facility, Los Angeles, California
• Disneyland-Grand Californian Hotel, Anaheim, California
• Library Square Tower (US Bank Building), Los Angeles, California
• The Gas Company Tower, Los Angeles, California
• Universal Studios-Central Security and Mail Facility, Los Angeles, California
• Westwood Gateway Towers II and III, Santa Monica, California

**Education/Certifications**

University of Southern California-BSCE (Building Science-Civil Engineer & Architecture)

USGBC-LEED AP 2006

**Affiliations**
• Commissioner 5th District - Orange County Planning Commission 2014-2018
• Board of Directors Ladera Ranch Civic Council (Founding Member) 2008-2017
• Board of Directors U.S. Green Building Council Orange County Chapter 2007-2011
**PROFESSIONAL EXPERIENCE**
Ms. DeGroff-Coffey has more than 35 years’ experience in both the private and public sectors of the construction industry. She has worked in project management, field supervision and senior corporate management. Ms. DeGroff-Coffey is well versed in providing support and review of project correspondence and field reports for compliance with project plans, specifications, the California Building Code (Title 24), and the Uniform Building Code. Ms. DeGroff-Coffey has both a strong practical background in this very technical field, as well as a sharp focus on client relationship management. This unique blend of skills has resulted in Reliant’s very loyal client base. In addition to overall operational responsibilities of the firm, she leads the company’s growth initiative.

**CORPORATE CULTURE**
Ms. DeGroff-Coffey also leads Reliant’s focus on giving back to the community. Reliant’s involvement reaches from pro bono services for fire training facilities, Habitat for Humanity, HomeAid OC, The Blue Heart International to end human trafficking, Fairway to the future – Sutter Hospital, CASA, Freedom Writers and The Military Children’s Charity.

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**Relationships Built to Last**

- The Irvine Company
- Disneyland Resort
- Sares-Regis Group
- Prologis
- Fullmer Companies
- Nordstrom
- Providence Holy Cross
- Tenet Healthcare
- Northgate Markets
- Bristol Farms
- Jones Lang LaSalle
- Pacific Industrial
- Duke Realty
- CW Driver / Driver SPG
- Associated Ready Mix
- Procast Precast Concrete
- Shea Development
- HCR Manor Care
- KPRS
- Newcastle Partners
- Howard CDM
- The Beverly Center
- RM Dalton
- Smith & Severson
- Alston
- Cannon Building Services

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**REGISTRATION**
- ACI Field Technician
- Radiation Safety Officer
- Nuclear Density and Moisture Operator

**PROFESSIONAL AFFILIATIONS**
- Member, American Concrete Institute
- Member, California Council of Testing & Inspection Agencies
- Member, Sales Marketing Professional Services (past board member)
- Member, NAIOP

**WORK HISTORY**
- Reliant Testing Engineers, Inc., President 2004 – Present
- QAI, Inc., President 2001 – 2004
- Twining Laboratories, Inc. Executive VP 2000 – 2004
- Bernard Brothers, Construction Manager 1999 – 2000
- Master Development Corp, Project Manager 1996 – 1999
- Arriero Brothers, Inc., Project Engineer 1983 - 1993
JACK LUCAS

QUALIFICATION HIGHLIGHTS

- Inspector of Record with experience in capital improvement projects of varied project delivery methods including traditional GC, CM-GC, CM-MultiPrime, and Design-Build.
- Administration of the California Building Code (CBC), referenced standards, and project specifications.
- Emphasis on pre-installation evaluation and specification verification with a goal of overall quality assurance.
- Encourages teamwork, partnering, and open communication between all parties to facilitate early identification and resolution of constructability or code issues.
- A willingness to participate in problem solving to keep the project moving forward.
- Coordination of material testing and specialty inspectors that assures high quality and high value inspection to the owner.

INSPECTION EXPERIENCE

Newport Mesa Unified School District (2013 to 2018)
Costa Mesa, California

As DSA Project Inspector, projects include:

- Wilson Elementary School HVAC Modernization & Administration Upgrades
  - New HVAC systems added to classrooms and administration buildings, a remodel to the administration building, and ADA site upgrades.
- Costa Mesa High School Enclave Buildings
  - CM-GC delivery. 17,000 ft², 2-story structural steel STEM emphasis classroom buildings for 7th & 8th grade students constructed from July 2013 to July 2014.
- Adams Elementary School HVAC Modernization & Administration Building Upgrades
  - New HVAC systems added to classrooms and administrations buildings, a remodel to the administration building, and ADA site upgrades.
- Woodland, Mariners, Back Bay, Kaiser Elementary Schools Photovoltaic (PV) System
  - Underground, structural, and electrical inspection for parking & lunch PV Structures for four schools.
Coast Community College District  (2004 to 2013)  
Costa Mesa, California  

As DSA Project Inspector, projects include:

- **OCC Consumer, Health Science and Biology Labs**
  - CM/Multi Prime delivery. Three buildings, 83,000ft², structural steel and concrete shear wall, Type II construction. An Allied Health building with an EMT training facility and instructional radiology and respiratory hospital suites that include a working medical gas system, respirator stations, x-ray facility, and sleep lab. A five chair state of the art dental suite and dental laboratory. The Biology building has laboratory suites with adjacent prep rooms, fume safety hoods, a Bio-Safety hood, walk-in refrigeration, autoclaves, a Pathology Lab, Plastination Lab, and a Phoenix Air Control System in all laboratory rooms.  
  - Construction Budget: $35,000,000

- **OCC Sailing & Rowing Center Remodel**
  - CM/GC delivery. Two Story CMU and Wood Frame Type V Building. Demolition & reconstruction of Sailing & Rowing Facilities required injection soil stabilization for liquefaction mitigation, unanticipated shoring adjacent structures and City property, and extensive shoring of existing structures.  
  - Construction Budget: $3,200,000

- **OCC Learning Resource Center**
  - CM/MultiPrime delivery. An 89,000ft² two story, structural steel moment connection and braced steel frame, Type II construction, B occupancy. A campus gathering place that includes the Campus Library, computer labs, group study rooms, and large open individual study room with spaces for more than 1000 occupants. The entire building is cyber connected for both hardwire and wireless service.  
  - Construction Budget: $25,000,000

- **OCC Art’s Pavilion & Café**
  - CM/GC delivery. An 8,500ft², CMU and Structural Steel, Type II construction, A-3 occupancy. A stand-alone gallery adjacent to the OCC Art Center. A multi-level security system and a pre-action fire suppression system fill special needs of high security and a high level of property protection. An onsite Café is built out with a tenant improvement for Starbucks Coffee Company.  
  - Construction Budget: $2,500,000

- **Coastline Westminster Learning Center**
  - A 42,000ft² multipurpose community college classroom & office center. Two story, structural custom CMU / structural steel frame, Type V-N construction, B occupancy. Three buildings with instructional rooms, art and science labs, a courtyard plaza with a water feature, and a connecting walkway bridge between buildings.  
  - Project Budget: $11,000,000

EDUCATION
Associate in Arts Degree - Orange Coast College - Costa Mesa, CA  
Civil Technology Certificate  
Construction Technology Certificate | Coastline College – Fountain Valley, CA  
Surveying and Mapping Certificate
Megan Drewen | Special Inspector

PROFESSIONAL EXPERIENCE

Ms. Megan Drewen, joined the Reliant Team in 2016. Her project experience ranges from OSHPD, DSA, commercial, retail, and municipal.

She possesses excellent plan reading skills, extensive knowledge of current building codes including California Building Code, and computer literacy. Megan Drewen uses Reliant’s iPad reporting system, enabling her to deliver daily reports from the field as well as keep running tabs on current work being performed.

In addition to field inspections, Ms. Megan Drewen has been instrumental in growing Reliant’s Southern California presence. She has always been an exemplary inspector on any project he has been a part of.

RECENT REPRESENTATIVE PROJECTS

Providence Holy Cross – Mission Hills
- Provided special inspection for trash compactor renovation and lab renovation
- Reinforced concrete and CWI welding inspection.

Providence Saint Josephs
- Fire panel installation.
- Reinforced concrete special inspection.

Valley Presbyterian Hospital
- Pharmacy renovation, roof replacement, and ED renovation.
- Reinforced concrete, CWI welding, fireproofing inspection.

Hollenbeck Palms Skilled Nursing Facility
- Duct support replacement, dining room extension.
- Reinforced concrete, CWI welding inspection.

New Vista Post-Acute Care Center
- Parking bollard replacement.
- Reinforced concrete inspection.

Century City Hospital
- Perimeter wall renovation, Mechanical room renovation.
- Fireproofing, reinforced concrete inspection.

Fountain Valley Hospital
- Parking Lot, Reinforced concrete inspection.

Sherman Oaks Hospital
- ER Renovation, Nurse call replacement, CA commercial building inspection.

EDUCATION
- California State University-Long Beach

CERTIFICATIONS
- AWS Certified Welding
- ICC Reinforced Concrete
- ICC Structural Masonry
- ICC Welding and Bolting
- ICC Spray Applied Fireproofing
- ACI Grade 1 Field Technician
- Fye Fiber Wrap Certification of Completion
- CA commercial Building Inspector
PROFESSIONAL EXPERIENCE

Mr. Nathan Haley brings over 16 years of experience from the construction industry. He has served as an inspector on numerous large-scale projects.

He has been working as a special inspector on concrete, pre-stressed concrete, masonry, structural steel/welding, Fiber reinforced construction for commercial, and residential projects.

Mr. Haley has excellent communication, plan reading skills as well as extensive knowledge of up to date building codes.

RECENT REPRESENTATIVE PROJECTS

Newport Mesa USD, Costa Mesa High School – Costa Mesa
  • FRP repair of gymnasium beams.

Fountain Valley Regional Medical Center Utility and Generator Upgrade
  • Provided epoxy dowel inspections.

Pacific Arts Plaza Parking Structure
  • 110k square foot, 350 car, 3 level parking structure in Costa Mesa with post tensioned decks, caissons, and masonry accents.

Disneyland Resort
  • Performed concrete, welding and masonry inspection for various locations in and around the resort. Most notably the Matterhorn track replacement and rehab, Rivers of America track installation and 400 block restoration.

Whole Foods Site Improvement-Fashion Island
  • Performed concrete, epoxy, masonry, welding and FRP installation inspections throughout Fashion Island Newport Beach.

630 Newport Center Drive Expansion
  • Performed continuous concrete, post tension concrete, masonry, and fiber reinforcing installation for the expansion of a 3-level parking structure near Fashion Island Newport Beach.

Hill Resort Villas, Hotel, Recreation Center, Newport Coast, Ca
  • 1.5 Years as Inspector of Record overseeing all concrete placement, PT slabs, CMU buildings, pool shotcrete and related site work.

CERTIFICATIONS
  • AWS Certified Welding
  • ICC Reinforced Concrete
  • ICC Structural Masonry
  • ICC Structural Steel Welding and Bolting
  • ICC Pre-Stressed Concrete
  • ICC Spray Applied Fireproofing
  • ACI Grade 1 Field Technician
  • TYFO Manufacturers
  • CA commercial Building Inspector

CITY LICENSE
  • City of Irvine
  • City of Newport Beach
  • City of Orange
  • City of San Clemente
  • City of Tustin
  • City of Dana Point
Appendix B: Professional Services Agreement Acceptance Form

Firm Name: Jett Construction Management

Address: 29 Salinger Court

City Coto de Caza State CA Zip Code 92679

Telephone: 949-283-0007 Fax: 

I have reviewed the RFP and Professional Services Agreement in their entirety. Our firm will execute the Professional Services Agreement with no exceptions.

Name of Authorized Representative: Jett McCormick

Signature of Authorized Representative: 

Date: August 28, 2018
MEMORANDUM

TO:       Engineering and Operations Committee
FROM:     Phil Lauri, PE, Assistant General Manager
DATE:     September 18, 2018
SUBJECT:  Programmable Logic Controllers and Supervisory Computer System Assessment

RECOMMENDATION

Recommend that the Board of Directors award a contract to TJC and Associates, Inc. in the amount of $70,050 and a contingency of $15,000 for a not-to-exceed amount of $85,050 to provide a Programmable Logic Controllers and Supervisory Computer System Assessment, and authorize execution of the contract.

STRATEGIC PLAN

Goal #1: Provide a safe, abundant, and reliable water supply.
Goal #2: Practice perpetual infrastructure renewal and improvement.

PRIOR BOARD ACTION/DISCUSSION

At its August 21, 2018 meeting, the Engineering and Operations (E&O) Committee received an information item that a Request for Proposals for a Programmable Logic Controllers and Supervisory Computer System Assessment was being solicited.

BACKGROUND

Mesa Water District’s (Mesa Water®) supervisory computer system was installed in 2012/2013. The supervisory computer system consists of 37 sites at the Mesa Water Reliability Facility (MWRF), wells, reservoirs, import stations, and pressure stations that send operational and control data via radio to three data concentrator sites located at Mesa Water’s main headquarters building, the MWRF, and Reservoir 2. The three data concentrators are the backbone of the system and are connected by three radio antennae. The supervisory computer system includes several servers for control programming, software application functionality, data historian’s management (located in the Emergency Operations Center as well as at the MWRF), three radio antennae, and numerous programmable logic controllers (PLCs) and Remote Terminal Units (RTUs). Like all computer equipment, the electronic components have a finite life expectancy and require on-going assessment and replacement as end-of-life is reached.

Mesa Water received a notice from Schneider Electric that its Modicon Quantum PLCs and Input/Output (I/O) modules will no longer be supported nor available for purchase from Schneider Electric. The Mesa Water Reliability Facility (MWRF) has three PLCs installed around the year 2000 for the original Colored Water Treatment Facility that used this now obsolete Modicon Quantum hardware. In order to maintain the overall viability of the supervisory computer system as its components reach end-of-life, a complete assessment of the supervisory computer system is needed.

DISCUSSION

A Request for Proposal (RFP) for a PLC and Supervisory Computer System Assessment to
systematically plan for end of life of the Mesa Water supervisory computer system components. This was developed to initiate a replacement plan and schedule for those systems. The RFP was developed by staff with input from Mesa Water’s SCADA Integrator. Key tasks include:

1) Inventory Mesa Water’s supervisory computer system main components (i.e., PLCs, Central Processing Units (CPUs), RTUs, data concentrators, etc.);

2) Identify critical hardware components and supporting software; and

3) Develop an end-of-life replacement plan for all hardware and software.

Industry-leaders in the supervisory computer system arena to receive the RFP were identified by reaching out through the American Water Works Association and International Society of Automation. The RFP was sent to the following seven consultants: Aspect Engineering Group (Aspect), Brady, Brown and Caldwell, Carollo, HDR, TJC & Associates, Inc. (TJC), and Westin. Four proposals were received. The cost proposals are shown in the table below:

<table>
<thead>
<tr>
<th>Proposer</th>
<th>Submitted Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>TJC</td>
<td>$48,230</td>
</tr>
<tr>
<td>Westin</td>
<td>$48,424</td>
</tr>
<tr>
<td>Brady</td>
<td>$46,988</td>
</tr>
<tr>
<td>Aspect</td>
<td>$52,670</td>
</tr>
</tbody>
</table>

Two finalists, TJC and Westin, were interviewed based on their proposals. Both finalists are industry leaders with strong references and California-based staff. TJC’s approach, experience, and project organization is more in alignment with Mesa Water’s scope of work requirements than Westin’s project delivery approach. TJC’s organization focused on a seasoned Project Manager with strong technical and client satisfaction skills who would be directing technical mid-level staff and reviewing deliverables. Westin’s organization had a non-technical Project Manager and put Mesa Water in charge of managing the individual technical team members. TJC’s organization was preferred as it provides a smoother path to a successful outcome. TJC also had a slightly lower cost than Westin, and is recommended as the best value selection. TJC’s proposal in response to the RFP is provided as Attachment A.

After the proposals were evaluated, it was noted and recommended by the Consultant that a complete network architecture diagram to describe the Supervisory Computer System had never been developed and would be helpful for future system management. In addition, the key components of the Supervisory Computer System, including the radio communications system and the supervisory control computer hardware were recommended to be assessed to ensure a complete end of life plan that includes these key components, and all equipment remains compatible during the phased equipment replacements. Evaluation of these components were added to the scope of work; TJC’s revised cost proposal is $70,050. TJC’s revised scope of work and fee schedule is provided as Attachment B. Staff recommends that the Board consider awarding a contract to TJC for $70,050 and a contingency of $15,000 for a not-to-exceed amount of $85,050.
FINANCIAL IMPACT

In Fiscal Year 2019, $100,000 is budgeted for the Mesa Water Reliability Facility PLC Replacement Study; no funds have been spent to date.

ATTACHMENTS

Attachment A: TJC Proposal
Attachment B: TJC Revised Scope and Fee, Redline
Proposal for
PLC Assessment

July 11, 2018

TJC and Associates, Inc.
2890 North Main St., Suite 303
Walnut Creek, CA 94597
(925) 357-2676
www.tjcaa.com
July 11, 2018

Karyn Igar, P.E.
Senior Civil Engineer
Mesa Water District
1965 Placentia Avenue
Costa Mesa, CA 92627

Subject: Proposal for PLC Assessment

Dear Ms. Igar:

On behalf of TJC and Associates, Inc. (TJCAA), we wish to thank you for the opportunity to submit our proposal for the District’s PLC Assessment Project. TJCAA is excited about our involvement in this effort, as it is particularly well suited to our firm’s capabilities. We believe that our team’s qualifications will provide the following benefits to the District:

**Applicable Experience:** Our experience in both design and programming makes us uniquely qualified to assess existing control systems and make recommendations for replacement that will meet the District’s needs over the long-term. Having performed dozens of PLC upgrade projects we have learned valuable lessons that provide our clients with the knowledge necessary to make intelligent decisions in selecting equipment and adopting standards.

**Technical Expertise:** As Project Manager, I bring over 30 years of system integration experience. I am supported by our staff of qualified engineers and technicians including our Project Engineer, Lee Meyer, P.E., and Helen Tran, our Senior Control Systems Technician. We bring a wealth of experience on design and programming projects and have provided similar work for several other clients throughout California. This technical breadth benefits the District because we consider design elements from electrical wiring through SCADA configuration and startup.

**Client Focused:** Having supported a wide variety of water industry clients over the past decades we have become well adept at developing solutions that are specifically designed and tailored to meet our client’s needs. Our designs and software are always developed based on feedback from client stakeholders and maintaining defined client standards.

Again, thank you for the opportunity to submit this proposal. Should you have any questions regarding this proposal please do not hesitate to call or email me (michael@tjcaa.com) or Paul Giorsetto (paul@tjcaa.com). We can be reached in our Walnut Creek office at (925) 357-2676.

Sincerely,

Michael J. Erwin, P.E.
Principal, Project Manager
TJC and Associates, Inc.
Section 1: Firm Overview

1.1 FIRM BACKGROUND

TJCAA is a small business enterprise, providing engineering services to both end users and other engineering firms. TJCAA supports clients throughout California and the western United States. Founded by Terence Cavanagh, S.E. and Gianna Zappettini as a structural engineering firm in 1998, TJCAA expanded in 2006 to offer multidiscipline design solutions in Structural Engineering, Electrical Engineering, and Instrumentation and Control (I&C).

TJCAA’s head designers, Terry Cavanagh and Paul Giorsetto, each provide over 30 years of experience, respectively, in delivering creative solutions for special districts, municipalities, and commercial/industrial clients. The TJCAA team provides expertise in design of structural, I&C, and electrical infrastructure for water and wastewater treatment plants, pump stations, and support facilities.

In 2012, Mike Erwin joined the TJCAA group. Mike brought to bear his 30-plus years of experience as a designer and system integrator working on control systems in the water and wastewater industry. Mike has been the point person for expanding TJCAA services to include Control System Programming (CSP) to our suite of services. Our CSP group, with its growing staff of system programmers, brings a combination of PLC and SCADA programming skills coupled with design and field experience to implement practical and effective CSP solutions.

1.2 CONTROL SYSTEMS PROGRAMMING GROUP

TJCAA’s Control Systems Programming group is comprised of engineers and programmers with real-world knowledge and a deep understanding of process control for the water industry. From configuring SCADA servers to calibrating instruments our CSP group offers a unique blend of qualifications and hands-on experience to meet our client’s most challenging needs.

TJCAA has designed, programmed, and implemented scores of PLC, RTU, and I/O upgrade projects. These experiences have enabled us to develop a set of best practices, design tools, and programming methods that ensure successful projects.
Section 2: Firm Qualifications

2.1 PROJECT DESCRIPTIONS AND REFERENCES

We take pride in the relationships we have established with our clients, and in the many successful projects we have performed over the years. Below are three references for relevant projects we have completed during the last five years. We encourage you to discuss our firm’s excellent service with our clients.

<table>
<thead>
<tr>
<th>Client Reference</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alameda County Water District</td>
<td>Treatment Plant 2 was originally commissioned in 1994 to provide up to 24 MGD of drinking water to the cities of southern Alameda County. The plant control system was comprised of three Modicon 984-785 Hot-Standby PLC systems, two stand-alone Modicon 984-785 PLC systems, and 41 remote I/O panels. In 2015, TJCAA was hired to provide both engineering services to upgrade the PLCs, I/O panels, and rewrite the PLC programs. The project was completed over three phases in three years. The first phase included upgrading the Plant and Dewatering PLC systems to Unity processors and rewriting the PLC programs. Phase 2 work included upgrading the Chemical and Ozone PLC systems to Unity processors, upgrading the associated I/O panels to X80 series I/O, and rewriting the PLC programs. In Phase 3 the remote I/O panels associated with the Plant and Dewatering PLC systems were upgraded to X80 series I/O, and the Turnout PLC was upgraded to a Unity processor with a new PLC program.</td>
</tr>
<tr>
<td>City of Benicia</td>
<td>In 2014, TJCAA was awarded the contract to upgrade the existing WTP 90-70 PLC to the PACSystems RX3i and to provide a fully updated and documented PLC program for control of the water treatment plant. The design included disconnecting all field wiring and removal of the entire MCP mounting panel, installation of a new mounting panel with all new components, and re-termination of the existing field wiring on the new terminal blocks. TJCAA provided project management for the City for the design and installation of the replacement PLC panel, programming of the new PLC system, and functional acceptance testing of the new program to bring the plant back into fully automatic operation. The programming portion of the work included some unique challenges. Since most of the existing 90-70 program was not documented, the iFix database export file from the plant’s existing SCADA software was used to document the PLC tags, then the existing ladder logic was used to determine how the existing PLC controlled each plant process. Once we determined how the process was controlled, the PLC program was rewritten and fully documented. Using the latest programming features and techniques, we were able to reduce the size of the program by about 20%. New user defined function blocks were developed for scaling analog I/O to real numbers (in engineering units), totalizing flows, controlling equipment cycle timers, tracking equipment runtimes, and filtering noisy analog input signals. A 24-hour plant shutdown was scheduled for installation of the new PLC panel and to begin testing of the new PLC program. The plant was back online with most systems under automatic control within 48 hours of the start of the plant shutdown.</td>
</tr>
</tbody>
</table>

Team Members Involved: Michael Erwin, P.E.
Lee Meyer, P.E.
Jacqueline Arama, P.E.

Project Year: June 2015 – April 2018
Contract Value: $760,000
Benjamin Egger, P.E.
Project Engineer
(510) 668-4482
Benjamin.Egger@acwd.com

Team Members Involved: Michael Erwin, P.E.
Jacqueline Arama, P.E.
Maria Aguirre

Project Year: January 2014 – June 2015
Contract Value: $87,250
Leo Larkin
Plant Superintendent
(707) 746-4293
LLarkin@ci.benicia.ca.us
### Client Reference

| City of Malibu                      | TJCAA teamed up with RMC Water and Environment in 2013 on the design of a new wastewater plant to serve the Civic Center area of the City of Malibu. TJCAA's scope of work included the Electrical and Instrumentation & Control portions of the treatment plant, two lift stations, and three injection wells. The design included three in-plant PLCs, three packaged system PLCs for membrane bioreactors, UV treatment and solids treatment, and PLCs at each of the lift stations and injection wells. TJCAA was awarded the PLC and SCADA programming for the project, while the plant was under construction, in April of 2016. TJCAA's scope of work included programming for eight Rockwell CompactLogix PLCs, SCADA configuration and programming for the entire collection and treatment system using Ignition software by Inductive Automation, and startup and commissioning of the control system. Programming included PLC to PLC communications over an area wide fiber optic network, development of User Defined Variables and Add-On Instructions for control of the pump stations, dissolved oxygen system, chemical injection systems, odor control systems, and process alarm handling for unmanned operation. |
| Civic Center Wastewater Treatment Plant |  |
| Team Members Involved: Michael Erwin, P.E. Lee Meyer, P.E. Helen Tran |  |
| Project Year: January 2013 – July 2018 |  |
| Contract Value: $370,000 |  |
| Rob DuBoux, Esq., P.E. Assistant Public Works Director City Engineer (310) 456-2489 x 339 RDuboux@malibucity.org |  |

### City of Benicia

#### Water Treatment Plant PLC Upgrade Project

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.jpg" alt="Before" /></td>
<td><img src="image2.jpg" alt="After" /></td>
</tr>
</tbody>
</table>

TJC and Associates, Inc.
Section 3: Project Team

TJCAA has assembled a team of design professionals with proven ability providing services similar to those described for the Project. TJCAA is committed to allocating these resources throughout the life of the Project. The following organization chart presents our proposed Project team and relationships.

Resumes for the Project team members are included in Appendix B. The team members shown below are all available to be assigned to this project through all phases of assessment, design, and construction, as needed. Refer also to Section 1 for experience of the management team and technical expertise.

3.1 KEY STAFF

*Michael J. Erwin, P.E. – Project Manager*

Mr. Erwin has been building valuable experience since 1986 in the design, implementation, and management of electrical power, control, automation, and instrumentation systems. He performs control system and electrical design engineering for water and wastewater treatment, collection, and distribution systems, focusing on instrumentation and control system design and control system programming (CSP). Mr. Erwin has hands-on familiarity with a variety of PLC and SCADA platforms. He gained his extensive experience not only as a consultant, but also as chief engineer and project manager for a systems integrator. With this background, he provides a viewpoint that emphasizes constructability and systems featuring maximum operator usability and efficiency.
Lee G. Meyer, P.E. – Project Engineer
Mr. Meyer is an electrical engineer with experience in electrical power and control systems engineering for the water and wastewater industry. He has performed the full scope of low-voltage (under 600 V) design including control panels, motor control centers, utility metering, transformers, switchboards, load centers, variable frequency drives, PLCs, and SCADA. His design experience also includes Ethernet and fiber-optic networking, radio telemetry, and relay logic. Mr. Meyer is familiar with NEC, NFPA, ISA, UL508A and UL698A standards and has provided engineering support for drafting and production teams. He has provided construction management services, including preparing and reviewing engineering drawings, submittals, engineering change orders, and requests for information.

Helen Tran – Senior Controls Technician
Ms. Tran an automation engineer with nearly 15 years’ experience in I&C and system integration. She has performed a variety of electrical and I&C designs for process equipment and utility systems. With a background in the electric power, biotechnology, and water treatment industries, Ms. Tran applies practical knowledge in design, documentation, programming, and configuration of control system hardware and software components. She is adept at interpreting client processes and operations, planning/design/implementation of automation, and providing support for system integration projects under a variety of automation hardware and software platforms.

Paul J. Giorsetto, P.E. – Principal-in-Charge, QA & QC
Mr. Giorsetto has over 35 years of design experience in the areas of control systems, telemetry, and industrial electrical applications. For the last 25 years, he has been responsible for multidiscipline groups on a variety of projects, maintaining project schedules, tracking earned value to budgets, and overseeing the quality of the design work products. His technical capabilities and experience include electrical system instrumentation and in-plant and remote telemetry SCADA systems. Mr. Giorsetto has been the electrical and/or instrumentation and controls (I&C) discipline lead on numerous large water design projects.
Section 4: Approach to Work

4.1 PROJECT APPROACH

TJCAA engineers will work with the District stakeholders to provide a PLC Assessment that will meet the District’s goals and provide a clear path forward to operate and maintain a highly reliable and well-functioning control system. Our recommendations will consider technical alternatives, the District’s history with the current systems, prevalent trends in the water industry, system reliability, serviceability, available technical support, local product support, and budget constraints.

The District has identified five Tasks associated with this assessment, and each task has an associated deliverable. The tasks and deliverables are detailed below.

Task 1: Narrative of the State of the PLC Industry

The deliverable for Task 1 will be a Technical Memorandum that describes the hardware, industrial networks, control system architectures, software, and current methods that are currently used for the water treatment and distribution industry. The memo will include a comparison of leading manufacturers, methods for technical support, product availability, partnerships with local system integrators, product life expectancies, and various product levels that are available.

TJCAA engineers meet regularly with PLC and SCADA manufacturers’ representatives, continually update our design standards and specifications to reflect current products and methods and, attend industry trade group meetings in order to keep tabs on current trends and technologies. In this era of disposable electronics, product obsolescence is a fact of life, especially in an industry that is relatively slow to deploy new technologies. Although control system hardware components will become obsolete, by employing intelligent design methods and modern programming techniques we can ensure that future replacement of obsolete hardware can be done with minimal disruption to the treatment process, and minimal cost to the District.

As part of Task 1, in addition to the Technical Memorandum, TJCAA will facilitate a Workshop with District stakeholders to discuss the current state of the industry and present control system alternatives that will benefit the District. The Workshop will also give us an opportunity to discuss project goals and review the current installed system.

Task 2: PLC and RTU Inventory

Once we receive record drawings from the District, TJCAA will review the drawings and fully document the currently installed system. An Excel spreadsheet will be used to document the attributes of each PLC and RTU system, including:

- PLC type and manufacturer
- Model number
- Hardware version
- Firmware version
- Programming software and current version used
- Year installed
- Life cycle status and remaining service life
- Rack type/setup
- Digital I/O card type and quantity
- Analog I/O card type and quantity
- I/O card capacity/extensibility
Task 3: Software and Programming Inventory

Under Task 3, TJCAA will document the programming software and languages that are currently used by Mesa Water District for PLCs, RTUs, and the SCADA system. The Excel spreadsheet created under Task 2 will be used to document the current installed software, including:

- The software manufacturer
- Software part number
- Software version
- The current licenses owned by the District
- Current availability and support level for the software
- Annual cost of maintaining licenses

TJCAA engineers will also perform a review of each of the PLC and RTU programs and document program organization, structure, languages used, consistency, tagging and annotation, data organization, efficiency, and control functions.

Once the programs have been documented, TJCAA will provide a summary report for each software package that identifies current use, software life cycle status, and recommended consolidation and upgrades.

Task 4: Replacement Planning and Recommendations

Once our hardware and software assessments are completed, TJCAA will prepare a Replacement Planning and Recommendations report. The report will organize sites based on the urgency of the recommended replacement; Immediate, Near-Term, and Long-Term. Our site by site recommendations will include the following.

- Expected life of the existing equipment.
- Scope of the replacement – PLC components, network components, power distribution and DC supplies, complete mounting panel assembly, or entire control panel.
- Down time required for recommended replacement scope.
- Replacement PLC manufacturer and series.
- Programming upgrade – conversion or rewrite.
- SCADA interface considerations.
- Estimated cost of the replacement.
- Replacement schedule, including drawing development, procurement, fabrication, programming, installation, and testing.
- Improvements to panel reliability and safety.

The report will also include a list of common control functions that can be implemented using standard user-defined function blocks on each of the Districts platforms.
Once the District has had an opportunity to review the replacement planning and recommendations, TJCAA will host a screen sharing conference call to discuss our findings and recommendations with the District.

**Task 5: Summary Report**

The deliverables from Tasks 1 through 4 will be combined with feedback from the District’s stakeholders and summarized in a Summary Report. The Summary Report will include a recommended schedule, budgets and phasing for replacement projects, a list of District wide recommendations, site by site replacement recommendations, the District’s tagging and naming standards, future hardware and software maintenance strategies, and a list of next steps.

### 4.2  KEY CHALLENGES

Based on our extensive experience in this area, we have identified three key challenges to the project that will need to be considered and addressed in developing a PLC replacement plan and recommendations for the District.

- A viable implementation and transition plan.
- Upgrading to modern programming techniques while maintaining the interface with the existing SCADA software.
- Developing design criteria to minimize the number of differing hardware and software platforms that must be maintained by the District.

**Implementation and Transition Plan**

Even when the replacement PLC equipment has been selected, there are many aspects that must be considered in developing a plan for installing that equipment. Some questions to consider are:

- Should only PLC components be upgraded, or does it make sense to replace the entire mounting panel assembly?
- What are the operational constraints that will limit down time for the processes being upgraded?
- How much of the preparation work can be completed before shutting down the system to perform an upgrade?
- How should processes be prioritized when testing and commissioning an upgraded control system?
- What network and program changes are necessary to maintain PLC to PLC communications and communications with SCADA systems when PLC systems are upgraded?
- Should programs be converted from older PLC programming software, or should the program be rewritten?

TJCAA will tailor an implementation and transition plan specifically to meet Mesa Water District’s technical needs, budget limitations, and operational constraints. Below is a summary plan for a 48-hour transition strategy developed and successfully implemented for the Benicia Water Treatment Plant PLC Upgrade Project.
Interface to the Existing SCADA System

With the advent of reliable industrial high-speed networks and efficient new communication protocols, programming methods and data structures used to transmit information between PLCs and SCADA systems have evolved significantly over the past ten years. Where we once used arrays and register tables of similar data types (e.g. integers, Boolean, etc.) to transmit information between industrial equipment, today’s technologies allow us to package information in user-defined data types (UDTs) that are based on process equipment and/or specific control functions. For example, in Figure 1 below, a single UDT variable called Pump2112 contains all of the information for Booster Pump 2. In older systems, the same amount of information would have required 17 variables, separated into three different types of data tables.

![Figure 1 - A single variable "Pump2112" includes all of the data available for Booster Pump 2](image-url)
The use of modern programming techniques is crucial to developing a reliable control system that can be maintained for the next decades. Unfortunately, in most cases the SCADA software and the PLC systems are not upgraded at the same time or under the same project. Without significant and expensive updates to the way the SCADA software is configured, the existing SCADA system will not be able to take advantage of the newer data structures. In order to maintain the operation of the existing SCADA software, the upgraded PLC systems must provide information using the data arrays and register tables that were common when the system was originally installed.

TJCAA has used several different solutions on several different PLC platforms to overcome this problem. Determining the best approach for Mesa Water District will depend on the age of the existing SCADA software, capabilities of the existing SCADA software, plans for upgrading the SCADA software in the near future, and budget constraints. TJCAA has implemented and/or specified these techniques for several clients including Santa Clara Valley Water District, City of Malibu, and Union Sanitary District.

**Common Design Criteria**

Even those agencies that have successfully standardized on a single PLC manufacturer have great difficulty maintaining all facilities on a common hardware and software platform. Over time facilities are upgraded at different rates, hardware becomes obsolete, different firmware versions are installed at different locations, and updated systems get programmed with newer software versions.

While these issues can’t be entirely avoided, their impacts can be mitigated by using a proactive upgrading strategy to manage hardware, firmware, and software versions at all District facilities. TJCAA has successfully implemented strategies for several of our clients to maintain common programming versions, schedule firmware upgrades, schedule hardware upgrades, maintain a control system inventory system, and manage PLC program version control.

In addition, developing an approach for implementing system wide standardization and use of programming modules can also be beneficial in managing transition and technical advances. For example, standards based on programming templates or subroutines can simplify upgrades of programming code across the system. Our team has implemented standardized programming modules and assisted our clients with developing standards at the Alameda County Water District, City of Malibu, City of Palo Alto, City of Benicia, Contra Costa Water District, East Bay Dischargers Authority, Union Sanitary District, Stockton East Water District, and Bella Vista Water District.

Custom programming modules are especially useful in applications that are repeated throughout the control system. They help the user to maintain consistency and ensure that identical programming methods are used by all programmers and technicians that maintain and modify the system.

In the Figure 2 below, TJCAA developed a custom analog input scaling function that results in an implied decimal integer value for interface to an existing older SCADA system, and a REAL value in engineering units for use in the PLC program, and to interface to the client’s planned upgraded SCADA system.
TJCAA has also developed custom programming modules for alarming, pump alternation, flow totalizers, elapsed runtime meter/starts counter, analog signal filtering, on/off cycle time control, modulating valve positioning control, and complex calculations. Figure 3 below shows the use of a chemical dosage calculation module that was developed for a water treatment plant with 16 separate chemical injection areas.

4.3 ASSUMPTIONS AND CLARIFICATIONS

TJCAA has included the following assumptions and clarifications in preparing this proposal.

1) The project scope will be completed in 2018 and the project schedule proposed in the RFP will be maintained.

2) TJCAA will facilitate one workshop at Mesa Water District facilities during Task 1. Site visits will be scheduled for the same day as the workshop to allow TJCAA to review a sample of the current installations and review the existing network and SCADA system. All other meetings will be held via conference calls with screen sharing.

3) TJCAA will setup a Dropbox folder for the project to allow file sharing between TJCAA and the District’s project staff.

4) Work will be performed primarily at TJCAA’s Walnut Creek office.

5) Project deliverables will be transmitted to the District in Adobe pdf format, native electronic format (MS Word and Excel), and hard copies as detailed in the RFP.

6) The District will provide TJCAA with as-built drawings of all PLC and RTU panels in Adobe pdf format, PLC and RTU panel programs in native electronic format, and requested electronic files from the District’s existing SCADA system.
7) TJCAA is a Schneider Electric Alliance Partner, Rockwell Automation Partner, GE Intelligent Platforms Solution Provider, and Inductive Automation Core Certified Integrator. These programs provide TJCAA software licenses. For other manufacturers, TJCAA may request the use of District software licenses to review electronic versions of the PLC and RTU programs.
Section 5: Fee Proposal

Our Fee Proposal is detailed on the next sheet. The estimate includes labor rates, labor classifications, direct costs, and estimated level of effort for each task.
### Mesa Water District

**PLC Assessment Project**

#### Personnel Name and Grade

<table>
<thead>
<tr>
<th>Personnel Name</th>
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<td>Paul Giorsetto</td>
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<td>Michael Erwin</td>
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<td>Lee Meyer</td>
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<td>Helen Tran</td>
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<td>AutoCAD Admin</td>
<td>C5</td>
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<td>Admin</td>
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#### Task Description and Subtotals

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**Total Direct Costs:** $48,230
Appendix A

Resumes
Michael J. Erwin, P.E.  
Principal

Experience

Michael Erwin, who heads up TJCAA’s Control Systems Programming group, has been building valuable experience since 1986 in the design, implementation, and management of electrical power, control, automation, and instrumentation systems. He performs electrical design engineering for water and wastewater treatment facilities, collection and distribution systems, and industrial facilities, focusing on instrumentation and control system design and programming. His specific experience includes development of power calculations, protective device coordination, equipment specification, instrument selection, and control panel fabrication design; design of SCADA systems for in-plant and telemetry-based systems; and programmable logic controller (PLC) programming.

Mr. Erwin has hands-on familiarity with a wide variety of PLC and SCADA hardware and software platforms, including Rockwell Automation, Schneider Electric, and GE Intelligent Platforms. He gained his extensive experience not only as a consultant, but also as chief engineer and project manager for a Northern California systems integrator. With this understanding of the water/wastewater, control system, and construction industries, he emphasizes constructability and focuses on systems that feature maximum operator usability and efficiency. His experience includes the following:

- **Treatment Plant 2 PLC Upgrade Project; Alameda County Water District; Project Manager/Lead Programmer.** Treatment Plant 2 was built in 1993 and included four Modicon 984-785 PLC systems, three of which were hot-standby PLCs. Michael Erwin was one of the PLC programmers on the original 1994 project. The PLC upgrade project involved converting the original Modicon 984 PLC programs to the latest version of Schneider Electric’s Unity software and testing and commissioning new Quantum Unity PLC systems to replace the existing PLCs. The programming work included development of new ACWD-defined function blocks, conversion of the LL984 ladder for plant control functions, and thoroughly bench-testing all aspects of the new program before installation and testing in the field.

- **Oro Loma Effluent Pump Station Control System Upgrade Project; East Bay Dischargers Authority, San Lorenzo, CA; Project Manager/Programmer.** The Oro Loma Effluent Pump Station collects treated wastewater from Hayward, San Leandro, San Lorenzo, Castro Valley, and Union City and pumps the treated water through a dechlorination station and into San Francisco Bay. The pump station consists of two 350-hp electric pumps on variable frequency drives (VFDs) and two 1,200-hp diesel driven pumps, and has a pumping capacity of over 200 mgd. The first phase of the project involved development of a control system design package to replace three existing Automation Direct PLCs and two Woodward engine controllers with two Quantum Unity PLCs that provided parallel control to two pumps each. In the second phase of the project TJCAA developed the new Unity PLC control programs and
configured the plant’s existing Wonderware system to monitor the control of the pump station.

- **Water Treatment Plant (WTP) PLC Upgrade Project; City of Benicia, CA; Project Manager/Programmer.** The Main PLC at the City’s WTP had become obsolete and difficult to maintain. In addition, multiple undocumented changes had been made over the past 15 years while the City’s maintenance staff was keeping the system operating reliably. The project included field verifying and “as-building” the existing PLC control panel, developing a bid set of documents for replacement of the PLC control panel, and programming the new GE RX3i PLC to improve performance of some treatment processes and a fully documented PLC control program. Because the plant was in operation, the installation team had only 24 hours to remove the existing PLC panel, install the new panel, and bring the plant’s primary processes back into operation. Not only was the installation completed on time, the plant was back in full automated operation within 32 hours of the initial plant shutdown.

- **Rinconada WTP Reliability Improvement Project; Santa Clara Valley Water District; Los Gatos, CA; Lead I&C Engineer.** Oversaw the electrical engineering and control systems design work for the $180 million WTP modernization. This project incorporates capacity increases to raise plant output to 100 mgd and incorporates new ozone treatment trains, multiple new and retrofitted chemical systems, filters, and floc-sed basins. The design was developed to maintain the plant in operation throughout the estimated 5-year construction period. Design included new 12-kV distribution, arc flash protection strategies, a new 3-MW diesel standby generator, and new distributed motor control centers with smart motor starters and VFD equipment. I&C design incorporated a new distributed PLC architecture coordinated with construction phasing and new processes. Final design included over 400 electrical, instrumentation, and controls design drawings.

- **Civic Center Wastewater Treatment Plant (WWTP); City of Malibu, CA; I&C and Electrical Discipline Lead; Control Systems Programming Lead.** Lead I&C, electrical engineer, and programmer for new greenfield WWTP and collection system pump stations for City of Malibu. This project included new SCE service, secondary selective 480-V distribution for reliability, standby generation, and local motor controls. The I&C design incorporated distributed controls based on PLCs and integration of control platforms provided by process package suppliers. Developed and commissioned seven Rockwell Studio 5000 PLC programs, managed development of the Ignition SCADA software application, and coordinated system integration of three packaged PLC systems.

**Publications and Presentations**


Lee G. Meyer, P.E.
Electrical Engineer

Experience

Lee Meyer is an electrical engineer with experience in electrical power and control systems engineering for the water and wastewater industry. He has performed the full scope of low-voltage (under 600 V) design including control panels, motor control centers (MCCs), utility metering, transformers, switchboards, load centers, variable frequency drives, programmable logic controllers (PLCs), and SCADA. His design experience also includes Ethernet and fiber-optic networking, radio telemetry, and relay logic.

Mr. Meyer is familiar with NEC, NFPA, ISA, UL508A, and UL698A standards and has provided engineering support for drafting and production teams. He has provided construction management services, including preparing and reviewing engineering drawings, submittals, engineering change orders, and requests for information.

His specific experience includes the following:

- **Treatment Plant 2 PLC Upgrade Project; Alameda County Water District; Fremont, CA; Control Systems Programmer.** Developed programming for an upgrade of the 21-mgd Water Treatment Plant (WTP) 2 PLC from an obsolete 984-series ProWorx PLC system to a modern Quantum Unity PLC system. Performed programming and bench-testing the new system, which involved I/O testing, SCADA testing, and function testing. This project also included field-verification and maintenance of PLC-related as-built documentation including PLC wiring diagrams, system design narratives, and coordination spreadsheet.

- **Rinconada WTP Reliability Improvement Project; Santa Clara Valley Water District; Los Gatos, CA; Electrical Designer.** Performed electrical engineering and control systems design as part of a $135-million WTP modernization. Performed a change order design for converting all PLCs and instrumentation from 120 V AC to 24 V DC. This project involves demolition and phased expansion of an 80-mgd plant while maintaining plant operations.

- **WTP A and B Electrical Improvements; City of Antioch WTP; Antioch, CA; Electrical Engineer.** The City’s two WTPs provide roughly 6.4 billion gallons of treated water annually. This project included a comprehensive electrical inventory documenting condition, settings, and circuiting details. Mr. Meyer performed site reconnaissance, modifications to the SKM electrical model, arc flash calculations, and arc flash label installation. Mr. Meyer also was the staff engineer on the system design upgrades, including replacement of the WTP A 480-V switchboard, main automatic transfer switch, and MCCs.

- **SCADA System Integrator Projects FY 2014–2016 (extended to 2018); Contra Costa Water District, Concord, CA; Programmer.** TJCAA was selected by Contra Costa Water District for performing all system integration tasks for District projects during the fiscal year. Mr. Meyer has performed a variety of tasks including technical and commercial comparisons of HMI platforms to assist the
District in selection of new software, field reconnaissance of remote telemetry units to accommodate system upgrades, and review and modifications of PLC and OIT applications. He provided assistance with development of panel I/O requirements, system PLC programming (Modicon Unity), human-machine interface graphic preparation (Magellis, Telvent and WonderWare), coordination with construction contractors, and development of as-built documentation.

- **Pump Station Facilities Repair; Delta Diablo; Antioch, CA; Electrical Engineer.** Project design engineer to provide instrumentation, controls, and electrical condition assessments for five pump stations in the Delta Diablo wastewater collection system: Pittsburg, Antioch, Bridgehead, and Shore Acres Pump Stations and the Broadway Diversion Facility. The purpose of this project is to increase reliability and extend the useful lives of these important facilities, while also facilitating operations within the system. Mr. Meyer performed site inspections to determine the condition and integrity of the electrical and I&C infrastructure including equalization storage basins, wetwells, pumps, electrical distribution, motor controls, and SCADA components and provided recommendations as well as final designs for electrical repairs.

- **SCADA System Master Plan and Standards Development; Union Sanitary District (USD); Fremont, CA; Control System Engineer.** Assisted in the technical development of the SCADA Master Planning document, providing a 10-year roadmap for USD SCADA system improvements. Mr. Meyer prepared sample graphics under the iFIX application for demonstrating concepts and features of Situational Awareness, High Performance human-machine interface graphics adopted by USD for use on future projects.

His previous experience at MCC Control Systems includes the following:

- **Wastewater Treatment Plant (WWTP) Expansion & Upgrade Project; City of Redding, CA; Electrical Designer.** Performed electrical power and controls design of multiple MCCs, transformers, load centers, PLC control panels, and local control panels for a WWTP capacity expansion. Developed loop diagrams per ISA S5.4 standards and developed interconnection diagrams. Supported production and CAD drafting teams during fabrication.

- **Thermal Energy Storage PLC Upgrade Project; University of California - Davis; Davis, CA; Electrical Designer.** Facilitated thermal energy storage control system upgrade from Siemens Apogee I/O banks to Allen-Bradley ControlLogix system. Performed field investigation to document existing system, developed interconnection check and diagrams, created I/O list and PLC rack design.

### Certifications

- **Inductive Automation – Ignition V7.9 – Core Certified**
**Helen Tran**
Senior Controls Technician

**Experience**

Helen Tran is an automation engineer with nearly 15 years’ experience in instrumentation and controls (I&C) and system integration. She has performed a variety of electrical and I&C designs for process equipment and utility systems. With a background in the electric power, biotechnology, and water treatment industries, Ms. Tran applies practical knowledge in design, documentation, programming, and configuration of control system hardware and software components. She is adept at interpreting client processes and operations, automation planning/design/implementation, and providing support for system integration projects under a variety of automation hardware and software platforms.

Her skillset includes operating principles of turbomachinery control systems and plant process controls. In addition, her experience includes pharmaceutical and biotech operations, and she has a thorough working knowledge of pharma design, construction, commissioning and qualification, and operations and experience within the current good manufacturing practices (cGMP) regulations.

Ms. Tran’s experience includes the following:

- **Wastewater Treatment Plant (WWTP); City of Malibu, CA; Senior Controls Technician.** Design and system integration/programming including operator interface terminal (OIT) graphics development for the City of Malibu’s new greenfield WWTP and collection system. Ms. Tran’s efforts included new OIT graphics using PanelView hardware and software, configured to match the main plant look and feel of the graphics developed under the main plant Ignition software. This project I&C design incorporates distributed controls based on Rockwell Automation PLCs and integration of control platforms provided by process package suppliers. Remote sites featured standalone PLC controls for lift stations and injection wells. The remote sites are all interconnected to the WWTP via a new fiber-optic cable system installed in parallel with new collection system pipelines.

- **Secondary Compliance Facilities, Phase 1; Honouliuli WWTP, City and County of Honolulu, HI; Senior Controls Technician.** Design and engineering support for new control system facilities provided as part of a major expansion to the existing WWTP in Honolulu. Process expansion included full secondary treatment facilities including clarifiers, aeration basins, and support infrastructure. Control system design expanded the existing fiber-optic network to accommodate the new process areas, new redundant PLC and remote I/O installations, and network-based SCADA to extract data directly from smart motor controllers, electrical distribution systems, analyzers, and valves.
**Control System Expansion Project; White Slough WWTP, City of Lodi, CA; Senior Controls Technician.** Design and engineering support for new control system facilities for the White Slough WWTP for the City of Lodi. Work included facility reconnaissance and inventory, development of conceptual level design, establishing new control system design criteria and standards, and preparation of new control system phased installation prepared to match the City’s existing annual budget allocations. The approach applied new Rockwell Automation-based hot standby ControlLogix processors allocated along geographic areas of the plant. Remote I/O drops were also incorporated to reuse existing wiring associated with the plant’s obsolete SLCs and PLC 5 hardware.

**Lead Automation Engineer III**

**Banks Integration Group, Vacaville, CA**

- Provided systems integration services for a Tangential Flow Filtration Skid Upgrade at a local biotechnology company from PLC 5 to ControlLogix. Responsibilities included Allen-Bradley PLC (ControlLogix) programming, human-machine interface design, electrical design, test form generation, documentation, FAT execution, start-up, and SAT execution effort on site.

- Provided engineering for a system migration upgrade from five standalone systems into a single GE iFIX SCADA system with terminal services in a virtual environment for a cGMP environment. Responsibilities included building the SCADA Server/Remote Desktop Server build, SDS/SSM/FS documentation development, factory acceptance testing, and site acceptance testing.

- Coordinated with vendors/contractors to eliminate potential conflicts and assure vendors’ compliance with design requirements.

- Evaluated projects and prepared feasibility analyses.

- Analyzed legacy systems (controls and electrical) and created upgrade approaches along with contractor electrical scopes of work for bid and proposals.

- Designed control panels, developed instrumentation specifications, and performed electrical design.

**Proficiencies**


*Communication:* Fluent in written and spoken Vietnamese.
**Paul Giorsetto, P.E., LEED AP**  
Vice President

**Experience**

Paul Giorsetto, a licensed engineer since 1984, has extensive design experience in the areas of electrical power distribution, electrical industrial applications, control systems, and instrumentation. His specific experience includes electrical system modeling and planning; medium and low-voltage electrical distribution designs of water, wastewater and industrial waste treatment facilities; plant instrumentation; and SCADA systems for in-plant and telemetry-based systems. He also has significant experience in construction services, as a resident engineer and inspector, and during facility startup.

Mr. Giorsetto has been the electrical and/or discipline lead on numerous large water and wastewater design projects, and has been a project manager on stand-alone control system and electrical design projects having construction costs in excess of $3 million. He has acted as project manager on several stand-alone electrical and instrumentation and controls (I&C) design-build projects.

- **Rinconada Water Treatment Plant (WTP) Reliability Improvement Project; Santa Clara Valley Water District; Los Gatos, CA; I&C and Electrical Discipline Lead.** Oversaw the electrical engineering and control systems design work for the $180 million water treatment plant modernization. This project incorporates capacity increases to raise plant output to 100 mgd and incorporates new ozone treatment trains, multiple new and retrofitted chemical systems, filters, and floc-sed basins. The design was developed to maintain the plant in operation throughout the estimated 5-year construction period. Design included new 12-kV distribution, arc flash protection strategies, a new 3-MW diesel standby generator, and new distributed motor control centers with smart motor starters and variable frequency drive (VFD) equipment. I&C design incorporated a new distributed programmable logic controller (PLC) architecture coordinated with construction phasing and new processes. Final design included over 400 electrical, instrumentation, and controls design drawings.

- **SCADA System Master Plan and Standards Development; Union Sanitary District (USD); Fremont, CA; Control System Engineer.** Assisted in the technical development of the SCADA Master Planning document providing a road map for USD SCADA system improvements over the next 10 years. The Master Planning process included reconnaissance, interviews with staff, development of potential projects (including costs), review and selection of projects, and projection of annual budget impacts. TJCAA also lead the effort to develop several technical standard documents for the USD engineering and project managers under the same project scope. Standards were developed addressing PLC programming, SCADA/human-machine interface software, field instrumentation, control panels, and I&C design methods.

- **SCADA Telemetry Upgrade Project; Contra Costa Water District, Concord, CA Project Manager.** Prepared comprehensive predesign analyses and report for development of alternatives for remote site radio and PLC equipment, new multiple address system radios, new
point-to-point and high bandwidth backbone communication links, and secure MPLS strategy as a standby strategy for routing telemetry SCADA data to CCWD servers. This project also included development of RFQ and RFP documents for execution of a design/build procurement strategy by CCWD for both the telemetry equipment and new server equipment being installed at the Randall-Bold WTP.

- **1630 Pump Station Project; Cucamonga Valley Water District, Rancho Cucamonga, CA; TJCAA Project Manager.** New pump station executed as a joint effort between CVWD and the Inland Empire Utilities District. Project management tasks included prime consultant responsibilities for all support disciplines: structural architectural, building mechanical, electrical, and I&C. The new pump station included a new building structure, building mechanical systems, new electrical (SCE) service, and control system coordination for secure extra-agency data exchange. Project requirements included a pre-purchase process to expedite procurement and ensure commonality of provided equipment.

- **Skinner WTP; Metropolitan Water District, Riverside CA; Electrical and I&C Task Leader.** Designed renovation of existing medium-voltage distribution, including a new 33-kV SCE service, new 4.16-kV main switchgear, addition of a 1.75-MW standby generator, and campus style unit substations as part of the $180 million plant upgrade. The design incorporated strict criteria for power supply switchover to the new SCE service and system controls for the standby generator addition with multiple main-tie-main circuit breakers. The project also included a fiber optic network, electrical power modeling, and electrical distribution and lighting design. I&C design included development of piping and instrumentation diagrams (P&IDs) for the facility including MWD-furnished ozone system equipment, 144-inch raw water metering, control narrative development, integration into the existing MWD control system, development of software interface protocols, and detailed I&C design for the plant improvements.

- **Groundwater Replenishment System; Orange County Water District, Fountain Valley, CA; Electrical and I&C Task Leader.** Designed electrical and I&C components. I&C design elements included application of P&IDs, design of bus-based I&C system using Foundation Fieldbus and DeviceNet, and a distributed control system preselection effort resulting in selection of an Emerson DeltaV process control system platform. Electrical aspects of the project included integrating the bus-based control system, a new 66-kV substation, 12-kV in-plant distribution, and large-scale application of VFDs, with over 30 units ranging in size from 500 to 2,500 hp using active front-end technologies.

**Publications and Presentations**


"Wireless Applications in the Water and Wastewater Industries," presented at the American Water Works Association, Fall 2007 Conference,


Section 4: Approach to Work

4.1 PROJECT APPROACH

TJCAA engineers will work with the District stakeholders to provide a PLC and Supervisory Control System Assessment that will meet the District’s goals and provide a clear path forward to operate and maintain a highly reliable and well-functioning control system. Our recommendations will consider technical alternatives, the District’s history with the current systems, prevalent trends in the water industry, system reliability, serviceability, available technical support, local product support, and budget constraints.

The District has identified five Tasks associated with this assessment, and each task has an associated deliverable. The tasks and deliverables are detailed below.

Task 1: Narrative of the State of the PLC Industry

The deliverable for Task 1 will be a Technical Memorandum that describes the hardware, industrial networks, control system architectures, software, and current methods that are currently used for the water treatment and distribution industry. The memo will include a comparison of leading manufacturers, methods for technical support, product availability, partnerships with local system integrators, product life expectancies, and various product levels that are available.

TJCAA engineers meet regularly with PLC and SCADA manufacturers’ representatives, continually update our design standards and specifications to reflect current products and methods and, attend industry trade group meetings in order to keep tabs on current trends and technologies. In this era of disposable electronics, product obsolescence is a fact of life, especially in an industry that is relatively slow to deploy new technologies. Although control system hardware components will become obsolete, by employing intelligent design methods and modern programming techniques we can ensure that future replacement of obsolete hardware can be done with minimal disruption to the treatment process, and minimal cost to the District.

As part of Task 1, in addition to the Technical Memorandum, TJCAA will facilitate a Workshop with District stakeholders to discuss the current state of the industry and present control system alternatives that will benefit the District. The Workshop will also give us an opportunity to discuss project goals and review the current installed system.

Task 2: PLC and RTU Inventory

Once we receive record drawings from the District, TJCAA will review the drawings and fully document the currently installed system. An Excel spreadsheet will be used to document the attributes of each PLC and RTU system, including:

- PLC type and manufacturer
- Model number
- Hardware version
- Firmware version
- Programming software and current version used
- Year installed
- Life cycle status and remaining service life
- Rack type/setup
- Digital I/O card type and quantity
- Analog I/O card type and quantity
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TJC and Associates, Inc.

- I/O card capacity/extensibility
- Power supply model number and age
- Operating deficiencies
- Network interfaces

Once the PLC and RTU systems have been documented, TJCAA will provide a report for each facility that summarizes findings and identifies critical deficiencies. TJCAA will then host a screen sharing conference call to discuss the results of our findings with the District.

**Task 3: Software and Programming Inventory**

Under Task 3, TJCAA will document the programming software and languages that are currently used by Mesa Water District for PLCs, RTUs, and the SCADA–Supervisory Control system. The An Excel spreadsheet created under Task 2 will be used to document the current installed software, including:

- The software manufacturer
- Software part number
- Software version
- The current licenses owned by the District
- Current availability and support level for the software
- Annual cost of maintaining licenses

TJCAA engineers will also perform a review of each of the PLC and RTU programs and document program organization, structure, languages used, consistency, tagging and annotation, data organization, efficiency, and control functions.

Once the programs have been documented, TJCAA will provide a summary report for each software package that identifies current use, software life cycle status, and recommended consolidation and upgrades.

**Task 4: Supervisory Control Computer Hardware Inventory**

Under Task 4, TJCAA will document the servers, workstations, and ancillary hardware installed for the District’s SCADA system. An Excel spreadsheet will be used to document the current hardware and software, including:

- Equipment location
- Equipment function
- Equipment name and network address
- Manufacturer and model number
- Year manufactured
- The computer’s base operating system and version
- The current virtual machines installed and associated operating systems and functions
- Current level of manufacturer’s support for the product line

**Task 5: Radio Telemetry System and Network Hardware Inventory**

Under Task 5, TJCAA will document the radios, antennas, and network switches that are installed as part of the District’s telemetry system. An Excel spreadsheet will be used to document the current hardware, including:
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TJC and Associates, Inc.

- Installed location
- Radio type
- Radio function
- Broadcast frequencies
- FCC License type
- Manufacturer and model number
- Year manufactured
- Network connections and routing
- Antenna type
- Antenna mounting
- Associated network switch
- Current level of manufacturer’s support for the product line

TJCAA will develop network architecture drawings that details the equipment installed at each facility and both wired and wireless network interconnections. Separate drawings will be developed for the 5 GHz network backbone, 900 MHz spread spectrum radio telemetry network, and 450 MHz licensed radio telemetry network.

**Task 46: Replacement Planning and Recommendations**

Once our hardware and software assessments are completed, TJCAA will prepare a Replacement Planning and Recommendations report. The report will organize sites based on the urgency of the recommended replacement; Immediate, Near-Term, and Long-Term. Our site by site recommendations will include the following.

- Expected life of the existing equipment and software.
- Recommended software upgrade schedule and software maintenance
- Scope of the replacement – Computer hardware, software, PLC components, radios, network components, power distribution and DC supplies, complete mounting panel assembly, or entire control panel.
- Down time required for recommended replacement scope.
- Replacement PLC-equipment manufacturer and series.
- Programming upgrade – conversion, upgrade, or rewrite.
- SCADA interface considerations.
- Estimated cost of the replacement.
- Replacement schedule, including drawing development, procurement, fabrication, programming, installation, and testing.
- Improvements to panel reliability and safety.

The report will also include a list of common control functions that can be implemented using standard user-defined function blocks on each of the Districts platforms.

Once the District has had an opportunity to review the replacement planning and recommendations, TJCAA will host a screen sharing conference call to discuss our findings and recommendations with the District.

**Task 57: Summary Report**

The deliverables from Tasks 1 through 4-6 will be combined with feedback from the District’s stakeholders and summarized in a Summary Report. The Summary Report will include a
recommended schedule, budgets and phasing for replacement projects, a list of District wide
recommendations, site by site replacement recommendations, the District’s tagging and
naming standards, future hardware and software maintenance strategies, and a list of next
steps.

4.2 KEY CHALLENGES

Based on our extensive experience in this area, we have identified three key challenges to
the project that will need to be considered and addressed in developing a PLC replacement
plan and recommendations for the District.

- A viable implementation and transition plan.
- Upgrading to modern programming techniques while maintaining the interface with
  the existing SCADA software.
- Developing design criteria to minimize the number of differing hardware and software
  platforms that must be maintained by the District.

Implementation and Transition Plan

Even when the replacement PLC equipment has been selected, there are many aspects that
must be considered in developing a plan for installing that equipment. Some questions to
consider are:

- Should only PLC components be upgraded, or does it make sense to replace the entire
  mounting panel assembly?
- What are the operational constraints that will limit down time for the processes being
  upgraded?
- How much of the preparation work can be completed before shutting down the system
to perform an upgrade?
- How should processes be prioritized when testing and commissioning an upgraded
  control system?
- What network and program changes are necessary to maintain PLC to PLC
  communications and communications with SCADA systems when PLC systems are
  upgraded.
- Should programs be converted from older PLC programming software, or should the
  program be rewritten?

TJCAA will tailor an implementation and transition plan specifically to meet Mesa Water
District’s technical needs, budget limitations, and operational constraints. Below is a summary
plan for a 48-hour transition strategy developed and successfully implemented for the Benicia
Water Treatment Plant PLC Upgrade Project.
## Interface to the Existing SCADA System

With the advent of reliable industrial high-speed networks and efficient new communication protocols, programming methods and data structures used to transmit information between PLCs and SCADA systems have evolved significantly over the past ten years. Where we once used arrays and register tables of similar data types (e.g. integers, Boolean, etc.) to transmit information between industrial equipment, today’s technologies allow us to package information in user-defined data types (UDTs) that are based on process equipment and/or specific control functions. For example, in Figure 1 below, a single UDT variable called Pump2112 contains all of the information for Booster Pump 2. In older systems, the same amount of information would have required 17 variables, separated into three different types of data tables.
The use of modern programming techniques is crucial to developing a reliable control system that can be maintained for the next decades. Unfortunately, in most cases the SCADA software and the PLC systems are not upgraded at the same time or under the same project. Without significant and expensive updates to the way the SCADA software is configured, the existing SCADA system will not be able to take advantage of the newer data structures. In order to maintain the operation of the existing SCADA software, the upgraded PLC systems must provide information using the data arrays and register tables that were common when the system was originally installed.

TJCAA has used several different solutions on several different PLC platforms to overcome this problem. Determining the best approach for Mesa Water District will depend on the age of the existing SCADA software, capabilities of the existing SCADA software, plans for upgrading the SCADA software in the near future, and budget constraints. TJCAA has implemented and/or specified these techniques for several clients including Santa Clara Valley Water District, City of Malibu, and Union Sanitary District.

**Common Design Criteria**

Even those agencies that have successfully standardized on a single PLC manufacturer have great difficulty maintaining all facilities on a common hardware and software platform. Over time facilities are upgraded at different rates, hardware becomes obsolete, different firmware versions are installed at different locations, and updated systems get programmed with newer software versions.

While these issues can’t be entirely avoided, their impacts can be mitigated by using a proactive upgrading strategy to manage hardware, firmware, and software versions at all District facilities. TJCAA has successfully implemented strategies for several of our clients to maintain common programming versions, schedule firmware upgrades, schedule hardware upgrades, maintain a control system inventory system, and manage PLC program version control.

In addition, developing an approach for implementing system wide standardization and use of programming modules can also be beneficial in managing transition and technical advances. For example, standards based on programming templates or subroutines can simplify upgrades of programming code across the system. Our team has implemented standardized programming modules and assisted our clients with developing standards at the Alameda County Water District, City of Malibu, City of Palo Alto, City of Benicia, Contra Costa...
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Water District, East Bay Dischargers Authority, Union Sanitary District, Stockton East Water District, and Bella Vista Water District.

Custom programming modules are especially useful in applications that are repeated throughout the control system. They help the user to maintain consistency and ensure that identical programming methods are used by all programmers and technicians that maintain and modify the system.

In the Figure 2 below, TJCAA developed a custom analog input scaling function that results in an implied decimal integer value for interface to an existing older SCADA system, and a REAL value in engineering units for use in the PLC program, and to interface to the client’s planned upgraded SCADA system.

![Figure 2 - Custom Analog Scaling Function](image)

TJCAA has also developed custom programming modules for alarming, pump alternation, flow totalizers, elapsed runtime meter/starts counter, analog signal filtering, on/off cycle time control, modulating valve positioning control, and complex calculations. Figure 3 below shows the use of a chemical dosage calculation module that was developed for a water treatment plant with 16 separate chemical injection areas.

![Figure 3 - Chemical Dosage Calculation](image)
4.3 ASSUMPTIONS AND CLARIFICATIONS

TJCAA has included the following assumptions and clarifications in preparing this proposal.

1) The project scope will be completed in 2018 and the project schedule proposed in the RFP will be maintained.

2) TJCAA will facilitate one workshop at Mesa Water District facilities during Task 1. Site visits will be scheduled for the same day as the workshop to allow TJCAA to review a sample of the current installations and review the existing network and SCADA system. All other meetings will be held via conference calls with screen sharing.

3) TJCAA will set up a Dropbox folder for the project to allow file sharing between TJCAA and the District’s project staff.

4) Work will be performed primarily at TJCAA’s Walnut Creek office.

5) Project deliverables will be transmitted to the District in Adobe pdf format, native electronic format (MS Word and Excel), and hard copies as detailed in the RFP.

6) The District will provide TJCAA with as-built drawings of all PLC and RTU panels in Adobe pdf format, PLC and RTU panel programs in native electronic format, and requested electronic files from the District’s existing SCADA system.

7) TJCAA is a Schneider Electric Alliance Partner, Rockwell Automation Partner, GE Intelligent Platforms Solution Provider, and Inductive Automation Core Certified Integrator. These programs provide TJCAA software licenses. For other manufacturers, TJCAA may request the use of District software licenses to review electronic versions of the PLC and RTU programs.
### Mesa Water District
### PLC Assessment Project

#### Personnel Name and Grade

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<tr>
<th>Paul Giorsetto</th>
<th>Michael Erwin</th>
<th>Lee H. Meyer</th>
<th>Helen Tran</th>
<th>AutoCAD</th>
<th>Admin</th>
<th>Other Direct Costs</th>
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<th>Task Description</th>
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<td><strong>Task 1</strong> Narrative of the State of the PLC Industry</td>
<td>34 Hours</td>
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<td>2 MAN Sistema PLC and RTU Inventory</td>
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<tr>
<td>3 Software and Programming Inventory</td>
<td>40 Hours</td>
</tr>
<tr>
<td>4 Supervisory Control Computer Hardware Inventory</td>
<td>24 Hours</td>
</tr>
<tr>
<td>5 Radio Telemetry System and Network Hardware Inventory</td>
<td>56 Hours</td>
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<td>6 Replacement Planning and Recommendations</td>
<td>98 Hours</td>
</tr>
<tr>
<td>7 Summary Report</td>
<td>76 Hours</td>
</tr>
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</table>

Total: $70,050
MEMORANDUM

TO: Engineering and Operations Committee
FROM: Phil Lauri, P.E., Assistant General Manager
DATE: September 19, 2018
SUBJECT: Water System Operations Update

RECOMMENDATION

Receive the presentation.

STRATEGIC PLAN

Goal #1: Provide a safe, abundant, and reliable water supply.
Goal #2: Practice perpetual infrastructure renewal and improvement.

PRIOR BOARD ACTION/DISCUSSION

None.

BACKGROUND

Mesa Water District (Mesa Water®) serves approximately 110,000 residents over an 18 square mile area through approximately 24,500 services. The system is comprised of a comprehensive distribution system and production and storage system.

**Distribution System:** Mesa Water operates a Division of Drinking Water (DDW) D5 (highest level class based on population) distribution system. The distribution system is comprised of 317 miles of distribution mainlines ranging in size from 4” to 42” of varying materials (e.g., steel, cast/ductile iron, concrete cylinder, asbestos cement, polyvinyl chloride, etc.). 87% of the system ranges from 4” to 14” with the remaining comprised of 16” to 42” pipelines. The larger pipelines function as the main distribution network to convey larger flows and maintain system pressure.

**Production System:** Mesa Water’s production system is comprised of five clear groundwater wells and two deep amber-tinted wells, the Mesa Water Reliability Facility (MWRF), three reservoirs (18, 10, and 1.25 million gallons), and five imported water connections to the Metropolitan Water District of Southern California (MWD). The MWRF is an advanced nanomembrane water treatment facility, classified by DDW as a T2 water treatment facility and used to treat the amber-tinted water pumped from the two deep groundwater wells. Mesa Water’s five clear wells are capable of producing approximately 12.9 million gallons per day (MGD) and the MWRF is capable of producing 8.64 MGD. Mesa Water’s MWD connections are capable of producing approximately 36.9 MGD. Total production capacity of the clear groundwater wells, MWRF, and MWD connections are approximately 58.4 MGD. Groundwater well production historically varies depending on the Orange County Groundwater Basin levels and production well fouling.

A D5 distribution system requires the addition of disinfection treatment (e.g., chloramines) to the highly purified groundwater. Each well site is equipped with a groundwater well, pumping system, chemical storage and management system, and SCADA system. Mesa Water’s well sites are located in the northern part of the City of Costa Mesa to allow access to the principal aquifer in
which suitable groundwater can be pumped. As such, Mesa Water’s production wells generate the main system pressures in this geographical area and drive water supplies from the north to the south through Mesa Water’s larger main pipeline distribution system.

**Historical Development:** Mesa Water’s distribution and production systems were progressively constructed as the service area became more populated and the City of Costa Mesa expanded to the extents of its boundaries. Prior to 1970, Mesa Water was solely dependent on MWD imported water as its primary source water. Mesa Water’s five MWD imported water connections served from the 42” OC-44 (3 connections) via the 96” MWD East Orange County Feeder No. 2 and the 36” Orange Coast Feeder (connections CM-2 and OC-14) have reliably served Mesa Water for several decades. In 1970, Mesa Water constructed the first of many groundwater wells that would ultimately allow Mesa Water to become more reliable on groundwater as its primary and more cost effective source water. In 2013, Mesa Water completed the expansion of the MWRF, which allowed Mesa Water to become 100% locally reliable using groundwater supplies and using MWD imported water as an emergency only backup source water supply.

**System Operations:** Mesa Water operates its distribution and production system on a pressure based approach. As water travels from the north to the south of the service area, pressure energy is lost along the course of travel creating lower pressures in the southern portion of the distribution system. The operational target is to maintain a minimum pressure in the southern portions of the service area using Mesa Water’s reservoirs while not over pressurizing the northern portion of the service area. To ensure minimum and maximum operational pressures throughout the distribution system, the reservoirs will boost pressure to the distribution system when required. The following are the operational scenarios in how Mesa Water’s system water demands, pressure, and supplies operate together:

<table>
<thead>
<tr>
<th>Scenario No.</th>
<th>Demands</th>
<th>System Pressure</th>
<th>Reservoir Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Increase</td>
<td>Decreases</td>
<td>Boosts Pressure/Provides Supply</td>
</tr>
<tr>
<td>2</td>
<td>Decrease</td>
<td>Increases</td>
<td>Allows Filling/Accepts Supply</td>
</tr>
<tr>
<td>3</td>
<td>Floating (Steady)</td>
<td>Floating</td>
<td>Off</td>
</tr>
</tbody>
</table>

For example, the well sites generally operate at a pressure of approximately 95 pounds per square inch (psi). The reservoirs are set to maintain a system pressure in the southern portion of the service area of approximately 55 psi. This system pressure set point ensures sufficient pressure at the most southern service area boundaries and highest mesa elevations (16th & Monrovia and 17th & Tustin). Under Scenario 1, when production supplies (i.e., well, MWRF, and MWD flows) are held constant and demands increase during a typical morning usage period (4 a.m. to 8:30 a.m.), hydraulics dictate that pressures will reduce, thereby requiring additional energy to boost the pressure and flow in the system. Thus, Mesa Water’s reservoirs will respond and start providing flow and pressure to maintain the designated 55 psi pressure set point (when pressure drops by 2 psi for more than 30 seconds). Conversely, Scenario No.2 demonstrates that when supplies are held constant and demands in the system decrease due to lower usage (midnight), system pressure increases, thus, the increased residual pressure and flow is relieved by opening the reservoir fill valve at one or both of the reservoirs to ensure maximum pressures are not exceeded within the distribution system. On some occasions throughout the day, system demand flows will roughly equal system production flow (Scenario No. 3) and the reservoirs neither boost nor relieve pressure, thus the system is deemed to be “floating”.

Page 2 of 4
**System Pressure**: Historically, Mesa Water has operated its well field between 95 psi to 100 psi (see attached System Pressure Map). Similar to a topographic map, the production field pressure results in a varying pressure gradient from the north to the south of the Mesa Water service area. As such, it is common to see the following operating pressures in these general areas:

- North of 405 Freeway: 85 - 95 psi
- Adams Avenue to 405 Freeway: 75 – 95 psi
- Wilson Street to Adams Avenue: 70 – 85 psi
- W.16th Street to Wilson Street: 50 – 70 psi

System pressures will vary by as much as 10% to 15% throughout the day depending on demand and supply variations and reservoir response time (typically 15 – 60 seconds). However, Mesa Water's distribution and production system provides very stable pressure delivery to its many customers with a considerable redundancy factor of not having a zoned pressure system that would require dedicated reservoirs.

**DISCUSSION**

Periodically, Mesa Water receives inquiries regarding high pressures and the need to have pressure-reducing regulators. Because of Mesa Water’s operational protocols and system pressure management discussed herein, high-pressure calls tend to come from residents in the northern part of the service area. The following regulations govern system pressure:

- Minimum System Pressure: 20 psi (California Code of Regulations Title 22: §64602)
- Maximum System Pressure: No maximum designated

While pressures over 80 psi for residential and businesses are regulated by the California Plumbing Code (requiring pressure regulating valves), conventional plumbing/piping systems materials are well equipped to withstand pressures far greater than 80 psi. The following are internal maximum pressure standards for conventional plumbing/piping materials typically used in a home or business water piping system:

- Copper Piping (Type K): 1” (757 psi) – 12” (330 psi)
- Copper Piping (Type L): 1” (440 psi) – 12” (225 psi)
- Galvanized Steel Pipe: 1” (4,956 psi) – 12” (1,441 psi)

The pressure regulating valve standard is put in place by the California Plumbing Code (CPC) as higher pressures are not typically needed to provide the required flow to standard fixture units and it is used to reduce repetitive material fatigue and conserve energy.

While Mesa Water does operate above 80 psi in a portion of the northern service area due to the aforementioned system management approach, the responsibility of installing and maintaining a pressure regulator is that of the homeowner. CPC Section 608.2 requires homeowners with pressures over 80 psi to install and maintain a pressure regulator on the downstream side of the water purveyor’s meter. This is typically installed just before the main shut-off valve going into the home or business.

In 2016, Mesa Water started construction of its Well Automation Project. This project has allowed Mesa Water to perform the following at its five clear groundwater well sites:
- Extensive Well Rehabilitation
- Construction of Permanent Chemical Storage Systems
- Implementation of Real-Time Chemical Management System
- Construction of Variable Frequency Drives (VFD)
- Construction of Security System Backbone Infrastructure
- Expanded Backup Power Generation

The Well Automation Project was planned and designed to provide multiple operational benefits. One of the significant benefits includes the ability to use the well VFDs to more efficiently manage system flows and pressures with varying basin levels and system demands. For example, prior to the implementation of the Well Automation Project, Mesa Water's wells were operated using constant speed pumps. This approach could cause wider system pressure variations (10-15%) when system demands changed throughout the day because, as system demands increase or decrease, the pumps would produce less or more pressure, respectively. With the addition of VFDs and supporting SCADA programming, the VFDs can be operated in such a manner as to maintain a tighter system flow or pressure based on the changing system demands. The addition of this function allows Mesa Water to more tightly control system pressures and reduce energy consumption.

Mesa Water provides its customers with the following guidance when system pressure inquiries are received:
- System pressures can moderately vary throughout the day due to changes in demand
- Mesa Water operates one pressure zone that varies across its service area (decreasing from north to south) to provide reliable pressure to all its customers
- Higher system pressures are not harmful to standard internal plumbing material (e.g., copper, galvanized steel, etc.)
- Pressure regulators are required by CPC Section 608.2 for pressures over 80 psi (Governed and enforced by the City of Costa Mesa)
- Pressure regulators are to be installed downstream of the meter (typically before the mainline shut-off valve) and maintained by the homeowner (City of Costa Mesa references the CPC as their plumbing standard)

FINANCIAL IMPACT

None.

ATTACHMENTS

Attachment A: System Pressure Map
REPORTS:

9. REPORT OF THE GENERAL MANAGER:
REPORTS:

10. DIRECTORS' REPORTS AND COMMENTS:
TO: Engineering and Operations Committee  
FROM: Phil Lauri, P.E., Assistant General Manager  
DATE: September 18, 2018  
SUBJECT: Well Automation and Rehabilitation Project Update

RECOMMENDATION

This item is provided for information only.

STRATEGIC PLAN

Goal #1: Provide a safe, abundant, and reliable water supply.  
Goal #2: Practice perpetual infrastructure renewal and improvement.

PRIOR BOARD ACTION/DISCUSSION

At its March 15, 2014 meeting, the Board of Directors (Board) adopted Resolution No. 1442 Replacement of Assets, which calls for rehabilitation of groundwater production wells if and when well production drops by more than 20% for a given well and 10% for overall clear water well production.

At its March 18, 2014 meeting, the Engineering & Operations (E&O) Committee received an information item describing the scope of the Well Automation and Rehabilitation Project.

At its September 11, 2014 meeting, the Board approved a contract with Carollo Engineers, Inc. in the amount of $749,995 with a 10% contingency for a not-to-exceed amount of $824,995 to provide professional design services for the Well Automation and Rehabilitation Project.

At its March 12, 2015 meeting, the Board approved a contract with RBF Consulting, a Michael Baker International Company, in the amount of $778,270 with a 10% contingency for a not-to-exceed amount of $856,097 for professional Construction Management Services of the Well Automation and Rehabilitation Project.

At its May 19, 2015 meeting, the E&O Committee received an information item on the planned appearance of the well sites, including the new chemical facility aesthetics.

At its November 12, 2015 meeting, the Board approved the Well Automation and Rehabilitation Project as well as the project’s Notice of Categorical Exemption from the California Environmental Quality Act (CEQA).

At its February 11, 2016 meeting, the Board approved a contract with Pacific Hydrotech Corporation for construction of the Well Automation and Rehabilitation Project for $10,488,500 plus a 5% contingency for a not-to-exceed amount of $11,012,925.

At its August 16, 2016 meeting, the E&O Committee received an update on the Well Automation and Rehabilitation Project.
At its July 13, 2017 meeting, the Board approved a change order to Carollo Engineers, Inc. in the amount of $195,960 to continue providing engineering support services for the Well Automation and Rehabilitation Project during construction.

At its October 12, 2017 meeting, the Board approved a change order to Pacific Hydrotech, Inc.’s contract for a not-to-exceed amount of $800,000 to furnish, install, and integrate Variable Frequency Drives (VFDs) at Wells 1, 3, 7, and 9.

At its November 9, 2017 meeting, the Board approved a change order to Michael Baker International’s contract for $420,673, for a total not-to-exceed amount of $1,276,770, to continue construction management services for the Well Automation and Rehabilitation Project and approved an increase in the authorized contingency to the Well Automation and Rehabilitation construction contract with Pacific Hydrotech, Inc. from 5% ($524,425) to 7.5% ($786,637).

At its July 12, 2018 meeting, the Board approved a change order to Pacific Hydrotech, Inc.’s contract for construction of the Well Automation and Rehabilitation Project for a not-to-exceed amount of $158,368.65 for compensable project delays.

BACKGROUND

The Well Automation and Rehabilitation Project was recommended as part of the 2014 Master Plan Update and included in the adopted Capital Improvement Program. The project provides the necessary improvements to Mesa Water’s clear well sites and includes the following key objectives:

1. Rehabilitation of clear wells 1, 3, 5, and 7 that were shown to have lost more than 20% of production as a result of the condition assessment performed in October 2013;
2. Design of well automation functionality for all clear wells, including remote well start/stop capabilities and a chemical addition system based on real-time system chemical demands;
3. Standardization of clear well operations across all well sites;
4. Reducing the frequency of chemical deliveries by increasing the size of the storage tanks;
5. Reducing the energy and labor costs of well operations;
6. Replacement of equipment that has exceeded its useful life, including well pumps, motors, and electrical switchgear;
7. Back-up power for wells to maintain operation when grid power is not available; and
8. Installation of well site security system infrastructure.

DISCUSSION

The Well Automation and Rehabilitation Project has competed work at four of the five wells. The status of each site is as follows:

**Well 5**: Construction on the Well Automation and Rehabilitation Project began at Well 5 in October 2016. Well 5 was returned to service in June 2017, after rehabilitation and repairs of the well, replacement of all the electrical and mechanical equipment, and construction of new chemical handling facilities with automated water disinfection. The Well 5 casing required extensive repair work (i.e., swaging, slurry fill, etc.) to allow continued use of the well. Well 5 has been producing approximately 2,300 gallons per minute (gpm) of high quality drinking water since returning to
service. Because the well was constructed of carbon steel, it is estimated that Well 5 has an approximate remaining useful life of five to eight years.

**Well 7:** Well 7 was returned to service on October 4, 2017, and is nearing the end of its one-year warranty period. Work completed at Well 7 included a conservative rehabilitation program, demolition of the end of useful life equipment, and installation of the new pump, motor and variable frequency drive (VFD), electrical equipment, and chemical handling facilities. Similar to Well 5, Well 7 was constructed with a carbon steel casing and has experienced some corrosion at various casing intervals. Well 7 had previous mitigation work performed in prior years due to corrosion, which resulted in moderate sanding. Thus, production is being limited to approximately 1,100 gpm using the VFD to minimize sanding and extend the remaining useful life of the well. It is estimated that Well 7 has an approximate remaining useful life of five to eight years.

**Well 3:** Well 3B was returned to service on July 17, 2018. Work included well rehabilitation, demolition of the end of useful life equipment, and installation of the new pump, motor, VFD, electrical equipment, and chemical handling facilities. Well 3 is producing 1,350 gpm of high quality drinking water since returning to service.

**Well 9:** Well 9B was returned to service on July 30, 2018. Work included demolition of the end of useful life equipment and installation of the new pump, motor, VFD, electrical equipment, and chemical handling facilities. Well 9 is producing 1,750 gpm of high quality drinking water since returning to service.

**Well 1:** With Well 3B and Well 9B reliably back in service, work began at Well 1 on August 13, 2018. Work began with demolition of the end of useful life equipment followed by a video of the well. The video showed a significant biofilm, and an extensive rehabilitation program is planned. Well 1 is the smallest of all the Mesa Water well sites and construction is expected to be challenging. Work at Well 1 is expected to be completed by January 22, 2019.

**FINANCIAL IMPACT**

In Fiscal Year 2019, $2,450,000 is budgeted for Well Automation and Rehabilitation.

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<th>Project Cost</th>
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<td>Original Contracts</td>
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<td>Revised Project Estimate</td>
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**ATTACHMENTS**

None.