AGENDA
MESA WATER DISTRICT
BOARD OF DIRECTORS
Tuesday, December 20, 2016
1965 Placentia Avenue, Costa Mesa, CA 92627
3:30 p.m. Special Board Meeting

ENGINEERING AND OPERATIONS COMMITTEE MEETING
Tuesday, December 20, 2016, 2016 at 3:30 p.m.

Teleconference Site:
115 Kilrea Rd
Derry, NH 03038

Members of the Public may attend and participate in the meeting at both locations. Notice will be posted on door at the Teleconference Site.

CALL TO ORDER

PLEDGE OF ALLEGIANCE

PUBLIC COMMENTS

Non-Agendized Matters: Members of the public are invited to address the Board on matters which are not on the Agenda. Each speaker is limited to three (3) minutes. The Board will set aside thirty (30) minutes for public comments.

Agendized Matters: 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 five (5) minutes.

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 or Development
5. Water Operations Status Report
6. Municipal Water District of Orange County Activities Update
7. Orange County Water District Activities Update

PRESENTATION AND DISCUSSION ITEMS:
Items recommended for approval at this meeting may be agendized for approval at a future Board meeting.

8. Nitrification Control Study Report
ACTION ITEMS:

9. Proclamation Honoring the Career of Scott Peca
10. Water Industry Support Services
11. As-Needed Design and Construction Management Services
12. Updated Standard Specifications and Drawings

REPORTS:

14. Directors’ Reports and Comments

INFORMATION ITEMS:

None

ADJOURNMENT
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<th>PROJECT ADDRESS</th>
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<tr>
<td>MC 2134</td>
<td>2026 Placentia</td>
<td>15 New Homes</td>
<td>Plans received and fees paid on 10/30/14. Plans reviewed on 10/30/14 and circulated for Dept. signatures. Plan check comments issued to Engineer on 11/13/14. Received revised plans 1/6/14. Plan check completed and permit issued 2/9/15. PreCon meeting held 2/11/15. Inspection ongoing as work progresses. Main hot-tap performed on 5/5/15. Services installed by contractor on 5/7/15. 16 - 1 inch meters installed and locked on 7/6/15. Inspector checked status of the project on 12/2/15. Backflow tested on two model units on 2/25/16. Backflow tested on 8 units on 4/5/16. Regular site visit on 12/8/16 with no progress to report. (12/14/16)</td>
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<tr>
<td>MC 2206</td>
<td>247 E 23rd St</td>
<td>Single Family Home</td>
<td>Plans received and plan check fees paid on 9/21/15. Plans did not require changes. Fees paid on 11/25/15. Permit issued on 12/1/15. Pre-con held on 1/27/16. 1 - 1&quot; meter installed on 2/4/16. Property owner contacted to check project status on 8/3/16. Regular site visit on 10/7/16 with no progress to report. (12/14/16)</td>
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<tr>
<td>MC 2214</td>
<td>1944 Church St</td>
<td>2 Single Family Homes</td>
<td>Plans received and plan check fees paid on 10/5/15. First submittal returned on 10/26/15. Fees paid on 12/15/15. Final mylars and payment received and permit issued on 1/29/16. Water services installed on 8/23/16. 2 - 1 inch water meters installed on 8/26/16. Shutdown for abandonment on 11/14/16. (12/14/16)</td>
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<tr>
<td>MC 2215</td>
<td>119 Cecil Pl</td>
<td>3 Single Family Homes</td>
<td>Plans received and plan check fees paid on 10/5/15. First submittal returned on 10/26/15. Fees paid on 12/15/15. Final mylars and payment received and permit issued on 1/29/16. Attended pre-con meeting on 9/1/16. 3 - 1 inch meters and meter boxes installed on 9/29/16. (12/14/16)</td>
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<tr>
<td>MC 2216</td>
<td>320 E 18th St</td>
<td>4 Single Family Homes</td>
<td>Plans received and plan check fees paid on 10/5/15. First submittal returned on 10/26/15. Fees paid on 12/15/15. Permit issued on 1/29/16. Pre-construction meeting held on 11/15/16. (12/14/16)</td>
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<tr>
<td>MC 2224</td>
<td>286-288 15th Street</td>
<td>2 Single Family Homes</td>
<td>Plans received and plan check fees paid on 11/18/15. Plans were determined to be incomplete and additional information was requested on 11/19/15 and provided on 12/28/15. First plan check returned on 12/30/15. Second plan check submitted on 1/25/16. Second plan returned on 2/24/16. Fees paid and permit issued on 12/2/16. (12/14/16)</td>
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<tr>
<td>MC 2225</td>
<td>215 Knox Place</td>
<td>2 Single Family Homes</td>
<td>Plans received and plan check fees paid on 11/18/15. Plans were determined to be incomplete and additional information was requested on 11/19/15 and provided on 12/28/15. First plan check returned on 12/30/15. Second plan check submitted on 1/25/16. Second plan check returned on 2/12/16. Fees paid and permit issued on 12/2/16. (12/14/16)</td>
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<tr>
<td>MC 2232</td>
<td>189-191 Merrill Place</td>
<td>2 Single Family Homes</td>
<td>Plans received and plan check fees paid on 2/1/16. Plan check completed on 2/12/16 and picked up on 2/29/16. Second plan check received on 3/10/16. Awaiting Mylar drawings and fee payment. Owner contacted on 12/4/16 for project status. (12/14/16)</td>
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<tr>
<td>MC2237</td>
<td>2245 Santa Ana Avenue</td>
<td>Meter Upgrade</td>
<td>Plans received and plan check fees paid on 2/29/16. Plan check completed 3/24/16. Fee paid and permit issued on 5/16/16. Regular inspection site visit on 11/4/16 with no progress to report. (12/14/16)</td>
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<tr>
<td>MC2240</td>
<td>222 E 15th Street</td>
<td>Meter Upgrade</td>
<td>Plans received and plan check fees paid on 3/25/16. Plan check picked up on 4/20/16. Fee paid and permit issued on 5/10/16. Meter installed on 6/13/16. Regular inspection site visit on 11/4/16 with no progress to report. (12/14/16)</td>
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<tr>
<td>MC2252</td>
<td>1100 South Bristol</td>
<td>Ganahl Lumber</td>
<td>Plans received and plan check fees paid on 6/1/16. Hydrant flow test completed on 9/7/16. Final plan check completed and returned on 10/28/16. Fees paid and permit issued on 11/29/16. (12/14/16)</td>
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<tr>
<td>C003-16-01</td>
<td>788 Center Street</td>
<td>2 Single Family Homes</td>
<td>Plans received and plan check fees paid on 6/28/16. Plans returned on 7/14/16. Awaiting resubmittal. (12/14/16)</td>
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<tr>
<td>C0006-17-01</td>
<td>155 Flower Street</td>
<td>2 Single Family Homes</td>
<td>Plans received and plan check fees paid on 8/1/16. Plans returned on 8/11/16. Fees paid and permit issued on 9/22/16. (12/14/16)</td>
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<tr>
<td>C0006-17-02</td>
<td>163 Flower Street</td>
<td>2 Single Family Homes</td>
<td>Plans received and plan check fees paid on 8/1/16. Plans returned on 8/11/16. Fees paid and permit issued on 9/22/16. (12/14/16)</td>
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<tr>
<td>C0007-17-01</td>
<td>1620 Orange</td>
<td>2 Single Family Homes</td>
<td>Plans received and plan check fees paid on 8/10/16. Plans waiting to be picked up. (12/14/16)</td>
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<tr>
<td>C0008-17-01</td>
<td>410 Walnut Place</td>
<td>4 Single Family Homes</td>
<td>Plans received and plan check fees paid on 8/10/16. Plans returned on 8/24/16. Awaiting resubmittal. (12/14/16)</td>
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<tr>
<td>C0009-17-01</td>
<td>3011 Ceylon</td>
<td>Meter Upgrade</td>
<td>Plans received and plan check fees paid on 8/16. Plans picked up on 10/18/16. Fees paid and permit issued on 12/5/16. (12/14/16)</td>
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<tr>
<td>C0010-17-01</td>
<td>1053 W. Wilson</td>
<td>2 Single Family Homes</td>
<td>Plans received and plan check fees paid on 8/30/16. Plans picked up on 10/4/16. Fees paid and permit issued on 11/18/16. (12/14/16)</td>
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<tr>
<td>C0011-17-01</td>
<td>527 Anton</td>
<td>Fire Hydrant Relocation</td>
<td>Plans received and plan check fees paid on 9/8/16. Plans waiting to be picked up. (12/14/16)</td>
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<td>C0012-17-01</td>
<td>2300 Harbor Blvd</td>
<td>33 Detached Condos</td>
<td>Plans received and plan check fees paid on 9/15/16. Plans submitted for second plan check on 12/6/16, plan check in progress. (12/14/16)</td>
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<tr>
<td>C0012-17-02</td>
<td>929 Baker Street</td>
<td>55 Detached Condos</td>
<td>Plans received and plan check fees paid on 9/27/16. Plans picked up on 10/18/16. (12/14/16)</td>
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<tr>
<td>C0013-17-01</td>
<td>2803 Royal Palm Drive</td>
<td>Fire Station</td>
<td>Plans received and plan check fees paid on 8/25/16. Plans picked up on 10/4/16. (12/14/16)</td>
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<td>C0014-17-01</td>
<td>Segerstrom Center for the Arts</td>
<td>Water Main Relocation</td>
<td>Plans received and plan check fees paid on 10/19/16. Plans picked up on 11/5/16. (12/14/16)</td>
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<tr>
<td>C0015-17-01</td>
<td>548 Victoria Street</td>
<td>5 Single Family Homes</td>
<td>Plans received and plan check fees paid on 10/26/16. Plans returned on 11/9/16. Awaiting final fee payment. (12/14/16)</td>
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<td>C0016-17-01</td>
<td>3101 Redhill Commerical Building</td>
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<td>Plans received and plan check fees paid on 11/22/16. Plans returned on 11/29/16. (12/14/16)</td>
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<tr>
<td>C0017-17-01</td>
<td>166 Rochester</td>
<td>2 Single Family Homes</td>
<td>Plans received and plan check fees paid on 12/7/16. Plan check in progress. (12/14/16)</td>
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Project Title: MWRF Finished Water Quality Polishing Project  

File No.: M17-005  

Description: Enhance finished water quality at the MWRF via Pilot Scale test  

Status: Technical memo completed 4/13. Initiated bench test on 6/24/13. Draft bench test report received 8/5/13. Next steps are to refine dosing, perform a full-scale pilot test, and estimate design and construction costs. Notice to proceed on pilot test design given on 9/17/13. Full scale pilot test plan submitted to CDPH for approval 10/15/13. CDPH approved the plan 11/7/13. Carollo Engineers finalized construction plans and conducted pre-bid meeting 11/26/2013. Bids are due 12/12/13. Only one bid received. Carollo requested bids from additional contractors. Second bid received on 1/8/14. J.R. Filanc Construction, Inc. lowest bidder. Project kick off meeting took place on 2/24/14. Installation of the SBS Addition System is to be completed 3/14/2014. The Full Scale Pilot Start Up and testing started on March 19, 2014 and completed May 27, 2014. Report to be submitted on 7/3/2014. Meeting with Trussell Technologies to discuss staff comments held on 7/30/14. Meeting to review next phase recommendations held on 8/19/14. Revised Draft Final Report submitted August 27, 2014. Staff reviewed the Report and provided comments. The re-revised Draft Report submitted 10/9/14. Staff reviewed the report and recommended for approval continued operations of the full-scale polishing pilot until a permanent full-scale system can be implemented (E&O Committee meeting 10/21/14). Request for extension of the operation of the MWRF Water Polishing Project pilot testing past December 4, 2014 granted by DDW on November 11, 2014. Developing RFP for design of the permanent SBS addition system (2/6/15). RFP distributed 2/27/15 and proposals received 3/26/15. Selection interviews held on 4/9/15. Team Carollo/Trussell is proposed for the project. Proposal approved by E&O Committee 4/21/2015 and Board 5/14/2015. Contract with Carollo finalized 6/12/15 and the kickoff meeting held on 6/17/15. Preliminary Design Report received 8/3/15. Progress meeting and conference call with Carollo to discuss the review comments was held on 8/25/15 and 10/1/15, respectively. 60% design package submitted on 10/28/15. Review comments sent to Carollo on 11/23/15. Meeting with Carollo to discuss water chemistry and chemical dosing systems at the MWRF held on December 7, 2015. 90% design submitted on 2/1/16. Staff reviewed the submittal, provided comments and discussed the comments and project requirements at the meeting held on 3/2/16. Design completed on 4/1/16. Project sent out to bid on 4/4/2016. Two bids received on 5/4/16. Staff recommended that the Board of Directors award a contract to the lowest bidder J.R. Filanc. E&O Committee recommended approval on 5/17/16. Board approved the project on 6/9/16. Kick-off meeting held on 6/28/16. Construction activities began at the MWRF on 9/21/16 with demolishing for the SBS Tank pad and trenching for new piping. Up to date the contractor has installed the following:

- supports and skid mounted SBS and Sodium Hypochlorite (SH) metering pumps,
- SBS and SH double containment piping,
- power and control conduits and wires to the pumps,
- concrete pad for the new Clean in Place (CIP) Pump,
- CIP suction and discharge piping system including Block and Bleed Valvs and modifications to the existing valves,
- softened water (UW) piping,
- new SS316 piping and air-vacuum valves for the Carbonic Acid System.

The contractor is working on completing installation of the CIP and SBS Dosing systems, new chemical analyzers, integration of newly installed equipment with SCADA, repairing paving, and painting of exterior piping. (12/9/16)

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**Project Title:** OC-44 Replacement and Rehabilitation Evaluation and Cathodic Protection Study

**File No.:** M 2034

**Description:** Evaluate potential repair and replacement options

**Status:** Contract awarded to RBF Consulting 2/12/13. Kick-off meeting held on 2/21/13. TM 1, 2 and 3 reviewed by Mesa Water® and City of Huntington Beach. Revised TM 1 and 3 submitted 6/12/13. Final study report due 7/31/13. Staff requested RBF to perform hydraulic modeling and habitat assessment to supplement original SOW. A meeting with MWDOC, MET and RBF to analyze possible new service connections on the OC Feeder held on 6/25/13. Workshop to discuss TM’s held on 7/2/13. Meeting to discuss PDR, permitting, work plan and design concerns held on 7/16/13. Draft PDR and final design scope proposal received 8/6/13. Hydraulic studies “Evaluation of MWD Water Supply Facilities” and “Analysis of Emergency Supply from OC-44 and OCF” received 8/8/13. Staff reviewed the PDR and Hydraulic Study reports and submitted comments to RBF 9/12/13. Received proposal for design of OC-44 Pipeline Rehabilitation Project 9/24/13. Proposal approved by E&O Committee 11/19/13 and by Board on 12/12/13. Staff prepared change order to RBF. Kick-off meeting held on 01/22/14. Project on progress. Outreach coordination meetings with project stakeholders took place on 2/14/2014. RBF is working with City of Newport Beach, County of Orange, and Irvine Company on receiving permits for surveying and geotechnical boring work. Orange County Health Care Permit issued 3/24/2014. Geotechnical boring conducted on 3/28/14. The county of Orange permit was issued April 7, 2014. Biological and Topographic Survey started in mid-April and will continue through the end of July. Scour analysis completed on May 29, 2014. Jurisdictional Delineation completed on 6/30/2014. Project progress meeting with RBF and City of Huntington Beach held on 7/2/14 to review environmental assessment and predesign requirements. The design of the pipeline rehabilitation started on 7/8/2014. 60% plans and specifications submitted for review 9/8/2014. Staff is coordinating with City of Huntington Beach and finalizing review of the design package. Initial Study and Mitigated Negative Declaration submitted 11/2/14. Staff is reviewing the submittal (11/6/14). 60% review meeting with City of Huntington Beach and RBF held on 12/1/14. 90% design submittal received on 2/5/15. Notice of Intent...
(NOI) posted at County Clerk and State Clearinghouse on 1/29/15. Initial Study/Mitigated Negative Declaration (IS/MND) posted on Mesa Water® website and distributed to agencies/parties identified on distribution list on 1/29/15. Permit applications submitted to the regulatory agencies, legal notice posted in the Daily Pilot, and hard copy of IS/MND posted at front counter on 1/29/15 for public review. The review period concluded 2/27/15. Three comment letters received. Prepared written responses to the comments and held public hearing at the Board Meeting on 4/9/15. 90% design submittal comments sent back to RBF on 3/26/15. Additional questions from RBF analyzed in coordination with the City of Huntington Beach and comments provided to RBF on 6/1/15. Progress meeting with RBF and City of Huntington Beach held 7/1/15. RBF is working with the regulatory agencies on obtaining encroachment permits and/or certifications. On 7/16/15 the consultant is scheduled to meet with the US Army Corps of Engineers (USACE) to discuss initial comments and obtain additional directions. Due to USACE staff shortage the permit is anticipated to be issued in March 2016. RBF is working with Regional Water Quality Control Board (RWQCB) on drafting the 401 Water Quality Certification for the project. The 401 Water Quality Certification was issued on 9/29/15. Comments to the California Department of Fish and Wildlife (CDFW) draft agreement were sent by RBF on 7/17/15. The CDFW permit is predicted to be issued in late October, 2015. In mid-June, 2015 RBF provided response to the California Coastal Commission’s (CCC) comments. The comments from CCC were received in the late July, 2015 and the permit is expected to be issued in mid-November, 2015. Permit from Caltrans obtained on August 17, 2015. 100% design package submitted on 7/21/15. Scour protection evaluation and recommendations submitted on 11/5/15. The CDFW should be issued by 12/18/15. The USACE has indicated that their permit should be issued in mid-January 2016. 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 forward to all agencies, including 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. Coastal Development Permit for Construction anticipated in late January, 2017. Final bid set will be completed once all permits are issued. Project in progress. (12/9/16)
**Project Title:** Well Automation and Rehabilitation  
**File No.:** MC 2101  
**Description:** Rehabilitate all clear water wells and add remote control SCADA capabilities  

**Status:** Design: RFP for Design Services released on 7/1/2014. Pre-proposal meeting held on 7/9/2014. 6 proposals received on 7/28/2014; interviewed 3 shortlisted firms on 8/6/2014. Recommendation to award contract to Carollo Engineers approved by E&O on 8/19/2014; Board approval requested on 9/11/2014. Project kickoff meeting held on 10/1/2014. Draft Permit plan received for review on 11/3/14. Well Standardization workshop held on 11/21/14 to align on site layouts, chemical tank sizing, and instrumentation. Draft Preliminary Design Report received on 1/12/2015, and reviewed in workshops on January 21, 2015 and February 3, 2015, and March 3, 2015. 60% received on April 13, 2015. Meeting to resolve review comments scheduled for April 27, 2015.  

Construction Management (CM) Services: Released and RFP for CM services on December 30, 2014 Preproposal meeting held on January 12, 2015. Four (4) proposals were received on January 26, 2015. Three proposers were interviewed on February 4, 2015, and the recommended Contract with RBF was approved by the Board on March 12, 2015.  

60% design received on April 13, 2015. General 60% Design Review workshop held on April 27, 2015 and electrical/instrumentation review workshop held on May 11, 2015. Working on optimizing construction sequence. Electrical design workshop scheduled for June 25, 2015. 90% design submittal received on July 15, 2015. Engineer’s Estimate of probable cost at 90% is approximately $10.1. Workshop to review and address 90% comments held on July 29, 2015. Contractor prequalification package sent to eight (8) General Contractors on July 18, 2015. Four prequalification applications were received on August 17, 2015. 100% Design received on September 16, 2015. Notice Inviting Sealed Bids was released to four prequalified contractors on October 5, 2015. Job Walks were conducted on October 13, 2015 for prequalified Prime Contractors and on November 3, 2015. Addenda and clarifications in response to bidder’s questions have been issued. Bid opening was extended to January 7, 2016 to allow for recent changes for new Well 9 layout. Four bids were received on January 7, 2016. An action item to award a contract to the lowest bidder was approved by the Engineering and Operations Committee on January 16, 2016 and by the full Board on February 11, 2016. Notice to proceed was sent on April 4, 2016. Preconstruction meeting held on April 12, 2016. The project is in the pre-construction submittal phase with several Requests for Information and equipment submittals received from the Contractor by the Construction Manager, and reviewed and responded to by the Design Engineer. 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. Well 5 Test Pumping scheduled to begin December 19, 2016 pending approval by the County of Orange Flood Control District to discharge to the Greenville-Banning Channel.

Project Title: Two New Wells

File No.: MC 2158

Description: New wells and real estate services to identify and acquire property

Status: Change Order to Well Rehabilitation and Automation approved at January 20, 2015 E&O to retain Carollo and subconsultant Geotechnical Consultants Inc. (GTC) to provide typical well site layout and hydrogeological investigation to identify promising locations for two new 2,000-gpm clear wells. Met with Real Estate Professionals on February 2, 2015, to discuss scope of work for well site property identification and acquisition. Met with OCWD Chief Hydrogeologist on March 24, 2015, to identify study area for new well sites. Gave Notice to Proceed to Real Estate company on May 4, 2015, and provided consultant report on preferred well site property characteristics. Real Estate consultant developed an advertisement postcard to describe the type of property needed, and sent it to over 1,000 commercial and industrial property owners in the study area. Three sites have been presented for evaluation. Also met with the Laguna Beach County Water District (LBCWD) Manager of Engineering and Operations on October 13, 2015, to discuss development of a jointly-owned well on property in Fountain Valley owned by LBCWD. An offer to purchase one site was presented to the property owner on November 16, 2016. The owner has not responded, and the offer time frame has expired. An offer for a different property was prepared and presented on January 6, 2016. Owner has decided to lease the property rather than selling. A third property is being evaluated by staff and OCWD for potential interference from the OCWD mid-basin injection. Travel time analysis results from OCWD showed that the property is inside the six month travel time window. A meeting was held on February 22, 2016, with OCWD and DDW to discuss the travel time analysis, and DDW determined that it would not issue a permit for a drinking water well at the site. A meeting with the City of Santa Ana Water Department was held to discuss the possibility of a jointly-owned well on a City of Santa Ana-owned site. An offer to purchase was presented to a property owner for an underutilized portion of a property on May 4, 2016. The offer was rejected. A revised offer was submitted on June 7, 2016. The owner has decided not to sell the property. Staff is working with Voit Real Estate to identify and evaluate underutilized sites in the vicinity of the study area. One underutilized site on Sunflower Boulevard was considered but rejected for being only 200 feet from the current Well 9B site, which would add significantly to pumping costs at both sites. Another site near Bristol and St. Gertrude was considered, but rejected due to the cost of the property, its location adjacent to a residential area, and the cost of construction of two miles of pipeline to Mesa Water’s service area. Negotiations are
nearing completion for a site in the Study Area.

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<tr>
<td>File No.:</td>
<td>MC 2229</td>
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<td>Description:</td>
<td>Replacement of Well 9</td>
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<td>Status:</td>
<td>Kickoff meeting was held on January 22, 2016. Well design criteria for depth, expected screen intervals, and expected pumping rate were established. Well design decisions include a continuous diameter of 18 inches with stainless steel casing and wire wrapped screen. Detailed design is in process. Draft bid documents reviewed and returned on March 25, 2016. Bid documents were released on April 22, 2016. The pre-bid site meeting was held on May 18, 2016 and attended by four bidders. Three bids were received by the deadline of June 7, 2016. The low bid from Weber Water Resources is approximately 30% below the Engineer’s Estimate. Notice to Proceed was issued to the contractor on July 19, 2016. Destruction of the existing well began on August 4, 2016 and was completed on August 19, 2016. The drilling of Well 9B began on August 29, 2016 and is currently in progress. The 304L Stainless Steel Casing is scheduled to arrive on site on September 14, 2016. Initial test pumping yielded a specific capacity of 13 gpm/ft, much lower than the 17-20 gpm/ft expected. As a result the test pump was removed and the well underwent further chemical development. Pump platform has been constructed and the contractor is currently running power to the new location. Pipework and fit-out is expected to be completed this week. Discharge into Banning Channel is prohibited until 12/19/16. Project in progress.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Title:</th>
<th>MWRF Parking Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>File No.:</td>
<td>M 2052</td>
</tr>
<tr>
<td>Description:</td>
<td>Conduct parking layout design</td>
</tr>
<tr>
<td>Status:</td>
<td>Parking study prepared by Onward Engineering in November 2013. The Board approved alternative # 3 Parking Along the MWRF Frontage on Gisler Ave. on 3/15/2014. RFP for the parking design in consultants’ review (11/6/14). RFP sent out to consultants 11/25/14. Proposals due 12/19/14. Interview with three consultants held on 1/7/15. Recommendation brought to January E and O for consideration of approval and will be brought to the Board on 2/12/15 for approval. Project approved 2/12/15. Kick-off meeting held on 2/19/15. Design in progress. 30% design submittal submitted 3/23/15. Staff met with C.J. Segerstrom and discussed concept and details of the proposed parking layout. Segerstrom verbally approved the project. City of Costa Mesa approved the concept and currently consultant is evaluating the landscape requirements with the City of Costa Mesa. E and O Committee accepted the conceptual design and provided comments on 5/19/15. The condition approval from Segerstrom received on 6/29/15. Staff is working with the designer (CivilSource), Mesa Water’s attorney, and City of Costa Mesa on addressing Segerstrom’s comments. Staff is reviewing the Initial Study/Summary of Findings Report received on 8/3/15.</td>
</tr>
</tbody>
</table>
Staff has addressed all Segerstrom’s requests included in their 6/29/15 letter and prepared a response letter. Approved construction plans were received from the City of Costa Mesa on 12/29/15. The final bid package completed 3/15/16. Encroachment Permit Application submitted to the City on 3/6/16. Hold Harmless Agreement for the Installation of Off-Site Parking Improvements within Public Right-of-Way received on 5/4/16. Staff reviewed the Agreement and sent comments to the City of Costa Mesa on 5/27/16. City approved all revisions as proposed by Mesa Water® and sent the agreement for signature on 6/24/16. The Engineering and Operations Committee reviewed the Agreement at July 19, 2016 meeting and recommended Board approval. Board approval obtained on August 11, 2016. Agreement sent to the City for execution and recording on 9/7/16. Recorded Agreement received from the City on 10/19/16.

**Project Title:**  OC 44 Import Stations Flow Meter Replacement

**File No.:**  M 2088

**Description:**  Provide design for replacement of Flow Meters in the OC 44 Import Turnouts No. TO-2, TO-4, and TO-5

**Status:**  Task Order No. RBF-3 for preparing construction drawings, technical specifications, and bid documents for the flow meter replacements in the import turnouts No. TO-2, TO-4, and TO-5 issued to Michael Baker International (MBI) former RBF Consulting on July 23, 2014. 75% plans and specifications submitted for review 10/7/2014. Staff is reviewing the submittal (10/9/2014). The review comments returned back to the consultant 11/4/14. Design of new pressure gauges, pressure transmitters, and related improvements were added to the scope in December 2014. Design in progress. 90% design package submitted for review on 2/20/15. Working with consultant and CLA-VAL on reviewing the design (3/6/15). 100% design submitted on 3/10/15. The comments to the 100% design sent back to the designer 4/30/15. Final design package received on 5/27/15. Mesa Water® staff is reviewing the package and working with MBI on addressing final comments 6/8/15. Project solicited 6/17/15 and pre-bid walk held on 6/29/15. Bids opened on 7/10/15. Staff recommended that the Board of Directors award a contract to the lowest bidder Jamison Engineering. E&O Committee recommended approval on 7/21/15. Board approved the project on 8/10/15. The kick-off meeting held on 8/17/15. Staff has finalized the contract and issued Notice to Proceed on 9/16/15. Project team is in the submittal review process. Progress meetings held on 2/2/16 and 3/2/16. Construction begun on April 4, 2016. The Contactor replaced 16” valve in Santa Ana Pressure Reducing Station on April 6, 2016 and meters in TO-2, TO-4, and TO-5 on April 29, 2016. Training for Mesa Water® personnel held on 6/14/16. Contractor continues working on remaining punch list tasks of the project including programming valve controls, integrating with SCADA, and on preparing a test plan. Hydraulic Analysis to determine flow through TO-2, TO-4, and TO-5 was prepared by MBI on September 30, 2016. Flow testing and equipment calibration performed on 11/3/16 and analysis to determine flow and pressure set points completed on 12/9/16. (12/9/16)
**Project Title:** Reservoir 1 and 2 Improvements  
**File No.:** M17-102  
**Description:** Installation of gas flow meters at Reservoir 1 and Reservoir 2,  
**Status:** Staff prepared Scope of Work and sent a request for quote to on-call Engineering consultant (As-Needed Design Consultant) to provide:  
Design and specifications for installation of gas meters for Res 1, Res 2, and Well 5. Evaluation and design of Res 1 Air Vent Covers and Roof Membrane, and design for replacement of Res 1 silencers. Request for quote sent out 3/5/15. Brady Engineers selected for the project. Kickoff meeting held on 4/7/15. 30% design package submitted 5/27/15. Designer is working on addressing the review comments and continuing the design (7/10/15). Well 5 gas meter moved into the well automation and rehabilitation project scope of work. 100% Design Package received on 8/4/15. Meeting with the designer to discuss reviewers' comments held on 8/10/15. The designer is revising the design and final bid package is anticipated to be submitted on 9/4/15. The final bid package submitted on 10/12/15. Staff has reviewed the submittal (11/5/15). Project advertised for bid on April 6, 2016. Pre-Bid meeting held on 4/20/16. Bids opened on 5/17/16. Two bids received for $516,000 and $556,600. Staff reviewed the bids and recommended E&O Committee to approve the lower bid. E&O Committee recommended approval of the project on 6/21/16. Kick-off meeting held on 8/3/16. Construction began on 9/12/16 with Reservoir 1 roof membrane replacement and air vent repair. The contractor is working on replacement of skylights, silencers and roof membrane at the Pump House of Reservoir 1 and on installation of gas meters for Waukesha engines at Reservoirs 1 and 2. Project in progress. (12/9/16)

**Project Title:** Pipeline Testing Program  
**File No.:** MC 2112  
**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:** Identifying segments for FY 2015 non-destructive testing and arranging for excavation and removal of segments that tested below 70% remaining wall thickness in FY2014 non-destructive testing. Released a Request for Proposal for a consultant to administer the program and develop standard operating processes on February 6, 2015. Three proposals were received on February 26, 2015, and interviews conducted on March 4, 2015. A contract with RBF was approved by the Board on April 9, 2015. Kickoff meeting held on April 21, 2015. Project status meeting held on June 8, 2015. Draft deliverable of prioritization of asbestos concrete pipe (ACP) for non-destructive testing received on June 26, 2015; updated draft received on August 7, 2015. Draft deliverable with recommendations for non-destructive testing technologies for metallic
MESA WATER® AND OTHER AGENCY PROJECTS STATUS REPORT
December 2016

Pipe received on August 7, 2015. Draft evaluation of destructive testing laboratories and tests received on August 21, 2015; final report received on September 16, 2015. Echologics performed non-destructive testing of 3 miles of ACP from July 13-17, 2015. Draft report received on August 14, 2015; final report received on September 1, 2015. Based on the Echologics reports from 2013 and 2015, ten ACP segments were selected for sampling and destructive testing. Three ferrous material pipelines with a history of repairs were also selected for field sampling and destructive testing. Draft bid documents for field sampling received on October 16, 2015. Final bid documents were released to three on-call contractors on November 23, 2015, for bids. Pre-bid meeting was held on December 7, 2015 and attended by all three of the bidders. Three bids were received on December 16, 2015. All bids exceeded the budget and the General Manager’s signing authority. An action item to approve a contract with the low bidder was approved by the Engineering and Operations Committee on January 19, 2016, and by the Board on February 11, 2016. Notice to Proceed with field sampling was given on March 7, 2016. An encroachment permit from the City of Costa Mesa was received on April 25, 2016. Field sampling began on May 16, 2016 and completed on June 28, 2016. Samples were shipped to MEIC Lab in Portland, Oregon, for destructive testing on July 7, 2016. Samples were received at MEIC on July 11, 2016. Lab results, including estimates of remaining useful life, are expected on October 10, 2016. Non-destructive testing of the next 3 miles of ACP was completed on September 16, 2016, and the draft report was received October 1, 2016. Proposals for design services for the next round of pipeline sampling and destructive testing were received. Staff is preparing a contract for design services.

<table>
<thead>
<tr>
<th>Project Title:</th>
<th>MWRF Outreach Center</th>
</tr>
</thead>
<tbody>
<tr>
<td>File No.:</td>
<td>MC 2147</td>
</tr>
<tr>
<td>Description:</td>
<td>Report on the feasibility of reconfiguring and potentially expanding the functional uses of the MWRF Operations and Administration Building to include a multi-purpose room and educational forum.</td>
</tr>
<tr>
<td>Status:</td>
<td>Mesa Water® is coordinating with IBI Group (designer) on the feasibility of implementing an education and outreach center at the MWRF. Kick-off meeting was held on 6/1/2015. Program Requirement Questionnaire meetings were held on 6/9/2015 and 6/17/15. Program Report delivered to Mesa Water® for review on 7/7/2015. 60% design concepts are scheduled for submittal on 08/14/15. 100% concept design received on 09/29/15. Virtual rendering received on 10/6/15. Concept designs presented at the October Board Workshop. A follow-up planning session was held at the November Engineering and Operations Committee Meeting to capture the Board’s input on evaluating reduced cost options and to revisit the existing Boardroom improvements. Board directed staff to develop a scope of work to evaluate scaled down layouts of the MWRF Outreach Center and revisit expanded layouts of the main Boardroom. Engineering and Operations Committee approved a contract amendment with IBI Group to reflect the revised scope of work. Item was approved by the Board.</td>
</tr>
</tbody>
</table>
February 11, 2016. IBI Group performed an inspection of the existing Boardroom on February 25, 2016 and are in the process of developing conceptual layouts. Staff review and meeting occurred on April 11, 2016. Conceptual layout work has been deferred.

<table>
<thead>
<tr>
<th>Project Title: Mesa Water® Main Office HVAC Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>File No.</strong>: MC 2171</td>
</tr>
<tr>
<td><strong>Description</strong>: Evaluate the existing HVAC system and provide recommendations for improved efficiency and operations of the system.</td>
</tr>
<tr>
<td><strong>Status</strong>: 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&amp;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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Title: Reservoirs 1 &amp; 2 Pumps, Controls, and Chemical System Assessment Project</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>File No.</strong>: MC 2173</td>
</tr>
<tr>
<td><strong>Description</strong>: Evaluate the existing Pumps, Controls, and Chemical Systems at Reservoirs 1 &amp; 2. The project includes lab testing of pump efficiency, physical assessment of pumps and pipework, assessment of the existing control system, and preliminary design of a chemical dosing system. Recommendations for improved efficiency and operations of the system will be included in a final report.</td>
</tr>
<tr>
<td><strong>Status</strong>: Mesa Water® has contracted with Hazen &amp; Sawyer to perform this study. Kick off meeting was held September 30, 2015. The consultant performed a field survey of both Reservoirs 1 &amp; 2 over two days. A preliminary outline of technical memo 1 was provided on December 11, 2015. Initial data requests were responded to by December 7, 2015, with follow up responses provided on January 7, 2016 (SCADA Data) and February 9, 2016 (Jockey Pump Data). Pump testing scope of work has been reviewed by Mesa Water® and returned to the Consultant for revision. TM-1 has been reviewed by staff and returned to the consultant. Pump extraction plan and bid documents are currently being reviewed by staff. The Consultant has begun the preliminary design of a chemical dosing system. Request for bids for the pump extraction will be released in August 2016. Bids for the pump extraction were submitted and reviewed. The item was presented to the Engineering and Operations Committee at the September 20, 2016 meeting. Contract has been executed. Field assessment</td>
</tr>
</tbody>
</table>

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was completed on October 19, 2016. Factory pump testing scheduled in early January 2017 to ensure coordination with Res 1 & 2 roof and silencer improvements. Further field tests conducted on December 2, 2016.

<table>
<thead>
<tr>
<th>Project Title:</th>
<th>Other Agency Project Coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Median construction in Placentia Ave. between Wilson St. and Adams Ave.</td>
</tr>
<tr>
<td>Status:</td>
<td>Mesa Water® 16” main runs 5’ East of the street center line. Mesa Water® is coordinating with designer and City on design of necessary protection and root barrier for the water main. 85% design plans received on (12/22/14). Plan review in progress 1/8/15. Plan review comments sent to the City 2/6/15. Mesa Water® provided update comments to landscaping plans on 6/17/15. Mesa Water® continuing to coordinate with the City, Stivers and Associates, Inc., and City Designer on layout of project. Revised final plans submitted for Mesa Water® review on 11/19/15. Staff reviewed the submittal in cooperation with Mesa Water® landscape consultant (Stivers Associates) and submitted comments to the City Designer on 12/28/15. The comments have been accepted by the Designer and Final Plans were submitted on 2/9/16. New comments sent to the designer on 2/18/16. The revised final plans received on 3/21/16 and approved by Mesa Water® on 3/31/16. City of Costa Mesa awaiting state funding for the project.</td>
</tr>
<tr>
<td>File No.:</td>
<td>M 2106</td>
</tr>
<tr>
<td>Description:</td>
<td>Water main relocation in New Hampshire Dr. due to Greenville-Banning Channel Improvements by County of Orange.</td>
</tr>
<tr>
<td>Status:</td>
<td>Relocation of 12” water main is required due to enlarged box culvert on Greenville-Banning Channel. Task Order No. RBF-2 issued to RBF Consulting on June 24, 2014 for design of the relocation. Mesa Water® is coordinating with County of Orange and RBF. Design in progress. Hydraulic analysis received from RBF 9/12/14 indicated that taking the New Hampshire pipeline out of service during construction of the Greenville-Banning Channel will have no adverse impacts on the distribution system (8/9/14). Mesa Water® is working with OCFCD on finalizing the cooperative agreement. E&amp;O Committee approved the agreement 11/18/14. Pipeline relocation design package submitted to Mesa Water® on 1/31/15. Mesa Water® is coordinating with OCFCD and consultant to address final comments. Plans and specifications for the pipeline relocation completed 3/3/15 and forwarded to OCFCD on 3/5/15. Project was delayed until Spring of 2016. Attended the pre-construction meeting on 7/21/15. Construction meeting with OCFCD’s contractor Sukut Construction (Sukut) held on 4/7/16. Staff is coordinating with OCFCD and Sukut on project schedule. Two new 12-inch valves installed by Mesa Water® on New Hampshire Dr. at Idaho Ave. on 7/7/16.</td>
</tr>
</tbody>
</table>
and air-vac valve relocated on 7/18/16. Approx. 110 ft. long section of existing 12” water main removed and existing box culvert demolished on 7/25/16. Construction of the new box culvert and water main replacement were completed in September, 2016. Completion of the Channel Improvements Project is scheduled for mid-January, 2017.
Water Quality Call Report
November 2016

Date: 11/4/2016
Source: Phone/Email
Address: 3055 Johnson Ave
Description: Per customer, two year old child has developmental delays and had lead detected in his/her blood. She's interested in getting her water tested for lead.

Outcome: Explained to customer about lead and copper testing that Mesa Water® has completed and that the water is not "aggressive" towards plumbing and does not require additional treatment. Also told her that we do not test the water at customer's home aside from the pre-determined lead and copper testing program sites. Provided customer a list of local state certified laboratories she can contact for her testing needs. Also provided her the link to EPA's website on lead.

Date: 11/13/2016
Source: Phone
Address: 3011 Club House Cir
Description: Customer inquired if Mesa Water fluoridates the water.

Outcome: Explained to customer that Mesa Water does not fluoridate supplies but the wells do contain naturally occurring fluoride. Also mentioned to customer that imported water from Metropolitan Water District is fluoridated. Showed customer where to find fluoride levels in the Consumer Confidence Report available online.

Date: 11/15/2016
Source: Phone
Address: 2785 Albatros
Description: Customer noticed odor in upstairs sink and shower.

Outcome: Explained to customer how to determine if the odor is coming from the water or from the drain. Customer will check the water the next time the odor returns and call back if she has additional questions.
## Policy Assignments for 2016

<table>
<thead>
<tr>
<th>Policy Name</th>
<th>Resolution</th>
<th>Date Adopted</th>
<th>Revision Schedule</th>
<th>Next Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rules and Regulations for Water Services (will include review of meter</td>
<td>Resolution No. 1470</td>
<td>02/09/16</td>
<td>Review and update as</td>
<td>February 2017</td>
</tr>
<tr>
<td>capacity charges and easement procedures)</td>
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<td>needed</td>
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<tr>
<td>Standard Specifications and Drawings</td>
<td>Resolution No. 1449</td>
<td>08/14/14</td>
<td>Review and update as</td>
<td>December 2016</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>needed</td>
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## Water Operations Status Report
### July 1, 2016 - November 30, 2016

### Operations Department Status Report

<table>
<thead>
<tr>
<th>Program</th>
<th>Wk Unit</th>
<th>Plan Days</th>
<th>Act Days</th>
<th>Plan Qty</th>
<th>Act Qty</th>
<th>Plan Cost</th>
<th>Actual Cost</th>
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<tbody>
<tr>
<td><strong>01 - HYDRANTS</strong></td>
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<tr>
<td>WD-0101 - HYDRANT MAINTENANCE</td>
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<td><strong>02 - VALVES</strong></td>
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<td>WD-0201 - DISTRIBUTION VALVE MAINTENANCE</td>
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<td>WD-0202 - NIGHT VALVE MAINTENANCE</td>
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<td><strong>03 - METERS</strong></td>
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<tr>
<td>WD-0301 - NEW METER INSTALLATION</td>
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<tr>
<td>WD-0302 - RAISE REPLACE METER BOX</td>
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<td>WD-0305 - ANGLE STOP/BALL VALVE REPLACE</td>
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<td><strong>04 - MAIN LINES</strong></td>
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<td>WD-0402 - AIR VAC MAINTENANCE/REPAIR</td>
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<td><strong>Program 04 TOTAL</strong></td>
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<td><strong>05 - SERVICE LINES</strong></td>
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<td>CAP AV - CAPITAL AIR VACUUM REPLACE</td>
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<td>CAP BI - CAPITAL BYPASS &amp; METER INSTALL</td>
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### VACANT POSITIONS

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### TOTAL

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**Total Cost:** $442,387
**Total Actual Cost:** $465,082
MEMORANDUM

TO: Engineering and Operations Committee
FROM: Phil Lauri, P.E., Assistant General Manager
DATE: December 20, 2016
SUBJECT: Municipal Water District of Orange County Activities Update

RECOMMENDATION

This report is for information only.

STRATEGIC PLAN

Goal #1: Provide a safe, abundant, and reliable water supply.
Goal #3: Be financially responsible and transparent.
Goal #7: Actively participate in regional water issues.

PRIOR BOARD ACTION/DISCUSSION

None.

DISCUSSION

This report on Municipal Water District of Orange County (MWDOC) issues is intended to brief the Committee and Board on activities relevant to Mesa Water District (Mesa Water®). The first section, “On-Going Issues”, is a status update on current studies, reports, and/or policy work groups that staff are involved with. The second section, “Last Month’s Issues”, is a report on noteworthy items that were covered at the last month’s MWDOC Board and Committee meetings. The last section, “Upcoming Issues”, is a preview of new and forthcoming issues important to Mesa Water®. This format is intended to keep the Committee and Board informed about current and future items at MWDOC in order to provide direction to staff and its MWDOC representatives in a timely manner, if required.

ON-GOING ISSUES

1. CALIFORNIA WATERFIX
   • Director Barbre updated the group on the California WaterFix bill. He was in Washington D.C. after the election and noted that there is renewed interest on the part of Senator Feinstein to get a bill passed prior to the inauguration in January. Senator Feinstein issued a press release in support of the bill (first time in four years); Senator Boxer is opposed to the bill.

2. PROPOSED LOWER COLORADO RIVER DROUGHT CONTINGENCY PLAN (DCP)
   • The purpose of the DCP is to reduce the risk of Lake Mead falling below 1,020 feet within the next ten years, prevent potential water curtailments to California water agencies, and provide stability on the Colorado River. The benefit to Metropolitan’s support for the DCP lies in the water management flexibility.
The benefit comes from the continued ability to store and take delivery of intentionally-created surplus (ICS) water and continue to identify further binational water supply opportunities and provide Metropolitan with an assurance that they will have access to a full Colorado River aqueduct during critical years to meet its service area’s water needs.

Proposed Drought Contingency Plan (DCP):
- Continue cooperative collaboration on River
- Reduce risk of Lake Mead falling to 1,020’
- Resolve ICS delivery dispute as well as other programs
- Plans call for:
  - Water use reductions triggers for each state
  - Cumulative cap on delivery reductions
  - Delivery reduction amounts conditionally recoverable

Benefits to Metropolitan:
- ICS recoverable when Lake Mead above 1,025’
- Interstate banking/exchanges permitted when Lake Mead above 1,045’
- Binational exchanges permitted when Lake Mead above 1,025’

3. LRP AGREEMENT BETWEEN METROPOLITAN, MWDOC AND EL TORO WATER DISTRICT FOR THE EL TORO RECYCLED WATER SYSTEM EXPANSION PHASE II PROJECT
   - The GM was authorized to execute final LRP agreement with MWD and El Toro Water District for the El Toro Recycled Water System Expansion Phase II Project.

4. LRP AGREEMENT BETWEEN METROPOLITAN, MWDOC AND SANTA MARGARITA WATER DISTRICT FOR THE LAKE MISSION VIEJO ADVANCED PURIFICATION WATER TREATMENT FACILITIES PROJECT
   - The GM was authorized to execute the final LRP agreement with MWD and Santa Margarita Water District for the Lake Mission Viejo Advanced Purification Water Treatment Facilities Project.

LAST MONTH’S ISSUES

1. WATER SUPPLY CONDITION UPDATE AND ORANGE COUNTY PERFORMANCE REPORT FOR SEPTEMBER 2016
   - For the month of September, 2016, Orange County saved 16.75% (compared to the historical average for September 2013-2014), exceeding the MWDOC goal of 10%.
   - Total water demand for FY 2015-16 was the lowest demand since FY 1982-83.
   - Orange County has saved 165,000 AF compared to CY 2013.
   - With the new water year starting on October 1, state precipitation is looking good. The Northern California accumulated precipitation (8-Station Index) is reporting 18 inches or 200% of normal as of November 28; for the month of November accumulated precipitation is at 6.1 inches which is just about normal compared to the historical average. In summary, October 2016 was one of the wettest Octobers on record and November finished up around average. However, the water year is
still early and most of the state's precipitation is needed in the winter months of December thru February.

- As of November, 2016, 88% of California is still in drought conditions. This is still extremely high but considerably better than November 2015 when 99% of California was in a drought.

2. EXECUTION AND IMPLEMENTATION OF WATER USE EFFICIENCY GRANT AGREEMENTS

- The GM was authorized to sign grant agreements for the staff to implement:
  - the US Bureau of Reclamation Agreement for implementation of the Comprehensive Landscape Water Use Efficiency Program – Phase II, and
  - the South Orange County Integrated Regional Water Management Implementation Grant for Strategic Turfgrass Removal and Design Assistance Program.

3. OATHS OF OFFICE:

- Directors Finnegan, Osborne and Thomas were sworn in to a new term by the MWDOC attorney and a new Director, Megan Yoo Schneider, was sworn in by her father to replace Susan Hinman.

UPCOMING ISSUES

- MWDOC Reserve Policy
- OC Reliability Study TM-4

FINANCIAL IMPACT

None.

ATTACHMENTS

None.
MEMORANDUM

TO: Engineering and Operations Committee  
FROM: Phil Lauri, P.E., Assistant General Manager  
DATE: December 20, 2016  
SUBJECT: Orange County Water District Activities Update

RECOMMENDATION

This report is for information only.

STRATEGIC PLAN

Goal #1: Provide a safe, abundant, and reliable water supply.  
Goal #3: Be financially responsible and transparent.  
Goal #7: Actively participate in regional water issues.

PRIOR BOARD ACTION/DISCUSSION

None.

DISCUSSION

This report on Orange County Water District (OCWD) issues is intended to brief the Committee and Board on activities relevant to Mesa Water District (Mesa Water®). The first section, “On-Going Issues”, is a status update on current studies, reports, and/or policy work groups that staff are involved with. The second section, “Last Month’s Issues”, is a report on noteworthy items that were covered at the last month’s OCWD Board and Committee meetings. The last section, “Upcoming Issues”, is a preview of new and forthcoming issues important to Mesa Water®. This format is intended to keep the Committee and Board informed about current and future items at OCWD in order to provide direction to staff and its OCWD representatives in a timely manner, if required.

ON-GOING ISSUES

1. OCSD/OCWD JOINT AGREEMENT FOR THE GWRS FINAL EXPANSION PROJECT

- The agreement delineates the responsibilities and obligations of each agency for CIP, land lease and operations. OCWD will operate the expanded plant, and pay for all construction and design activities, including the rehabilitation of the existing pipeline that runs from Plant 2 to GWRS. OCSD will operate the new headworks’ and distribution line between Plant 2 and GWRS. OCSD will fund that portion of work, including design and construction. OCWD will share in staffing the existing guard shack and do minor improvements to security fencing. Unit cost of water, including the needed mid-basin injection system is $350M or $968/acft. The full board approved this agreement unanimously.
LAST MONTH’S ISSUES

1. GROUNDWATER REMEDIATION MONTHLY STATUS UPDATE
   - OCWD submitted final grant applications for:
     - North Basin:
       - EW-1 initial project - $900,000
       - RI/FS planning grant - $1,000,000
     - South Basin:
       - RI/FS planning grant - $1,000,000
   - Total request of $2.9 million - Award expected in January, 2017

2. DOCUMENTS FOR 2016A REFUNDING REVENUE BOND ISSUANCE
   - The Board unanimously approved a resolution authorizing execution and delivery of Indenture, Escrow Agreement, Purchase Contract, Continuing Disclosure Certification, and the Preliminary Official Statement in support of a fixed rate refunding revenue bond issuance to refund the 2009A COPs not to exceed $118 million including fees.

3. BOARD SWEARING IN CEREMONY (DIRECTORS ANTHONY, BILODEAU, BRANDMAN, GREEN, YOH)

UPCOMING ISSUES

- GAP Study
- Poseidon Project
- IRWD Lawsuit

FINANCIAL IMPACT

None.

ATTACHMENTS

None.
MEMORANDUM

TO: Engineering and Operations Committee
FROM: Tracy E. Manning, Assistant Operations Manager
DATE: December 20, 2016
SUBJECT: Nitrification Control Study Report

RECOMMENDATION

Recommend that the Board of Directors receive the report and 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

The issue of nitrification was first discussed at the January 11, 2014 Engineering and Operations Committee meeting shortly after a series of nitrification events occurred within the distribution system.

On October 21, 2014, the E&O Committee received an information item of the intention to retain professional engineering services to perform a Nitrification Control Study and provide a Nitrification Mitigation and Control Plan.

On May 14, 2015, the Board authorized the General Manager to execute a contract with Carollo Engineering (Carollo) in the amount $248,746 to perform the Nitrification Control Study.

BACKGROUND

Mesa Water has historically seen periodic nitrification events in both storage reservoirs as well as in the southeastern distribution area where nitrification events have been difficult to address. Nitrification is one of the main challenges encountered by water providers that use monochloramine as a distribution system residual disinfectant. Monochloramine is a chlorine and ammonia compound with an optimal 5-to-1 ratio by weight. When this optimal ratio is exceeded, monochloramine is destroyed and disinfection by-products and taste and odor compounds are formed. When the ratio is sub-optimal, free ammonia is made available as a food source to nitrifying bacteria leading to nitrification. System operations must then be adjusted to maintain consistently high-quality water.

While the health standard for nitrite is limited to drinking water sources rather than distribution systems, the problem with nitrification in the distribution system is that its byproducts degrade chloramines, which leaves the distribution system unprotected against potential contaminants and bacterial growth. This chloramine instability can lead to potential violation of regulated water quality parameters, corrosion issues, and reduced pipeline life. Operational challenges required during nitrification events include reduced reservoir storage, increased water sampling, removing affected reservoirs from service in order to perform break-point chlorination, distribution system flushing, and the potential use of costly imported water. Therefore, control or elimination of nitrification is important to the operation of the water system.
In late November through December 2013, there was an unusual series of four nitrification events that occurred in the Kemp Reservoir, although at no time were water quality compliance or health standards exceeded. The close sequence of nitrification events resulted in a determination that the quality of water going into the reservoir, rather than events occurring within the reservoir itself, appeared to be the source for these events.

With the consultation and approval of the Division of Drinking Water, targeted unidirectional flushing (UDF) and a 30-day conversion from chloramine to free chlorine for disinfection was undertaken. Both techniques yielded positive, but short-term results. Elevated nitrification levels within the distribution system and Kemp Reservoir had returned within three months of the conclusion of the free chlorine conversion. Based on the aforementioned incidents, the 2014 Water Master Plan Update recommended that Mesa Water® undertake a more detailed study of nitrification in the distribution system.

In July 2015, Mesa Water launched a Nitrification Control Study to resolve this issue by assessing the impacts of nitrification and the effectiveness of the disinfection protocols used at its production and distribution facilities, developing a Nitrification Mitigation and Prevention Plan (NMPP), and developing a plan and cost estimate for proposed system modifications to address nitrification. Evaluation techniques included:

- Extensive review and analysis of historical water quality and operational data,
- Targeted field sampling and analyses at source water entry points, reservoirs, and distribution system, and
- Water system modeling was performed using various operational scenarios to determine water age and identify areas where reservoirs share influence.

Additionally, bench scale testing of all water sources was conducted to evaluate the viability of converting to a free chlorine residual water system permanently while continuing to meet all water quality standards.

DISCUSSION

Nitrification Control Study Report

Carollo Engineering encapsulated the results and recommendations from the Nitrification Control Study in a series of technical memos (TM) and an Executive Summary (Attachment A).

TM-1 contains extensive analysis of existing water quality data; several water system model scenarios designed to depict common water supply scenarios; and several reservoir flow scenarios designed to identify the degree of influence each reservoir has on the other in relation to water age. This analysis was used to develop the sampling plan for additional testing. Key initial observations included:

- Elevated nitrite levels in Kemp Reservoir correlate to the commissioning of the Mesa Water Reliability Facility (MWRF) in early 2013 and the subsequent significant reduction in imported water use.
- The MWRF and well sources provide consistently acceptable chlorine levels; reservoir chlorine levels are consistently and significantly lower, although have trended higher since the MWRF was placed in-service.
• Average and median free ammonia concentrations were within recommended limits to prevent nitrification, but data showed many individual excursions of high free ammonia concentrations as well as low chlorine to ammonia ratios. These excursions may result in monochloramine instability.
• Reservoir areas of influence share significant overlap, leading to increased water age.
• Additional modeling work would be required to identify options for physical changes to the distribution system that may reduce water age.

TM-2 includes the results, analyses and key observations of targeted field sampling and analyses performed based on the testing plan developed during the initial evaluation of data. Key areas of testing and outcomes included:
• 2-day and 7-day chloramine demand testing of both sources and distribution system sites indicate low overall chlorine demand. This indicates that source water quality likely does not significantly influence nitrification events.
• Disinfection By-Product (DBP) formation potential was tested using water from each of Mesa Water’s sources to determine if it were feasible to convert the entire distribution system to free chlorine residual on a permanent basis. Results demonstrated that clear wells and imported water supplies remained within DBP standards, while treated MWRF water exceeded DBP standards due to higher source water bromide levels. Results also indicate that chlorine demands would require booster free chlorination facilities within the distribution system to maintain required disinfectant residual levels in a free chlorine residual system.
• Biofilm and nitrifying bacteria levels were monitored in both reservoirs over a two-month period. Bacterial nitrifiers were present in each biofilm sample as a fraction of total bacteria levels.
• Reservoir cycling intensity and frequency were extrapolated using level data collected. Reservoirs are cycled deeply, but at low frequency leading to increased water age.

TM-3 was developed as a stand-alone Nitrification Mitigation and Prevention Plan. This plan provides system operators with the following:
• Background information on Mesa Water’s system and water sources,
• Operational strategies to prevent nitrification from occurring,
• Recommended monitoring in addition to the current monitoring schedule, and
• Water quality and disinfection strategies to mitigate nitrification events.

TM-4 provides proposed water system modifications and recommendations designed to control the two primary factors identified through the Nitrification Control Study as contributing to nitrification within Mesa Water’s distribution system: Monochloramine instability and water age.
Recommendations have been summarized and prioritized in Table 1:

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<th>Category</th>
<th>Priority</th>
<th>Description</th>
<th>Impact</th>
</tr>
</thead>
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<tr>
<td>Water Quality Goals</td>
<td>Higher</td>
<td>1. Continue implementation of the Well Automation Project</td>
<td>Decrease free ammonia at entry points; Stabilize chlorine and ammonia dosing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Implement complete chloramine booster stations at reservoir sites</td>
<td>Maintain higher chloramine residuals and control free ammonia</td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>3. Continue periodic reservoir inspections and cleaning</td>
<td>Reduce sediment build-up</td>
</tr>
<tr>
<td>Operational Goals</td>
<td>Higher</td>
<td>1. Increase reservoir cycling rates</td>
<td>Decrease water age</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Hydraulic modeling to identify alternative system operations to decrease water age</td>
<td>Identify system modifications to reduce water age</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Implement the Nitrification Mitigation and Monitoring Plan</td>
<td>Allow for early detection of water quality changes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Develop additional water sources to aid in reservoir cycling</td>
<td>Allow for rapid deep reservoir cycling and decreased water age</td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>1. Pipe flushing</td>
<td>Reduce sediment build-up in pipes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Replace unlined steel and ductile iron pipe (DIP)</td>
<td>Remove potential for nitrification where these pipe are installed</td>
</tr>
</tbody>
</table>

Implementation is already underway for several recommendations including well automation, acquisition of additional well sites, and reservoir inspections. Projects developed to implement additional recommendations will be brought before the board at a future date.

FINANCIAL IMPACT

In Fiscal Year 2016, $248,746 was budgeted for the Nitrification Control Study. Funds required to complete recommended projects will be budgeted in future fiscal years.

ATTACHMENTS

Attachment A: Executive Summary

The entire report is available by request and copies will be available at the Committee Meeting.
MESA WATER DISTRICT
NITRIFICATION CONTROL STUDY
EXECUTIVE SUMMARY

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<td>2.0 SUMMARY OF WORK AND FINDINGS</td>
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<td>2.1 Strategy to Eliminate Nitrification</td>
<td>ES-3</td>
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<tr>
<td>2.2 Strategy to Achieve Water Quality Goals While Using Chloramines</td>
<td>ES-3</td>
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<td>2.3 Strategy to Improve Operation While Using Chloramines</td>
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<td>3.0 RECOMMENDATIONS AND COST ESTIMATES</td>
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<td>3.1 Higher-priority Recommendations</td>
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<td>3.2 Lower-Priority Recommendations</td>
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Figure ES.2 Water Quality Goals and Recommendations to Limit Nitrification .......... ES-5
1.0 INTRODUCTION

Around the year 2000, Mesa Water District (Mesa Water) switched from free chlorine to monochloramine as the distribution system residual disinfectant. This was done to align with the use of chloramine in the water imported from the Metropolitan Water District of Southern California (MWD), and to comply with disinfection byproduct (DBP) requirements.

Since that time, Mesa Water has experienced periodic nitrification events that have impacted its storage reservoirs and localized areas of its drinking water distribution system. To limit the extent of nitrification, Mesa Water has used a Nitrification Monitoring and Action Plan that was approved by the State of California along with routine monitoring to determine the onset of nitrification and actions to undertake. However, nitrification has persisted in the distribution system, particularly in the southern service area.

Nitrification is one of the main challenges encountered by water providers that use monochloramine as a distribution system residual disinfectant. It is triggered by the presence of free ammonia in water, which can come from excess ammonia dosing during the chloramination process, or chloramine decomposition. However, nitrification within the distribution system is not a regulated condition, so why is it important to address and treat? The problem with nitrification in the distribution system is that its byproducts degrade chloramines, which leaves the distribution system unprotected against potential contaminants and bacterial growth. This water quality instability can lead to potential violation of one or more regulated water quality parameters, corrosion issues, reduced pipeline life and on-going and significant operational challenges in order to keep the distribution system out of nitrification, such as additional sampling, taking reservoirs off line for break-point chlorination and potential use of imported water. Therefore, control and/or elimination of nitrification are important.

In Summer 2015, Mesa Water launched a study to resolve this issue by assessing the impacts of nitrification and the effectiveness of the disinfection protocols used at its production and distribution facilities, developing a Nitrification Mitigation and Prevention Plan (NMPP), and developing a plan and cost estimate for proposed system modifications to address nitrification.

2.0 SUMMARY OF WORK AND FINDINGS

To establish a baseline for the study and analyze historical water quality trends, a detailed evaluation of water quality data from 2000 to 2015 was undertaken. This was followed by bench- and full-scale sampling tests that were conducted to investigate specific issues that may explain the nitrification episodes experienced by Mesa Water. These experiments were
aimed at isolating and understanding some of the root causes of nitrification by focusing on chloramine decay and demand, and examining the presence of nitrifying bacteria in the distribution system. Finally, the results were synthesized into recommendations that aimed at bringing water quality parameters within set targets that would limit nitrification. A Nitrification Mitigation and Prevention Plan were developed to enable Mesa Water to monitor and maintain the water quality parameters within these desired goals.

The factors that affect nitrification are numerous. The main water quality parameters that may lead to nitrification are the presence of free ammonia, low total chlorine residuals, and low chlorine-to-ammonia ratios. Preserving monochloramine stability is key in preventing nitrification, because chloramine degradation and decay release ammonia, which is the food source for ammonia-oxidizing bacteria. Therefore, the longer the water remains in the distribution system the more likely one or more of the many factors that impact monochloramine decay may have an opportunity to cause decay. Thus water age is another critical factor. Figure ES.1 shows a graphical illustration of the major factors impacting nitrification and the ranges within which each of these factors should be maintained in order to minimize the occurrence of a nitrification episode.

<table>
<thead>
<tr>
<th>Factors Important in Nitrification</th>
<th>Range</th>
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<tr>
<td>Free Ammonia NH₃-N (mg/L)</td>
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<tr>
<td>0</td>
<td>0.05</td>
</tr>
<tr>
<td>0.10</td>
<td>0.15</td>
</tr>
<tr>
<td>Monochloramine (mg/L)</td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>2.0</td>
</tr>
<tr>
<td>2.5</td>
<td>3.0</td>
</tr>
<tr>
<td>Cl₂: NH₃-N Ratio</td>
<td></td>
</tr>
<tr>
<td>4.5:1</td>
<td>5.0:1</td>
</tr>
<tr>
<td>Water Age (Days)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

**Figure ES.1** Illustration Of The Major Factors Impacting Nitrification And Ranges Within Which Each Should Be Controlled At The Entry Points Of The Distribution System

Other water quality parameters may also promote nitrification, including higher water temperature, slightly lower pH, and the presence of alkalinity, although these factors are not as critical as those shown in Figure ES.1. The presence of organic and inorganic materials is also important because it affects monochloramine stability. Distribution system operation
and hydraulics also affect nitrification, and in addition to water age, the presence of sediments, biofilms and corrosion byproducts may promote nitrification.

2.1 Strategy to Eliminate Nitrification

One approach to eliminating nitrification is to switch back to free chlorine as the distribution system residual disinfectant; and some water agencies have chosen this option.

Mesa Water has considered switching back to free chlorine too, but there are ramifications for doing so. Switching to free chlorine would involve chlorine-only addition at the clear water wells and the Mesa Water Reliability Facility (MWRF), booster chlorination at the reservoir sites and possibly elsewhere in the distribution system, to maintain a residual all the way to customers taps, as well as breakpoint chlorinating MWD water when this water source is used. Disinfection By-Product (DBP) concentrations would be high in water treated by the MWRF, and to some extent, in breakpoint chlorinated MWD water as well. The high proportion of brominated DBPs observed during the DBP formation potential tests in free chlorinated MWRF water would be concerning considering that brominated DBP species present greater health effects than their chlorinated counterparts, and are being considered in future regulations. Thus, reducing bromide levels would be necessary to control brominated DBPs, and one potential approach to doing so would be switching out the membranes at the MWRF for ones that can remove a portion of the bromide and some additional organic material. This would be costly and would also lead to higher electrical costs due to the increased operating pressure required to process water through a tighter membrane.

Overall, switching to free chlorine would not be straight forward and would require additional work to clarify the extent of all possible drawbacks, and identify the true cost.

2.2 Strategy to Achieve Water Quality Goals While Using Chloramines

Assuming that Mesa Water remains using monochloramine as the distribution system residual disinfectant, the key factors impacting nitrification that were illustrated in Figure ES.1 apply. Figure ES.2, presents the three most critical water quality aspects again, together with some additional parameters that should be considered, and system improvements that may be needed to achieve these goals and the anticipated costs for each.

The first three goals in Figure ES.2 are critically important, i.e., limiting free ammonia, maintaining high total chlorine residuals, and controlling the chlorine-to-ammonia ratio. Because deviations from these three water quality goals may promote nitrification in Mesa Water’s distribution system, the improvements associated with these goals should be implemented as soon as possible, and monitoring should be conducted to confirm that these parameters remain within their target values. The other water quality parameters presented in the bottom part of Figure ES.2 also impact nitrification because they
destabilize the monochloramine residual in Mesa Water’s distribution system, although this represents an indirect effect on nitrification.

In summary, maintaining the water quality goals listed above in Figure ES.2 will help Mesa Water limit nitrification in its distribution system when using monochloramine as the residual disinfectant. However, nitrification does not only depend on water quality at the entry points of the distribution system; distribution system hydraulic conditions and operation are also important. Nitrifying bacteria will remain present in the distribution system biomass as long as monochloramine is the distribution system residual disinfectant, and therefore if conditions within the distribution system result in suboptimal water quality conditions with respect to Figure ES.2, then nitrification may proliferate. For example, long water age in the system will result in the decay of the chloramine residual which will release ammonia, the food source of ammonia oxidizing bacteria.

2.3 **Strategy to Improve Operation While Using Chloramines**

Many of the distribution system related factors aim at achieving the water quality goals listed in Figure ES.2, and some of them require system improvements.
### Critical Water Quality Goals

<table>
<thead>
<tr>
<th>Critical Water Quality Goals</th>
<th>Range</th>
<th>Rational</th>
<th>Recommendations</th>
<th>Improvement Project(s)</th>
<th>Budget Cost(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free Ammonia NH$_3$-N (mg/L)</td>
<td>0-0.05</td>
<td>Being the substrate for AOB, high free ammonia concentration is one of the main triggers of nitrification</td>
<td>Monitor for free ammonia</td>
<td>•Modify monitoring program to include free ammonia at all distribution system sites &lt;br&gt; •Continue well automation project (underway)</td>
<td>Ongoing</td>
<td>Highest</td>
</tr>
<tr>
<td>Monochloramine (mg/L)</td>
<td>1.5-2.0</td>
<td>Allowing total chlorine residual to decrease below ~1.5 mg/L Cl$_2$ can trigger nitrification</td>
<td>Ability to dose chlorine and ammonia at all entry points, including reservoir outlets</td>
<td>•Complete well automation project (underway) &lt;br&gt; •Install complete chlorination booster stations at the reservoir sites</td>
<td>$1.5 - 2.0 Million</td>
<td>Highest</td>
</tr>
<tr>
<td>Cl$_2$/NH$_3$ N Ratio</td>
<td>4.5:1</td>
<td>Higher ratios are preferable because less ammonia is initially available to start the nitrification process when chloramines decay</td>
<td>Continue to calculate the chlorine-to-ammonia ratios at all entry points of the distribution system, including the reservoir outlets</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Additional Water Quality Goals

<table>
<thead>
<tr>
<th>Additional Water Quality Goals</th>
<th>Range</th>
<th>Rational</th>
<th>Recommendations</th>
<th>Improvement Project(s)</th>
<th>Budget Cost(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUVA Ratio (1)(2)</td>
<td>1.5-2.0</td>
<td>Certain fractions of the organic material can consume chloramines, which may trigger nitrification</td>
<td>Monitor for TOC and UV absorbance at 254 nm at all entry points of the distribution system, and calculate SUVA</td>
<td>•Modify monitoring program to include TOC and UV$_{254}$ at all sites &lt;br&gt; •Replace membranes at MWRF to remove portion of bromide and reduce SUVA(4)</td>
<td>$3.0 Million + increased energy costs</td>
<td>High</td>
</tr>
<tr>
<td>Bromide (mg/L) (3)</td>
<td>100</td>
<td>Inorganic compounds can consume chloramines; the ammonia released in this process may trigger nitrification</td>
<td>Consider reducing bromide in MWRF water Monitor for bromide in the MWRF treated water</td>
<td></td>
<td></td>
<td>Lower</td>
</tr>
</tbody>
</table>

**Notes:**

1. SUVA: Specific UV absorbance at 254 nm. SUVA is calculated by dividing UV absorbance at 254 nm (UV$_{254}$) by the dissolved organic carbon (DOC) concentration. For Mesa Water’s treated water, total organic carbon (TOC) can be used as a reliable estimate for DOC.
2. The water quality goal is proposed for the MWRF because its organic material was shown to be the most reactive towards chlorine. The value of < 2.0 for SUVA in the MWRF treated water is not an absolute figure, but provides a guideline relative to Mesa Water’s other water sources.
3. The water quality goal is proposed for the MWRF treated water because it has shown the highest bromide concentration. The value of < 100 µg/L in the MWRF treated water is not an absolute figure, but provides a guideline relative to Mesa Water’s other water sources.
4. Replacement of membranes at MWRF was discussed in Section 2.0 with respect to switching to free chlorine as the residual disinfectant. Replacement of membranes would also address lowering SUVA and bromide while continuing to use monochloramine as the distribution system residual disinfectant, if these constituents are determined to be water quality factors contributing to nitrification episodes once the critical water quality goals have been met.

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**Figure ES.2** Water Quality Goals and Recommendations to Limit Nitrification
Nitrification is more likely to occur in areas where water age is high, because these areas coincide with areas of lower disinfectant residuals, providing food and ample time for the nitrifying bacteria to become established. These areas include dead ends, remote locations of the distribution systems, sites with lower flow rates (e.g., oversized pipes), as well as reservoirs with excessive water age, poor turnover rate, short-circuiting, and common inlets and outlets.

In the case of Mesa Water, high water age was found in various areas of the distribution system due to three main causes: overall reservoir operation, reservoir mixing, and reservoir cycling. Hydraulic modeling showed that due to the configuration of the distribution system there is a tendency for the reservoirs to be filled with water that is already in the distribution system rather than directly from the wells or the MWRF. This effectively leads to a reservoir-to-reservoir transfer of water and associated water aging, creating conditions for nitrification. The impacts of reservoir-to-reservoir transfer can be reduced by more frequent and deep reservoir cycling and potentially some modifications to the distribution system to promote more flow through the south eastern areas. However, Mesa Water currently does not have the water sources that would allow for deep reservoir cycling and rapid filling of the reservoirs. Mesa Water's change in water supply strategy to become 100% locally supplied has led to challenges in operating the system and specifically with regard to turning over the water in the reservoirs more rapidly due to the limited local supply.

3.0 RECOMMENDATIONS AND COST ESTIMATES

This section summarizes the recommendations made throughout the project, based on the overall assumption that Mesa Water will continue to use monochloramine as the distribution system disinfectant. The recommendations focus on modifying water quality to match as closely as possible the parameter goals presented in Figures ES.1 and ES.2. Recommendations are prioritized in order to capture the largest benefit relative to the cost of implementation, as shown in Table ES.1 and detailed below.

3.1 Higher-priority Recommendations

The higher-priority recommendations have the greatest potential to meet the critical water quality goals and distribution system operation practices that would decrease the occurrences and severity of nitrification in Mesa Water’s distribution system. These are listed in order of importance and should be implemented as soon as possible:

1. **Continue to implement the Well Automation Project.**

   What this will achieve: This will help decrease free ammonia concentrations at the entry points of the distribution system, and control the chlorine-to-ammonia-N ratio within 4.5:1 to 5:1 Cl₂:NH₃-N at all distribution system entry points. Proper control needs to be implemented so that the set targets are met and that response is immediate should concentrations deviate from these targets.
<table>
<thead>
<tr>
<th>Category</th>
<th>Priority</th>
<th>Description</th>
<th>Impact</th>
<th>Cost Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Quality Goals</td>
<td>Higher</td>
<td>1. Continue to implement the Well Automation Project</td>
<td>Decrease free ammonia at entry points</td>
<td>Underway</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Implement complete chloramine booster stations at the reservoir sites</td>
<td>Maintain higher chloramine residuals and control free ammonia</td>
<td>$1.5 - $2.0 M</td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>3. Continue reservoir inspection; initiate reservoir cleaning</td>
<td>Reduce sediment build-up</td>
<td>$50,000 over four years</td>
</tr>
<tr>
<td>Operational Goals</td>
<td>Higher</td>
<td>1. Reservoir cycling</td>
<td>Decrease water age</td>
<td>See Item #4 below</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Hydraulic modeling to identify alternative system operations to decrease water age</td>
<td>Identify system modifications to reduce water age</td>
<td>$75,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Implement the Nitrification Mitigation and Monitoring Plan</td>
<td>Allow for early detection of water quality changes</td>
<td>$50,000 per year</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Develop additional water sources to aid in reservoir cycling</td>
<td>Allow for deep reservoir cycling</td>
<td>$4.0 M for 2 wells</td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>1. Pipe flushing</td>
<td>Reduce sediment build-up in pipes</td>
<td>$100,000 for each year flushing done</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Replace unlined steel and ductile iron pipe (DIP)</td>
<td>Remove potential for nitrification where these pipe are installed</td>
<td>$6.0 M over five years</td>
</tr>
</tbody>
</table>
Cost Estimate: This project is currently underway and the costs have been accounted for by Mesa Water.

2. Implement complete chloramine booster stations at both reservoirs including ammonia addition. This would include installation of control systems to adjust chlorine and ammonia dosing based on residual measured at the reservoir outlets.

What this will achieve: This would allow Mesa Water to maintain a much higher chloramine residual and have better control of the free ammonia concentrations at the reservoir outlets, thus reducing free ammonia and maintaining the chlorine-to-ammonia ratio to within the desired range to control nitrification.

Cost Estimate: A preliminary cost estimate has shown the cost to implement both systems would be between approximately $1.5 and $2 million. The cost range is required due to the challenges with locating the chemical storage and dosing facilities near the reservoirs.

3. Increase reservoir cycling. Individual reservoir cycles should not exceed 5 days, and preferably not be longer than 3 days.

What this will achieve: Increasing reservoir cycling will decrease water age and therefore reduce the possibility of monochloramine decay that could trigger nitrification.

Cost Estimate: The short-term cost estimates are low if all wells and the MWRF are operational. However, with two wells currently out of service additional sources will be required to allow for rapid re-filling of the lag reservoir. The budget cost for drilling and equipping a new well is estimated to be $1.5 million, plus approximately $0.5 million for a well site; and therefore $4.0 million is budgeted for two additional wells. By comparison, Mesa Water has estimated that the average cost of MWD water is $1,180/AF including the impact of readiness to serve costs; therefore if imported water was used to off-set the impact for reservoir filling with one large well out of service, the annual cost of water would be almost $2.0 million; about the cost of a new well.

4. Conduct hydraulic modeling to identify ways to reduce the water age in the southern portion of the distribution system.

What this will achieve: This would identify distribution system configuration and/or operational modifications and their implementation costs to permanently reduce water age in the southeastern area of the system where nitrification has been the biggest challenge.

Cost Estimate: A budget amount of $75,000 is estimated for this work; to conduct hydraulic modeling and develop implementation cost estimates.
5. Implement the proposed monitoring program described in the Nitrification Mitigation and Monitoring Plan, as presented in TM No. 3. Review water quality data regularly to identify any deviations from the target water quality goals.

What this will achieve: This will allow a more thorough understanding of Mesa Water's distribution system water quality, and allow for early detection of deviations from water quality goals that might trigger nitrification, so that appropriate action can be taken as quickly as possible.

Cost Estimate: The additional analytical work is expected to cost approximately $50,000 per year, which includes additional laboratory costs ($16,000) and additional staff time ($34,000). By comparison, the cost to purchase on-line analyzers would be considerable, even if only partial analyses are to be performed. For the eight entry points to the distribution system the cost would be more than $200,000 for measuring only two parameters (free chlorine and total chlorine), and would require additional staff time for calibration.

3.2 Lower-Priority Recommendations

The lower-priority recommendations pertain to operational aspects of the system to help prevent conditions that could lead to nitrification in the future:

1. **Inspect reservoirs annually to assess the rate and level of sediment buildup. Reservoirs should be drained and cleaned every 3 to 5 years.**

   What this will achieve: Reducing sediment build-up provides fewer locations where biofilm can accumulate within the reservoirs and also reduces the constituents that consume monochloramine.

   Cost Estimate: Over a four year period the cost for annual inspection and then one cleaning event per reservoir is estimated to be $50,000.

2. **Conduct flushing of the distribution system.** Understanding that unidirectional flushing (UDF) is not an option because of Mesa Water’s limitation in water discharge, the NO-DES approach is recommended.

   What this will achieve: Similar to the above recommendation for the reservoirs, pipe flushing will reduce sediment build up in the distribution system, thus reducing the potential for monochloramine decay and the release of free ammonia.

   Cost Estimate: The purchase price for a NO-DES truck that can operate at 150 psi is approximately $450,000. However, these units are apparently complex to operate. The alternative is to hire the company to conduct flushing. If this is the selected approach, Mesa Water should budget approximately $100,000 per year to flush 30-miles of distribution pipework. Conducting flushing of this nature for two years would provide Operations staff with some information about the effectiveness of the flushing program and its impact on nitrification, after which a decision could be made with respect to purchasing a truck or continuing with a service contract for flushing.
For comparison, if UDF were to be used it would be considerably cheaper, probably in the area of $50,000 per flushing event including development of an appropriate flushing plan and customer education.

3. **Assess the condition and location of the ductile iron pipes (DIP), cast iron pipes (CIP) and un-lined steel pipes, and replace them if they are located where nitrification has been most severe.**

What this will achieve: Corrosion provides an opportunity for monochloramine decay and release of free ammonia. Replacing metal pipes in areas where nitrification has been most severe reduces the possibility of these pipes becoming a future cause of a nitrification episode.

**Cost Estimate:** The length of DIP and cast iron pipe in the area where nitrification events were most severe is estimated to be approximately two miles, combined. The estimated cost to replace these pipes over the next five years is $6.0 million.
MEMORANDUM

TO: Engineering & Operations Committee
FROM: Coleen L. Monteleone, Assistant General Manager
DATE: December 20, 2016
SUBJECT: Proclamation Honoring the Career of Scott Peca

RECOMMENDATION

Recommend the Board of Directors approve a proclamation honoring the career of Scott Peca for his more than 28 years of dedicated and committed service to Mesa Water District.

STRATEGIC PLAN

Goal #5: Attract and retain skilled employees.

PRIOR BOARD ACTION/DISCUSSION

None.

DISCUSSION

Scott Peca began his career at Mesa Water District on January 18, 1988 as a Water Maintenance Worker I. He worked his way up through the organization holding job titles including Water Maintenance Worker II and Facility Maintenance Worker I & II.

As a Water Maintenance Worker, Scott was involved in operating, maintaining, installing, and repairing the District's water distribution infrastructure to ensure an uninterrupted supply of quality potable water to the customers of Mesa Water District.

As a Facility Maintenance Worker, Scott performed a variety of building and grounds maintenance and repair duties; and monitored contract services for alarm, air conditioning, landscaping, custodial, and elevator services for the District.

Scott was indispensable when it came to the set-up of meeting rooms in the preparation of the District's Board of Directors' meetings, employee meetings, and other meetings and events.

Scott was nominated for the Silver Lining Award in 2015; and served as a Safety Ambassador for numerous years.

FINANCIAL IMPACT

None.

ATTACHMENTS

Attachment A: Draft Proclamation
A Day of Celebration to Honor the Career of Scott Peca

Whereas, Scott Peca began his career at Mesa Water District on January 18, 1988 as a Water Maintenance Worker I and worked his way up through the organization holding job titles including Water Maintenance Worker II and Facility Maintenance Worker I & II; and

Whereas, as a Water Maintenance Worker, Scott was involved in operating, maintaining, installing, and repairing the District’s water distribution infrastructure to ensure an uninterrupted supply of quality potable water to the customers of Mesa Water District; and

Whereas, as a Facility Maintenance Worker, Scott performed a variety of building and grounds maintenance and repair duties; and monitored contract services for alarm, air conditioning, landscaping, custodial, and elevator services for the District; and

Whereas, Scott was indispensable when it came to the set-up of meeting rooms in the preparation of the District’s Board of Directors’ meetings, employee meetings, and other meetings and events; and

Whereas, Scott was nominated for the Silver Lining Award in 2015; and served as a Safety Ambassador for numerous years.

NOW THEREFORE, BE IT RESOLVED that the Board of Directors of Mesa Water District hereby recognizes and honors you for your more than 28 years of dedicated and committed service to the District and wishes you the best as you begin your retirement.

______________________________
Ethan Temtanka, President

______________________________
Jim Atkinson, Vice President

______________________________
October 28, 2016

______________________________
Shawn Dewane, President

______________________________
Fred R. Bockmiller, Jr., P.E., Director

______________________________
James R. Fisler, Director
MEMORANDUM

TO: Engineering and Operations Committee
FROM: Phil Lauri, P.E., Assistant General Manager
DATE: December 20, 2016
SUBJECT: Water Industry Support Services

RECOMMENDATION

1. Renew the Water Industry Support Services contract for two years for $50,000 per year with John Robinson Consulting Inc. for a total not-to-exceed amount of $150,000; or

2. Direct staff to develop Requests for Proposals for Water Industry Support Services.

STRATEGIC PLAN

Goal #1: Provide a safe, abundant, and reliable water supply.
Goal #7: Actively participate in regional water issues.

PRIOR BOARD ACTION/DISCUSSION

None.

BACKGROUND

Mesa Water actively participates in the development and collaboration of regional and state wide water management issues. These issues involve monitoring of the Orange County Groundwater Basin management and policies, monitoring of imported water rates and policy issues occurring at Metropolitan Water District (MWD) and the Municipal Water District of Orange County (MWDOC), and monitoring and development of state water policies.

DISCUSSION

Mesa Water uses professional water industry support services to assist Management and the Board in advocating Mesa Water policies in regional and state wide water issues. This work includes performing necessary institutional, technical, financial and policy analyses, attending coordination meetings, and advocating the interests of Mesa Water Board’s adopted policy positions.

Mesa Water competitively solicited bids for these services in July 2015. John Robinson Consulting Inc. was selected to assist with this effort and has provided excellent support in developing the strategic framework for several key initiatives (i.e., Mesa Water Reliability Facility Regional Water usage, etc.). It is expected that the following regional water issues will be evaluated and potentially implemented over the next few years where support services will be necessary:

- Green Acres Project (GAP) agreement development
- Orange County Groundwater Basin Storage
- Mesa Water Reliability Facility Regional Water use agreement development
It is recommended that the Engineering & Operations Committee consider extending this contract for two years for an additional $100,000. Alternatively, the Engineering & Operations Committee may desire to direct staff to competitively solicit proposals for this work effort.

FINANCIAL IMPACT

$44,300 has been expended since November 2015. There is $50,000 budgeted in the Engineering Consultant budget for FY2017. $50,000 will be budgeted in FY2018.

ATTACHMENTS

Attachment A: John Robinson Consulting Inc. Proposal
November 4, 2016

Mr. Phil Lauri, Assistant General Manager
Mesa Water District
1965 Placentia Avenue
Costa Mesa, CA 92627

Subject: Letter Proposal – Water Resources Support Services

Dear Mr. Lauri:

John Robinson Consulting, Inc. (JR Consulting) is pleased to submit this letter proposal to Mesa Water District (Mesa Water®) based upon our conversion on Wednesday, November 2nd as this would be an extension of our water resources support efforts that we have been performing since fall 2015. Our firm is a California S Corporation, is a Small Business Enterprise (SBE) and is located locally in Pasadena. We are in compliance with Mesa Water®’s Professional Service Agreement and have complied with the insurance requirements. This letter proposal outlines our scope of services, schedule and fee estimate to provide water resources support services to Mesa Water®.

**Firm Experience:** Mr. Robinson has over 20 years’ experience in a wide range of water resources and groundwater basin management projects. His responsibilities have included groundwater modeling and resource evaluations, development of groundwater basin water budgets, analysis and remediation of saltwater intrusion, evaluation of intakes for brackish and seawater desalination systems, aquifer testing, wellfield design, remedial investigations, evaluation of reclaimed water and flood water recharge, analysis of groundwater contamination, regional dewatering, and environmental impacts of construction projects to groundwater regimes.

Mr. Robinson has developed groundwater budgets for groundwater basins across the western United States. His most recent work is concentrated on groundwater modeling (of which development of water budgets based on field information is a key aspect). He has worked on numerous projects involving State of California water supply management protocols and regulations, involving groundwater and seawater flow in coastal areas of southern California include West Coast and Orange County groundwater basins.

**Qualifications:** John Robinson bring over 20 years of water resources qualifications working for Southern California municipal clients, with a focus on catalyzing innovative solutions in the areas of water resources, water management, conjunctive use, recycled water, master planning, groundwater storage, local supplies, wastewater, and water reclamation. We offer a unique combination of proven engineering and scientific professionals who deliver excellence in various groundwater extraction strategies, determining optimal groundwater recharge, storage, and extraction methods. JR Consulting qualifications include detailed studies of the confining layer prevalent, including aquifer test design and analysis, and field drilling and soil sampling. Our groundwater qualifications include the Main San Gabriel Basin, Central Basin, West Coast Basin and Orange County Groundwater Basin.
Mr. John Robinson is the Principal of John Robinson Consulting, Inc., and his experience encompasses a variety of wastewater engineering, water resources, water reclamation, and master plan projects. Over the last 20 years, Mr. Robinson has been heavily involved in assisting clients coordinate, manage, and write different types of local, state, and federal water resource projects including groundwater and recycled water planning, policies and infrastructure design. John has an intimate understanding of Orange County as he is a Treasurer of the Orange County Water Association and has worked in Orange County his entire consulting career.

Please refer to Attachment A for a detail resume.

Scope of Services: JR Consulting has reviewed the Scope of Services outline in the RFP and the associated deliverables for the tasks list below and is available to complete all task.

- TASK 1 – Orange County Water District (OCWD) Green Acres Project Analysis
- TASK 2 – As-Needed Support Services
- TASK 3 – Meetings

Compensation: JR Consulting will provide the scope of services based on the scheduled negotiated with Mesa Water®’s Project Manager. The services will be on a time and material basis with a not-to-exceed budget based on an hourly rate of $150 per hour with no “other direct costs” applied. Based on scope of services, it is recommended that $50,000 be budgeted for Tasks 1 through 3.

JR Consulting commits to timely, responsive services, and to deliver excellence in the offered services. We are eager and enthusiastic to begin supporting Mesa Water® with the water resources support services.

If there are any questions, please feel free to contact me at (626) 375-9389 or jrobinson@johnrobinsonconsulting.com

Very truly yours,

John Robinson Consulting, Inc.

John Robinson, Principal
Appendix A
JOHN ROBINSON, PRINCIPAL

EDUCATION:
B.S., Civil Engineering, California State University, Long Beach, 1993

REGISTRATION:
Engineering-in-Training, California, Registration No. 109865, 1997
USC Cross Connection Certified

PROFESSIONAL AFFILIATIONS:
American Society of Civil Engineers
California Water Environment Association (Board of Director – Corporate for Los Angeles Basin Section)
Orange County Water Association (Board of Directors – Treasurer)
Water Environmental Federation
WateReuse Association (Past President for the Los Angeles Chapter)

SUMMARY OF QUALIFICATIONS:
Mr. Robinson has more than 20 years of experience in engineering consulting, construction management, project leadership/project management, operational/fiscal management and market sector strategy development focused most recently on recycled water programs and infrastructure. Mr. Robinson’s experience encompasses a variety of wastewater engineering, water reclamation and planning projects. The clients he has provided services to are mostly municipalities and cities in Southern California and Arizona. The following is a quick summary of his skill set:

- Involved in feasibility/master studies and planning, technology evaluation and recommendations, preparation of study and design reports.
- Experienced in design for new water reclamation and wastewater facilities and expansion of existing facilities.
- Provided reclamation system computer hydraulic modeling, and has been intimately involved with regulatory agencies with permitting jurisdiction over recycled water projects.

Mr. Robinson provides technical direction and project oversight for the development of public infrastructure that includes pipelines, pumping stations, reservoirs, hydraulic structures, recharge basins, and wells. His technical expertise ranges from master planning and program management to final design and construction implementation. As a project manager, he has on numerous occasions successfully led my project teams to complete the work within the project budgets and time schedules and with a high degree of responsiveness to the clients.

KEY STRENGTHS:
Strengths include client and project management, development of strategic marketing plans/business development, leadership of staff, staff mentorship and guidance, verbal/written communications along with fiscal analysis and financial management.

RELEVANT EXPERIENCE:
Project Manager, Owens Valley Natural Resources Management, Los Angeles Department of Water and Power, Los Angeles, CA
Mr. Robinson was the principal-in-charge for extensive studies to manage groundwater recharge and extraction and to assist LADWP in compliance with the Long Term Water Agreement in the Owens Valley. This 9-year project has involved assisting LADWP in a variety of subject areas, including vegetation monitoring, CEQA studies associated with the Lower Owens River Project (LORP), annual reporting on enhancement and mitigation projects, Mono Basin studies and update of the LAASM model, review and analysis of surface water hydrology, and modular groundwater flow (MODFLOW) modeling coupled with Ecological Dynamics Simulation (EDYS)
modeling at six separate well fields to evaluate various management techniques for extraction of groundwater augmented by surface spreading. In addition to development of various groundwater extraction strategies, the project involves determination of optimal groundwater recharge, storage, and extraction methods. The project also involves detailed studies of the confining layer prevalent in the valley, including aquifer test design and analysis, and field drilling and soil sampling.

Project Manager, Owens Valley Environmental Investigations, Owens Valley, Anheuser Busch Companies, CA
Mr. Robinson was the principal-in-charge for a comprehensive Environmental Impact Report (EIR) and Environmental Assessment (EA) in the Owens Valley, California. The project included the construction of test production facilities and 20 monitoring wells and piezometers. A long-term aquifer test was performed to evaluate the aquifer response to well field pumping. This analysis was used to develop pumping scenarios that would optimize production and minimize adverse environmental impacts of groundwater extraction. Movement of contaminants from Owens Lake was modeled using three separate analytical models and a MODFLOW numerical model that incorporated three aquifer layers over a 10 square mile area. The MODFLOW model was calibrated using historical groundwater levels, climatic monitoring and results of the long-term constant-rate aquifer test. The companion model MODPATH was used to evaluate the travel time of potential contaminants. Following field testing, future impacts to phreatophytic vegetation and movements of natural contaminants were modeled using analytical and numerical models. The project also involved evaluation of air quality, seismic, archeological, subsidence, water quality, and aesthetic impacts. Mr. Robinson acted as the project liaison to numerous federal, state, and local agencies, and conducted public information meetings with the local community of Cartago.

Project Hydrogeologist, Evaluation of the Causes and Potential Solutions to Fugitive Dust, Owens Lake, CA
Mr. Robinson was the principal-in-charge on field data collection program to determine the nature of the generation of windblown dust from Owens Lake Bed in southern Owens Valley. The project included mapping of saltcrust, dune, and other surface morphologies of the over 100-square-mile, mostly dry lake bed. Field observations and samples of saltating particles were collected during an intense windstorm on the lake bed in order to evaluate dust generation characteristics of various surface morphologies. Based on field observations, it was determined that the type of surface features generated, and hence the capacity to generate dust, is strongly dependent on local hydrologic conditions of the saturated or unsaturated substrate. Several mitigating alternatives were evaluated, including stabilization by grain size or hydrologic alteration, sand fences, and salt resistant vegetation.

Project Manager, Sun Valley Watershed Management Plan, Los Angeles County Department of Public Works, Los Angeles County, CA
Mr. Robinson was the principal-in-charge for development of a watershed management plan for the Los Angeles Department of Public Works. The project is unique in that instead of addressing a single objective of flood control, the project seeks to optimize the multiple benefits of stormwater capture, habitat restoration, recreation, groundwater recharge, water quality improvement, and flood control. The project has brought together a diverse set of stakeholders including a variety of public agencies, environmental groups, and local landowners. The Watershed Management Plan involves innovative techniques such as stormwater Best Management Practices (BMPs), constructed wetlands, infiltration devices, and recycled water.

Project Manager, Intake Studies and Design for Ocean Water Desalination, West Basin Municipal Water District, CA
Mr. Robinson was the Project Manager for the feasibility study of ocean water intake systems for the West Basin Municipal Water District in Southern California. This work included cataloguing information on existing or planned intake systems for ocean water intake systems worldwide and a detailed description of all known technologies for ocean desalination intake systems (both surface and subsurface), including evaluation of site-specific requirements, range of intake capacities, impingement and entrainment reduction, environmental effects, cost, and advantages and disadvantages of each technology. Based on this evaluation, the most feasible technology for intake to the proposed desalination plant was selected. Mr. Robinson managed a diverse team of experts, including marine biologists, oceanographers, engineers, hydrogeologists, and environmental specialists.
MEMORANDUM

TO: Engineering and Operations Committee
FROM: Phil Lauri, P.E., Assistant General Manager
DATE: December 20, 2016
SUBJECT: As-Needed Design and Construction Management Services

RECOMMENDATION

Recommend that the Board of Directors authorize an additional allocation of $100,000 to the On-Call Design and Construction Management budget for FY 2017 for a not-to-exceed amount of $350,000.

Recommend that the Board of Directors consider a change order the MWH Constructors' On-Call Design and Construction Management contract in the amount $50,000 for a not-to-exceed amount of $300,000 in FY 2017.

STRATEGIC PLAN

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

PRIOR BOARD ACTION/DISCUSSION

On September 12, 2013, the Board approved three contracts for $100,000 per year for two years for On Call Design Services with R. Brady and Associates, RBF- A Division of Michael Baker International, and Leidos.

On October 10, 2013, the Board approved three contracts for $100,000 per year for two years for On Call Construction Management Services with MWH Constructors, Butier, and Leidos.

On February 12, 2015, the Board approved $100,000 in additional funding to the On-Call Design budget.

On April 19, 2016, the Committee approved four contracts for $250,000 per year for three years for On-Call Design and Construction Management Services to MWH Global, Michael Baker International, Inc., Brady and Associates, Inc., and CivilSource, Inc.

On May 19, 2016, the Board approved the budget for Fiscal Year (FY) 2017, including $250,000 for On-Call Design and Construction Management Services.

BACKGROUND

Since 2005, Mesa Water has used on-call consulting design services to perform as-needed capital improvement project design that is beyond Mesa Water’s staffing ability and/or expertise. These types of projects typically consist of pipeline design, including design of pipeline relocations to accommodate the City of Costa Mesa, County of Orange and other agency projects, surveying, structural analysis, mechanical design, electrical design, traffic analysis, environmental-related services, corrosion protection assessment, hydraulic modeling, and other miscellaneous design disciplines. Since 2013, Mesa Water has used on-call construction management services for
administration, supervision, and inspection of construction activities of the capital improvement projects. In 2016, four firms were competitively selected to provide on-call professional services in design and construction management.

DISCUSSION

Construction of several small to medium size capital improvement projects were initiated with the start of the fiscal year in July 2016. These projects require Professional Services under the on-call design and construction management contracts to facilitate project delivery. Key projects include Well 9B Construction Management, MWRF Improvements construction management, design and construction management of Reservoir 1 and 2 Improvements, and design and construction management of OC-44 Import Stations Meter Replacement, as well as several smaller projects. Task Orders totaling $232,154 of the $250,000 FY 2017 budget have been issued, leaving $17,856 for the remainder of FY 2017. Several significant on-call Construction Management projects have been awarded to MWH, and $205,952 of the $250,000 annual ceiling of this contract has been committed. Other projects planned for the FY 2017 On Call services contracts include design and construction management of pipeline sampling for the Pipeline Integrity Program destructive testing, and design services for replacement of the hydraulic controllers in the Santa Ana pressure control structure on the OC-44. Other unplanned needs for on-call professional services may arise in the second half of the fiscal year. It is therefore recommended that the Committee consider adding $100,000 to the FY 2017 budget for on-call design and construction management services. It is also recommended that the Committee consider approving an additional contract authority for MWH, On-Call Design and Construction Management contract in the amount $50,000 for a not-to-exceed amount of $300,000 in FY 2017.

FINANCIAL IMPACT

$250,000 is budgeted in FY 2017 for On-Call Design and Construction Management Services. Task Orders totaling $232,154 have been authorized, and $75,652 has been invoiced to date. The additional funding will come from cash-on-hand.

ATTACHMENTS

None.
MEMORANDUM

TO: Engineering and Operations Committee
FROM: Phil Lauri, P.E., Assistant General Manager
DATE: December 20, 2016
SUBJECT: Updated Standard Specifications and Drawings

RECOMMENDATION

Recommend that the Board approve the update to Mesa Water's Standard Specifications and Drawings.

STRATEGIC PLAN

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

PRIOR BOARD ACTION/DISCUSSION

August 14, 2014 – Mesa Water District’s Standard Specifications and Drawings were last updated and adopted by the Board of Directors.

BACKGROUND

This project provides an update and reformatting to Mesa Water’s Standard Specifications and Standard Drawings (MWSSSD). Mesa Water’s last update was in August 2014.

DISCUSSION

MWSSSD is divided into four main sections and includes the following proposed changes:

Part 1 – Procedural Guide and Design Requirements
Section 100 – Procuring Water Service From Mesa Water District
  100.15 – Increase minimum improvement bond to $1,000. Refer to Attachment A for suggested changes.

Section 200 – Mesa Water® Fees and Charges for New Development
  200.2 – Increase minimum performance bond to $1,000 and clarify capacity charges. Refer to Attachment B for suggested changes.

Section 300 – Design and Inspection Procedures
  300.2.7 – Increase minimum easement width to 15 feet per the Mesa Water® Rules and Regulations for Water Service. Refer to Attachment C for suggested changes.
  300.7.1 – Reference Section 200.2.3 to avoid redundant information. Refer to Attachment D for suggested changes.

Section 400 – Design Criteria, Water Facilities
  400.8 – Reference the City of Costa Mesa Fire Department. Refer to Attachment E for suggested changes.
400.10.2 – Include requirements for Shared Services termed “Dominquez Tee.” Refer to Attachment F for suggested changes.
400.11 – Include passive purge and vegetation requirements to Standard Water Notes. Refer to Attachment G for suggested changes.
400.13.1 – Include AutoCAD files as part of project closure and record drawings. Refer to Attachment H for suggested changes.

Part 2 – General Conditions for Construction of Water Facilities
Section 200 – Scope and Control of Work
200.5 – Label section “Submittals.” Refer to Attachment I for suggested changes.

Part 3 – Technical Specifications for Construction of Water Facilities
Specifications
Section 15041 – Include storm drains to National Pollutant Discharge Elimination System. Refer to Attachment J for suggested changes.
Section 15042 – Increase maximum flow for flushing from 2 feet per second to 3 feet per second. Refer to Attachment K for suggested changes.
Section 15139 – Include NSF61 to materials compliance requirements. Refer to Attachment L for suggested changes.
Section 15162 – Include Romac 501 as accepted Transition Coupling. Refer to Attachment O for suggested changes. Refer to Attachment M (Page 15162-3) for suggested changes.
Section 15162 – Include Romac Alpha as accepted Flanged Coupling Adaptor. Refer to Attachment M (Page 15162-3) for suggested changes.
Section 15162 – Include Romac EJ400 as accepted Expansion Joints. Refer to Attachment M (Page 15162-4) for suggested changes.

Standard Drawings (Refer to Attachment N for suggested changes)
- Drawing 7 – Remove fourth meter from 2-inch manifold.
- Drawing 14 – Common modern practice calls for resilient wedge gate valves for pipe 12 inches or less in diameter as reflected in the proposed drawing. Situations involving large diameter pipe or materials not listed on the drawing shall be addressed on a case-by-case basis with oversight by the District Engineer.
- Drawing 16 – The existing drawing does not include a meter assembly used to monitor illegal connections and water loss. The assembly is not a typical installation and staff proposes to vacate the standard.
- Drawing 16N – The existing drawing does not include a meter assembly used to monitor illegal connections and water loss. The assembly is not a typical installation and staff proposes to
delete the standard.

- Drawing 17 – The existing drawing does not include a meter assembly used to monitor illegal connections and water loss. The assembly is not a typical installation and staff proposes to vacate the standard.
- Drawing 17N – The existing drawing does not include a meter assembly used to monitor illegal connections and water loss. The assembly is not a typical installation and staff proposes to delete the standard.
- Drawing 20 – 2-inch Junior Fire Lines are now installed downstream of a 2-inch meter per Mesa Water® Standard Drawings 2, 3, 18, and either 23 or 24.
- Drawing 21 – The existing drawing does not include a meter assembly used to monitor illegal connections and water loss. The assembly is not a typical installation and staff proposes to vacate the standard.
- Drawing 21N – The existing drawing does not include a meter assembly used to monitor illegal connections and water loss. The assembly is not a typical installation and staff proposes to delete the standard.
- Drawing 22 – Through meetings with the City of Costa Mesa Fire Department and Mesa Water® Operations Staff it has been determined that there is an excess of isolation valves in the standard assembly and two valves can be removed without loss of isolating abilities and provide reduced cost to Mesa Water® customers.
- Drawing 22A – Through meetings with the City of Costa Mesa Fire Department and Mesa Water® Operations Staff it has been determined that there is an excess of isolation valves in the standard assembly and two valves can be removed without loss of isolating abilities and provide reduced cost to Mesa Water® customers.

FINANCIAL IMPACT

None.

ATTACHMENTS

Attachment A: Suggested changes to Part 1 Section 100.15
Attachment B: Suggested changes to Part 1 Section 200.2.3
Attachment C: Suggested changes to Part 1 Section 300.2.7
Attachment D: Suggested changes to Part 1 Section 300.7.1
Attachment E: Suggested changes to Part 1 Section 400.8
Attachment F: Suggested changes to Part 1 Section 400.10.2
Attachment G: Suggested changes to Part 1 Section 400.11
Attachment H: Suggested changes to Part 1 Section 400.13.1
Attachment I: Suggested changes to Part 2 Section 200.5
Attachment J: Suggested changes to Part 3 Section 15041
Attachment K: Suggested changes to Part 3 Section 15042
Attachment L: Suggested changes to Part 3 Section 15139
Attachment M: Suggested changes to Part 3 Section 15162
Attachment N: Suggested changes to Standard Drawings
As set forth in the Agreement, the applicant guarantees the water facilities against defects in workmanship and materials for a period of one (1) year after the date of acceptance of the facilities by Mesa Water District.

It is further agreed that the facilities shall be restored to full compliance with the requirements of Mesa Water’s Standard Specifications and Plans, including any test requirements, if during said one (1) year period the facilities or any portion thereof are found not be in conformance with any provisions of said Standard Specifications and Plans. This guarantee is in addition to any and all other warranties, express or implied, with respect to the facilities.

100.13 DEDICATION OF FACILITIES

Upon completion and final inspection of all work, the inspector shall file a Final Inspection and Cash Bond Release Request (Appendix 5) at least 30 days prior to a regular Board Meeting for dedication and formal acceptances. The applicant shall furnish Mesa Water with a report of the actual costs of the water facilities, and to substantiate such report with invoices and receipts acceptable to Mesa Water. Mesa Water shall also be provided with a complete set of record drawings (“as-builts”) on reproducible mylars. Upon said acceptance, Mesa Water will give approval for the release of bonds held by Mesa Water District or posted to the city or county for the construction of the water facilities.

100.14 INDEMNITY BOND

If water facilities are to be constructed in a right-of-way under the jurisdiction of an agency requiring Mesa Water District to sign the encroachment permit, the applicant shall furnish Mesa Water with an Indemnity Bond prior to execution of the permit. The bond shall be for a sum not less than the completed value of said facilities. The value shall be determined by the District Engineer.

100.15 IMPROVEMENT BONDS

The Developer shall post improvement bonds directly with Mesa Water District prior to construction of the offsite water systems. A detailed Engineer’s cost estimate will be submitted by the Developer. Ten percent (10%) or a minimum of $1,000 (whichever is more) of the total cost estimate will be paid by the Developer before construction. The bonds shall guarantee the satisfactory completion of the water systems in the sole opinion of Mesa Water District.

100.16 BOND RELEASE

Subject to Government Code Section 66499.7, forty (40) days following satisfactory completion of the construction of the improvements and upon written request of the Developer, Mesa Water District will release the construction bonds. The developer surety bonds will be released one year after the acceptance of the facilities by Mesa Water District.

END OF SECTION
ATTACHMENT B
SECTION 200

MESA WATER FEES AND CHARGES
FOR NEW DEVELOPMENT

200.1 ADMINISTRATION AND ENGINEERING FEES

As set forth in the Water Service Agreement (Appendix 4), the applicant hereby agrees to pay all administration and engineering fees, (including inspection and plan check costs), calculated as a percentage of the total cost as estimated by Mesa Water, as well as Capacity Charges, meter charges, interim water service line charges, (if applicable), and any other charges of Mesa Water District. The amount of such fees and charges shall be based on the applicable schedules of the Rules and Regulations in effect on the date when the applicant has submitted to Mesa Water its completed Application, payment of all fees and charges, plans and specifications, bonds, conveyance of necessary easements and other items which may be required herein prior to issuance of the permit and the plans of the Applicant have been approved by Mesa Water.

The meter charge includes provisions by Mesa Water of a water meter and customer control valve. The customer control valve is to be obtained from Mesa Water and installed by the applicant’s contractor as the work progresses, and that the water meter is to be installed by Mesa Water prior to the provision of permanent water service by Mesa Water.

200.2 DEPOSIT

A deposit will be collected on all new development to cover the actual cost for time and materials, including Mesa Water’s fully burdened labor rate, for Plan Check, Installation and Inspection Work performed. After the work has been completed, the actual cost of the project will be determined and any excess funds from the deposit will be refunded or the applicant shall be required to pay the costs in excess of the deposit. The current approved Fees and Charges for New Development are included within Appendix 6.

200.2.1 Plan Check

The plan check deposit shall be determined using the current approved Water Rate and Charges schedule for New Development.

The most current and up-to-date approved Water Rate and Charge Schedule can be found at www.mesawater.org.

200.2.2 Construction Inspection

The construction inspection deposit shall be determined using the current approved Fees and Charges for New Development.

200.2.3 Construction Performance Bond

The customer or applicant shall provide a construction performance bond in the amount of 10% of the estimated installation and construction costs or a minimum of $1,000 (whichever is more) as determined by:

1. Cost estimate certified by a Registered California Civil Engineer; or
2. Executed construction contract for water system implementation.
The minimum bond amount will be $500.00.

200.2.4 Capacity Charges

The current approved Capacity Charges based on meter type and size are included within Appendix 6, Fees and Charges for New Development. The most current and up-to-date approved Water Rate and Charge Schedule can be found at www.mesawater.org. Capacity charges are not a deposit and applicants are not entitled to a refund except as conditioned under the terms of the Rules and Regulations for Water Service, Section 4.1.5XX, for consideration of upsizing meter sizes.

200.2.5 Meters

The current approved Meter Installation Deposit is based on meter type and size or on the water rate charge schedule for New Developments and can be found at www.mesawater.org.

200.2.6 Construction Work Performed by Mesa Water for Customers

The applicant is encouraged to perform construction with the assistance of a Contractor. However, the applicant may request Mesa Water to perform the work. Mesa Water may construct facilities upon approval of the General Manager.

It will be the responsibility of the Contractor to furnish all materials which shall meet Mesa Water’s Standard Specifications. Contractor to submit material specifications and cut sheets to Mesa Water District for approval, two weeks prior to construction. It will also be the responsibility of the Contractor to provide all labor and equipment necessary to construct or install the water facilities in conformance with the approved plans and the specifications contained in the latest edition of Mesa Water’s Standard Specifications. Contractor to provide proof of valid contractor’s license issued by the State of California for pipeline construction work (C34 or Class A).

END OF SECTION
ATTACHMENT C
300.2.7 Backflow Device Locations

All commercial and industrial domestic water services, and domestic services to sites where there is recycled water on-site, will require that a Reduced Pressure Principle backflow device (RPPD) be installed immediately downstream of the water meter. The device must be installed in accordance with Mesa Water’s Standard Drawings. The assembly must be installed above ground and cannot be installed in an underground vault. These assemblies can be installed in such a manner as to be screened from view, but must be easily accessible to Mesa Water’s personnel to facilitate testing and servicing. There must be a minimum of five (5) feet of clearance on all sides of the backflow assembly. In addition, a ten-fifteen (10') foot wide easement must be dedicated to Mesa Water from the public right-of-way to the fireline backflow assembly combination or S-22 meter installation.

All fire services requiring a backflow assembly as specified in Section 300.2.3.2 (Fire Service Requirements) must be installed in accordance with Mesa Water’s Standard Drawings. The required backflow assemblies must be on private property and shall be located adjacent to the building but upstream of the residential building valve, and shall be testable and easily accessible for maintenance and repairs. In addition, a ten-fifteen (10') foot wide easement must be dedicated to Mesa Water from the public right-of-way to the backflow assembly.

300.3 PROVIDING REQUIRED EASEMENTS

If an easement outside of the public right-of-way is granted by the District Engineer and General Manager, per Section 4.2.15 of the Rules and Regulations for Water Service for construction and/or maintenance of water facilities, including but not limited to, water mains, hydrants, meter vaults, and any other water appurtenances; its minimum width shall be 15 feet for water mains; and 5 feet on all sides for meters, fire hydrants, meter vaults, and other appurtenances, unless otherwise determined by Mesa Water.

An easement running parallel with a lot line shall not be split so as to occur on two lots. The easement, title report, and legal descriptions with accompanying sketch and plans shall be prepared by the applicant's engineer, two copies of which shall be sent to Mesa Water’s Engineering Department, or easements for Mesa Water facilities shall be shown on a tract or parcel map.

Easement descriptions shall be in a form acceptable to Mesa Water and will be checked by Mesa Water’s Engineering Department. Easements shall also be shown on the construction plans. Mesa Water will approve the plans only after all required easements have been deeded to Mesa Water District together with any necessary partial re-conveyance or subordination agreements. Exhibits will be 8-1/2” X 11”, no exceptions.

Along public streets, a three or five foot utility parallel easement on private property for Mesa Water District may be required depending upon public right-of-way widths and sidewalk locations.

Applicant shall submit two copies of the easement description, plat and boundary closure calculations to Mesa Water for review.

If acceptable, the applicant shall furnish two additional copies of the description, plat and boundary closure calculations, signed by a professional land surveyor, a current (within 30 days) title report of the property reflecting all deeds of trust and encumbrances, and subordinations signed by the trustees shown on the title
300.7 WATER SERVICE AGREEMENT

When the plans are substantially complete, with only minor revisions remaining, Mesa Water will compute the required Capacity Charges, Meter Charges, and Administrative and Engineering Fees (Payment Voucher included in Appendix 3) and prepare the Water Service Agreement. The applicant will be notified when the agreement and the Payment Voucher are available.

Mesa Water will send a draft copy of the Agreement to the developer including the attached Exhibit “A” summarizing the Water Service Fees and Charges.

300.7.1 Bonds

The applicant will provide, concurrently with the signed Water Service Agreement, if applicable, Payment and Performance Bonds, in connection with the water facilities to be constructed and for an amount to be determined by Professional Engineer’s estimate or executed contract and approved by Mesa Water’s District Engineer per section 200.2.3 of this document.

300.8 FINAL PLAN APPROVAL

Water improvement plans must be approved by the District Engineer before any construction can start. Approval by the District Engineer will be contingent upon satisfying the following requirements:

1. All required corrections have been made on the water improvement plans, and are in conformance with Mesa Water’s Standard Specifications.
2. The Water Service Agreement (Appendix 4) has been executed by the applicant and returned to Mesa Water.
3. All required easement documents have been executed and delivered to Mesa Water. Tract/parcel maps must be signed by Mesa Water prior to plan approval.
4. All required Fees and Charges have been paid by the developer/applicant.
5. All required bonds have been posted with the appropriate entity.
6. All plan submission requirements have been met (mylars, prints and CD).

When the plans have been approved, the applicant’s engineer will be notified.

300.9 WATER SERVICE FEES AND CHARGES

The applicant agrees to pay all administrative and engineering fees, (including inspection and plan check costs), as well as Capacity Charges, meter charges, interim water service line charges, if applicable, and any other charges of Mesa Water. Such fees and charges shall be set forth on Exhibit “A” of the Water Services Agreement between the applicant and Mesa Water District.

300.10 BOARD APPROVAL OF AGREEMENT
If a sewer is above a water main, the special construction shall extend a minimum of ten (10) feet of horizontal clearance on both sides, or if not feasible, center the piece of new water pipe under the crossing to maximize this horizontal clearance.

If a sewer is located below a water main, and within a vertical distance of a one (1) foot clearance distance, the special construction shall extend a minimum of four (4) feet of horizontal clearance on both sides of the crossing. These construction requirements shall not apply to house laterals that cross perpendicular less than one (1) foot below a pressure water main.

400.7.3 Separation from New and Existing Utilities

Construction of new utilities or structures shall maintain a minimum of five (5) foot parallel separation and a minimum of one (1) foot vertical separation from all Mesa Water pipelines, construction of new water facilities shall maintain a minimum of five (5) foot parallel separation and one (1) foot minimum vertical separation from all existing utilities and structures.

400.8 FIRE FLOW REQUIREMENTS

The design criteria to be used for determining fire flow requirements shall be the actual fire flow requirements as determined by the Orange County Fire Authority, Costa Mesa Fire Department, or per appropriate local fire jurisdiction for the specific area under development.

Before designing the domestic water system for a project, the applicant shall obtain the Orange County Fire Authority or the appropriate local fire jurisdiction fire flow requirements for the project. These requirements, plus indication of the Fire Authority’s approval, are required to be on the improvement plans prior to Mesa Water’s approval. All existing fire flow tests shall be performed by Mesa Water. Mesa Water will charge a fee to perform this fire flow test. As a general guide, the following shall be considered, as the minimum:

400.8.1 Residential Dwelling Units

The water system shall be capable of providing a residential fire flow minimum of 2,000 gpm, combined flow, for a 4-hour duration from any two adjacent hydrants at a minimum 20 pounds of residual pressure (psi) at the main. For residences 3,600 square feet and under and not contiguous with open space areas, the minimum requirement shall be 1,000 gpm per hydrant at 20 psi (for a total flow of 2,000 gpm). For residences 3,600 square feet and under which are contiguous with open space areas, the minimum requirement shall be 1,000 gpm per hydrant at 30 psi (for a total flow of 2,000 gpm). For residences over 3,600 square feet, the Fire Authority shall be consulted. The open space area is defined as any area bordering an undeveloped open space with no fire control mechanism. New residential dwelling units may be constructed with residential fire sprinkler systems (if required by NFPA 13D or NFPA 13R) which will reduce the minimum fire flow requirements.

400.8.2 Schools and Commercial Areas

The system shall be capable of providing a fire flow of at least 3,000 gpm for 3 hours duration (or as required by the Fire Authority) out of any two adjacent hydrants at a minimum 20 pounds of residual pressure at the main. Most schools and commercial areas will have built-in sprinkler protection for the buildings which will reduce the minimum fire flow requirements.

400.8.3 Industrial Areas
In industrial developments requiring a high fire flow, the applicant shall consult with the Fire Authority to discuss options for upgrading the domestic water system to deliver the fire flow or provide built-in sprinkler protection for the structures.

400.9  FIRE HYDRANT LOCATIONS

The location of fire hydrants shall be as determined by the Orange County Fire Authority or the appropriate local fire jurisdiction for the specific area under development. The exact location with respect to the curb and sidewalk shall be as shown per Mesa Water Standard Drawings.

400.9.1  Fire Hydrant spacing

The maximum fire hydrant separation shall be 300 feet from fire hydrant to fire hydrant. The actual spacing will be determined by the Fire Authority. Fire hydrants shall be located a minimum of three (3) feet from the ECR or BCR at intersections or near lot lines. No fire hydrant shall be located within 3 feet of a driveway, or closer than 40 feet to any structure (unless approved by the Fire Authority).

In selected situations where the fire hydrant run is over 20 feet, the size of the hydrant lateral may be increased to 8-inches.

400.9.2  Types of Hydrants

Wet barrel all-bronze type hydrants with check valve, as specified by Mesa Water Standard Specifications, are to be used at all locations.

400.9.3  Plan Requirements

Fire hydrants shall be shown on the plans where the hydrant is to be located with respect to the property line. Mesa Water fire hydrants shall be located within the public right of way. Maintenance and construction of private hydrants shall be the responsibility of the property owner, and painted red. The building footprints or building pad areas are also to be shown.

400.10  SERVICE MATERIALS AND MINIMUM SERVICE SIZE

400.10.1  General

Approved materials and manufacturers for various service material tubing and connections are as listed in Mesa Water's Standard Specifications.

400.10.2  Minimum Domestic Service Size

Minimum domestic service line size shall be 1-inch in diameter for 5/8-inch, ¾-inch and 1-inch meters. Shared services, termed a “Doninguez Tee,” that serve two adjacent properties shall require an individual service upgrade in order to accommodate an increase in meter size due to a remodel or new construction demands. Improvements shall be paid by the property owner undertaking the proposed property improvements. The sizing of the service shall be specified on the plans designated by lot numbers. Services for private-street residential, commercial or industrial developments are to be as shown on plans and may require a detail on the plans of the location of the proposed service.
400.10.3 Type of Service Line

Acceptable service line material is as described below:

- 1-inch and 2-inch service lines shall be copper tubing, Type “K” soft.
- 4- inch and larger service lines shall use PVC pipe per Technical Specification Section 15064. 3-inch service is not acceptable, use 4-inch piping upstream of meter.

400.10.4 Meters

All residential meters 5/8” through 2” will be furnished by Mesa Water, subsequent to payment of all applicable charges, and installed by Mesa Water. All industrial, commercial, individual service meters 3” and larger will be furnished by Mesa Water, subsequent to payment of all applicable charges, and installed by the applicant.

400.10.5 Pressure Reducing Valves

Individual pressure regulators are required by the Uniform Plumbing Code if the average static pressure in the water main is 80 psi or more. Where required, the water service shall be provided with approved pressure regulators set at 80 psi, and shall be installed per Mesa Water Standard Drawings or appropriate governing agency's standards.

400.11 STANDARD WATER NOTES

The following Standard Water Notes shall be included on all improvement plans or water system construction plans:

1. All water system work shall conform to Mesa Water's "Standard Specifications for the Construction of Water Facilities", as last revised. The contractor shall have a copy of the project plans and Mesa Water’s Standard Specifications on the job at all times.
2. A pre-construction meeting of representatives from various other affected utility companies, agencies and the contractor shall be held on the job site (or at a location approved by Mesa Water) at least forty-eight (48) hours prior to the start of work.
3. Mesa Water’s Inspector shall be notified at least two working days before start of work or any inspection. To arrange for inspection, call (949) 631-1291.
4. Water mains shall be installed after the installation of curb and gutter at six feet off of curb face, or as staked by the applicant's surveyor at a minimum 50-foot stationing, if there are no existing curbs.
5. Water meters shall not be located within a driveway. Any water meter found to be within a driveway shall be removed completely and reinstalled at the proper location, at no cost to Mesa Water.
6. All water service laterals shall be constructed perpendicular to the water main without bends or angles from the connection point on the main.
7. All main line valves shall be maintained so as to be accessible during tract development and construction. All valve stem tops having over 48 inches of cover will require an extension meeting Mesa Water Standard Drawing.
8. The top of the pipe 10 inches in diameter and smaller shall be a minimum of 30 inches of cover from the street subgrade or undercut, whichever is greater, unless indicated otherwise on the job plans or as directed otherwise by Mesa Water Inspector because of unusual field conditions. At no time shall the pipe have less than 42 inches of cover between the top of the pipe and the finished street grade.

9. The top of the pipe 12 inches in diameter and larger shall be a minimum of 36 inches of cover from the street subgrade or undercut, whichever is greater, unless indicated otherwise on the job plans or as directed otherwise by Mesa Water Inspector because of unusual field conditions. At no time shall the pipe have less than 48 inches of cover between the top of the pipe and the finished street grade.

10. Pipe shall be bedded and backfilled per Mesa Water Standard Drawings.

11. Fire hydrants shall be installed in accordance with Mesa Water's Standard Drawings and installed behind curbs and sidewalks where the sidewalks are adjacent to the curbs. Fire hydrants shall be per Mesa Water's Standard Specifications and shall have a concrete pad poured around them. All fire hydrants shall be set with the bottom flange 4 inches above the concrete pad or sidewalk.

12. All water mains 4-inches through 12-inches shall be SDR-14 or thicker, AWWA C-900 PVC, unless otherwise approved by Mesa Water.

13. No facility is to be backfilled until inspected and approved by a Mesa Water Inspector.

14. Shut down or tapping of existing waterlines to facilitate connection to existing facilities shall be coordinated with Mesa Water. Any relocation of existing facilities are subject to approval of the District Engineer.

15. No "hot-taps" or other tie-in connections shall be made to existing Mesa Water mains prior to conducting and passing an approved pressure test and a bacteriological test on the new water distribution system.

16. Tapping sleeves, where called for on the plans, shall be pressure tested in an approved manner in the field, in the presence of Water Mesa Inspector, prior to tapping the main line. Tapping of the main line shall not proceed unless a Mesa Water Inspector is present. Size on size taps of water mains will require approval from Mesa Water on a case-by-case basis.

17. All water services shall be installed per Mesa Water's Standard Specifications. All meters shall be installed in grass or planter areas and accessible by vehicle. Any services located in sidewalks are subject to the City or appropriate governing agency and Mesa Water approval. Any meters located in banks of 4 shall be manifolded per Mesa Water Standard Drawings. All meter registers and lids shall be marked with address identification.

18. Where meters and meter boxes are located within slopes, the angle meter stops shall be so located that the meters and boxes will be parallel and flush, respectively, with the finished surface. Wherever the surrounding grade exceeds eight (8) percent, or in the opinion of Mesa Water Inspector, the adjacent slope is too great, a small retaining wall, clear of the meter box, shall be constructed to the satisfaction of the Mesa Water representative.

19. The applicant shall furnish and install the service lateral between water mains, meters and meter boxes. Water services shall be installed to the property line prior to paving of the street.

20. Curbs shall be inscribed with a "W" indicating locations of all domestic water services. Letter inscription shall be made using a 4-inch power tool wheel grinder.

21. Curbs shall be inscribed with tie downs for all valve locations. Letter inscription shall be made using a 4-inch power tool wheel grinder.
22. The contractor shall expose all points of connection to the existing water system for verification of horizontal and vertical location before construction.

23. All valves shall be located off the tee unless otherwise approved by Mesa Water.

24. At street intersections and bus stops with concrete pads, the main line shall be roped to avoid cross gutter conflict.

25. Individual pressure regulators will be required by the Uniform Plumbing Code if static pressure in the main is 80 psi or more.

26. All 5/8” through 2” meters and customer service valves will be furnished by Mesa Water following receipt of payment of all applicable charges and fees. Mesa Water shall install all 5/8” through 2” meters and customer service valves. The contractor shall expose all angle meter stops and properly locate the meter boxes to grade prior to requesting inspection and installation of the meters and customer service valves by Mesa Water.

27. All nuts and bolts, including valves body bolts and flanges, shall be grade 316 stainless steel. All buried flanges, valves and fittings shall be wrapped with 10-mil polyethylene sheet.

28. Final inspection of new water mains must include water samples that will be tested for presence of bacteria. Two (2) consecutive “passing” samples are required for acceptance.

29. Any water obtained from Mesa Water facilities shall be metered with a construction meter obtained from Mesa Water. The use of jumpers is allowed by permit only. Meters must be installed prior to occupancy of a dwelling.

30. The contractor working on Mesa Water facilities must have a C-34 license issued by the State Contractor’s License Board or Class “A” General Contractors License.

31. Contractor shall obtain and show proof of a construction dewatering permit from the State of California, Regional Water Quality Control Board prior to the start of construction, unless otherwise approved by the District Engineer.

32. An Encroachment Permit from the appropriate jurisdictional agency (City of Costa Mesa, City of Newport Beach or the County of Orange) is required prior to any work within public right-of-way or easement.

33. The existence and location of any underground utilities or structures shown on these plans were obtained by a search of the available records. Approval of these plans by Mesa Water does not guarantee the accuracy, completeness, location, or the existence or non-existence of any utility pipe or structure within the limits of this project. The contractor is required to take all due precautionary means necessary to protect those utility lines not shown on these plans.

34. The applicant shall remove to the satisfaction of Mesa Water’s Inspector all unused water stubs and/or services that were provided to the project site.

35. All butterfly valves 12-inches in diameter and larger shall be flanged and shall be bi-directionally tested and installed by the certified operator in accordance with Mesa Water’s Standard Specifications and Standard Drawings.

36. If a 13D sprinkler system is not a flow through (passive purge) system, then a testable backflow device next to building (residential only) shall be installed. Mesa Water’s Inspector shall verify all flow through systems by:

   • Turning off house valve
   • Check for flow on flow through connection (i.e. toilet or sink)

37. Vegetation, including trees and shrubbery, shall not be planted within 5 feet of water
1. Separate estimate of quantities for the domestic water systems indicating quantity of pipes, valves, fire hydrants, domestic water services, etc. are to be included on the plans.
2. Plan and profile sheet to show existing underground utilities as well as proposed underground utilities. Vertical clearance at crossings shall be indicated by showing top of pipe and bottom pipe elevation at point of intersection.

3. Blow-off assemblies shall be installed at low points of all mains. Temporary blow-offs shall be installed as service stub-outs for testing and flushing purposes.

4. Combination air valves are to be installed at all high points of water mains in accordance with Mesa Water’s Standard Specifications.

5. Generally, Mesa Water requires all fittings and valves (smaller than 12-inches in diameter) to have "push-on" type ends, except at tees and crossings where valves are required. Valve and fitting are to have flange to flange connection.

6. Water sample stations shall be provided for each contiguous water service area.

7. Water mains to be constructed in landscape slopes and within easements shall be constructed with C-900 SDR 14 or C-905 PVC SDR 18 PVC pipe. Slope anchors may be required in accordance with Mesa Water’s Standard Drawings dependent upon grades and local soil conditions. Thrust blocks will also be required at the angle points at both the top and bottom of the slope.

8. The contractor shall restore or replace all removed or damaged or otherwise disturbed existing surfaces or structures not otherwise noted on the plans or specified herein to a condition equal to that before the work began and to the satisfaction of the Director of Engineering, and the City Engineer. All excess earth and all other debris shall be removed and disposed off by the contractor and the entire site of the work shall be left in a condition acceptable to the City and/or Mesa Water prior to final acceptance of the work. All restoration and cleanup shall be performed in accordance with Mesa Water's Standard Specifications.

400.13 RECORD “AS-BUILT” DRAWINGS

400.13.1 Record Drawings

Record drawings shall be based on an “as built” review and shall show all changes in the work constituting departures from the original contract drawings. Upon completion of each increment of work, all required information and dimensions shall be transferred to the record drawings. Facilities and items to be located and verified on the record drawings shall include the following:

1. Point of connection;
2. Location and elevation of all valves, bends and tees;
3. Location of all services;
4. Type, manufacturer, and model of valves and fire hydrant. Turns required for complete open/close cycle shall be provided for all valves.
5. Location of buried conduit and sensor line assemblies;
6. Items located and constructed as called out in the plans need not be noted as such.
7. Final settings of instrumentation and control equipment.

Prior to submission of the record mylars, two sets of blue lines or bond copy and CAD files will be submitted for review by Mesa Water’s Inspector. One set will be returned with comments if necessary. Final 4-mil mylar record drawings are to be submitted only upon incorporation of Mesa Water's Inspector comments.
SECTION 200
SCOPE AND CONTROL OF WORK

200.1 RESPONSIBILITY FOR FURNISHING MATERIAL AND INSTALLATION

It will be the responsibility of the applicant and his contractor to furnish all materials that meet the following material specifications and all labor and equipment to install facilities in conformance with approved plans and specifications, including Mesa Water’s Standard Specifications.

200.2 GUARANTEE

The applicant and his contractor shall guarantee the work, upon completion, against leaks and breaks due to defective materials or workmanship furnished by the contractor, against settlement of backfill, and damage to resurfacing for a period of one year from the date of completion and acceptance by Mesa Water. Arrangement shall be made for the faithful performance bond to be enforced for a period of one year after the date of final acceptance to cover this guarantee. Damage or leaks due to acts of God, from sabotage, and/or vandalism are specifically exempt from this guarantee.

The date of acceptance by Mesa Water will commence when completion of the entire tract, commercial, or industrial complex is final. Partial releases are not considered to relieve applicant and his contractor of responsibilities under this section.

When defective material or workmanship discovered in the work requires repairs to be made under this guarantee, the applicant shall be notified by telephone and shall make all repairs at their own expense within three calendar days after receipt of such telephoned notice. This telephone notice shall be followed up by written correspondence. Should the applicant or his contractor fail to repair the damage within the three days, Mesa Water may make the necessary repairs and charge the applicant with the actual cost of the repairs. In emergencies demanding immediate attention, Mesa Water shall have the right to repair the defect or damage and charge the applicant with the actual cost of all labor and material required.

200.3 LICENSES, PERMITS, AND FEES

The contractor shall have a valid Contractor’s License of the appropriate class (Class “A” or “C-34”). The contractor or applicant shall obtain all permits, pay all fees, obtain business licenses, and give all necessary notices required for the construction of the work. The contractor shall provide proof of licensing to the District Engineer. Class “A” license shall be required for all non-pipeline work.

200.4 PLANS AND SPECIFICATIONS

Prior to the commencement of construction of any pipelines or pipeline structures, the applicant shall furnish to Mesa Water, design drawings showing pipeline plans and profiles and details of pipeline structures. Work shall not be commenced until Mesa Water has approved said design drawings. The contractor shall keep at the worksite a copy of the approved plans and specifications, and a copy of Mesa Water’s Standard Specifications to which Mesa Water shall have access at all times.

200.5 SHOP DRAWINGS/SUBMITTALS

Wherever called for in these Standard Specifications or on the drawings, or where required by Mesa Water, the contractor shall furnish, to Mesa Water for review, three prints of each shop drawing.
SECTION 15041

CHLORINATION OF WATER MAINS FOR DISINFECTION

PART 1 - GENERAL

A. Description

This section describes the disinfection of potable water mains, services, appurtenances, and connections by chlorination, in accordance with ANSI/AWWA B300, B301, C651 and C652 and as specified herein. All chlorine products shall be NSF 60 certified.

B. Related Work Specified Elsewhere

Hydrostatic Testing of Pressure Pipelines: 15042.

C. Job Conditions

1. Discharge of chlorinated water into watercourses or surface waters is regulated by the National Pollutant Discharge Elimination System (NPDES). Contractor shall procure an NPDES permit prior to beginning of work if he plans to discharge water into watercourses, stormdrains, or surface waters.

2. The rate of flow and locations of discharges shall be scheduled in advance to permit review and coordination with Mesa Water and cognizant regulatory authorities.
   a. Orange County EMA--Flood Control.
   b. Cities of Costa Mesa and Newport Beach and portions of unincorporated County of Orange.

3. Potable water shall be used for chlorination.

4. Requests for use of water from Mesa Water lines shall be submitted 48 hours in advance.

5. Chlorination shall be performed prior to hydrostatic testing for pipelines having a diameter of 10-inches and larger. See Part 3, Paragraph A-9 for concurrent testing of smaller diameter pipelines.

PART 2 - MATERIALS

A. Liquid Chlorine Solution

Liquid chlorine solution shall be in accordance with the requirements of ANSI/AWWA B301, and shall be injected with a solution feed chlorinator and a water booster pump or a sufficiently pressurized source of water to provide an adequate flow to inject and disperse the chlorine solution.
2. Concrete Anchor and Thrust Blocks: All concrete anchor blocks shall be allowed to cure a sufficient time to develop the designed minimum strength before testing.

3. Mortar Lining: Steel pipelines shall not be tested before the mortar lining and coating on all of the pipe lengths in the line have attained an age of fourteen (14) days. Cement-mortar lined pipe shall not be filled with water until a minimum period of eight (8) hours has elapsed after the last joint in any section has been made.

4. Flushing: All pipelines shall be flushed prior to hydrostatic testing and disinfection. Flushing shall be performed via Mesa Water’s Flush-out assemblies constructed in accordance with Mesa Water’s Standard Drawings. Velocities shall be sufficient to achieve a minimum of 2 feet per second (fps) velocity in the pipeline. Refer to the table herein below in Section F.1 (Filling/Flushing Rate).

F. Field Test Procedure

1. Filling / Flushing Rate: The pipeline shall be filled at a rate such that the average velocity of flow is no greater than \( \frac{2}{3} \) fps. At no time shall the maximum velocity of flow exceed 2 fps. The following table gives filling and flushing rates to provide \( \frac{2}{3} \) fps velocity for various pipe diameters.

<table>
<thead>
<tr>
<th>Nominal Size (inches)</th>
<th>Flow Rate Q (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>120</td>
</tr>
<tr>
<td>6</td>
<td>180</td>
</tr>
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<td>8</td>
<td>240</td>
</tr>
<tr>
<td>10</td>
<td>360</td>
</tr>
<tr>
<td>12</td>
<td>480</td>
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<td>16</td>
<td>720</td>
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<tr>
<td>18</td>
<td>960</td>
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<td>20</td>
<td>1,200</td>
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<tr>
<td>24</td>
<td>1,440</td>
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<tr>
<td>30</td>
<td>1,800</td>
</tr>
<tr>
<td>36</td>
<td>2,160</td>
</tr>
</tbody>
</table>

2. Air Removal: All air should be purged from the pipeline before checking for leaks or performing pressure tests on the system. To accomplish this, if air valves or other outlets are not available at high points, taps shall be made to expel the air, and these taps shall be tightly plugged after testing.

3. Pressurization: After the pipeline has been filled and allowed to sit a minimum of 48 hours (72 hours for mortar-lined pipelines), the pressure in the pipeline shall then be pumped up to the specified test pressure.
ATTACHMENT L
SECTION 15139
FIRE HYDRANTS

PART 1 - GENERAL

A. Description

This section includes materials, installation, and testing of wet-barrel type fire hydrants.

B. Related Work Specified Elsewhere

2. Concrete: 03300.

PART 2 - MATERIALS

A. Hydrant Top Section

1. General: Fire hydrants shall be of the wet barrel type, with individual valves for each outlet, and shall conform with the requirements of AWWA C503.

2. Outlets: Hydrants shall have two (2) 2-1/2-inch outlets and one 4-inch outlet. All outlets shall have National Standard Hose Threads. For residential areas, one (1) 2-1/2-inch outlet and one (1) 4-inch outlet.

3. Materials of Construction: The hydrant top section shall be manufactured of bronze conforming to ASTM B62 or type 304 stainless steel conforming to CF-8 ASTM-A-351. All interior working parts, including stem, shall be of bronze containing no more than 7% zinc or 2% aluminum and NSF61 compliant.

4. Operating Nuts: Hydrants are to be provided with 1-1/2-inch sized pentagon-shaped operating nut, and 1-1/2-inch capnuts.

5. Outlet Caps: Plastic outlet nozzle caps shall be provided for all outlets. Caps shall be securely chained to the barrel with non-kinking metal chain in a manner to permit free rotation of the cap.

6. Flanges: Hydrant flanges shall be drilled with a 6-hole pattern. The flange shall be drilled with 3/4-inch diameter holes located on a 9-3/8-inch bolt circle.
SECTION 15162
FLEXIBLE PIPE COUPLINGS AND EXPANSION JOINTS

PART 1 - GENERAL

A. Description

This section describes materials and installation of flexible gasket sleeve-type compression pipe couplings for steel, PVC, ACP, and ductile iron pipe.

B. Related Work Specified Elsewhere

1. Painting and Coating: 09900.

C. Submittals

1. Submit manufacturer's catalog data on flexible pipe couplings. Show manufacturer's model or figure number for each type of coupling or joint for each type of pipe material for which couplings are used.
2. Submit manufacturer's recommended torques to which the coupling bolts shall be tightened for the flexible gasket sleeve-type compression pipe couplings.
4. Show number, size, and material of construction of the rods and lugs for each thrust harness on the project.

PART 2 - MATERIALS

A. Flexible Pipe Couplings for Steel Pipe

1. General: Steel couplings shall have center sleeves of steel conforming to ASTM A 36, A 53 (Type E or S), or A 512 having a minimum yield strength of 30,000 psi. Follower rings shall be malleable iron (ASTM A 47, Grade 32510), ductile iron (ASTM A 536), or steel (ASTM A 108, Grade 1018, or ASTM A 510, Grades 1018 or 1021). Follower ring material shall match that of the pipe being joined; i.e.: steel follower rings on steel pipe; malleable iron rings for ductile iron pipe. Minimum center sleeve length shall be 5-inches for pipe sizes 1-inch through 3-inches; 7-inches for pipe size 4-inches; and 10-inches for pipe sizes larger than 4-inches.
2. Sleeve Bolts: Sleeve bolts shall have a minimum yield strength of 40,000 psi, an ultimate strength of 60,000 psi, shall be Type 316 stainless steel conforming to ASTM A 193 (Grade B8M) for bolts and ASTM A 194 (Grade 8N) for nuts, and shall conform to AWWA C111.
3. Manufacturers: Flexible pipe couplings for steel pipe shall be steel, and shall be Dresser Style 38, Smith-Blair Type 411, Baker Series 200, Ford, Romac or approved equal.

B. Joint Harness

1. Tie Bolts or Studs: Tie bolts or studs shall be as shown in AWWA Manual M11, Table 13-6, 13-7, and 13-7A. The minimum numbers and sizes of tie bolts or studs shall be as shown in the table below. Bolt or stud material shall conform to ASTM B 193, Grade B7. Nuts shall conform to ASTM A 194, Grade 2H. Lug material shall conform to ASTM A 36, ASTM A 283, Grade B, C, or D, or ASTM A 285, Grade C. Lug dimensions, plate thickness, and weld dimensions shall be as shown in AWWA Manual M11, Figure 13-17.

### TIE BOLTS OR STUD REQUIREMENTS FOR FLEXIBLE PIPE COUPLINGS

<table>
<thead>
<tr>
<th>Nominal Pipe Size (inches)</th>
<th>150 psi</th>
<th>250 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. Bolts or Studs</td>
<td>Size (inches)</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>5/8</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>5/8</td>
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<tr>
<td>4</td>
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<td>5/8</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>5/8</td>
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<td>8</td>
<td>2</td>
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<td>7/8</td>
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<td>20</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>24</td>
<td>4</td>
<td>7/8</td>
</tr>
<tr>
<td>30</td>
<td>4</td>
<td>1-1/8</td>
</tr>
<tr>
<td>36</td>
<td>4</td>
<td>1-1/4</td>
</tr>
</tbody>
</table>

2. Criteria for Number and Size of Tie Bolts or Studs: The number and size of bolts shall be selected based on the test pressure shown in Section 15042 (Hydrostatic Testing of Pressure Pipelines). For test pressures less than or equal to 150 psi, the 150-psi design in the table above shall be used. For test pressures between 150 and 250 psi, the 250-psi design in the table above shall be used.

3. Washers: Stainless steel, Type 316, washers shall be provided for each lug. Washer material shall be the same as the nuts. Minimum washer thickness shall be 1/8-inch.

4. Wall Thickness Requirement for Welded Lugs: Pipe wall to which lugs are welded shall be adequate to resist stresses. If necessary, the pipe wall thickness shall be increased.
C. **Flexible Couplings for Ductile Iron Pipe**

1. General: Ductile iron pipe couplings shall have sleeves of ASTM A 126 Class B ductile iron with a minimum yield strength of 30,000 psi. Follower rings shall be malleable iron ASTM A 47 Grade 32510 or ductile iron ASTM A 536. Minimum center sleeve length shall be 7-inches for pipe sizes up to 6-inches in diameter; 10-inches for pipe sizes larger than 6-inches pipe diameters.

2. Sleeve Bolts: Sleeve bolts shall be corrosion resistant Type 316 stainless steel with minimum yield strength of 45,000 psi and shall conform to ASTM-A-193 and AWWA C111.

3. Manufacturers: Flexible couplings for ductile iron pipe shall be ductile iron: Dresser Style 153, Smith-Blair Type 442, Baker Series 228, Ford Style FCI, Romac Style 501, or approved equal.

D. **Transition Couplings**

1. Steel Pipe: Transition couplings for connecting steel pipe having different outside diameters shall be steel: Dresser Style 62 or 162, Smith-Blair Type 413, Baker Series 212 or 240, Romac 501, or approved equal.

2. Ductile Iron Pipe, PVC Pipe, and Asbestos Cement Pipe: Transition couplings for connecting ductile iron pipe, PVC pipe, and asbestos cement pipe having different outside diameters shall be ductile iron, and shall be Smith-Blair Type 441, Baker Series 236, Ford Style FC2A, Romac and Dresser or approved equal.

3. Sleeve Bolts: Sleeve bolts shall have a minimum yield strength of 40,000 psi, an ultimate strength of 60,000 psi, shall be Type 316 stainless steel conforming to ASTM A 193 (Grade B8M) for bolts and ASTM A 194 (Grade 8N) for nuts, and shall conform to AWWA C111.

E. **Reducing Couplings**

Reducing couplings for steel pipe shall be steel. Reducing couplings for ductile iron pipe, PVC pipe, and asbestos cement pipe shall be ductile iron. Couplings shall be Dresser Style 62, Baker Series 220 or 240, Smith-Blair Type 415 or R441, Romac, Ford, or approved equal.

F. **Flanged Coupling Adapters**

Flanged coupling adapters may be used to install valves, meters, and other types of flanged fittings to plain end pipe of diameter 10-inches and smaller. Flanged coupling adapters shall be Smith-Blair Type 912, Baker Series 601 or 604, Dresser Style 127, Ford Style FFCA, Romac Style FAC501, Romac Alpha, or approved equal.

G. **Expansion Joints**

1. General: Expansion joints shall have body, flanges, and slip pipe of carbon steel. Packing shall consist of a minimum of four rubber rings, each separated by jute packing.
For installation in steel pipelines, expansion joint shall have plain ends, beveled for welding. For installation in ductile iron pipelines, expansion joint shall have plain ends. Slip pipe shall have a machined surface, and body shall be equipped with pipe stops. Where called for on the plans, limit or stop rings and limit rods shall be provided to prevent the slip pipe from pulling out of the joint.

2. Limit Rods and Body Studs, Bolts and Nuts: Limit rods and body studs, bolts, and nuts shall be Type 316 stainless steel conforming to ASTM A 193 (Grade B8M) for rods and bolts, and ASTM A 194 (Grade 8M) for nuts.

3. Manufacturers: Expansion joints shall be Baker Series 403 or 404, Smith-Blair Type 611 or 612, Romac EJ400, or approved equal.

H. Sleeve Bolts and Nuts for Flanges

1. Stainless Steel Bolts: Bolts and nuts for buried and submerged flanges, flanges in underground vaults and structures, and flanges located outdoors above ground shall be Type 316 stainless steel conforming to ASTM A 193 (Grade B8M) for bolts and ASTM A 194 (Grade 8M) for nuts.

2. Washers: Washers shall be provided for each nut. Washers shall be of the same material as the nuts.

PART 3 - EXECUTION

A. Installation of Flexible Pipe Couplings and Expansion Joints

1. General: Oil, scale, rust, and dirt shall be cleaned from pipe ends. Gaskets in flexible pipe couplings shall be cleaned before installing. Expansion joints shall be installed per manufacturer's recommendations. Expansion joints shall be installed so that 50% of total travel is available for expansion and 50% is available for contraction.

2. Bolt Thread Lubrication: Bolt threads shall be lubricated with graphite and oil prior to installation.

B. Painting and Coating

1. Flexible Couplings: Flexible pipe couplings (including joint harness assemblies), transition couplings, flanged coupling adapters, and expansion joints shall be coated per Section 09900 (Painting and Coating); sleeves shall be coated per System G-1. After installation couplings shall be wrapped with 8-mil polyethylene wrap per AWWA C105.

2. Interior Surface Coating: Interior surfaces of flexible coupling and transition coupling sleeves, and the body of expansion joints shall be coated per Section 09900 (Painting and Coating), System G-1.
C. Bonding Flexible Pipe Couplings

Buried flexible pipe couplings that are connected to ductile-iron, cast-iron, or steel pipe shall be bonded to adjacent piping as described in Section 16640 (Cathodic Protection and Joint Bonding).

D. Hydrostatic Testing

Flexible pipe couplings, expansion joints, and expansion joints shall be hydrostatically tested in place with the pipe being tested. Test shall be performed in accordance with Section 15042 (Hydrostatic Testing of Pressure Pipelines).

END OF SECTION
MESA WATER DISTRICT
2" SERVICE
STANDARD MANIFOLD INSTALLATION

Legend of Material:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Size &amp; Description</th>
<th>Manufacturer</th>
<th>Spec. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2&quot; Brass &quot;Ball Style&quot; Angle Meter Stop w/ Lockwing (Inlet: FIP; Outlet: &quot;Slopped&quot; Elongated Holes)</td>
<td>James Jones</td>
<td>J1974W</td>
</tr>
<tr>
<td>2</td>
<td>2&quot; Copper Tubing</td>
<td>Mueller</td>
<td>B24265</td>
</tr>
<tr>
<td>3</td>
<td>3/4&quot; Crushed Rock</td>
<td>Ford</td>
<td>BFA13-777W</td>
</tr>
<tr>
<td>4</td>
<td>1&quot; Brass Ball Valve (Lockwing)</td>
<td>James Jones</td>
<td>J1905W</td>
</tr>
<tr>
<td>5</td>
<td>Meter Flange</td>
<td>Mueller</td>
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<td></td>
<td></td>
<td>Ford</td>
<td>B13-444W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>McDonald</td>
<td>6101MW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Mueller</td>
<td>CF31-77</td>
</tr>
<tr>
<td></td>
<td></td>
<td>McDonald</td>
<td>610F</td>
</tr>
</tbody>
</table>

General Notes:

1. Number of meters and size shall be determined by Mesa Water, irrigation shall be separate.
2. Meter and customer service valve will be furnished and installed by Mesa Water.
3. All fittings shall be silver copper solder only.

Remove fourth meter to avoid confusion. 2-inch manifolds are limited to 3 1-inch meters.
2" SERVICE
STANDARD MANIFOLD INSTALLATION

LEGEND OF MATERIAL:

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>SIZE &amp; DESCRIPTION</th>
<th>MANUFACTURER</th>
<th>SPEC. NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>2&quot; BRASS &quot;BALL STYLE&quot; ANGLE METER STOP W/ LOCKWING (INLET: FTP; OUTLET: &quot;SLOTTED&quot; ELONGATED HOLES)</td>
<td>JAMES JONES</td>
<td>J1974W</td>
</tr>
<tr>
<td>②</td>
<td>2&quot; COPPER TUBING</td>
<td>MUELLER</td>
<td>B24265</td>
</tr>
<tr>
<td>③</td>
<td>3/4&quot; CHRUSHED ROCK</td>
<td>FORD</td>
<td>BFA13-777W</td>
</tr>
<tr>
<td>④</td>
<td>1&quot; BRASS BALL VALVE (LOCKWING)</td>
<td>McDonald</td>
<td>46048</td>
</tr>
<tr>
<td>⑤</td>
<td>METER FLANGE</td>
<td></td>
<td>TYPE &quot;K&quot; SOFT</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>PER STD DWG NO. 3</td>
</tr>
<tr>
<td>⑥</td>
<td></td>
<td>JAMES JONES</td>
<td>J1905W</td>
</tr>
<tr>
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<td>MUELLER</td>
<td>B24351</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>FORD</td>
<td>6105</td>
</tr>
</tbody>
</table>

GENERAL NOTES:

1. NUMBER OF METERS AND SIZE SHALL BE DETERMINED BY MESA WATER, IRRIGATION SHALL BE SEPARATE.
2. METER AND CUSTOMER SERVICE VALVE WILL BE FURNISHED AND INSTALLED BY MESA WATER.
3. ALL FITTINGS SHALL BE SILVER COPPER SOLDER ONLY.

MESA WATER DISTRICT

TRAFFIC VALVE BOX PER STD DWG NO. 14A

2" COPPER NIPPLE
2" COPPER TEE
2" COPPER ELL (TYP.)

METER BOX PER STD DWG NO. 3

2" MIP X SOLDER ADAPTER (BEYOND)

SECTION A

PLAN

SIDEWALK

2" COPPER SERVICE PER STD DWG NO. 2

20" MIN. 36" MIN. 18" MIN. (TYP.)
GENERAL NOTES:

1. ANCHOR BLOCK ONLY REQUIRED WHEN VALVE IS NOT FLANGED TO TEE OR CROSS

2. PROVIDE VALVE STEM EXTENSION IF DEPTH TO VALVE EXCEEDS 4 FT. PER STD DWG NO. 15

3. DIMENSION "C" EQUALS TRENCH WIDTH PLUS 2 X THE PIPE DIAMETER.

4. BUTTERFLY VALVE OPERATORS SHALL BE LOCATED ON THE LEFT HAND SIDE OF THE VALVE WHEN STANDING ON THE FLANGED END OF THE VALVE (AT THE TEE OR CROSS) AND LOOKING THROUGH THE VALVE TOWARD THE PIPE END. WHERE CONCRETE CROSS GUTTERS WILL EXIST AT STREET INTERSECTIONS WHICH WILL INTERFERE WITH VALVE BOXES THE PIPELINE SHALL BE MOVED TO A POSITION OF 7 FEET OFF CURB FACE TO CLEAR CROSS GUTTER.
ITEMS:

1. FLG x FLG x FLG D.I.P. TEE
2. FLG x PO RW GATE VALVE PER MESA WATER STANDARD SPECIFICATION 15100
3. BEVELED END JOINING VALVE x PE DR–14 PVC (C900) PIPE
4. CAST BOLTED SLEEVE–TYPE COUPLING FOR IDENTICAL OR DIFFERENT PIPE MATERIALS ON EACH SIDE
5. EXISTING PIPE

NOTES:

1. NUTS AND BOLTS SHALL BE 316 STAINLESS STEEL.
2. DOUBLE WRAP TEES, VALVES AND ALL FITTINGS IN 8–MIL POLYETHYLENE.
3. WARNING TAPE SHALL BE INSTALLED.
4. SEE MESA WATER STANDARD DRAWING 18 FOR TRENCH DETAILS.
5. SEE MESA WATER STANDARD DRAWING 12 FOR FURTHER THRUST BLOCK DETAILS.
6. SEE MESA WATER STANDARD DRAWING 14A AND 15 FOR VALVE BOX ASSEMBLY AND VALVE EXTENSION.
GENERAL NOTES:
1. PRESSURE TEST AND CHLORINATE TO LIMITS SHOWN ABOVE.
2. CONTACT MESA WATER FOR LATEST LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES.
3. BACKFLOW ASSEMBLY SHALL BE A MINIMUM OF 36" FROM ANY STRUCTURE, CURB OR SIDEWALK.
4. BACKFLOW ASSEMBLY MUST BE EASILY ACCESSIBLE TO FACILITATE TESTING AND SERVICING.
MESA WATER DISTRICT

DOUBLE CHECK DETECTOR ASSEMBLY

GENERAL NOTES:
1. PRESSURE TEST AND CHLORINATE TO LIMITS SHOWN ABOVE
2. CONTACT MESA WATER FOR LATEST LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES.
3. BY-PASS DETECTOR METER IN CUBIC FEET
4. BACKFLOW ASSEMBLY SHALL BE A MINIMUM OF 36” FROM ANY STRUCTURE, CURB OR SIDEWALK.
5. BACKFLOW ASSEMBLY MUST BE EASILY ACCESSIBLE TO FACILITATE TESTING AND SERVICING.

"FOR FIRE USE ONLY"
NON-HEALTH HAZARD (POLLUTANT) BACKFLOW PREVENTION DEVICE

Installation does not allow for meter.
Default to Mesa Water Standard 22A
LIMIT OF PRESSURE TEST AND CHLORINATION

MIN. (TYP.):

D.I. SPOOL (FLG X FLG)
D.I. VALVE SETTER (FROM DEVICE MANUFACTURER), OR 2 D.I. 90° BENDS (FLG X PO) WITH THRUST BLOCK PER STD DWG NO. 12

CONCRETE PAD REINFORCED W/ W.W.F. (1.6 X 1.6)
LIMIT OF MESA WATER INSPECTION

FRONT ELEVATION VIEW

GENERAL NOTES:
1. PRESSURE TEST AND CHLORINATE TO LIMITS SHOWN ABOVE.
2. CONTACT MESA WATER FOR LATEST LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES.
3. BACKFLOW ASSEMBLY SHALL BE A MINIMUM OF 36” FROM ANY STRUCTURE, CURB OR SIDEWALK.
4. BACKFLOW ASSEMBLY MUST BE EASILY ACCESSIBLE TO FACILITATE TESTING AND SERVICING.

Installation does not allow for meter. Default to Mesa Water Standard 22A
Installation does not allow for meter. Default to Mesa Water Standard 3 or 24 downstream of the meter.
Installation does not allow for meter. Default to Mesa Water Standard 122A.

MESA WATER DISTRICT
REDUCED PRESSURE DETECTOR ASSEMBLY (3" OR LARGER)

GENERAL NOTES:
1. PRESSURE TEST AND CHLORINATE TO LIMITS SHOWN ABOVE
2. CONTACT MESA WATER FOR LATEST LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES.
3. BACKFLOW ASSEMBLY SHALL BE A MINIMUM OF 36” FROM ANY STRUCTURE, CURB OR SIDEWALK.
4. BACKFLOW ASSEMBLY MUST BE EASILY ACCESSIBLE TO FACILITATE TESTING AND SERVICING.
1. Pressure test and chlorinate to limits shown above.

2. Contact Mesa Water for latest list of approved backflow preventer assemblies.

3. Backflow assemblies shall be a minimum of 36” from any structure, curb, or sidewalk.

4. Backflow assembly must be easily accessible to facilitate testing and servicing.

5. Min. setback:

6. D.I. Spool (Flg x Flg)

7. D.I. Valve Setter (from device manufacturer), or 2 D.I. 90° bends (Flg x Flg) per thrust block per std. dwg. no. 12

Installation does not allow for meter.

Default to Mesa Water Standard.

Concrete pad reinforced W/W. 1.6 x 1.6
1. 6” R.W. GATE VALVE (FLG. x FLG.)
2. 6”-90° D.I. BEND (FLG. x FLG.)
3. 6” D.I. SPOOL (FLG. x FLG.)
4. 6” D.I. REDUCER (FLG. x FLG.)
5. R.W. GATE VALVE WITH HANDWHEEL (NRS) (FLG. x FLG.)
6. D.I. STRAINER (FLG. x FLG.)
7. COMPOUND METER OR TURBO METER (FLG. x FLG.) PURCHASED FROM MESA WATER AND INSTALLED BY CONTRACTOR
8. APPROVED REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY OR APPROVED DOUBLE CHECK VALVE ASSEMBLY (FLG. x FLG.)
9. 90° ELL (FLG. x FLG.)
10. D.I. SPOOL (FLG. x FLG.)
11. D.I. TEE (FLG. x FLG.)
12. CONCRETE PAD REINFORCED W/ W.W.F. 1.6 X 1.6
13. ADJUSTABLE PIPE SUPPORTS
15. CONCRETE THRUST BLOCK PER STD DWG NO. 12

GENERAL NOTES:
1. DIMENSIONS SHOWN ARE APPROXIMATE, AND ARE BASED ON AN ASSUMED METER LENGTH OF 6”. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO MESA FOR REVIEW PRIOR TO CONSTRUCTION.
2. R.W. VALVES IN METER ASSEMBLY TO BE LOCKED (BY CHAIN) IN TO OPEN POSITION R.W. VALVE IN BYPASS TO BE LOCKED (BY CHAIN) IN THE CLOSED POSITION.
3. ASSEMBLY MUST BE EASILY ACCESSIBLE TO FACILITATE TESTING AND SERVICING.
MESA WATER DISTRICT

RPP OR DCV APPROVED BACKFLOW ASSEMBLY (3", 4", 6", & 8" METER INST.)

Proposed Revision

Legend of Material:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Size &amp; Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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</tr>
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<td>6&quot;-90° D.I. BEND (FLG. x FLG.)</td>
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<td>6&quot; D.I. REDUCER (FLG. x FLG.)</td>
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<tr>
<td>5</td>
<td>R.W. GATE VALVE WITH HANDWHEEL (NRS) (FLG. x FLG.)</td>
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<td>COMPOUND METER OR TURBO METER (FLG. x FLG.) PURCHASED FROM MESA WATER AND INSTALLED BY CONTRACTOR</td>
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<td>8</td>
<td>APPROVED REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY OR APPROVED DOUBLE CHECK VALVE ASSEMBLY (FLG. x FLG.)</td>
</tr>
<tr>
<td>9</td>
<td>90° ELL (FLG. x FLG.)</td>
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<td>10</td>
<td>D.I. SPOOL (FLG. x FLG.)</td>
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<td>D.I. TEE (FLG. x FLG.)</td>
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<td>CONCRETE PAD REINFORCED W/ W.W.F. 1.6 X 1.6</td>
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<td>13</td>
<td>ADJUSTABLE PIPE SUPPORTS</td>
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<tr>
<td>14</td>
<td>STANDARD POST PER STD DWG NO. 48</td>
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<tr>
<td>15</td>
<td>CONCRETE THRUST BLOCK PER STD DWG NO. 12</td>
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</tbody>
</table>

General Notes:

1. Dimensions shown are approximate, and are based on an assumed meter length of 20". Contractor shall submit shop drawings to mesa for review prior to construction.

2. R.W. valves in meter assembly to be locked (by chain) in to open position R.W. valve in bypass to be locked (by chain) in the closed position.

3. Assembly must be easily accessible to facilitate testing and servicing.
MESA WATER DISTRICT

RPP OR DCV APPROVED BACKFLOW ASSEMBLY (3", 4", 6", 8" & 12" METER INST.)

FOR FIRE USE ONLY

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<tr>
<td>6</td>
<td>D.I. STRAINER (FLG. x FLG.) U.L. LISTED AND FM APPROVED FOR FIRE SERVICE</td>
</tr>
<tr>
<td>7</td>
<td>TURBO METER (FLG. x FLG.) U.L. LISTED AND FM APPROVED FOR FIRE SERVICE PURCHASED FROM MESA WATER AND INSTALLED BY CONTRACTOR</td>
</tr>
<tr>
<td>8</td>
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<td>14</td>
<td>STANDARD POST PER STD DWG NO. 4B.</td>
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<td>15</td>
<td>CONCRETE THRUST BLOCK PER STD DWG NO. 12</td>
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</tbody>
</table>

GENERAL NOTES:

1. DIMENSIONS SHOWN ARE APPROXIMATE, AND ARE BASED ON AN ASSUMED METER LENGTH OF 90". CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO MESA FOR REVIEW PRIOR TO CONSTRUCTION.

2. R.W. VALVES IN METER ASSEMBLY TO BE LOCKED (BY CHAIN) IN TO OPEN POSITION R.W. VALVE IN BYPASS, TO BE LOCKED (BY CHAIN) IN THE CLOSED POSITION.

3. ASSEMBLY MUST BE EASILY ACCESSIBLE TO FACILITATE TESTING AND SERVICING.

Replace with Attached. Remove redundant valves.
RPP OR DCV APPROVED BACKFLOW ASSEMBLY (3", 4", 6" & 8" METER INST.)

MESA WATER DISTRICT

ELEVATION

LEGEND OF MATERIAL:

1. 6" R.W. GATE VALVE (FLG. x FLG.)
2. 6"-90° D.I. BEND (FLG. x FLG.)
3. 6" D.I. SPOOL (FLG. x FLG.)
4. 6" D.I. REDUCER (FLG. x FLG.)
5. R.W. GATE VALVE WITH HANDWHEEL (NRS) (FLG. x FLG.)
6. D.I. STRAINER (FLG. x FLG.) U.L. LISTED AND FM APPROVED FOR FIRE SERVICE
7. COMPOUND METER OR TURBO METER (FLG. x FLG.) PURCHASED FROM MESA WATER AND INSTALLED BY CONTRACTOR
8. APPROVED REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY OR APPROVED DOUBLE CHECK VALVE ASSEMBLY (FLG. x FLG.)
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12. CONCRETE PAD REINFORCED W/ W.W.F. 1.6 X 1.6
13. ADJUSTABLE PIPE SUPPORTS
14. STANDARD POST PER STD DWG NO. 48
15. CONCRETE THRUST BLOCK PER STD DWG NO. 12

GENERAL NOTES:
1. DIMENSIONS SHOWN ARE APPROXIMATE, AND ARE BASED ON AN ASSUMED METER LENGTH OF 20". CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO MESA FOR REVIEW PRIOR TO CONSTRUCTION.
2. R.W. VALVES IN METER ASSEMBLY TO BE LOCKED (BY CHAIN) IN TO OPEN POSITION R.W. VALVE IN BYPASS TO BE LOCKED (BY CHAIN) IN THE CLOSED POSITION.
3. ASSEMBLY MUST BE EASILY ACCESSIBLE TO FACILITATE TESTING AND SERVICING.
REPORTS:

13. REPORT OF THE GENERAL MANAGER:
REPORTS:

14. DIRECTORS’ REPORTS AND COMMENTS: