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AZ CORP COMMISSION
DOCKET CONTROL

2013 MAY 22 PM 2 33

Transcript Exhibit(s)

Docket #(s): W-01445A-12-0348

Arizona Corporation Commission
DOCKETED
MAY 22 2013

DOCKETED BY nr

Exhibit #: A11-Section 8

Part 12 of 14. FOR PART 1 PLEASE SEE BARCODE 0000151150, FOR PART 2 SEE

BARCODE 0000151151, FOR PART 3 SEE BARCODE 0000151152, FOR PART 4 SEE

BARCODE 0000151153, FOR PART 5 SEE BARCODE 0000151154, FOR PART 6 SEE

BARCODE 000151155 FOR PART 7 PLEASE SEE BARCODE 0000151156, FOR PART

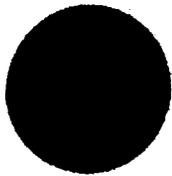
8 SEE 0000151157, FOR PART 9 SEE BARCODE 0000151158 FOR PART 10 SEE

BARCODE 0000151159, FOR PART 11 SEE BARCODE 0000151160, FOR PART 13

SEE BARCODE 0000151162 FOR PART 14 SEE BARCODE 000151163

WA 1-4932

Rimrock



**Federal Communications Commission
Public Safety and Homeland Security Bureau**



VHF/UHF Narrowbanding Information for Public Safety Licensees

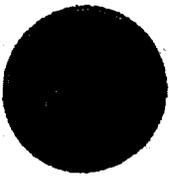
December 2010



Outline



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- **Narrowbanding Basics**
 - **Narrowbanding Deadlines**
 - **How to Prepare for Narrowbanding**
 - **Modifying Licenses to Reflect Narrowbanding**
 - **Additional Information Resources**



Narrowbanding Basics



- Who is required to narrowband?
 - All Public Safety and Industrial/Business licensees in the 150-174 MHz (VHF) and 421-512 MHz (UHF) bands
- What is required?
 - By January 1, 2013, licensees must migrate their systems from 25 kHz (wideband) to 12.5 kHz (narrowband) channel bandwidth or a technology that achieves equivalent efficiency



Benefits of Narrowbanding



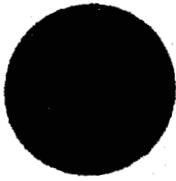
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- **Narrowbanding ensures more efficient use of the spectrum and greater spectrum access for public safety and non-public safety users**
 - **Will relieve congestion in and result in increased channel availability for public safety VHF/UHF systems**
 - **Narrowbanding has been consistently supported by the public safety community, including APCO, NPSTC, and other organizations**



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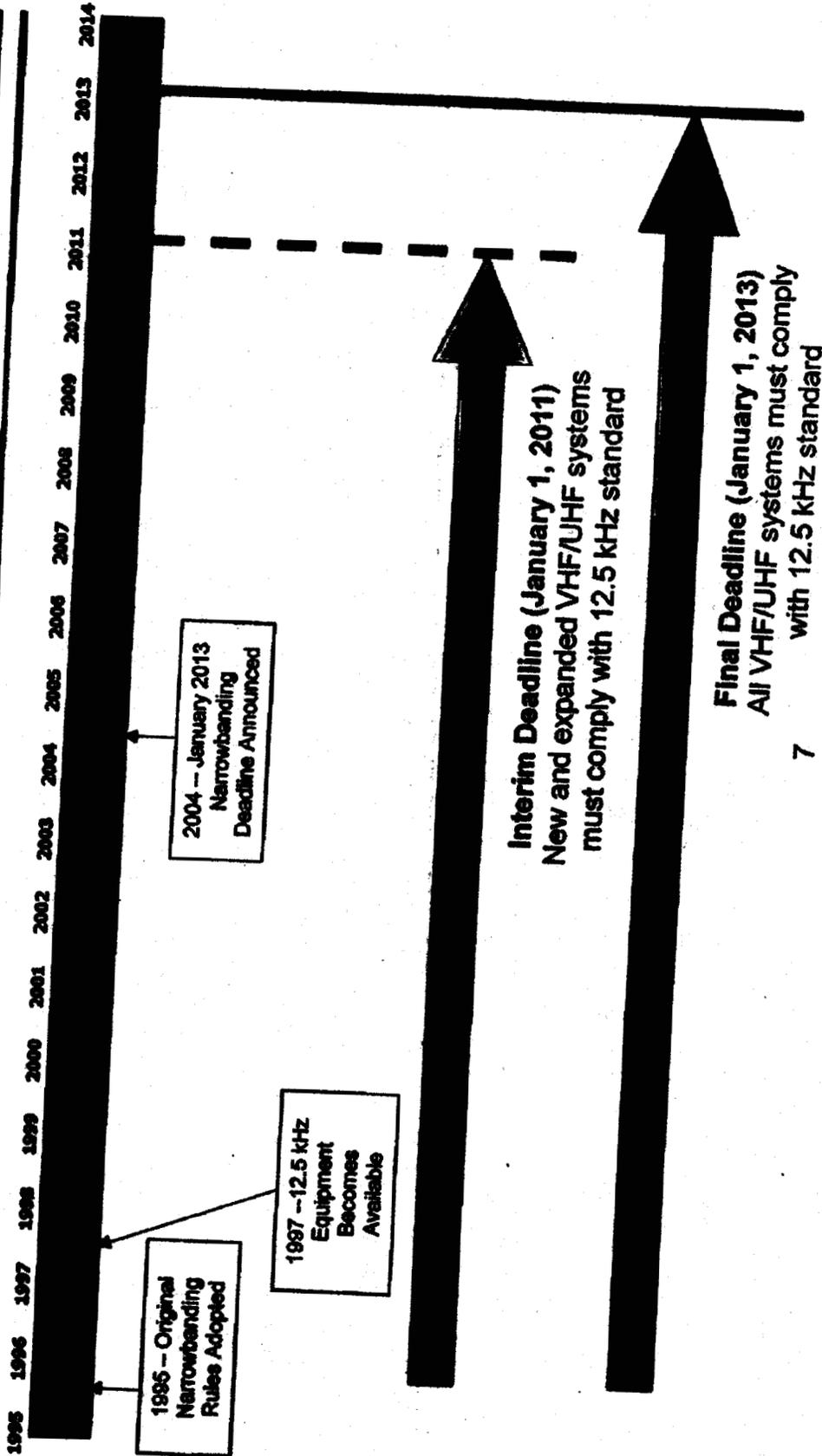
Narrowbanding Deadlines

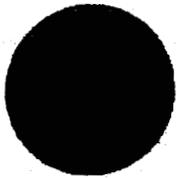


- All licensees must complete narrowbanding to 12.5 kHz by January 1, 2013
 - FCC will also no longer allow manufacture or importation of equipment that includes a 25 kHz mode
- Some interim requirements take effect on January 1, 2011:
 - 12.5 kHz operation required for all new VHF/UHF systems or expansion of existing systems
 - FCC will not certify new equipment that includes a 25 KHz mode



Narrowbanding Timeline

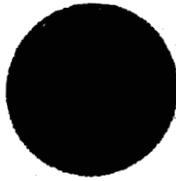




Why Meeting the Deadline Is Important



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- After January 1, 2013, FCC interference rules will not protect non-compliant wideband systems from harmful interference
 - Systems that fail to narrowband by the deadline could create interference or interoperability problems for systems that have narrowbanded
 - Wideband equipment will not be available after January 1, 2013



The Deadline Will Not Be Extended



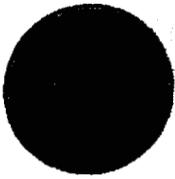
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- The Commission has recently reaffirmed the January 1, 2013 deadline
 - Licensees facing unique circumstances may request waivers, but waiver requests must meet a high standard and are not routinely granted
 - Licensees concerned about meeting the deadline should focus on planning and preparation
 - Informal contact with the Bureau is encouraged prior to any filing



Future Narrowbanding to 6.25 kHz Technology



- Narrowbanding rules provide for eventual migration from 12.5 kHz to 6.25 kHz bandwidth
 - Intended to further increase efficiency and channel availability
- The FCC has not set a deadline for 6.25 kHz implementation
 - No deadline will be established without further notice and comment
- Licensees may narrowband to 6.25 kHz voluntarily
 - All 150-174 MHz and 421-512 MHz equipment certified after January 1, 2013 must include 6.25 kHz capability



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Preparing for Narrowbanding



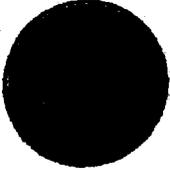
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- Prepare NOW – January 1, 2013 is approaching fast!
 - Determine how narrowbanding will affect your system
 - Will existing equipment need replacement/retuning?
 - Will additional sites be needed to maintain coverage?
 - Is coordination with neighboring systems required?
 - Develop a compliance plan
 - Timeline
 - Funding requirements
 - Contact the Public Safety and Homeland Security Bureau with questions/concerns



Availability of Narrowband Equipment



- All VHF/UHF equipment certified since 1997 has 12.5 kHz capability
 - Many systems have equipment with dual 25 kHz/12.5 kHz capability, making the narrowbanding transition easier
- Check with your vendor to determine whether your existing system equipment is narrowband-capable or needs modification/replacement



Funding Considerations

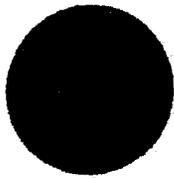
- Cost of narrowbanding will vary depending on the nature of each licensee's existing system
 - Narrowbanding generally does not require a system upgrade, though licensees may combine narrowbanding with other scheduled upgrades or modifications
 - Narrowbanding costs may be more substantial for older systems that require replacement of existing equipment
- Funding to support narrowbanding may be available through federal grant programs (agency contact information provided in "Additional Information Resources" section)



Outline



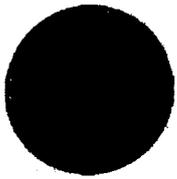
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Licensing Modifications



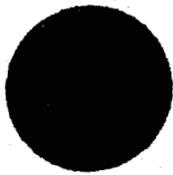
- Licensees should modify their licenses to add a narrowband emission designator prior to commencing narrowband operations
 - Licensees may maintain both narrowband and wideband designators on their licenses while they are transitioning their systems
- Once the narrowband transition is complete, licensees should modify their licenses by removing the wideband emission designator
- These actions can be completed online using ULS



Frequency Coordination



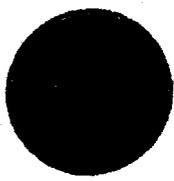
- Frequency coordination is not required for addition of narrowband emissions designator or removal of wideband emissions designator, provided no other changes are being made
 - For licensees north of Line A or west of Line C, reduction in bandwidth does not require Canadian coordination
- Frequency coordination is required when narrowbanding is combined with other modifications that alter a station's footprint
 - E.g., changes in location, antenna height, ERP, as well as when switching from analog to digital emissions



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PSHSB Website and Contacts



Roberto Mussenden
202-418-1428

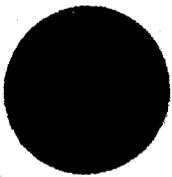
Roberto.Mussenden@fcc.gov
Zenji Nakazawa

202-418-7949

Zenji.Nakazawa@fcc.gov

Narrowbanding Mailbox: narrowbanding@fcc.gov
Bureau Website:

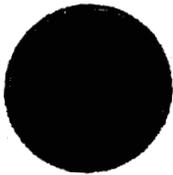
<http://www.fcc.gov/pshs/public-safety-spectrum/narrowbanding.html>



Other Resources



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- http://www.aaacomm.com/fcc_licensing.htm
 - <http://www.mrfac.com/Mandatory-Narrowbanding.html>
 - <http://www.npstc.org/narrowbanding.jsp>
 - <http://www.IMSAafety.org>



Federal Resources



-
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- DHS
 - Office of Emergency Communications (oecc@hq.dhs.gov)
 - SAFECOM
 - <http://www.safecomprogram.gov/SAFECOM/grant/default.htm>
 - FEMA
 - www.fema.gov/grants
 - <http://www.fema.gov/government/grant/iecgp/index.shtml>
Interoperable Emergency Communications Grant Program
 - DOJ National Institute of Justice
 - <http://www.ojp.usdoj.gov/nij/topics/technology/communication/radios/fcc-narrowbanding.htm>

ARIZONA WATER COMPANY WORK AUTHORIZATION

W.A. NUMBER: 1-4932
 P.E. NUMBER:
 BUDGET ITEM NO.: B-1
 SHEET NO.: 1 of 2

SYSTEM: SEDONA VALLEY VISTA	WORK TO START BY: UPON AUTHORIZATION
DIVISION: VERDE VALLEY	WORK TO BE FINISHED BY: WITHIN 180 DAYS
TAX CODE: 0976	

DESCRIPTION OF WORK:
 Replace radios at 16 sites to be compliant with FCC narrow band requirement. Sites include: Sedona Office, Harmony High Park Tank, Rainbow Well No. 6, Williams Well No. 7, Southwest Center Well No. 8, Harmony Hills Well No. 12, Sedona Golf Resort Tank, Rancho Rojo Well, Sedona Golf Resort Well, Valley Vista Well No. 13, Montezuma Hills Tank, Wickiup Mesa Tank, Rimrock Well No. 1, Rimrock Well No. 2, Montezuma Haven Well No. 3, and Pinewood Unit 9 Tanks. Construct in accordance with attached drawings and/or Arizona Water Company specifications.

FACTORS JUSTIFYING WORK:
 APPROVED 2012 BUDGET ITEM (\$125,000)
 The FCC narrow banding mandate requires that all existing radios that operate on channel bandwidths of 25 kHz be converted to 12.5 kHz or less on or before January 1, 2013. These radio replacements and modifications are needed in order for the Company to provide safe, reliable, and adequate water service.

COST ESTIMATE		AUTHORIZATION	DATE
COST OF WORK:		PREPARED BY:	
MATERIAL	11,000	Mike Loggins <i>ML</i>	4-26-12
LABOR	8,400	REVIEWED FOR ESTIMATOR VERIFICATION:	
CONTRACT PORTION	93,371	Charles Briggs <i>CB</i>	05-04-2012
OVERHEAD	12,405	REVIEWED BY:	
TOTAL AUTHORIZED EXPENDITURES CHARGEABLE TO THIS W.A.	\$ 125,176	Andrew J. Haas <i>AJH</i>	4-26-12
FUNDS RECEIVED:		Andy Haas <i>AH</i>	5-7-12
CONTRIBUTIONS RECEIVED	0	APPROVED BY ENGINEERING:	
REFUNDABLE ADVANCES RECEIVED	0	Frederick Schneider <i>FS</i>	5-1-2012
TOTAL CONTRIBUTIONS/ADVANCES	0	APPROVED BY FINANCE:	
NET CASH REQUIRED	\$ 125,176	Joseph Harris <i>JH</i>	5/2/12
COMMENTS:		AUTHORIZED BY PRESIDENT:	
		William M. Garfield <i>WG</i>	5-4-2012
		William Garfield	

There are two separate contracts with Global Data Specialists associated with this WA:
 1. Sedona
 2. Valley Vista

CONSTRUCTION NUMBER:
**RELEASED TO
 CONSTRUCTION**
 Authorized by **FRED SCHNEIDER**
 Date 5/4/2012

AFH

ARIZONA WATER COMPANY

WORK AUTHORIZATION - DETAIL SHEET

W.A. NUMBER: 1-4932
 P.E. NUMBER:
 BUDGET ITEM NO.: B-1
 SHEET NO.: 2 of 2

RETIREMENT PROPERTY UNITS	PLANT PROPERTY ACCOUNT	UNIT DESCRIPTION	QUANTITY	UNIT COST	TOTAL	
<p>Project Description:</p> <p>Replace radios at 16 sites to be compliant with FCC narrow band requirement. Sites Include: Sedona Office, Harmony High Park Tank, Rainbow Well No. 6, Williams Well No. 7, Southwest Center Well No. 8, Harmony Hills Well No. 12, Sedona Golf Resort Tank, Rancho Rojo Well, Sedona Golf Resort Well, Valley Vista Well No. 13, Montezuma Hills Tank, Wickup Mesa Tank, Rimrock Well No. 1, Rimrock Well No. 2, Montezuma Haven Well No. 3, and Pinewood Unit 9 Tanks.</p>						
C O N T R A C T W O R K		DESCRIPTION	PLANT PROP ACCT	QUANTITY	UNIT COST	TOTAL
		Configure RTU and onsite integration for Valley Vista	397.2	1	\$ 6,525.00	\$ 6,525
		Purchase Ace radio for Valley Vista	397.2	4	3,780.00	15,160
		Purchase OIT for Valley Vista	397.2	1	5,792.00	6,792
		Program and onsite integration of OIT for Valley Vista	397.2	1	5,760.00	5,760
		Conduct radio path survey for Sedona	397.2	1	4,420.00	4,420
		Electrical install for Valley Vista	397.2	1	6,500.00	6,500
		Configure RTU and onsite integration for Sedona	397.2	1	7,952.50	7,953
		Purchase to power radio for Sedona	397.2	5	450.00	2,250
		Purchase DPSK card for Sedona	397.2	5	180.00	900
		Purchase Ace radio for Sedona	397.2	3	3,613.33	11,440
		Electrical install for Sedona	397.2	1	2,827.00	2,827
		Configure RTU and onsite integration for Rimrock	397.2	1	7,952.50	7,953
		Purchase to power radio for Rimrock	397.2	5	480.00	2,250
		Purchase DPSK card for Rimrock	397.2	5	180.00	900
		Electrical install for Rimrock	397.2	1	2,828.00	2,828
		Shipping, bonds, and tax for Valley Vista	397.2	1	4,568.00	4,568
		Shipping, bonds, and tax for Sedona	397.2	1	2,329.50	2,330
		Shipping, bonds, and tax for Rimrock	397.2	1	2,329.50	2,330
		Replace Base Station Radio	397.1	1	655.00	655
TOTAL CONTRACT WORK					\$ 93,371	
M A T E R I A L S		Purchase Wonderware software	397.2	1	\$ 9,500.00	\$ 9,500
		Purchase SCADA computer	397.2	1	1,500.00	1,500
		SERVICE CONNECTIONS: DOUBLE-LONG	345			
		SERVICE CONNECTIONS: DOUBLE-SHORT	345			
		SERVICE CONNECTIONS: SINGLE-LONG	345			
		SERVICE CONNECTIONS: SINGLE-SHORT	345			
TOTAL MATERIALS					\$ 11,000	
L A B O R		Engineering Design	397.2	40	\$ 50.00	\$ 2,000
		Project Management	397.2	40	50.00	2,000
		TESTING FEE				
		PERMIT FEE				
		SURVEY FEE				
		FIELD INSPECTION	397.2	80	55.00	4,400
		INSTALL SERVICE CONNECTIONS: DOUBLE-LONG	345			
		INSTALL SERVICE CONNECTIONS: DOUBLE-SHORT	345			
		INSTALL SERVICE CONNECTIONS: SINGLE-LONG	345			
		INSTALL SERVICE CONNECTIONS: SINGLE-SHORT	345			
TOTAL LABOR					\$ 8,400	
SUBTOTAL - CONTRACT WORK, MATERIALS, AND LABOR					\$ 112,771	
OVERHEAD					12,405	
TOTAL					\$ 125,176	
REFUNDABLE PORTION <input type="checkbox"/>						
NON-REFUNDABLE PORTION <input type="checkbox"/>						
COST ESTIMATE						

AFH

WIA 1-4952 - Replace Eight Wireless Telemetry and Voice Communication Units to Comply with FCC Narrowband Regulations

ID	Task Name	Duration	Start	Finish
1	Microsoft Project Network Diagram	33 days	2/28/2012	10/28/2012
2	Update Quotes	30 days	2/28/2012	3/18/2012
3	Escalate Contract Documents	20 days	3/19/2012	4/18/2012
4	Provide Materials	60 days	4/19/2012	7/18/2012
5	Program Radios	60 days	4/19/2012	7/18/2012
6	Install Radio Controls, Console, and Apparatuses	55 days	7/19/2012	9/14/2012
7	Start-Up	30 days	9/17/2012	10/26/2012
8	Field Troubleshooting	30 days	10/29/2012	12/7/2012
9	Project Close Out	15 days	12/10/2012	12/25/2012
10	In Service	0 days	12/26/2012	12/26/2012





ARIZONA WATER COMPANY

Verde Valley Division
48 Cotter Pot Dr. Suite 7
Sedona, AZ 86336 P.O. Box 202-7082

PROPOSAL/CONTRACT

CONTRACTOR: Global Data Specialists	SYSTEM: Sedona
ADDRESS: 1815 W. First Avenue, Suite 110	W.A. No.: 1-4932
CITY-STATE: Mesa, Arizona 85202	BID DATE: March 31, 2012

- CONTRACTOR SUBMITS this PROPOSAL/CONTRACT to ARIZONA WATER COMPANY, an Arizona corporation (the "Company"), to perform the work and complete the project described on Page 2 (the "Project"), as an independent prime contractor.
- Contractor certifies that it has a complete copy of, and has read, understood and accepts, the Company's General Conditions of Contract, and the Company's Construction Specifications and Standard Specification Drawings (the "Specifications"), all of which are attached hereto. Contractor has reviewed the specific plans and related construction drawings for the Project (the "Drawings"), copies of which are also attached hereto. The General Conditions of Contract, Specifications and Drawings are incorporated into this Proposal/Contract. Contractor affirms that all work and materials to be furnished or purchased for the Project will be in strict conformance with the General Conditions of Contract, Specifications and Drawings.
 - Contractor represents and warrants that it has satisfied and complied with the provisions of Section 6, Contractor Understands Work and Working Conditions, of the General Conditions of Contract prior to submitting this Proposal/Contract.
 - Contractor represents that this Proposal/Contract is fair and honest in all respects, is submitted in good faith and is not submitted in collusion with any other company, entity or person.
 - Contractor acknowledges that one hundred percent (100%) Performance and Payment Bonds are required and must be provided to the Company prior to the commencement of work.
 - Prior to the commencement of work, Contractor will submit to the Company a list of all materials to be used in the Project. This materials list will include the manufacturer, part number, price and quantity included in this Proposal/Contract.
 - Contractor will furnish all labor, tools, equipment and materials required to complete the Project according to the General Conditions of Contract, Specific Reference Drawings. No materials purchased by Contractor to be incorporated into the Project are subject to tax at the time of purchase and Contractor will not charge the Company for any such tax. Contractor will pay the applicable transaction privilege tax (the "Contracting Tax") on the Project after Contractor receives payment of the final Project Invoice from the Company. The cost of materials incorporated into the Project which are exempt by Arizona Revised State Statutes ("A.R.S.") from the Contracting Tax, for example, pipes or valves having a diameter of four (4) inches or larger, including equipment, fittings and any other related part that is used in connecting the pipes or valves (A.R.S. 342-208) A.S.T., will not be included in the total cost of the labor and materials upon which the Contracting Tax is computed. Contractor retains full liability and obligation to pay the Contracting Tax and will defend and indemnify the Company against any demand or obligation to pay the Contracting Tax.
 - Contractor will maintain detailed accounts records of all materials purchased and incorporated into the Project. Such records will include all supporting original vendor invoices, for all materials purchased. Following completion of the Project, Contractor will submit an itemized accounting to the Company, which will include all supporting original vendor invoices and satisfactory evidence of payment thereon. The Company will not pay Contractor for materials not actually incorporated into the Project, and the disposition of such materials will remain Contractor's responsibility.
 - The Estimated Total Cost of the Project shown on Page 2 is based on estimated labor and material quantities to be furnished. It includes an estimate of the Contracting Tax and the cost of the required Performance and Payment Bonds. Contractor will not cancel, modify or withdraw this Proposal/Contract during a ninety-day (90) period commencing on the Bid Due Date. The Company may accept this Proposal/Contract by signing and mailing, or otherwise delivering, a copy hereof to Contractor during such ninety-day (90) period. If the Company does not accept this Proposal/Contract during such ninety-day (90) period, Contractor may cancel this Proposal/Contract by giving written notice of cancellation to the Company.
 - Prior to the commencement of work, Contractor will provide the Company with a detailed construction schedule, in either Gantt or CPM form, identifying all tasks to be performed from the date of the written Commencement Notice through completion of the Project, including testing, training of Company Personnel and final Project Invoicing. Contractor will provide the Company with a copy of such construction schedule depicting the progress of work on the Project at least monthly.
 - Contractor will not commence work on the Project until the Company gives Contractor a written Commencement Notice. Contractor will complete the Project within 185 calendar days after the Commencement Notice is issued.
 - Following the Company's written notice of satisfactory completion of the Project, and upon receipt of the final Project Invoice from Contractor, the Company shall pay Contractor the actual total cost of the Project, which will be calculated as shown on Page 2, except that actual labor and material quantities installed/constructed will be substituted for the estimated labor and materials quantities and the Contracting Tax will be recalculated based on such actual labor and materials quantities.
 - The amount of applicable liquidated damages for Contractor's failure to deliver or perform within the time limit shown in Paragraph 10 may be deducted from the Company's payment of the final Project Invoice. This provision shall not limit the Company's ability to terminate this Proposal/Contract for Contractor's unsatisfactory performance or failure to perform as provided in the General Conditions of Contract, Specifications or Drawings, or in this Proposal/Contract.

SPECIAL CONDITIONS:

CONTRACTOR: Global Data Specialists	PROPOSAL/CONTRACT ACCEPTED: ARIZONA WATER COMPANY
By: <i>[Signature]</i>	By: <i>[Signature]</i>
Print Name: DIANE MASON	Print Name: Fredrick K. Schneider, PE
Title: SALES MANAGER	Title: Vice President - Engineering
Date: 4/23/12	Date: 5-4-12

APH



ARIZONA WATER COMPANY

COMMENCEMENT NOTICE

CONTRACTOR:

Mr. Duane Moody
Global Data Specialists
1815 W. First Avenue, Suite 110
Mesa, Arizona 85202

DATE: April 25, 2012
DIVISION: VERDE VALLEY
SYSTEM: SEDONA
W.A.: 1-4932

THIS IS YOUR NOTICE TO PROCEED WITH THE FOLLOWING PROJECT(S):

DESCRIPTION OF WORK:

Provide narrow banding upgrade for the Sedona water system radio controls

PERFORMANCE AND PAYMENT BONDS REQUIRED: Yes No

TOTAL DAYS ALLOWED: 180

COMPLETION DATE: October 23, 2012

Prior to the start of construction, please call Keith Self, Division Manager at 928-282-7092 to schedule a pre-construction meeting.

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MAY 14 2012

ARIZONA WATER COMPANY
PHOENIX - ENGINEERING

ARIZONA WATER COMPANY
Company

GLOBAL DATA SPECIALISTS
Contractor (type name)

By [Signature]
Title Vice President - Engineering

By [Signature]
Title Sales Manager



ARIZONA WATER COMPANY

SPECIFICATIONS

GENERAL CONDITIONS OF CONTRACT: E-4-1

CONSTRUCTION SPECIFICATIONS: E-8-1

STANDARD SPECIFICATION DRAWINGS: E-9-1

2007 EDITION WITH 2010 REVISIONS

ARIZONA WATER COMPANY

GENERAL CONDITIONS OF CONTRACT: E-4-1

ARIZONA WATER COMPANY

E-4-1

GENERAL CONDITIONS OF CONTRACT

DEFINITIONS

- A. **Company.** The words "Company" or "Arizona Water Company" mean Arizona Water Company, and where applicable, any division of Arizona Water Company, whose principal place of business is located at 3805 North Black Canyon Highway, Phoenix, Arizona 85015-5351 (Post Office Box 29006, Phoenix, Arizona 85038-9006).
- B. **Company's Authorized Representative.** The words "Company's Authorized Representative" mean any officer of the Company, and any of the Company's Engineers, any Division Manager or Superintendent of the Company and/or such other person(s) designated in writing as the "Company's Authorized Representative" by the President or any Vice President of the Company.
- C. **Contractor.** The word "Contractor" means either an individual or other entity employed to do the work as shown on the Construction Drawings and as specified herein.
- D. **Construction Drawings.** The words "Construction Drawings" mean plans prepared by or on behalf of Arizona Water Company.
- E. **Invitation to Bid.** The term "Invitation to Bid" means the current copy of Arizona Water Company's Form E-3-11-4 Request for Proposal/Contract or Form E-3-12-2 Invitation to Bid.
- F. **Contract.** The word "Contract" means the written document titled "Contract" or "Proposal/Contract" when such document has been signed by an officer or other authorized representative of both the Contractor and the Company.
- G. **Inspector.** The word "Inspector" means the Company's Authorized Representative or a person designated in writing by the Company's Authorized Representative.

GENERAL CONDITIONS OF CONTRACT

1. GENERAL

These General Conditions of Contract govern all works of installation and construction unless deviations are provided for on the Construction Drawings or in the Contract.

2. BONDS

The Contractor shall, upon request by the Company, furnish a performance bond and a material payment bond in the amount of 100% of the Contract price, in a form and from a surety acceptable to the Company.

3. LABOR AND/OR MATERIAL RELEASES

The Contractor shall supply labor and/or material releases satisfactory to the Company when requested to do so. Forms will be provided by the Company.

4. LICENSE

The Contractor shall have, as may be required by law, a valid license applicable to the work to be performed.

5. INSURANCE

The Contractor shall maintain in full force and effect insurance at no less than the following minimum amounts:

WORKER'S COMPENSATION	In accordance with requirements of the laws of the State of Arizona.
COMPREHENSIVE GENERAL LIABILITY (Including contractual liability covering death, bodily injury and property damage)	Combined single limit of not less than \$1,000,000 for each occurrence.
AUTOMOTIVE LIABILITY (Including owned, non-owned and hired vehicles)	Combined single limit of not less than \$1,000,000 for each occurrence.
SUBCONTRACTOR'S PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE AND VEHICLE LIABILITY INSURANCE	Contractor shall either require each of its subcontractors to procure and to maintain Subcontractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance of the type and in the amounts specified in this Section 5 or insure the activities of its subcontractors in Contractor's own policy, in like amounts.

Such insurance shall name the Company, its officers, agents, and employees as additional insured and be primary for all purposes.

The Company will at all times have the right to require that all of such insurance be placed with insurance companies that are satisfactory to it. The Contractor shall file with the Company a certificate evidencing that each policy of insurance for the above coverages in the minimum amounts specified has been purchased and is in good standing.

Such certificate shall provide that notice be given to the Company at least thirty (30) days prior to cancellation or material change in the form of such policies or any of them. Such certificates shall be kept on file by the Company and the Company must have current certificates on file, or a certificate must accompany any bid proposal, before that proposal will be accepted by the Company.

6. CONTRACTOR UNDERSTANDS WORK AND WORKING CONDITIONS

By executing a Contract with the Company, the Contractor warrants that it has, by careful examination, satisfied itself as to the nature and location of the work, including soil conditions, the character, quality and quantity of the materials to be encountered, the character of the equipment and facilities needed preliminary to and during prosecution of the work, the general and local conditions, and all other matters which can in any way be expected to affect its work under the Contract. Verbal agreements or conversations with any officer, agent or employee of the Company, either before or after the execution of the Contract, are not binding upon the Company and shall not affect or modify any of the terms or obligations herein contained.

7. SPECIFICATIONS AND DRAWINGS

The Contractor shall keep on the job a complete copy of all drawings and specifications furnished by the Company which are applicable to the Contract with the Company. Anything mentioned in the specifications and not shown on the drawings or shown on the drawings and not mentioned in the specifications shall be of like effect as if shown or mentioned in both. In case of a discrepancy between the figures, drawings or specifications and physical conditions of the job, the matter shall be immediately submitted to the Company's Authorized Representative for decision as to adjustments, if any, because of the discrepancy; without a decision from the Company's Authorized Representative no discrepancy shall be adjusted by the Contractor, save only at its own risk and expense. Any deviation from the specifications must be approved in writing by the Company's Authorized Representative.

8. PROPERTY PROTECTION

Trees, fences, poles, underground structures and all other property shall be protected unless their removal is authorized on the Construction Drawings. Any property damaged shall be restored by the Contractor, at its expense, to the owner's satisfaction.

9. SPECIAL PERMITS, LICENSES AND INSURANCE

The Company shall obtain all permits for railroad, county, state, city and irrigation district rights-of-way as well as Forest Service, State Land Department and Bureau of Land Management permits. (Pipeline Contractors)

Whenever blasting is required, the Contractor shall obtain all permits, licenses and insurance required at its expense. (All Contractors)

The Contractor will be required to obtain, and shall certify in writing to the Company that it has obtained, all additional permits required to perform the work including, but not limited to, a National Pollution Discharge Elimination System Permit and/or an Aquifer Protection Permit as those permits relate to disposal of drilling, development and test waters and/or any other discharge or similar activity. (Well Drilling Contractors)

10. SURVEYS

The Company shall be responsible, or arrange, for all surveys required for the work covered in the Contract, unless otherwise specified.

11. BENCH MARKS, PROPERTY STAKES AND SURVEY STAKES

Bench marks, property stakes and survey stakes shall be preserved by the Contractor; in case they are destroyed or removed by Contractor or its employees, the Company will replace them at the Contractor's expense, and the Contractor and its sureties shall be liable therefore.

12. TOOLS, EQUIPMENT AND MATERIALS

The Contractor shall furnish all of the necessary tools, equipment, and pipeline materials required for the work. All material furnished by the Contractor shall be of the quality specified by the Company in its Construction Specifications (E-8-1).

13. SUPERINTENDENCE BY CONTRACTOR

The Contractor shall assure adequate superintendence of the work by a competent foreman or superintendent (with full authority to act on behalf of Contractor) satisfactory to the Company, who will be on the job at all times when work is in progress.

14. ORDER AND DISCIPLINE

The Contractor shall at all times enforce strict discipline and good order among its employees.

15. INDEPENDENT CONTRACTOR

The Contractor is an independent contractor and any provisions in the Contract, the specifications, or these General Conditions of Contract and Arizona Water Company's Construction Specifications which may appear to give the Company the right to direct the Contractor as to the details of the doing of any work to be performed by the Contractor, or to exercise a measure of control over said work, shall be deemed to mean and shall

mean, that the Contractor shall follow the desires of the Company in the results of the work only and not in the means whereby said work is to be accomplished, and the Contractor shall use its own discretion and shall have complete and authoritative control over the work and as to the details of the doing of the work.

16. PUBLIC SAFETY AND CONVENIENCE

Contractor shall at all times conduct its work so as to ensure the least possible obstruction to traffic and other inconvenience to the general public and the residents and businesses in the vicinity of the work, and to ensure the protection of persons and property.

To protect persons from injury and to avoid property damage, Contractor shall provide and maintain adequate barricades as required during the progress of the work and until it is safe to use the property for its intended purpose. The rules and regulations of the local governmental agencies and specific permit requirements respecting safety provisions shall be observed at all times.

In the case of blasting, the Contractor shall exercise extreme caution to protect the general public and personal and public property from harm or damage.

17. PROPERTY PROTECTION

Trees, fences, poles, and all other property shall be protected unless their removal is authorized by the Company. Any property damaged shall be restored by Contractor, at his expense, to Company's satisfaction.

18. RESPONSIBILITY OF CONTRACTOR

The work shall be under Contractor's responsible care and charge. Contractor shall bear all loss and damage whatsoever and from whatsoever cause, except that caused solely by the act of Company, which may occur on or to the work during the fulfillment of the Contract. If any loss or damage occurs, Contractor shall immediately make good any such loss or damage, and in the event of Contractor refusing or neglecting to do so, Company may, or by the employment of some other person, make good any such loss or damage, and the cost and expense of so doing shall be charged to Contractor.

The mention of any specific responsibility or liability imposed upon Contractor shall not be construed as a limitation or restriction of any general liability or duty imposed upon Contractor by the Contract. The reference to any specific duty or liability being made herein is merely for the purpose of explanation.

Contractor alone shall at all times be responsible for the safety of Contractor, Contractor's employees, and its subcontractors' employees, and for Contractor and its subcontractors' plant and equipment and the method of performing the work.

19. ERRORS AND OMISSIONS

If Contractor, in the course of the work, becomes aware of any errors or omissions in the Contract Documents or in the instructions, or if Contractor becomes aware of any discrepancy between the Contract Documents and the physical conditions of the site of

the work, Contractor shall immediately inform Company in writing. Any work done by Contractor after such discovery, until authorized by Company, will be done at Contractor's risk.

20. LAWS, REGULATIONS

Contractor shall give all notices required by law and comply with all laws, ordinances, rules and regulations, including, but not limited to, all applicable federal, state, local and other legally required health and safety standards, orders, rules, regulations or other laws, pertaining to the conduct of the work. Contractor shall be liable for, and shall defend and indemnify Company against and hold it harmless from, all violations of any law, ordinance, rule, regulation, standard, or order in connection with work furnished by or on behalf of Contractor. If Contractor observes that the Contract Documents are at variance with any law, ordinance, rule, regulation, standard, or order it shall promptly notify Company in writing and any necessary changes shall be adjusted as provided in the Contract for changes in the work. Contractor shall not perform any work contrary to such laws ordinances, rules, regulations, standards, or orders.

21. PERMITS, FEES AND INSPECTIONS

Permits and licenses necessary for the prosecution of the work, including, but not limited to, any National Pollution Discharge Elimination Systems (NPDES) Permits required by U.S. Environmental Protection Agency or the Arizona Department of Environmental Quality shall be secured, paid for, and complied with by Contractor.

Contractor shall be responsible for its actions and shall abide by all conditions and/or restrictions set forth in the NPDES Permit and any other permit or license required for this project.

Company shall at all times have access to the work whenever it is in preparation or in progress and Contractor shall provide proper facilities for such access and for all inspections. If the Contract Documents, the General Superintendent's instructions, laws, ordinances or any public authority require any work to be inspected or approved, Contractor shall give timely notice of its readiness for inspection.

Inspection of the work shall not relieve Contractor of any of its obligations even if defective work or unsuitable materials may have been previously overlooked by Company and accepted or estimated for payment. If any work is found not in accordance with the Contract Documents, Contractor, at its sole cost and expense, shall promptly make good such defective work.

22. CONSTRUCTION MARKING (PIPELINE ONLY)

Each job shall be marked and/or barricaded by the Contractor in such a manner that the construction is clearly visible at all times.

23. EXTRA WORK AND/OR MATERIALS

Except as otherwise herein provided, no charge for any extra work and/or material will be allowed unless the same has been ordered in writing by the Company's Authorized Representative, and the price stated in such order.

24. CHANGES

The Company shall have the right to make any changes in the work that it may determine to be necessary. If such changes affect the cost of the work, an equitable adjustment shall be negotiated. Changes shall in no way affect or void the obligations of both parties under the original Contract.

25. INSPECTION

All work and material shall be open at all times to inspection and acceptance or rejection by the Company's Inspector. Any work covered up by the Contractor prior to inspection and acceptance by the Company shall be subject to being uncovered at the expense of the Contractor for inspection by the Company. The Contractor shall give the Company reasonable notice of starting new work and shall provide, without extra charge, reasonable and necessary facilities for inspection, even to the extent of taking out portions of finished work. In case any such finished work removed is found satisfactory, however, the actual direct cost of such removal and replacement, plus 15% of such cost, will be paid by the Company; in addition, if completion of the work has been delayed thereby, the Contractor shall be granted a suitable extension of time on account of the additional work involved.

26. DEFECTIVE WORK OR MATERIAL

The Contractor shall remove, at its own expense, any work or material found defective by the Company's Inspector and shall rebuild and replace the same without extra charge; in default thereof, the same may be done by the Company at the Contractor's expense.

27. ASSIGNMENT

Neither party to the Contract may assign the Contract or sublet it in whole or in part without the written consent of the other, nor shall the Contractor assign any monies due or which may become due hereunder without the previous written consent of the Company, nor shall such consent release the Contractor from any of its obligations and liabilities under the Contract.

28. RIGHTS OF VARIOUS INTERESTS

Whenever work that is being done for the Company other than by the Contractor is contiguous to work being done by the Contractor, the respective rights of the various interests involved shall be established by the Company to secure the completion of the various portions of the work in general harmony.

29. SUSPENSION OF WORK

The Company's Authorized Representative may at any time and for any reason suspend all or any portion of the work under the Contract. This right to suspend work shall not be construed as denying the Contractor compensation for actual, reasonable and necessary expenses due to suspension to which it may be entitled.

The Company's Authorized Representative may order the Contractor to suspend any work because of certain conditions, such as inclement weather, or because the

Contractor is in violation of these General Conditions of Contract or the Construction Specifications. It is understood that compensation for expenses will not be allowed for such suspension when ordered by the Company's Authorized Representative on account of such conditions.

30. PROCEDURE OF WORK (PIPELINE ONLY)

All work under the Contract shall be planned and performed so as to cause a minimum of interference with normal vehicular and pedestrian traffic. At no time shall the Contractor completely obstruct the traffic to any business establishment during normal work hours of that business. It shall be the Contractor's responsibility to maintain facilities for ingress and egress to any business establishment. When crossing any street, not more than one-half of the street may be blocked at one time. All federal, state, county and city laws, rules and regulations relating to this subject are to be obeyed.

The Contractor shall complete any portion or portions of the work in such order of time as the Company may require. The Company shall have the right to take possession of and use any completed or partially completed portions of the work. If such prior possession or use increases the cost of or delays the work, the Contractor will be entitled to extra compensation or extension of time or both, as the Company may determine.

31. DISPUTES

All questions or controversies which arise between the Contractor and the Company, under, or in reference to, the Contract, shall be decided by the Company's Authorized Representative and a representative of the Contractor, and their decision shall be final and conclusive upon both parties.

32. CONNECTION TO EXISTING SYSTEM (PIPELINE ONLY)

Unless approved in writing by the Company's Authorized Representative, no tie-in or hot tap on the existing system shall be made unless the Company's Inspector is present. When the tie-in requires the operation of an existing valve or other control equipment, the conditions of Paragraph(s) 30 and 33 shall be complied with. The Contractor shall notify the Company twenty-four (24) hours prior to tie-in as to the exact time the Contractor plans to make tie-in so that the Company's Inspector will have sufficient time to locate valves and make necessary preliminary arrangements for shut down.

33. PLANNED INTERRUPTION OF WATER SERVICE (PIPELINE ONLY)

No valve or other control on an existing Company water system shall be operated for any purpose by the Contractor without approval of the Company's Inspector. All of the Company's water customers whose service is interrupted by a planned interruption, other than in cases of emergency, shall be notified by the Contractor at least twenty-four (24) hours before the planned interruption and advised of the probable time when the service will be restored.

34. EXISTING UTILITY FACILITIES (PIPELINE ONLY)

The Contractor shall notify all known utilities in the area of the work to be performed under the Contract and shall make arrangements to have their facilities marked in

accordance with A.R.S. 40-360.022 ("Blue Stake Law"). The Contractor shall be responsible for locating and preserving all marked facilities. Any damages to these marked facilities shall be repaired at the expense of the Contractor.

The Company will pay the cost to relocate its or other structures when such structures are found occupying the physical space of the proposed installation. It is understood that the Contractor will be reimbursed for such work only when written authorization from the Company has been obtained in advance of such work.

35. CLEANING UP

The Contractor shall remove from the Company's property and from all public and private property, at its own expense, all temporary structures, rubbish and waste materials resulting from its operations. In the event Contractor fails to do so, the Company may remove same at the expense of the Contractor.

36. WORKING HOURS (PIPELINE ONLY)

Unless stated to the contrary in the Invitation to Bid and/or so stated on the Construction Drawings, or agreed to by the Company during a Pre-Construction Conference, the Contractor shall not be permitted to perform work on Saturdays, Sundays, or Company holidays, or commence work such as tie-ins that cannot be completed during normal working hours.

37. INDEMNITY

- A. The Contractor shall indemnify the Company against, and save and hold it harmless from, any and all liability, claims, demands, loss, actions, causes of action, expense, penalties, fines, assessments, damages and costs of every kind and nature for injury to or death of any and all persons, including, without limitation, employees or representatives of the Company or of the Contractor or of any subcontractor, or any other person or persons, and for damage, destruction or loss, consequential or otherwise, to or of any and all property, real or personal, including, without limitation, property of the Company or of the Contractor or of any subcontractor, or of any other person or persons, and the violation of any law, ordinance, rule, regulation, standard, or order resulting from or in any manner arising out of or in connection with the performance of the work under the Contract, howsoever same may be caused, including, without limitation, the Company's active or passive negligence. The Contractor shall also, upon request by the Company, and at no expense to the Company, defend the Company in any and all suits, concerning such injury to or death of any and all persons, and concerning such damage, destruction or loss, consequential or otherwise, to or of any and all property, real or personal, including, without limitation, suits by employees or representatives of the Company or of the Contractor or of any subcontractor, or any other person or persons, or concerning any court or administrative proceeding concerning the violation of any law, ordinance, rule, regulation, standard, or order. Excluded from this paragraph are only those injuries to or deaths of persons and damage, destruction or loss, to or of property arising from the sole negligence or willful misconduct of the Company.
- B. Contractor shall indemnify the Company against, and save and hold it harmless from, any and all liability, claims, demands, damages, costs, expenses and attorney's fees, suffered or incurred on account of any breach of any obligation, covenant or other

provision of this contract, including without limitation, breach of the indemnity provisions of subsection A of this Section 37.

- C. Contractor further agrees to defend, indemnify and hold harmless the Company, its directors, officers, employees, and agents, from and against any and all costs, damages, claims, expenses, violations, notices of violations, penalties, liens, assessments, and liabilities of every kind and nature, foreseeable or unforeseeable, directly or indirectly, arising from any release, removal, generation, use, storage or disposal on, under, around, or from the well site of any material, substance, or waste, hazardous or non-hazardous, including, without limitation, drilling fluids, mud, cuttings and development and test water howsoever same may be caused, including, without limitation, the Company's active or passive negligence.

38. LIENS

If at any time there shall be evidence of any lien or claim for which the Company might become liable and which is chargeable to the Contractor, the Company shall have the right to retain out of any payment then due or thereafter to become due, an amount sufficient to completely indemnify the Company against such lien or claim. If the Company determines that such lien or claim is valid, the Company may pay and discharge the same, and deduct the amount so paid from any monies which may be or become due and payable to the Contractor.

39. PAYMENT

Upon completion of the installation or construction, the Company will, within thirty (30) days after receipt of proper invoice and labor and material releases, pay the amount due the Contractor. If the Company believes that additional work, such as clean up, is required, it may deduct the total cost of such additional work from the amount to be paid to Contractor.

40. COMPANY'S RIGHT TO TERMINATE CONTRACT: DAMAGES DUE TO DELAY

If the Company finds the Contractor to be in material violation of any section of these General Conditions of Contract, Construction Specifications or Standard Specification Drawings or if the Contractor refuses or fails to prosecute the work, or any separable part thereof, with such diligence as will insure its completion within the time specified or any extension thereof, or fails to complete said work within such time, or when any other cause exists to justify such action, the Company may, without prejudice to any other right or remedy, by written notice to the Contractor, terminate its right to proceed with the work or such part of the work as to which there has been such violation, delay or other cause.

In the event the Contractor's right to proceed is terminated, the Company may take over the work and take possession of, and utilize in completing the work, such materials as may be on the site of the work and necessary therefore and prosecute said work to completion by whatever method it may deem expedient. The Contractor and its sureties shall be liable to the Company for any excess cost caused thereby.

In the event the Contractor's right to proceed with the work is terminated, the Contractor shall not be entitled to receive any further payment until the work is completed or the job is canceled. If the unpaid balance of the Contract price exceeds the expense of finishing

the work, including compensation for additional managerial and administrative services, such excess shall be paid to the Contractor. If such expenses exceed such unpaid balance, the Contractor shall pay the difference to the Company.

41. **GUARANTEE**

The Contractor shall guarantee all labor and workmanship and any materials it installs for a period of one year following the date of completion and acceptance by the Company. If any portion of the work or any of the materials become defective within the guarantee period, the Company will notify the Contractor of such defect. The Contractor must repair any defect within fifteen (15) days of such notification. If repairs are not completed within this time period, the Company may repair the defect, or cause such defect to be repaired, and the cost of such repairs shall be paid by the Contractor. The Company reserves the right to determine which defects are the result of poor labor and workmanship and which are caused by defective materials.

42. **LIQUIDATED DAMAGES FOR NON PERFORMANCE: REQUEST FOR EXTENSION(S) OF TIME**

Time is of the essence in the Contract. The time period required for completion of the work will be specified in the Contract. The Contractor agrees that the Company will suffer substantial damages in the event the Contractor fails to complete the work within the agreed upon time period. The Contractor and the Company agree that since it would be impracticable or extremely difficult to precisely fix such damages, a reasonable approximation of such actual damages suffered by the Company shall be a sum equal to 0.5% of the Contract price for each working day beyond the time period for completion of the work specified in the Contract.

Request by the Contractor for extensions of the time period shall be in writing and shall not become effective until approved in writing by the Company's Authorized Representative.

43. **PAYMENT FOR REQUIRED TESTING**

Whenever testing is required by any governmental agency or by the Company to assure conformance of the Contractor's work with the appropriate standard, it will be paid for as follows:

- a. For testing required under permits obtained by the Company or testing specifically requested by the Company, the cost of the first test will be paid for by the Company. In the event of failure of the first test, the cost of all further testing associated with the failure will be paid by the Contractor.
- b. For testing required under permits obtained by the Contractor, all costs will be paid by the Contractor. Testing of the pipeline for pressure and leakage will be included in the Contract price.

44. CONTRACT DEADLINES AND BONDS REQUIREMENTS

The time limits to be allowed for the completion of any work covered in the Contract shall be established as follows: In the proposal submitted to the Company, in response to the Invitation to Bid, the Contractor shall state the number of calendar days required for completion of the work. The time required will become a part of the Contract. When the Company is ready to proceed with the work, a Commencement Notice will be issued by the Company to the Contractor by mail. The Commencement Notice will allow the time required in the Contract plus ten (10) calendar days and will indicate the final day of the time allowed. The work cannot begin until the Company has received a performance bond and materials payment bond for the Contract price unless the bonds have been waived under the special conditions section of the Contract. The additional ten (10) days is the allowance for time to deliver the Commencement Notice to the Contractor and for the Contractor to return the performance bond and materials payment bond to the Company. Time extensions will be granted if warranted, and only at the time of the delay, thus extending the final day of the time allowed.

If the Company elects not to require a performance bond and a material payment bond for the work, the cost of the bonds will be deducted from the proposed total cost and the Contract will reflect this reduced cost and the bonds requirements will be waived under special conditions of the Contract.

ARIZONA WATER COMPANY

CONSTRUCTION SPECIFICATIONS: E-8-1

ERRATA 2010

ARIZONA WATER COMPANY

E-8-1

**CONSTRUCTION SPECIFICATIONS
FOR THE INSTALLATION OF WATER DISTRIBUTION SYSTEMS
DUCTILE IRON**

DEFINITIONS

- A. **Company.** The words "Company" or "Arizona Water Company" mean Arizona Water Company, and where applicable, any division of Arizona Water Company, whose principal place of business is located at 3805 North Black Canyon Highway, Phoenix, Arizona 85015-5351 (Post Office Box 29006, Phoenix, Arizona 85038-9006).
- B. **Company's Authorized Representative.** The words "Company's Authorized Representative" mean any officer of the Company, and any of the Company's Engineers, any Division Manager or Superintendent of the Company and/or such other person(s) designated in writing as the "Company's Authorized Representative" by the President or any Vice President of the Company.
- C. **Contractor.** The word "Contractor" means either an individual or other entity employed to do the work as shown on the Construction Drawings and as specified herein.
- D. **Construction Drawings.** The words "Construction Drawings" mean plans prepared by or on behalf of Arizona Water Company.
- E. **Contract.** The word "Contract" means the written document titled "Proposal/Contract" when such document has been signed by an officer or other authorized representative of both the Contractor and the Company.

**CONSTRUCTION SPECIFICATIONS
FOR THE INSTALLATION OF WATER DISTRIBUTION SYSTEMS
DUCTILE IRON**

1. GENERAL

All work is to be completed in a safe, workmanlike manner and in accordance with these Construction Specifications; any deviation therefrom must be approved in writing by the Company.

Installations must conform with the requirements of all governmental regulating agencies and the cost of conforming to such regulations must be included in the unit bid prices. Examples of such regulations, without attempting to be inclusive, are:

- a. Special compaction and paving for street crossing.
- b. Shoring when required because of the trench depth.
- c. Closing a trench in those areas where no open trench is allowed overnight.
- d. Barricading and traffic control as required.

2. LOCATION MARKING

Alignment stakes as required in the opinion of the Company shall be furnished by the Company to the Contractor and shall be set by the Company at agreed upon intervals and offsets. Under normal circumstances these will reference the pipeline location five feet (5') into the right-of-way measured from property pins. Grade stakes will be provided only when the Construction Drawings show a pipeline depth other than covered in these Specifications. It is the responsibility of the Contractor to preserve all survey work.

3. TRENCH EXCAVATION

The trench location is to be determined by the Construction Drawings.

FOR 8-INCH OR SMALLER PIPE: The depth of the trench prior to pipe laying shall be such that the finished pipeline shall have between thirty-six inches (36") and forty-two inches (42") of cover unless otherwise specified on the Construction Drawings.

FOR 12-INCH AND LARGER PIPE: The depth of the trench prior to pipe laying shall be such that the finished pipeline shall have between forty-eight inches (48") and sixty inches (60") of cover unless otherwise specified on the Construction Drawings.

The width of the trench at and below the level at the top of the pipe shall be a minimum of twelve inches (12") plus the outside diameter of the pipe barrel and a maximum of twenty-four inches (24") plus the outside diameter of the pipe barrel.

The bottom of the trench shall be accurately graded to provide a uniform bearing for each length of pipe for the full length of the pipe. If the native material on the trench bottom can be reasonably dug by hand, bell holes shall be dug for the joints so that the joints in no way support the pipe. When native materials such as rock are encountered during trenching that will not provide a uniform support for the pipe, the trench will be over-excavated an additional six inches (6") and suitable bedding material will be placed in the trench.

Bedding material will be placed by hand in four-inch (4") lifts and compacted to ensure uniform compaction and to eliminate any voids under the pipe. When the space between the pipe and trench bottom varies, this must be backfilled and compacted in four-inch (4") lifts to the mid-section of the pipe.

Whenever the trench is over-excavated for whatever reason, the trench bottom will be brought up to the correct depth at the Contractor's expense using either method (a) or (b) as follows:

- a. A.B.C. material shall be used and compacted to a uniform density of not less than 80% of the maximum density as determined by AASHTO T-99 method A and T-191.
- b. Native material 100% of which will pass through a one and one-half inch (1½") screen and at least 20% of which will pass through a number-8 screen shall be used and compacted to a uniform density of not less than 85% of the maximum density as determined by AASHTO T-99 method A and T-191.

4. MATERIALS TO BE PROVIDED BY CONTRACTOR

Unless otherwise specified on the Construction Drawings or in the Contract, the Contractor will supply all of the necessary materials which will become a permanent and integral part of the water distribution system, including concrete blocking, anchors, backfill material, paving material and supplies used during the prosecution of the work. All materials provided by the Contractor to construct the water distribution system must be NSF Standard 61 approved. All potable water pipes and fittings shall have NSF-PW seal. Construction materials used in the water system shall be lead free as defined at AAC R28-4-504 and R18-1-101. The Contractor will provide the following materials:

- a. FIRE HYDRANTS: Mueller Super Centurion 250 Fire Hydrant, meets ANSI/AWWA C502 Standard, Model No. A-423, 5¼" main valve opening, three way, 6" Mechanical Joint Shoe, 1½" pentagon operating nut, color - yellow, drain open, open direction - left, 4' or 4'6" bury depending on application. For pumper and hose nozzle information see below.
 - (1) 1 - 4" Pumper Nozzle, NST and 2 - 2½" Hose Nozzles, NST. (These locations only: Ajo, Casa Grande, Coolidge and San Manuel.)
 - (2) 1 - 4½" Pumper Nozzle, NST and 2 - 2½" Hose Nozzles, NST. (These locations only: Apache Junction, Arizona City, Lakeside, Oracle, Overgaard, Pinewood, Rimrock, Sedona, Sierra Vista, White Tank and Winkelman.)
 - (3) 1 - 4½" Pumper Nozzle, NST and 2 - 2½" Hose Nozzles, NPT (Bisbee only.)
 - (4) 1 - 3" Pumper Nozzle GA 6-350 (6 threads per inch, 3.50 pitch diameter) and 2 - 2½" Hose Nozzles, NPT (Miami only.)

- (5) 1 – 3½" Pumper Nozzle GA 6-411 (6 threads per inch, 4.11 pitch diameter) and 2 – 2½" Hose Nozzle, NST (Superior only.)
- b. **FITTINGS:** Manufactured by Tyler or Union. Crosses, Elbows, Tees, Cap, Reducer, Adapter, Plug, Blind Flange and Tapped Flange; Ductile Iron, Class 350, SSB, Cast Iron Cement Lined.
- (1) Foster Adaptors for MJ, made by Infact Corporation: Available in size 4" to 16". Part No. 4" = 4FA-BC, 6" = 6FA-BC, 8" = 8FA-BC, 10" = 10FA-BC, 12" = 12FA-BC, 16" = 16FA-BC.
- c. **DETECTOR CHECK VALVE:** Mueller/ Hersey EDC III, iron body, including 5/8" x ¾" Trim Kit. Trim Kit Part No.: 4" = 282080, 6" = 282082, 8" = 282085, 10" = 282496.
- d. **GATE VALVES:** Mueller Resilient Wedge Gate Valves, meets AWWA C509 specification, 250 psig, Non-rising stem, Part No. A-2360 sizes 4" through 12" ; Part No. A-2361 sizes 14" through 36", low zinc stems, epoxy coated inside and outside to meet the NSF 61 rating. The bonnet and stuffing box shall have 304 stainless steel bolts/nuts.
- e. **TRACER WIRE and WARNING TAPE:**
1. **TRACER WIRE:** Shall be direct bury AWG #14 solid copper wire, Color: Blue.
 2. **WARNING TAPE:** Reef Industries, Standard Terra Tape in 3" widths. Color: Blue and imprinted 'Arizona Water Company'.
- f. **AIR RELEASE VALVE:** Crispin Model AR10 with 1" NPT inlet and ½" NPT outlet, cast iron body and top flange; with a 5/64" orifice with stainless steel valve sealing faces and BUNA-N rubber.
- g. **PRESSURE RELIEF VALVE:** Watts 174A, Model M, 2" inlet, 2" outlet, Bronze Body, 30lb. to 150lb. pressure range.
- h. **MEGA LUG:** Mechanical Joint restraint made of ductile iron conforming to ASTM 536-80, 250 psi made by EBAA Iron, Inc., series 1100 or equal.
- i. **METER BOXES:**
- (1) Concrete Box with a steel regular lid, Number 1: Tucson specification.
 - (2) Concrete Box with a steel regular lid, Number 2, 3, and 4: Phoenix specification.
- j. **PIPE, COPPER:** Type K soft copper in 60 or 100-foot coils, per ASTM B88.
- k. **PIPE, DUCTILE IRON:** Ductile Iron Pipe, Cement Lined, Push-on, conform to current ANSI/AWWA Specification A21.51/C151, Pressure Class 350 (sizes 4" through 12"), Pressure Class 250 (sizes 14" through 20"), or Pressure Class 200 for 24" through 36" pipe. Vendors:

- (1) Pacific States Cast Iron Pipe Company
- (2) Griffin Pipe
- (3) United States Pipe and Foundry Company
- (4) American Ductile Iron Pipe
- (5) Clow Pipe (McWane, Inc.)

l. **PIPE, PLASTIC:** Plastic pipe, C-900 PVC per ANSI/AWWA C900, Class 150, sizes 6" through 12". NSF61 approved. Furnished in laying lengths of 20'. The barrel shall conform to the outside dimensions of steel pipe (IPS) or cast iron (CI) pipe equivalent and the wall thickness of dimension-ratio (DR) 18.

m. **POLYETHYLENE ENCASEMENT (Polywrap):** For all pipeline and related fittings installed, EXCEPT for the Coolidge Division. Minimum 8 Mil. and installed per AWWA C105/A21.5-93 and ASTM A-674-89. Manufactured by the Pacific States Cast Iron Pipe Company. The wrapping tape shall be minimum 10 mil. vinyl tape. No duct tape shall be used.

n. **COUPLING:** Mueller, straight three part union, tested to meet ANSI/AWWA C800, H15403, conductive compression.

Mueller, H15428, straight coupling, conductive compression by male iron pipe, tested to meet ANSI/AWWA C800 specification. Size: 2".

Mueller, H15451, straight coupling, conductive compression by female iron pipe, tested to meet ANSI/AWWA C800 specification. Size: 2".

Viking Johnson brand, sold by Mueller: MaxiFit Straight (2"-24"), MaxiFitXtra Straight (4"-8") or MaxiStep Transition, tested to meet AWWA/ANSI C.219-91 specifications – certified to ISO 9001:1994 / Smith – Blair Quantum.

o. **STOP, ANGLE METER, BALL:** Mueller, valve, B24258, conductive compression by meter swivel nut, tested to meet ANSI/AWWA C800, size 5/8" x 3/4" x 3/4" for a 3/4" service or size 1" for a 1" service.

Mueller, valve, B24265, female pipe thread by meter swivel nut, tested to meet ANSI/AWWA C800, size 5/8" x 3/4" x 3/4" for a 3/4" service or size 1" for a 1" service.

p. **STOP, CORP:** Mueller, ball valve, B25008, taper thread by conductive compression, tested to meet ANSI/AWWA C800 specification, sizes: 3/4", 1" and 2".

Mueller, ball valve, B25028, iron pipe thread by conductive compression, tested to meet ANSI/AWWA C800 specification. Sizes 3/4", 1", and 2".

Mueller, 300 Ball Curb Valve, B-25122, taper thread by conductive compression, tested to meet ANSI/AWWA C800 specifications, size: 2". (2" service)

- q. **STOP, CURB:** Oriseal valve, H10291, iron pipe thread by iron pipe thread, quarter turn check, brass, tested to 300 psi working pressure, tested to meet ANSI/AWWA C800 specification, size: 2".
- Mueller, B20283, Mueller 300 ball curb valve, female iron pipe by female iron pipe, quarter turn check, tested to meet ANSI/AWWA C800 specification. Size: 2". (Blow-off E-9-8-1).
- r. **TAPPING SADDLE:** Smith Blair, Cast Bronze ASTM-B584 85-5-5-5, double strap, iron pipe threads, Models 321 and 323. Washers are silicon bronze, ASTM-B36. Gaskets are grade 60 Buna N, or Mueller bronze double strap service saddle, BR 2 B series, cast bronze, ASTM-B585, 85-5-5-5, or H16084, 200 psig, meets ANSI/AWWA C800.
- s. **TAPPING SLEEVE:** Mueller H304 Stainless Steel Tapping Sleeve, JCM 432 18-8 Type 304 Stainless Steel Tapping Sleeve, Romac "SST" Type 304 Stainless Steel Tapping Sleeve or CASCADE-style CST-EX stainless steel pressure-rated tapping sleeve.
- t. **TAPPING VALVE:** Mueller Resilient Wedge tapping valve, Catalog Number T-2360-16, Class 125, sizes 4" through 12"; T-2361-16, Class 125, sizes 14" to 36" all with Type 304 stainless steel fasteners; bypass valves are required on 18" - 36" valves flange by mechanical joint per ANSI/AWWA C111, iron wedge, non-rising stem. Epoxy coated interior/exterior per ANSI/AWWA C550 for NSF 61 compliance. 250 PSI range for valves 4" to 12". 150 PSI range for valves 14" to 36".
- u. **U-BRANCH:** Mueller, H15364, 1" male iron pipe by 3/4" male iron pipe, tested to meet ANSI/AWWA C800 specification. Size: 1" x 3/4" x 1 1/2", straight line.
- v. **VALVE BOXES:** Valve Box with Cover, adjustable, Tyler 562-A or equal, made of cast iron.
- w. **VAULTS:** Utility Vault Company, Chandler, AZ.
- (1) 4484-WA concrete vault with a 3660 aluminum double torsion door with a recessed padlock hasp, two - 18" x 24" center knockouts.
 - (2) 575-WA concrete vault with a 4874 aluminum double torsion door with a recessed padlock hasp, two - 18" x 24" center knock outs and adjustable frame.
 - (3) 612-5X-WA concrete vault with a 4874 aluminum double torsion door with a recessed padlock hasp, two - 18" x 24" center knockouts.
- x. **VALVE, METER:** Mueller, B24265-1, Mueller 300 ball angle meter valve, female iron pipe by meter nut, quarter turn check, lock wing, tested to meet ANSI/AWWA C800 specification. Size: 1".

Mueller, B25170, Mueller 300 ball straight valve, conductive compression by female iron pipe, quarter turn check, lock wing, tested to meet ANSI/AWWA C800 specification. Size: 1".

- y. YOKES, METER: Relocator type copper meter yoke with horizontal inlet and outlet and meter thread ends, B24118, with lock wing Mueller 300 angle ball valve, full port, sizes: 1" x 12", 5/8" x 3/4" x 7", 5/8 x 3/4" x 9".

Mueller, 2" copper meter yoke with horizontal inlet and outlet and female iron pipe threads, B2423-99000, with lock wing Mueller 300 ball angle meter valves on inlet and outlet risers. Raised 1" by-pass with lock wing Mueller 300 ball valve.

The Contractor also will be required to provide the following materials, the cost of which will be included in its unit bid price:

All material and concrete for thrust blocks, other anchors, reinforcing steel; all gravel, crushed stone, A.B.C., earth, sand, or screened material which may be required; all material for bracing and shoring trenches and for construction of forms; all barricades and traffic control equipment; all material for paving replacement and any water used for compaction of backfill.

5. INSTALLATION OF MATERIALS

All materials are to be installed in accordance with manufacturer's recommendations unless otherwise directed by these Specifications.

All pipe, fittings and valves shall be laid true to the lines, grades and locations established by the Specifications and the Construction Drawings.

The ends and inside of the pipe shall be thoroughly cleaned and inspected for damage. No damaged materials shall be installed in the water distribution system.

Whenever the work ceases for any reason, all open pipeline ends shall be tightly plugged by the Contractor. Plugs shall be watertight and approved by the company.

Concrete thrust blocks of the sizes required by the plans and specifications are to be provided at all valves, changes in direction or size, or at any other point where an unbalanced thrust due to water pressure would exist. Thrust blocks are to be formed to prevent any concrete from spilling over or into a joint.

Trench curves as shown on the Construction Drawings may be made without fittings when using push on joint pipe up to twelve inches (12") in diameter, if the deflection of the pipe does not exceed five degrees (5°) or nineteen inches (19") per eighteen-foot (18') length of pipe. The minimum radius of such curves will be two hundred five feet (205').

Prior to construction, the appropriate agency(ies) will be notified as required by the permit(s).

It shall be the Contractor's responsibility to uncover all existing water lines being connected to, and to verify the location, depth and size of pipe before any construction begins.

Any construction performed without the knowledge of the duly authorized representative is liable for removal and replacement at the Contractor's expense.

All fire hydrants, frames, covers and valve boxes, etc. shall be adjusted to finished grade prior to the placing of the asphalt concrete surface course by the Contractor (where applicable).

Air release valves shall be installed at water system high points per Standard Detail E-9-8-2.

All water services shall be set a minimum of two feet (2') on the customer's property, preferably within the P.U.E. and not within right-of-way.

Unless otherwise specified on the construction drawings, all water mains shall be installed five feet (5') from the property line inside the right-of-way or easement.

Water valves shall be spaced not more than five hundred feet (500') in commercial districts and not more than eight hundred feet (800') in other districts. Variations may be required for transmission mains or special applications.

Installation of water line casing shall be per Standard Specification E-9-24-1.

Tracer Wire and Warning Tape are to be installed on all mains, tees, crosses, ells and fire hydrant laterals. They will not be installed on service lines. The tracer wire will be installed on the water main 45 degrees from the vertical centerline of the pipe and shall be taped to the fittings directly and on the main every 10 feet using a minimum 10 mil vinyl tape. The tracer wire shall be placed between the valve riser and box with a minimum of 12" of wire inside. The warning tape shall be installed a minimum of two feet below the surface, being measured from final grade, directly over the center of the pipe. Any splices in the tracer wire shall be joined using waterproof connectors. Any splices in the warning tape shall be joined using minimum 10 mil vinyl tape. The tracer wire shall be tested for continuity after backfill and compaction, but before paving. Any detected damages to the wire shall be repaired before paving will be allowed.

6. BACKFILL OF WATER MAIN TRENCHES

Backfill of any excavation shall conform to the requirements of any of the governmental agencies having jurisdiction over the location. If no governmental agency having such jurisdiction specifies backfill or compaction requirements, and no special requirements are shown on the Construction Drawings, the procedure set forth in this section will apply for water line trenches.

The bedding material above the pipe and backfill material shall be compacted to a minimum of 70% compaction within a utility easement and 80% compaction within a right-of-way as determined by AASHTO T-99 method A and T-191. If water settling is used for compaction, it is the responsibility of the Contractor to prevent the pipe from floating.

The bedding material shall be either native material, 100% of which will pass through a one and one-half inch (1½") screen and at least 20% of which will pass through a number-8 screen, or imported material which conforms to M.A.G. specifications for A.B.C. or type-B

select materials. Bedding material shall be used below and around the pipe and a minimum of twelve inches (12") above the pipe. Shade and bedding material to be mechanically compacted prior to remainder of trench back-fill.

The remainder of the trench shall be backfilled with native or imported material which shall be of sound earthen material free from broken concrete, wood, broken pavement, or other unsuitable substances. Except as otherwise specified, backfill may be material containing no pieces larger than six inches (6") in greatest dimension.

Where settlement occurs, additional backfill material shall be placed and compacted and the trench shall be brought to final grade.

7. HYDROSTATIC TESTING OF COMPLETED PIPELINES

Hydrostatic testing of water pipelines will be completed before the new system is connected into the existing water system so that all testing can be done against all new materials.

The completed section of water pipeline to be tested shall be slowly filled with water with care being taken to expel all air from the pipe. If necessary, the pipe will be tapped at high points to vent air.

The Contractor shall provide all equipment and labor necessary to accomplish this testing and the price shall be included in the unit prices. The Contractor shall notify the Company in advance of the testing so that the Company can schedule a duly authorized representative to be at the site during testing. The Contractor, at its own expense, shall make any necessary repairs to the system being tested in order to cause the section being tested to meet the test limits set below. The Contractor may request authorization of the Company to connect the new pipelines to the existing system prior to completion of pressure testing when, in the Company's sole opinion and judgment, conditions warrant such connection.

The Contractor shall assume all responsibility to complete pressure testing to Company's specifications after such connection, including, but not limited to, isolation of the new pipelines from the existing system, if necessary.

Connections prior to completion of pressure testing shall not be made unless prior Company authorization has been obtained, and any extra expenses resulting from such connections shall be the sole responsibility of the Contractor.

Leakage tests will be for a period of two hours at 200 ± 5 psi at the point of lowest elevation; leakage may not exceed 0.1 gallons per hour per one thousand feet (1,000') of pipe per inch of diameter. If dry utilities are not installed, a second pressure test is required.

8. STERILIZATION AND FLUSHING OF COMPLETED WATER PIPELINES

Sterilization and flushing will conform to recommendations of Arizona State Department of Health Services Engineering Bulletin Number 8, latest edition, or any future Arizona Department of Environmental Quality bulletins. Contractor to follow all conditions of any discharge permit.

9. NO OTHER UTILITIES ALLOWED IN OR NEAR WATER PIPELINE TRENCHES

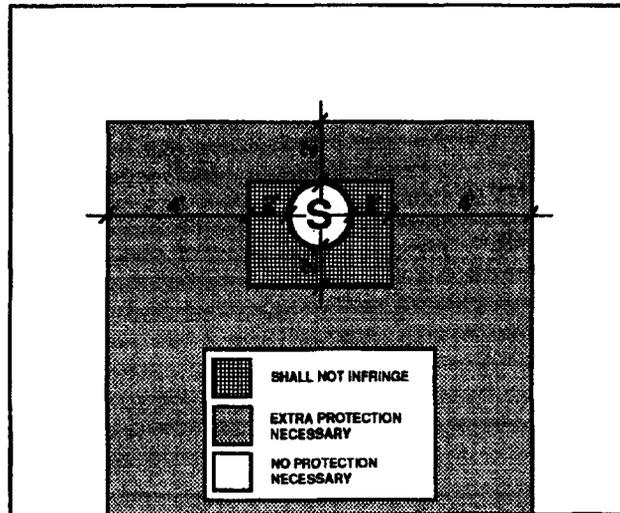
No other utility installations will be permitted in the water pipeline trench or within five feet (5') of the Company's water pipeline when running parallel to the water pipelines.

10. PROTECTION OF WATER MAINS NEAR SEWERS

In order to protect water mains from contamination by sewers, the installation of the water mains must conform to the following requirements:

- a. Horizontal - When water lines and sewers are laid parallel with each other, the horizontal distance between them shall not be less than six feet (6'). Each line shall be laid on undisturbed or bedded material in a separate trench. Where conditions prevent the minimum horizontal separation set forth above, extra protection will be required. Extra protection shall consist of constructing the sewer main with mechanical joint ductile iron pipe or with slip-joint ductile iron pipe if joint restraint is provided, or encasing both the water main and sewer main in concrete. See Detail E-9-30-1 and E-9-30-2

The Construction Drawings shall indicate the installation requirements. The drawings showing these exceptions shall have been approved by the appropriate state and/or county health department. Refer to the diagram below for clarification.



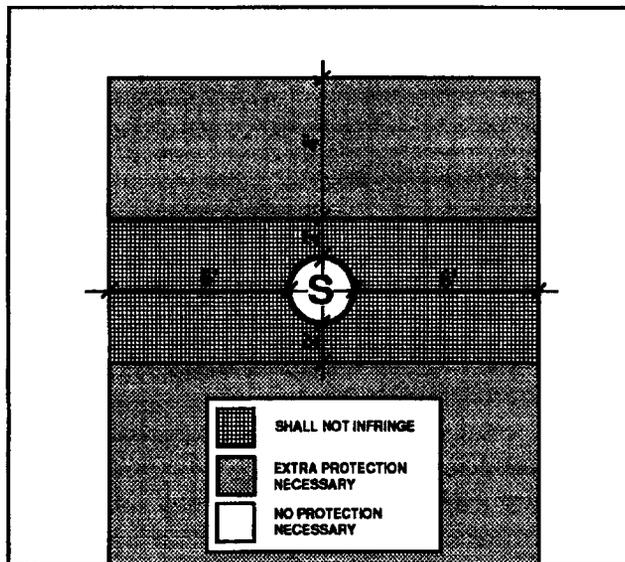
Under no circumstances will the horizontal separation between sewer mains and water mains be less than two feet (2'). All distances are to be measured from the outside of the sewer main to the outside of the water main.

- b. Vertical - When a water main is parallel with or crosses a sewer main within two feet (2') above the sewer or greater than two feet (2') below the sewer, extra protection will be required. Extra protection shall consist of constructing the sewer main with mechanical joint ductile iron pipe or with slip-joint ductile iron pipe if joint restraint is provided, or encasing both the water main and sewer main in concrete. See Detail E-9-30-1 and E-9-30-2.

The Construction Drawings shall indicate the installation requirements. The drawings showing these exceptions shall have been approved by the appropriate state and/or county health department.

Under no circumstances will the vertical separation of a sewer main installed above a water main be less than two feet (2'). All distances are to be measured from the outside of the sewer main to the outside of the water main. Refer to the diagram above for clarification.

- c. When unusual conditions such as, but not limited to, highway or bridge crossings prevent the water and sewer main separations required from being met, the appropriate state and/or county health department will review and may approve requests for authorization to use alternate construction techniques, materials and joints on a case-by-case basis.
- d. No water pipe shall pass through or come into contact with any part of a sewer manhole. The minimum horizontal separation between water mains and manholes shall be six feet (6'), measured from the center of the manhole.
- e. The minimum separation between force mains or pressure sewers and water mains shall be two feet (2') vertically and six feet (6') horizontally under all conditions. Where a sewer force main crosses above, or less than six feet (6') below, a water line, the sewer main shall be encased in at least six inches (6") of concrete for ten feet (10') on either side of the water main. Refer to the diagram below for clarification.



- f. Sewer mains (gravity, pressure, force) shall be kept a minimum of fifty feet (50') from drinking water wells, unless the following conditions are met:
 - 1. Water main pipe, pressure tested in place to 50 psi without excessive leakage, may be used for gravity sewers at distances greater than twenty feet (20') from drinking water wells.
 - 2. Water main pipe, pressure tested in place to 150 psi without excessive leakage, may be used for pressure sewers and force mains at distances greater than twenty feet (20') from drinking water wells.
- g. No septic tank/disposal field system shall be constructed within one hundred feet (100') of a drinking water well.
- h. All distances are measured perpendicularly from the outside of the sewer main to the outside of the water main. These separation requirements do not apply to building, plumbing or individual house service connections.
- i. Use Mechanical Joint ductile iron pipe with Megalug thrust restraints a minimum of ten (10') feet on each side of a sewer or storm drain crossing.

11. COMPACTION

When crossing existing water mains a minimum of 95% compaction is required to the bottom of existing mains.

Arizona Water Company requires that no slurry be permitted to contact existing cement/asbestos or ductile iron pipes, unless authorized by the company. Slurry may be poured in the bottom of the sewer trench stopping three inches (3") below the existing water main. The backfill used around the main should be AB in sufficient depth to prevent slurry from contacting existing main.

12. WATER MAIN MATERIAL SPECIFICATIONS

Ductile iron pipe (Push-on type) minimum class 350, cement lined and conform to AWWA C151.

All main line valves shall conform to AWWA C500 with a minimum working pressure of 200 psi.

All cast iron fittings to be cement lined in accordance with AWWA C104 and shall conform to AWWA C110 with a minimum working pressure of 250 psi. Except for the Coolidge System – See Note 4L.

Maximum joint deflection for 6" mechanical joint ductile iron pipe is seven degrees, seven minutes ($7^{\circ} 7'$) or twenty-seven inches (27") per eighteen-foot (18') length pipe, for a maximum curve of one hundred forty-five feet (145').

Maximum joint deflection for 8" and 12" mechanical joint ductile iron pipe is five degrees, twenty-one minutes ($5^{\circ} 21'$) or twenty inches (20") per eighteen-foot (18') length pipe, for a maximum curve of one hundred ninety-five feet (195').

Maximum joint deflection for 6", 8" and 12" push-on joint ductile iron pipe is five degrees (5°) or nineteen inches (19") per eighteen-foot (18') length pipe for a maximum curve of two hundred five feet (205').

ARIZONA WATER COMPANY

3805 N. BLACK CANYON HIGHWAY, PHOENIX, ARIZONA 85015-5351 • P.O. BOX 29006, PHOENIX, ARIZONA 85038-9806
PHONE: (602) 240-6860 • FAX: (602) 240-6878 • WWW.AZWATER.COM

November 24, 2010

Mr. Tony Geiger
US Pipe – Waterworks Marketing Consultants
34522 N. Scottsdale Road
Scottsdale, Arizona 85226

Re: US Pipe Sentinel Fire Hydrants and Resilient Wedge Gate Valves

Dear Mr. Geiger:

Thank you for your interest in working with Arizona Water Company (the "Company") to add US Pipe Sentinel Fire Hydrants and Resilient Wedge Gate Valves to the Company's material and equipment specifications. Based on the US Pipe product information you provided and your field presentations to our operations and engineering staff, the Company is pleased to inform you that the following items are approved for use in the Company's water systems in Arizona.

Sentinel Fire Hydrant:

- Model Sentinel 250
 - 5¼" MVO
 - 4½" pumper
 - 2½" hose
 - Meets AWWA C-502 standard and approval by ULFM

Resilient Wedge Gate Valves:

- Model US Pipe A-USP0
 - Meets AWWA C-509 Full Body Cast Iron includes 304 SS Nuts, Bolts & Low Zinc Bronze Stem
 - Size range 2" thru 12"
- Model US Pipe A-USP1
 - Meets AWWA C-515 Reduced Wall Ductile Iron includes 304 SS Nuts, Bolts & Low Zinc Bronze Stem
 - Size range 14" thru 48"

E-MAIL: marketing@azwater.com

ARIZONA WATER COMPANY

To: Tony Geiger – US Pipe

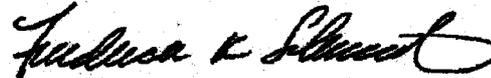
November 24, 2010

Subject: US Pipe Sentinel Fire Hydrants and Resilient Wedge Gate Valves

Page 2

We look forward to developing a long-term relationship with you and the US Pipe products. If I can be of any assistance, please call me.

Very truly yours,



**Fredrick K. Schneider
Vice President – Engineering**

afh

VIA EMAIL: TGEIGER4@COX.NET

ARIZONA WATER COMPANY

3805 N. BLACK CANYON HIGHWAY, PHOENIX, ARIZONA 85013-3351 • P.O. BOX 29006, PHOENIX, ARIZONA 85038-9006
PHONE: (602) 240-6860 • FAX: (602) 240-6878 • WWW.AZWATER.COM

October 19, 2010

Mr. Jim Ryan
Clow Valve Company
8121 N. 10th Avenue
Phoenix, Arizona 85021

Re: Clow Medallion Fire Hydrants and Resilient Wedge Gate Valves

Dear Mr. Ryan:

Thank you for your interest in working with Arizona Water Company (the "Company") to add Clow Medallion Fire Hydrants and Resilient Wedge Gate Valves to the Company's material and equipment specifications. Based on the Clow product information you provided and your field presentations to our operations and engineering staff, the Company is pleased to inform you that the following items are approved for use in the Company's water systems in Arizona.

Medallion Fire Hydrant:

- Model F-2545
 - 5½" MVO
 - 4½" pumper
 - 2½" hose
 - Meets AWWA C-502 standard and approval by ULFM

Resilient Wedge Gate Valves:

- Model 2639 & 2640
 - Meets AWWA C-509 Full Body Cast Iron includes 304 SS Nuts, Bolts & Low Zinc Bronze Stem
 - Size range 2½" thru 12"
- Model 2638
 - Meets AWWA C-515 Reduced Wall Ductile Iron includes 304 SS Nuts, Bolts & Low Zinc Bronze Stem
 - Size range 14" thru 48"

E-MAIL: mail@azwater.com

ARIZONA WATER COMPANY

To: Jim Ryan – Clow Valve Company

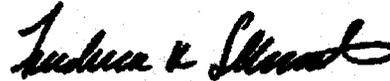
October 19, 2010

Subject: Clow Medallion Fire Hydrants and Resilient Wedge Gate Valves

Page 2

**We look forward to developing a long-term relationship with you and the Clow products.
If I can be of any assistance, please call me.**

Very truly yours,



**Fredrick K. Schneider
Vice President – Engineering**

lar

VIA EMAIL: JIM.RYAN@CLOWVALVE.COM

February 21, 2012

Contractor

Re: Fitting Specifications

Dear Contractor:

Effective March 1, 2012, Arizona Water Company (the "Company") has changed its fitting specifications for Ductile Iron Fittings and Ductile Iron Flanged Fittings ("Fittings"). All Fittings purchased by the Company, on the Company's behalf or installed with the intent of being conveyed to the Company, must comply with the requirements noted below.

Previous Fitting Specifications:

Fittings

Manufactured by Tyler or Union, Crosses, Elbows, Tees, Cap Reducer, Adapter, Plug, Blind Flange and Tapped Flange: Ductile Iron, Class 350, SSB, and Cast Iron Cement Lined.

New Fitting Specification:

Ductile Iron Fittings (Push-On and Mechanical Joint)

Ductile Iron Push-On and Mechanical Joint ("MJ") fittings for water lines shall be made of ductile iron per ASTM A536 and be cast in the United States of America. Fittings shall have USA cast on the fitting to designate they are made in the United States. All fittings will be manufactured and tested in accordance with ANSI/AWWA C153/A21.53 for compact design and ANSI/AWWA C110/A21.10 for full body design. In accordance with ANSI/AWWA C104/A21.4 fittings 2" – 3" will be single thickness cement mortar lined and 4" – 64" will be cement mortar lined. Fittings will be Asphaltic seal coated on the exterior in accordance with ANSI/AWWA C104/A21.4. MJ fittings with flanged end(s) will match ANSI/AWWA C115/A21.15 and ANSI B16.1 class 125 flanges. All fittings shall be NSF-61 listed for use with potable water.

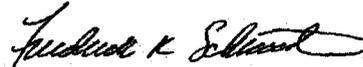
Ductile Iron Flanged Fittings

E-MAIL: mail@azwater.com

Ductile Iron flanged fittings for water lines shall be made of ductile iron per ASTM A536 and be cast in the United States of America. Fittings shall have USA cast on the fitting to designate they are made in the United States. All fittings will be manufactured and tested in accordance with ANSI/AWWA C110/A21.10 design. Flange ends will match ANSI/AWWA C115/A21.15 and ANSI B16.1 class 125 flanges. In accordance with ANSI/AWWA C104/A21.4 fittings 2" - 3" will be single thickness lined and 4" - 64" will be cement mortar lined. Fittings will be Asphaltic seal coated on the exterior in accordance with ANSI/AWWA C104/A21.4. All fittings shall be NSF-61 listed for use with potable water.

If you have any questions or require further information, please contact me at 602-240-6860.

Very truly yours,



**Fredrick K. Schneider, PE
Vice President - Engineering
engineering@azwater.com**

afh
Enclosure

ARIZONA WATER COMPANY

STANDARD SPECIFICATION DRAWINGS: E-9-1

ERRATA 2010

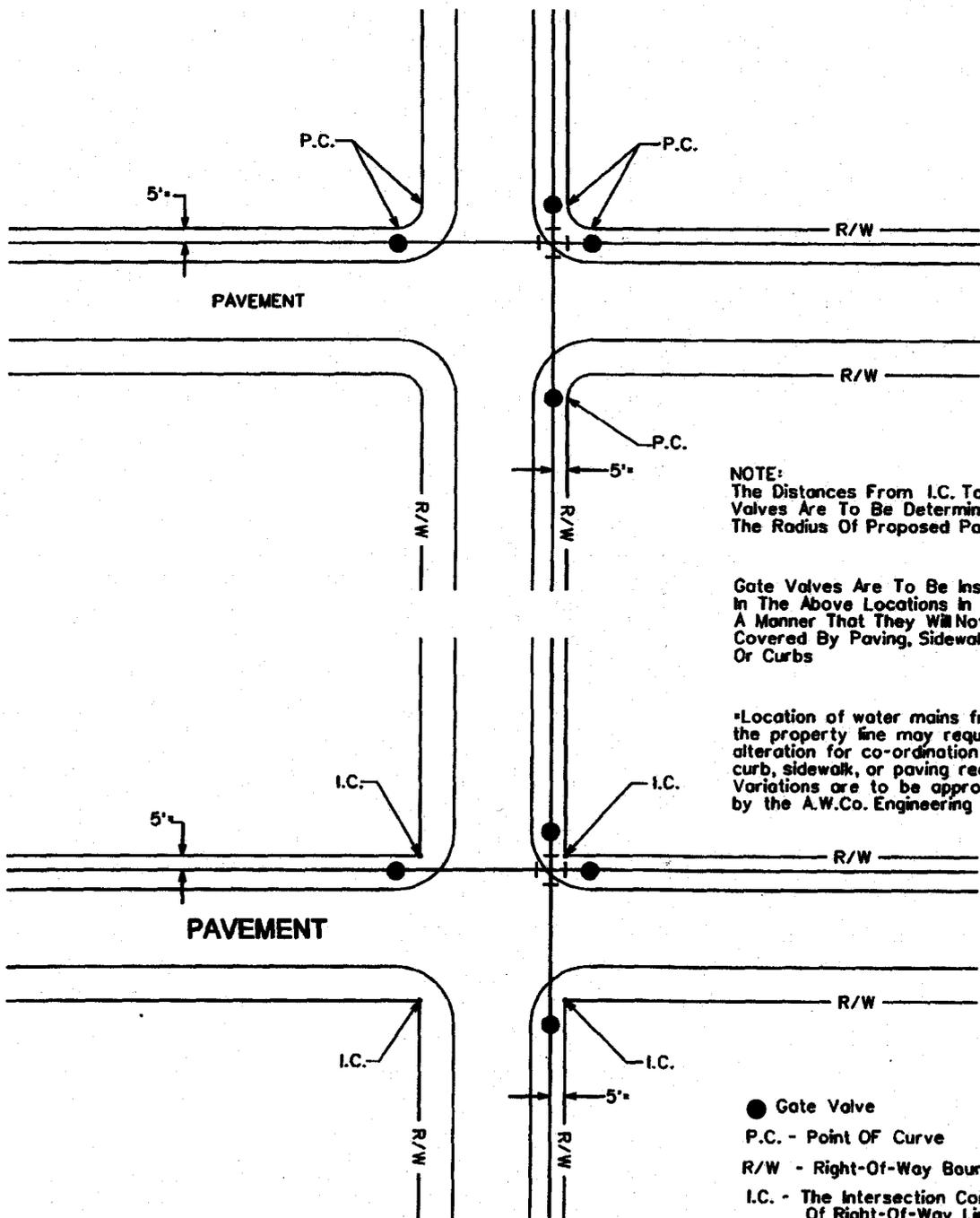
ARIZONA WATER COMPANY

STANDARD SPECIFICATION DRAWINGS - DUCTILE IRON

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- E-9-2 INSTALLATION OF TYPICAL VERTICAL AND HORIZONTAL GATE VALVES
- E-9-3 INSTALLATION OF TYPICAL TAPPING SLEEVE AND VALVE
- E-9-4 INSTALLATION OF TYPICAL VALVE SUBJECT TO NON-VEHICULAR AND VEHICULAR TRAFFIC
- E-9-5 INSTALLATION OF TYPICAL THRUST BLOCKING SCHEDULE THRUST BLOCK FOR VERTICAL BENDS, AND MEGALUG THRUST RESTRAINTS
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- E-9-17 STEEL WATER STORAGE TANK
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PERPENDICULAR
- E-9-30-2 WATER AND SANITARY SEWER SEPARATION/PROTECTION – PARALLEL



NOTE:
 The Distances From I.C. To Gate Valves Are To Be Determined By The Radius Of Proposed Pavement.

Gate Valves Are To Be Installed In The Above Locations In Such A Manner That They Will Not Be Covered By Paving, Sidewalks, Or Curbs

*Location of water mains from the property line may require alteration for co-ordination with curb, sidewalk, or paving requirements. Variations are to be approved by the A.W.Co. Engineering dept.

- Gate Valve
- P.C. - Point Of Curve
- R/W - Right-Of-Way Boundary
- I.C. - The Intersection Corner Of Right-Of-Way Lines

ARIZONA WATER COMPANY

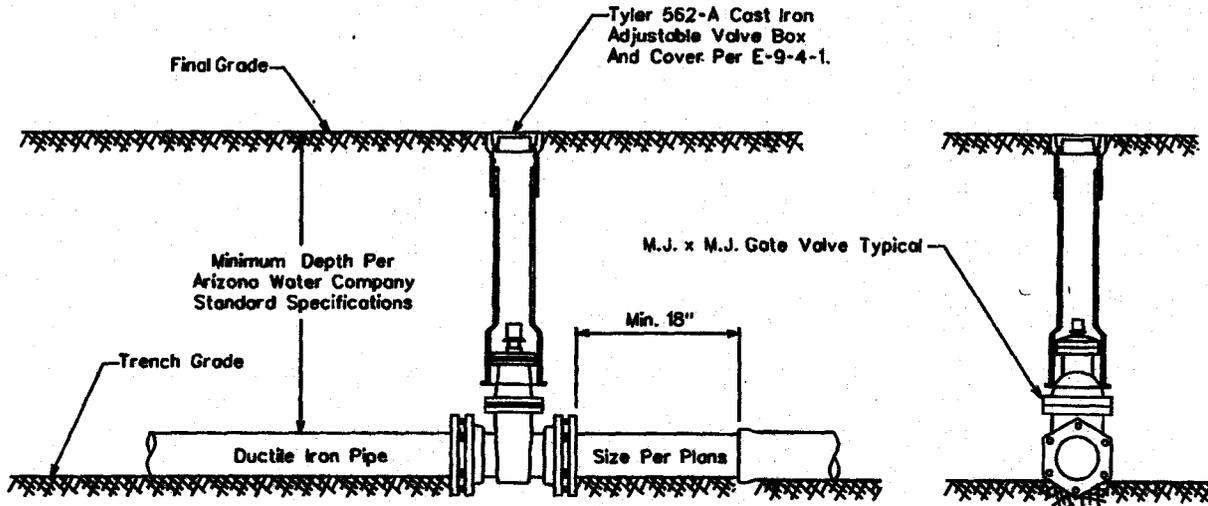
STANDARD SPECIFICATION			
FOR THE INSTALLATION OF			
TYPICAL GATE VALVE LOCATIONS			
DRAWN BY: CCO	APPROVED BY: M.W.	DATE: 3/20/86	△ 1/31/2001
			E-9-1-1

FOR 6" THROUGH 12" GATE VALVES

Mueller Resilient Wedge Gate Valves
Catalog Number A-2360-__
ANSI/AWWA C509 Compliant

FOR 14" THROUGH 16" GATE VALVES

Mueller Resilient Wedge Gate Valves
Catalog Number A-2361-__
ANSI/AWWA C509 Compliant



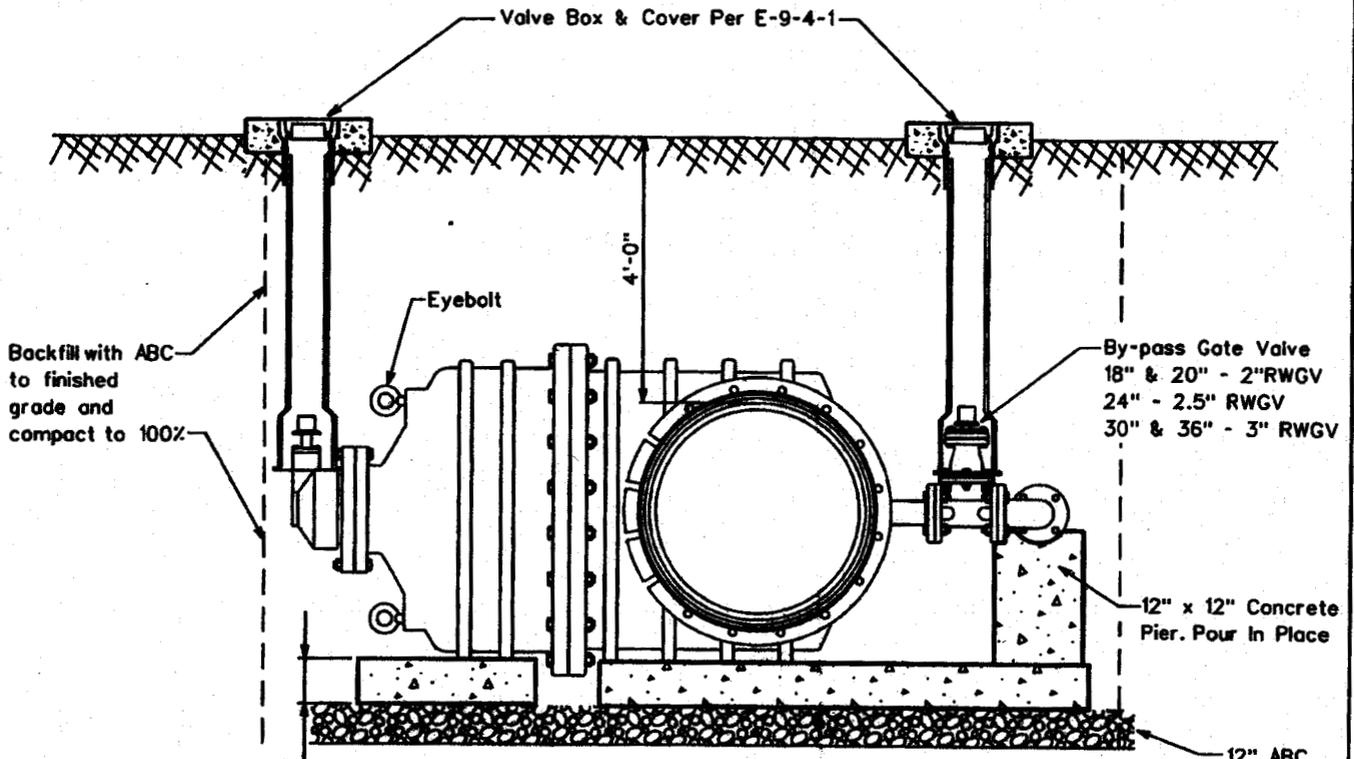
All Valves Installed On Pipe Five Feet (5') Deep And Greater Are To Be Installed With A Valve Operator Extension, Mueller Catalog No. A-26441.

ARIZONA WATER COMPANY

STANDARD SPECIFICATION
FOR THE INSTALLATION OF

TYPICAL VERTICAL GATE VALVES

DRAWN BY: CB	APPROVED BY: MW	DATE: 03.20.1986	△ 08.23.2006	E-9-2-1
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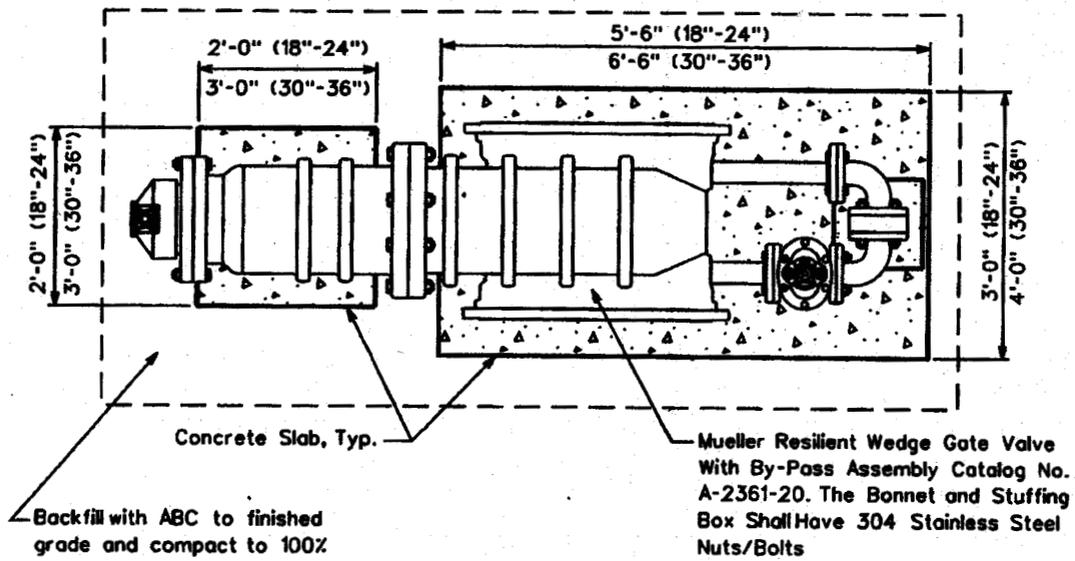
Backfill with ABC to finished grade and compact to 100%

By-pass Gate Valve
 18" & 20" - 2" RWGV
 24" - 2.5" RWGV
 30" & 36" - 3" RWGV

12" x 12" Concrete Pier. Pour In Place

12" ABC Compacted To 100%

All concrete slabs to be class "C", which is defined as concrete whose minimum compressive strength at 14 days reaches 1600psi and at 28 days reaches 2000psi. per MAG Section 725, Table 725-1. Slabs to be formed and poured prior to valve installation.



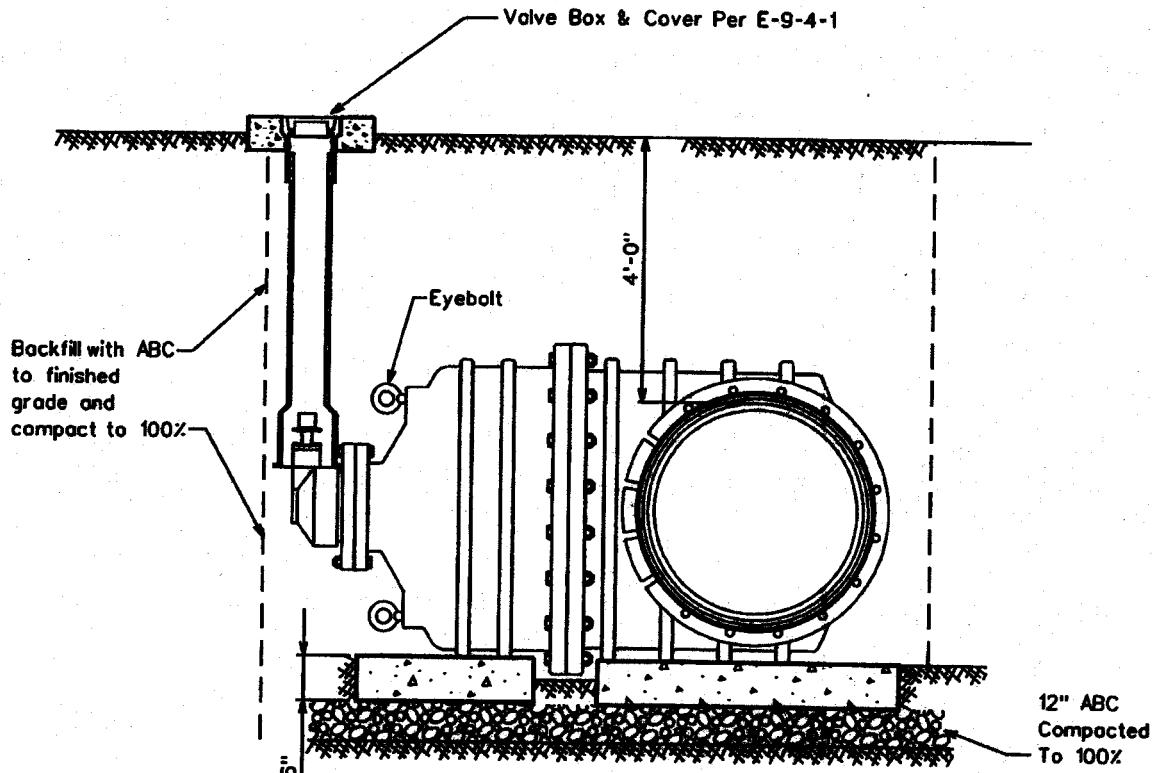
Backfill with ABC to finished grade and compact to 100%

Mueller Resilient Wedge Gate Valve With By-Pass Assembly Catalog No. A-2361-20. The Bonnet and Stuffing Box Shall Have 304 Stainless Steel Nuts/Bolts

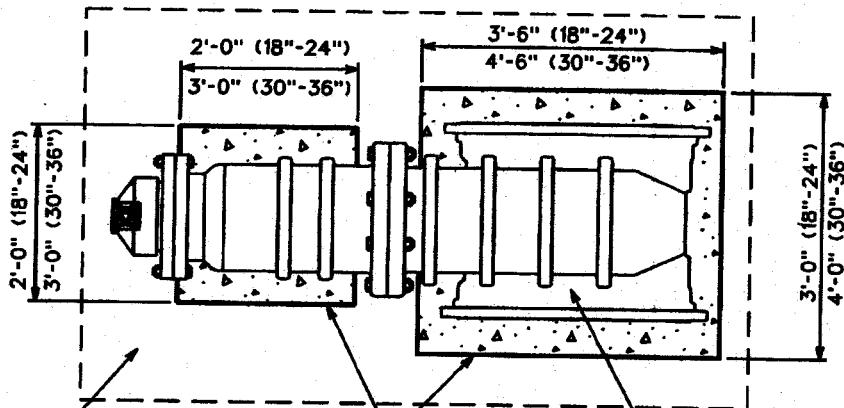
ARIZONA WATER COMPANY

All valves installed on pipe five feet and greater are to be installed with a valve operator extension Mueller catalog No. A-26441 The distance is measured from the top of the operating nut to final grade.

STANDARD SPECIFICATION			
FOR THE INSTALLATION OF			
INSTALLATION OF BEVEL GEARED HORIZONTAL GATE VALVES WITH BY-PASS FOR 18" AND LARGER VALVES			
DRAWN BY:	APPROVED BY:	DATE:	
CB		12.07.2004	△
			E-9-2-2



All concrete slabs to be class "C", which is defined as concrete whose minimum compressive strength at 14 days reaches 1600psi and at 28 days reaches 2000psi. per MAG Section 725, Table 725-1. Slabs to be formed and poured prior to valve installation.



Concrete Slab, Typ.

Backfill with ABC to finished grade and compact to 100%

Mueller Resilient Wedge Gate Valve Assembly Catalog No. A-2361-20. The Bonnet and Stuffing Box Shall Have 304 Stainless Steel Nuts/Bolts

All valves installed on pipe five feet and greater are to be installed with a valve operator extension Mueller catalog No. A-26441 The distance is measured from the top of the operating nut to final grade.

ARIZONA WATER COMPANY

STANDARD SPECIFICATION			
FOR THE INSTALLATION OF			
INSTALLATION OF BEVEL GEARED HORIZONTAL GATE VALVES WITHOUT A BY-PASS FOR 18" AND LARGER VALVES			
<small>DRAWN BY:</small> CB	<small>APPROVED BY:</small>	<small>DATE:</small> 12.07.2004	<small>REV:</small> △ 5.13.2005
			E-9-2-3

304 Stainless Steel Topping Sleeve

Thrust Blocking Per Standard Specification E-9-5-1

Undisturbed Soil

Mueller Flange x M.J. Resilient Wedge Tapping Valve w/Epoxy Coating.
Catalog Number:
T-2360-16 (4" - 12")
T-2361-16 (14" - 36")

Ductile Iron Pipe - Size Per Plans

Existing Main

NOTE:

1. All flanges, bolts, and nuts shall be kept free of concrete.
2. Air pressure test the tapping sleeve before the live tap is made.
3. Polywrap all new fittings

***Approved Vendors:**

- Mueller, Catalog No. H304, 304 Stainless Steel
- JCM, Model 432, 304 Stainless Steel
- Romac, 'SST', 304 Stainless Steel
- Cascade, 'CST-EX', 304 Stainless Steel

Tyler 562-A Cast Iron Adjustable Valve Box And Cover Per E-9-4-1.

Final Grade

Thrust Blocking Per Standard Specification E-9-5-1

Undisturbed Soil

Minimum Depth Per Arizona Water Company Standard Specifications

Ductile Iron Pipe - Size Per Plans

Pressure Treated Board Rated For Permanent Wood Foundation (.60 lbs. of preservative per cu.ft.)

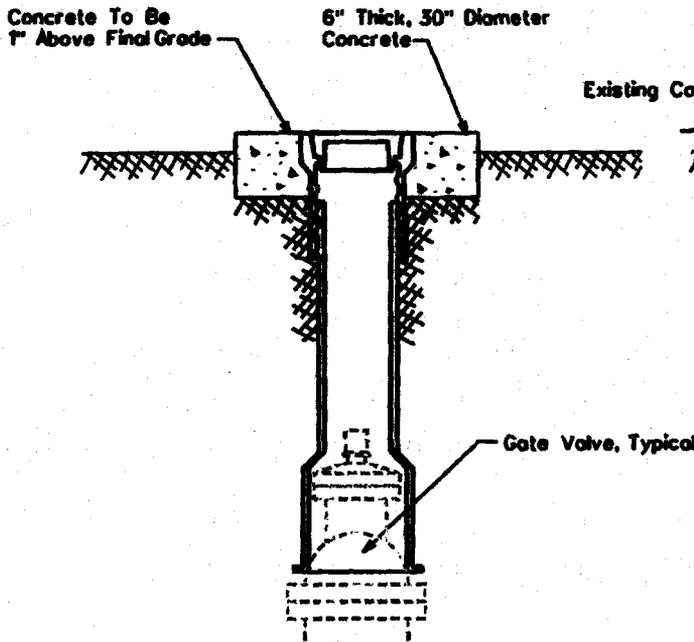
Precast Concrete Valve Blocks, Typical

ARIZONA WATER COMPANY

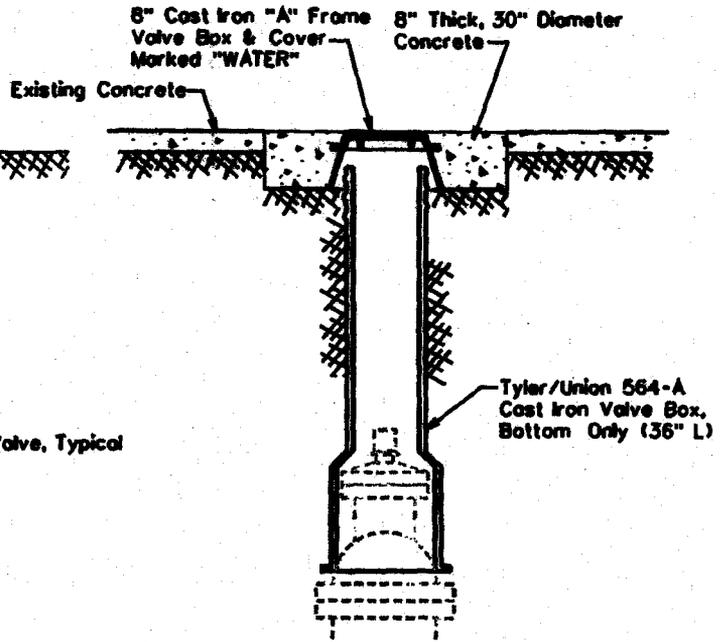
STANDARD SPECIFICATION FOR THE INSTALLATION OF

TYPICAL TAPPING SLEEVE AND VALVE

DRAWN BY: CB	APPROVED BY: MW	DATE: 03.20.1986	△ 08.23.2006
E-9-5-1			

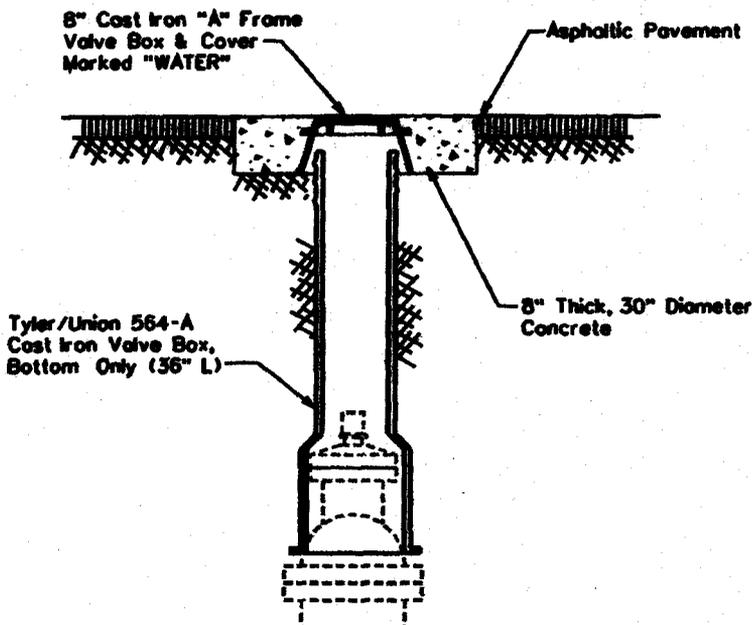


NON-VEHICULAR VALVE BOX



CONCRETE VALVE BOX

For Areas Subject To Vehicular Traffic



ASPHALT VALVE BOX
For Areas Subject To Vehicular Traffic

NOTE:

1. The Valve Box Shall Be Adjusted To Finished Grade Prior To Placing Of Asphalt And/Or Concrete.
2. For Non-Traffic Areas Use Tyler/Union 562-A, Two-Piece, 6855 Series Or Equivalent Adjustable Cast Iron Valve Box And Cover. Valves 4" To 12"
- For Traffic Areas, Use Tyler/Union 564-A Bottom Section Only With An 8" Cast Iron "A" Frame With Cover. Valves 4" To 12"
3. All Valves Installed Five Feet (5') Deep And Greater Are To Be Installed With A Valve Operator Extension, Mueller Catalog No. A-26441 And Shall Have A Debris Cop
4. Use Minimum Class "C" Concrete which is defined as concrete whose minimum compressive strength at 14 days reaches 1600psi and at 28 days reaches 2000psi per MAG Section 725, Table 725-1.

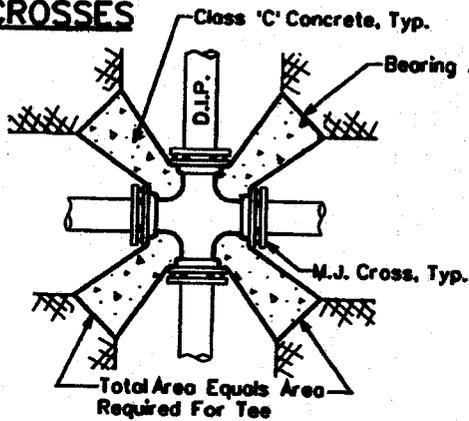
ARIZONA WATER COMPANY

STANDARD SPECIFICATION
FOR THE INSTALLATION OF

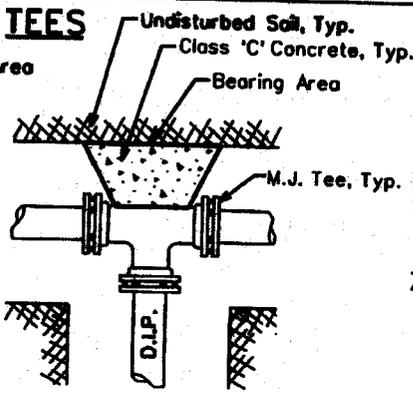
TYPICAL VALVE SUBJECT TO NON-VEHICULAR
AND VEHICULAR TRAFFIC

DRAWN BY: CB	APPROVED BY: MW	DATE: 03.20.1986	△ 8.24.2006	E-9-4-1
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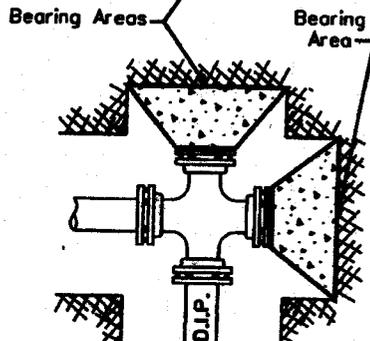
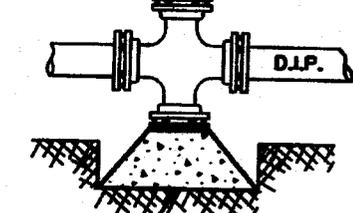
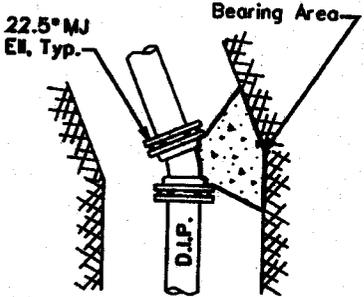
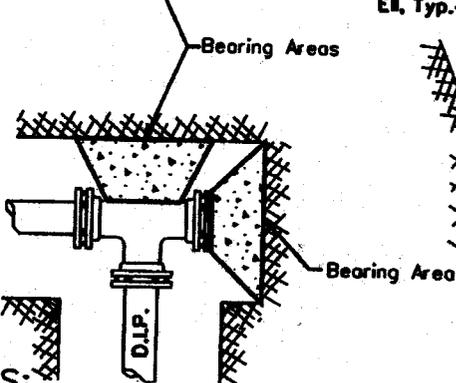
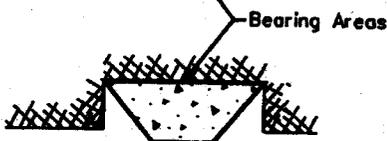
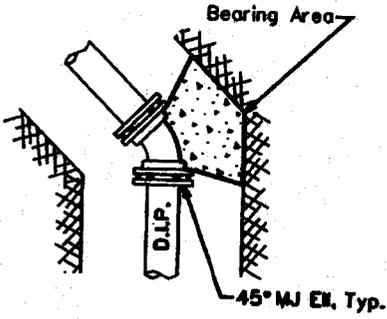
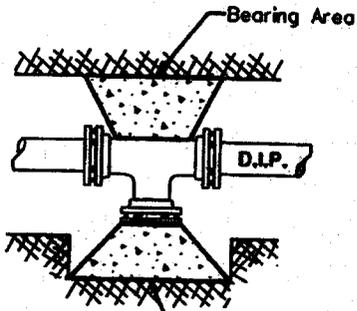
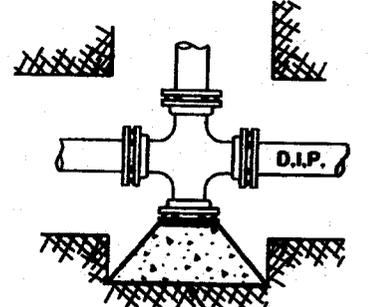
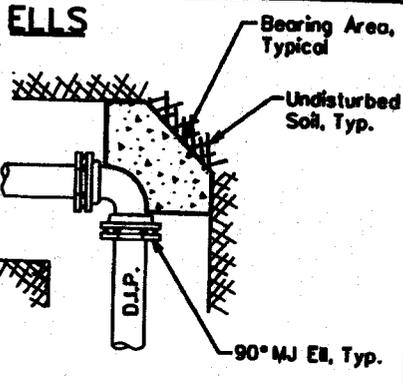
CROSSES



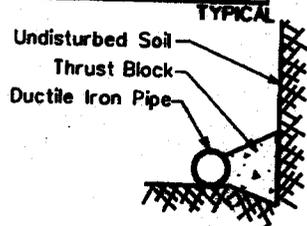
TEES



ELLS



CROSS SECTION



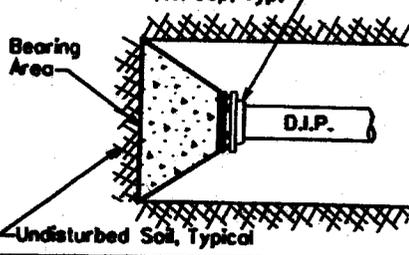
NOTES:

1. Use minimum Class 'C' concrete, which is defined as concrete whose minimum compressive strength at 14 days reaches 1600psi and at 28 days reaches 2000psi, per MAG Section 725, Table 725-1.
2. Thrust blocks are to bear on undisturbed earth with minimum bearing area as shown. If not undisturbed, areas will be increased as required.
3. Place the pressure treated form board in front of all plugs before pouring thrust blocks.
4. Form all non-bearing areas to prevent any concrete from entering any joint.
5. All flanges, bolts and nuts shall be kept free of concrete.
6. Center the bearing area on the pipe centerline and force line.
7. All pipe fittings to be wrapped with polyethylene pipe wrap prior to thrust block installation. (where applicable)

THRUST BLOCK SCHEDULE

PIPE SIZE	TEE, 45°, AND 22.5° ELLS, & PLUGS	90° ELLS
6" And Under	4 Sq.Ft.	6 Sq.Ft.
8"	6 Sq.Ft.	9 Sq.Ft.
12"	13 Sq.Ft.	20 Sq.Ft.
16"	23 Sq.Ft.	32 Sq.Ft.
18" And Larger	Calculated Per Project	

CAPS



STANDARD SPECIFICATION FOR THE INSTALLATION OF

TYPICAL THRUST BLOCKING SCHEDULE

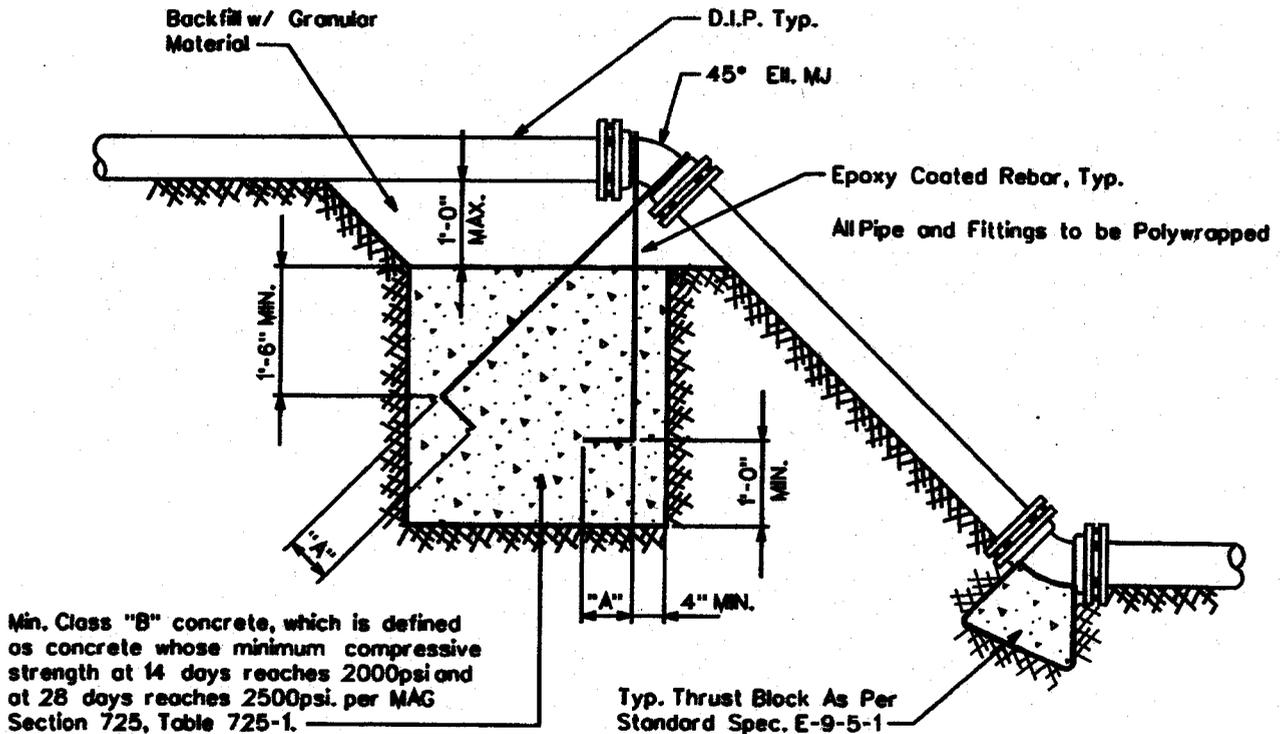
DRAWN BY: CB	APPROVED BY: MW	DATE: 03.20.1986	△ 05.27.2005	E-9-8-1
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NOTES

1. Bars In Conc. Thrust Block To Be Coated w/ 2 Coats Coal Tar Epoxy or by Other Approved Method.
2. Bars To Have 90° Hook @ Their Ends, As Per Table Below.

Pipe Size	Min. Bar Size	"A" Dimension (Hook)	Min. Block Dimension (WxHxL)
6"	#6	6"	3'x3'x3'
8"	#6	9"	4'x3'x4'
12"	#8	9"	5'x4'x5'
16"	#9	12"	7'x6'x7'

• For 125 P.S.I. Working Pressure

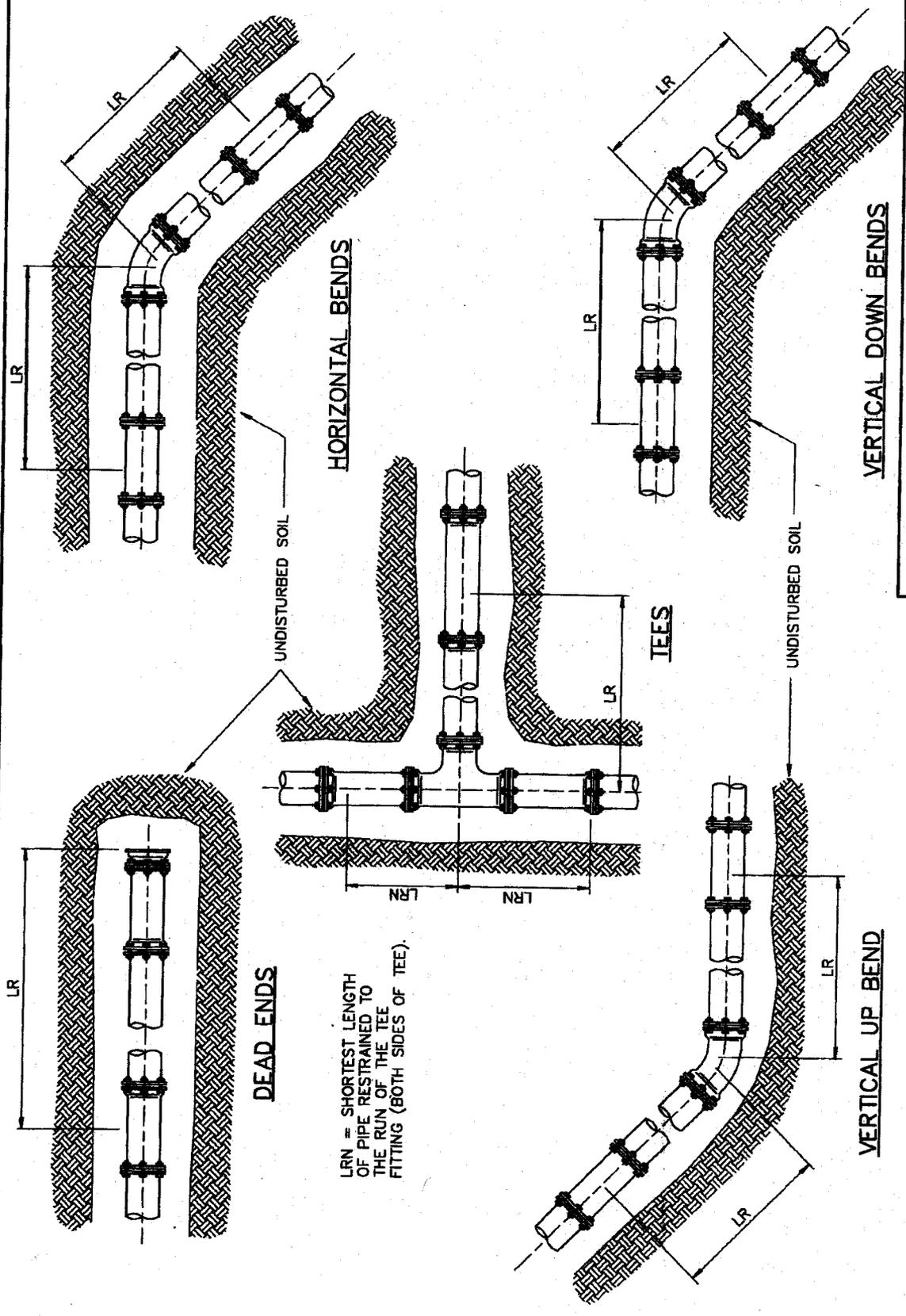


ARIZONA WATER COMPANY

**STANDARD SPECIFICATION
FOR THE INSTALLATION OF**

THRUST BLOCK FOR VERTICAL BENDS

DRAWN BY: JPK	APPROVED BY: MJW	DATE: 7-5-96	△ 01.16.2007	E-9-5-2
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STANDARD SPECIFICATION
 FOR THE INSTALLATION OF
JOINT RESTRAINT FOR NEW DUCTILE IRON AND C-900 PVC MAINS

DRAWN BY: CB APPROVED BY: MW DATE: 01.16.2007 Δ E-9-5-3-1

ARIZONA WATER COMPANY

RESTRAINED LENGTHS, LR, FOR DUCTILE IRON PIPE

NOMINAL PIPE SIZE INCHES	HORIZONTAL BENDS		TEES		VERTICAL OFFSETS								DEAD ENDS
	22-1/2'		LRN=0'	LRN=10'	90° BEND FITTINGS		45° BEND FITTINGS		22-1/2' BEND FITTINGS		22-1/2' BEND FITTINGS		
	90°	45°			DOWN BEND	UP BEND	DOWN BEND	UP BEND	DOWN BEND	UP BEND	DOWN BEND	UP BEND	
4	18	7	4	30	8	31	18	7	6	3	31		
6	25	10	5	43	20	44	25	18	10	9	5	44	
8	32	13	6	56	34	58	32	24	13	11	6	58	
10	38	16	8	68	45	69	38	29	16	14	8	69	
12	45	19	9	80	57	81	45	34	19	16	9	81	
14	51	21	10	91	68	92	51	38	21	18	10	92	
16	57	24	11	103	79	104	57	43	24	21	11	104	
18	62	26	12	113	90	115	62	48	26	23	12	115	
20	68	28	14	125	100	126	68	52	28	25	14	126	
24	79	33	16	145	121	147	79	61	33	29	16	147	

RESTRAINED LENGTHS, LR, FOR DUCTILE IRON PIPE WITH POLYETHYLENE WRAP

NOMINAL PIPE SIZE INCHES	HORIZONTAL BENDS		TEES		VERTICAL OFFSETS								DEAD ENDS
	22-1/2'		LRN=0'	LRN=10'	90° BEND FITTINGS		45° BEND FITTINGS		22-1/2' BEND FITTINGS		22-1/2' BEND FITTINGS		
	90°	45°			DOWN BEND	UP BEND	DOWN BEND	UP BEND	DOWN BEND	UP BEND	DOWN BEND	UP BEND	
4	26	11	5	69	18	72	26	11	14	5	72		
6	36	15	7	99	47	102	36	42	15	20	7	102	
8	47	19	9	130	78	133	47	55	19	26	9	133	
10	56	23	11	157	103	159	56	66	23	32	11	159	
12	65	27	13	185	131	187	65	77	27	37	13	187	
14	74	31	15	211	156	214	74	89	31	42	15	214	
16	82	34	16	238	183	241	82	100	34	48	16	241	
18	90	37	18	263	207	266	90	110	38	53	18	266	
20	98	41	20	289	233	292	98	121	41	58	20	292	
24	113	47	22	337	280	340	113	141	47	68	22	340	

NOTES:

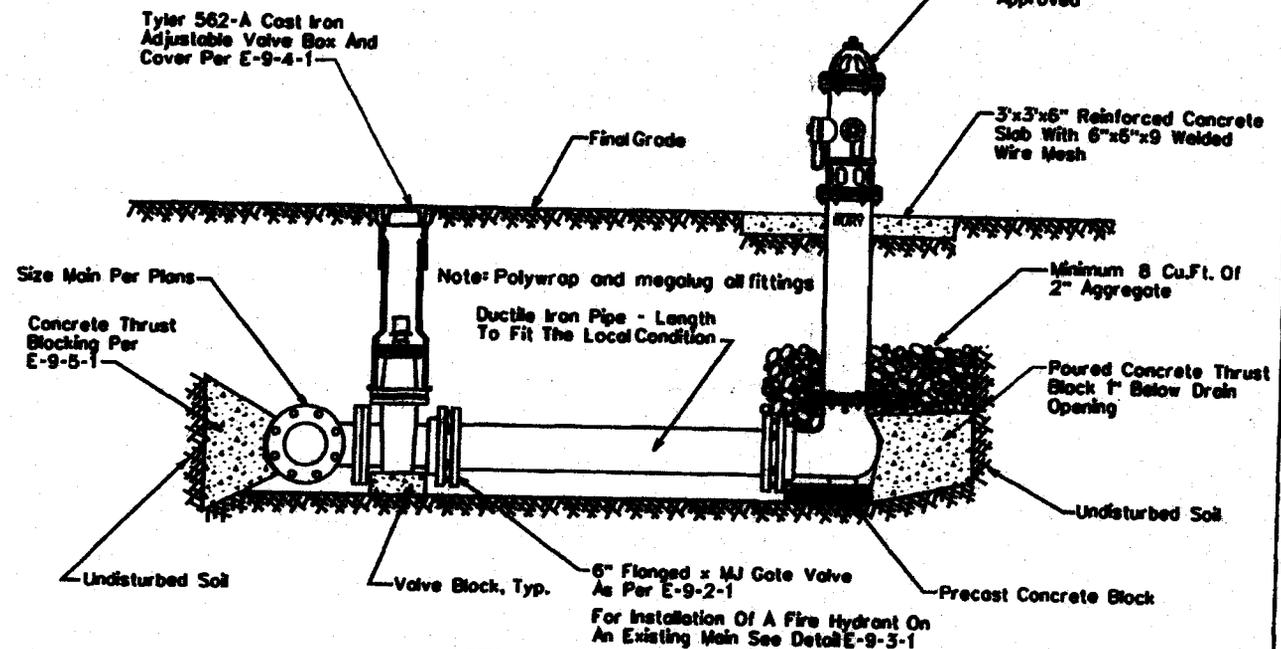
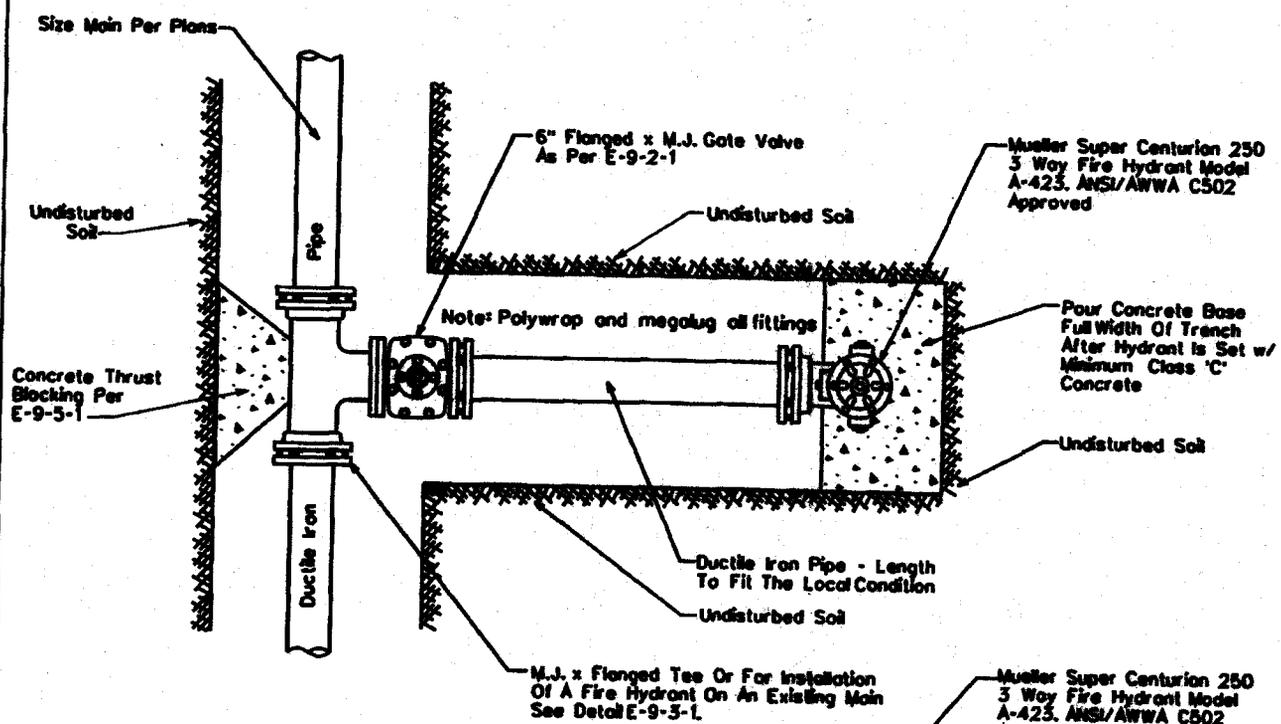
1. ALL JOINTS WITHIN THE SPECIFIED LENGTH LR MUST BE RESTRAINED.
2. ALL LENGTHS ARE GIVEN IN FEET.
3. THE MAXIMUM TEST PRESSURE SHALL NOT EXCEED 200 PSI
4. THE MINIMUM DEPTH OF BURY SHALL BE 3' TO TOP OF PIPE.
4. RESTRAINED LENGTHS MAY BE REDUCED WHEN SUPPORTED BY ENGINEERING CALCULATIONS.

STANDARD SPECIFICATION
FOR THE INSTALLATION OF

JOINT RESTRAINT FOR NEW DUCTILE IRON AND C-900 PVC MAINS

DESIGNED BY: CB APPROVED BY: MW DATE: 01.16.2007 Δ E-9-5-3-2

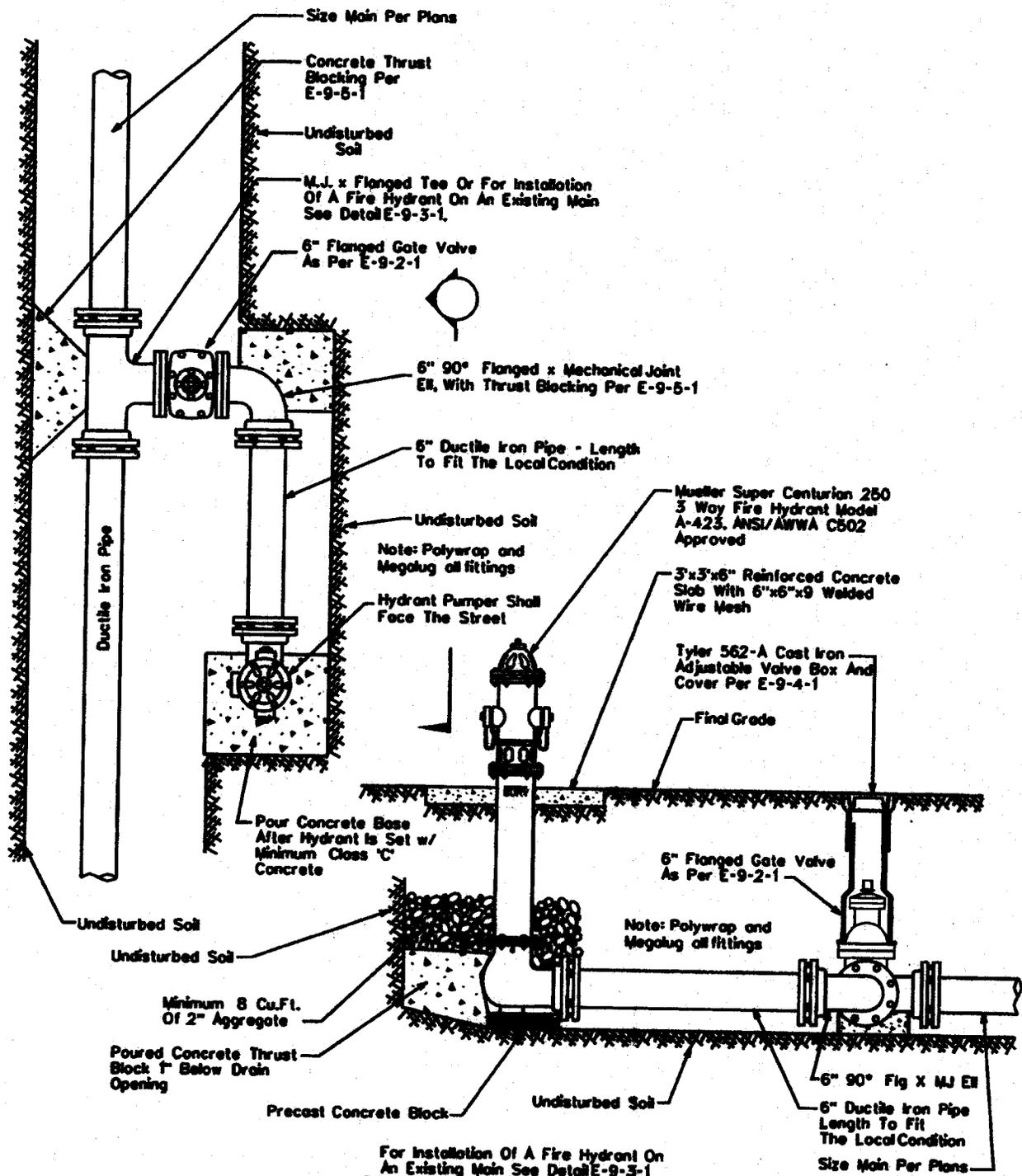




NOTE: All Flanges, Bolts, Nuts and Drain Holes Shall Be Kept Free Of Concrete

ARIZONA WATER COMPANY

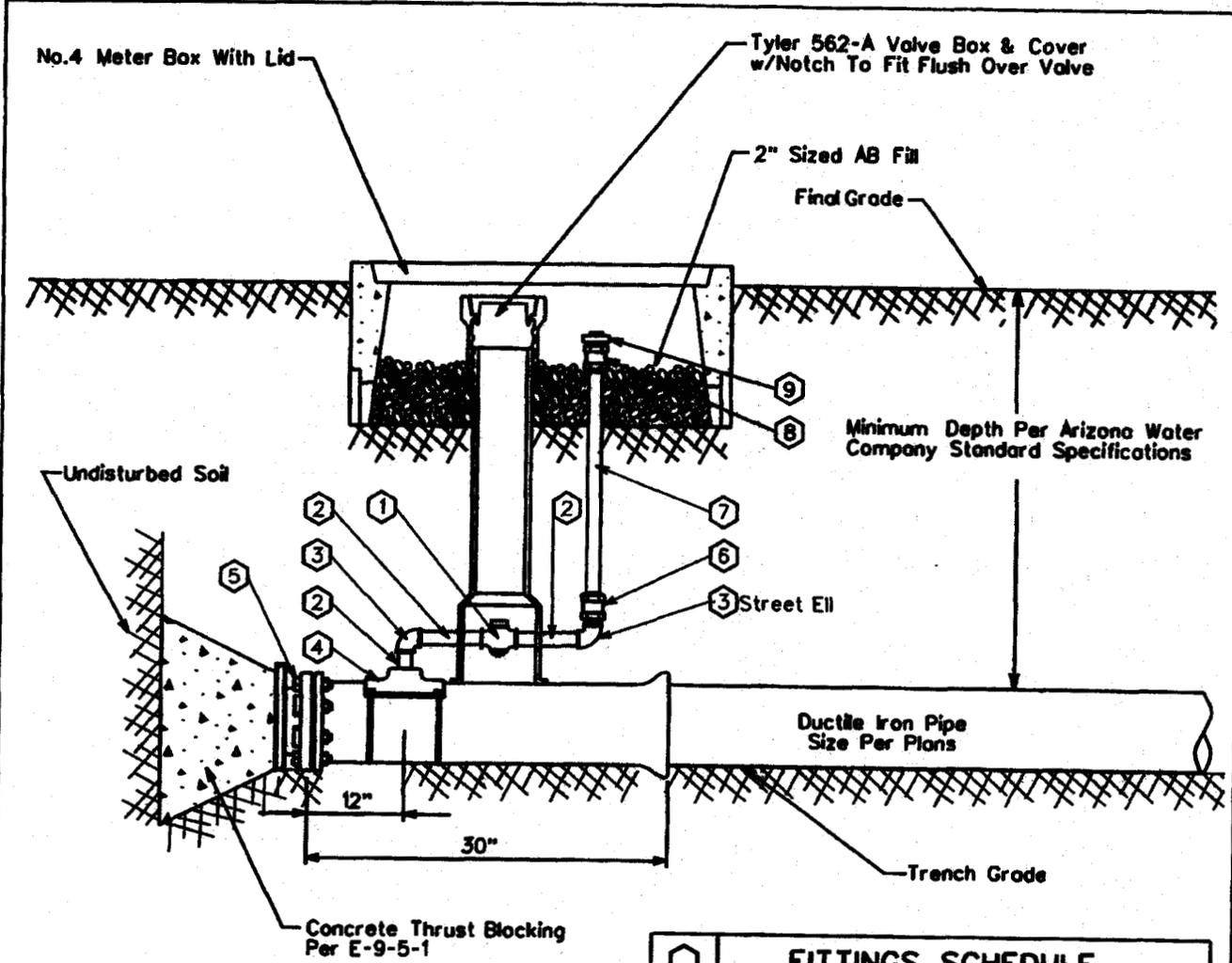
STANDARD SPECIFICATION				
FOR THE INSTALLATION OF				
TYPICAL PERPENDICULAR FIRE HYDRANT				
DRAWN BY:	APPROVED BY:	DATE:		
CB	MW	1-28-91	△ 08.24.2006	E-9-6-1



NOTE: All Flanges, Bolts, Nuts And Drain Holes Shall Be Kept Free Of Concrete.

ARIZONA WATER COMPANY

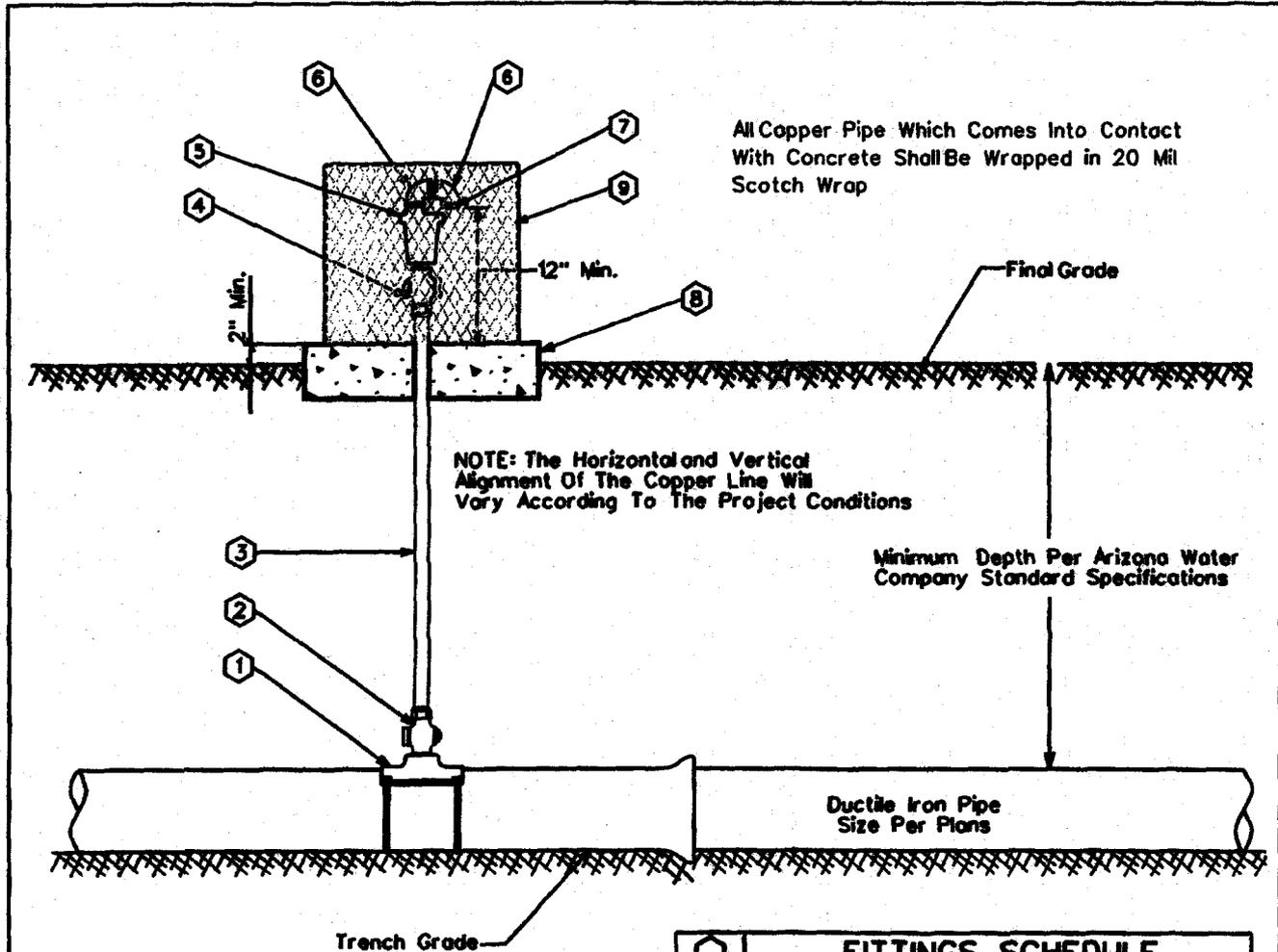
STANDARD SPECIFICATION				
FOR THE INSTALLATION OF				
TYPICAL PARALLEL FIRE HYDRANT				
DRAWN BY:	APPROVED BY:	DATE:		
JW	M/W	03.20.1986	△ 08.24.2006	E-9-7-1



FITTINGS SCHEDULE	
1.	2" Mueller 300 Ball Curb Valve B-20283 FP x FP W/ 2" Mueller Brass Square Wrench Nut Adapter B-20299
2.	2" Brass Nipple - Length To Fit Field Conditions
3.	2" Brass 90° Elbow, IPST
4.	Mueller Double Strap Bronze Service Saddle - BR28
5.	M.J. Plug - Megalug Restraints May Be Required
6.	2" Straight Coupling CC x FP H-15451
7.	2" Copper Pipe
8.	2" Straight Coupling CC x MP H-15428
9.	2" Square Head Plug, MP

ARIZONA WATER COMPANY

STANDARD SPECIFICATION FOR THE INSTALLATION OF			
2" BLOWOFF ASSEMBLY			
DRAWN BY: CB	APPROVED BY: MW	DATE: 03.20.1986	△ 03.21.2006
			E-9-8-1



GENERAL NOTES:

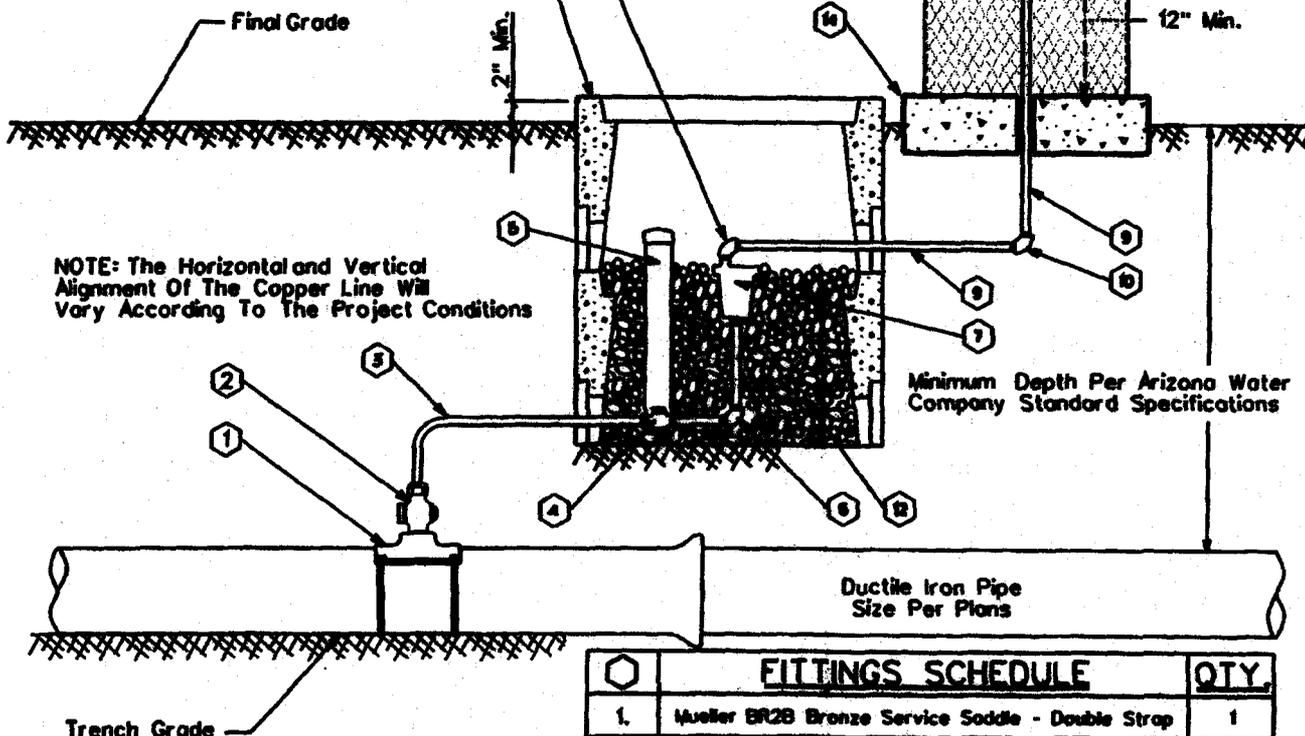
1. The valve shall be installed at high points and on long runs to vent the accumulation of air with the line under pressure- see the construction plans for specific locations.
2. The valve shall have a 1/4" orifice with valve sealing faces of stainless steel and BUNA-N rubber.
3. The valve shall be Crispin model AR10 for 6" and larger water mains.
4. Crispin model AR10 valve construction consists of a 1" IPST inlet & 1/2" IPST outlet, cast iron body and top flange with stainless steel float and trim.
5. The air release assembly shall be located out of the path of traffic but within right-of-way or easement.

FITTINGS SCHEDULE	
1.	Mueller BR2B Bronze Service Saddle - Double Strap
2.	1" Mueller B-2500B Taper x Comp. Ball Corp Stop
3.	1" Type 'K' Copper w/NO Splices - Field Fit
4.	1" Mueller B-2502B IP x Comp. Ball Corp Stop
5.	Crispin 1" Air Release Valve, Model AR10
6.	1/2" Brass Street Elbow
7.	No. 16 Wire Mesh Screen (Non-Corroddible)
8.	4" Thick Concrete Pad - Class 'C' Concrete
9.	Guardhook, Model GS-1, Available From EPOL, Inc. Available in Leaf Green Or Desert Tan

ARIZONA WATER COMPANY

STANDARD SPECIFICATION FOR THE INSTALLATION OF			
TYPICAL AIR RELEASE VALVE			
DRAWN BY: CB	APPROVED BY: MW	DATE: 03.20.1997	△ 08.24.2006 E-9-8-2

All Copper Pipe Which Comes Into Contact With Concrete Shall Be Wrapped In 20 Mil Scotch Wrap



NOTE: The Horizontal and Vertical Alignment Of The Copper Line Will Vary According To The Project Conditions

Minimum Depth Per Arizona Water Company Standard Specifications

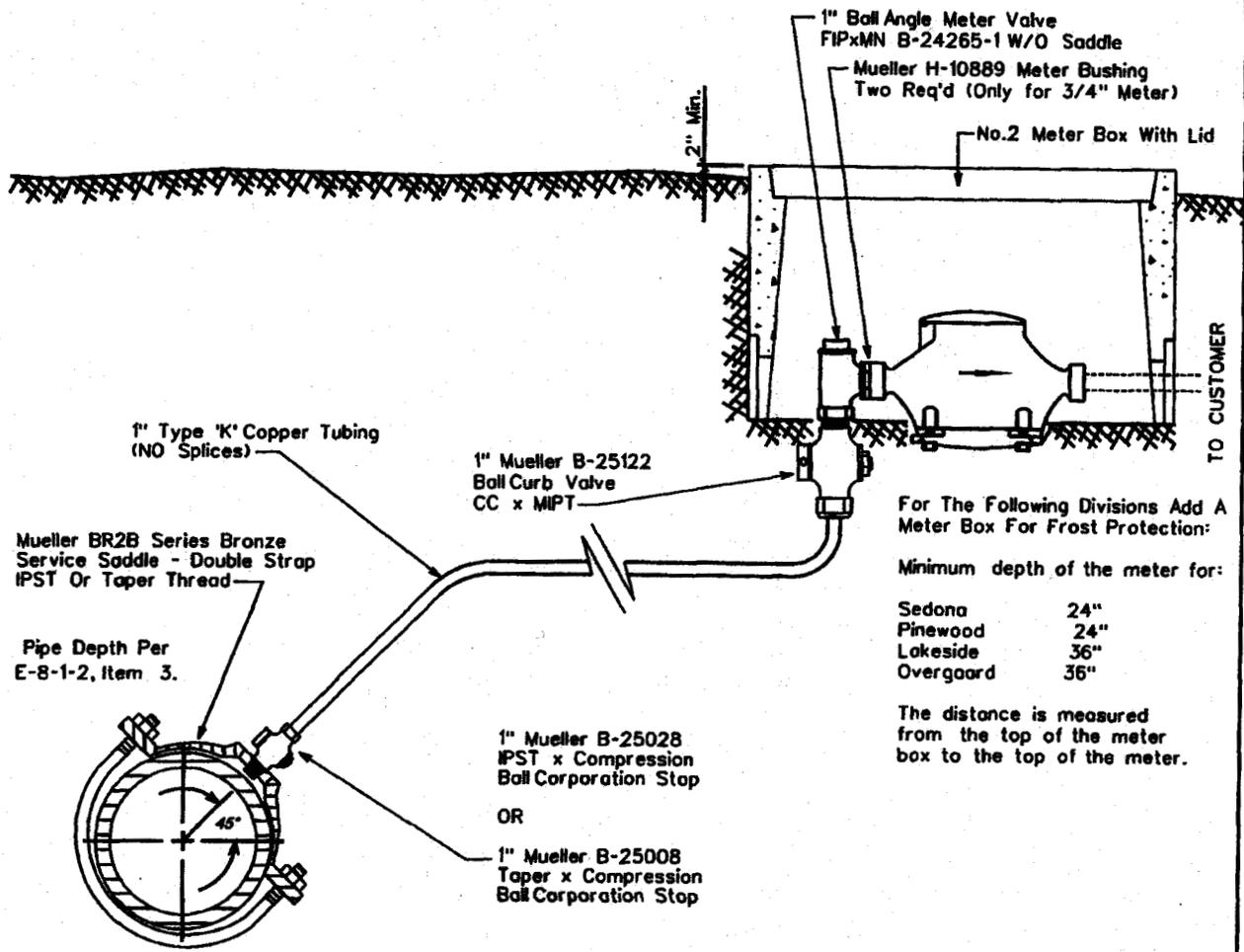
GENERAL NOTES:

1. The valve shall be installed at high points and on long runs to vent the accumulation of air with the line under pressure- see the construction plans for specific locations.
2. The valve shall have a 1/4" orifice with valve sealing faces of stainless steel and BUNA-N rubber.
3. The valve shall be Crispin model AR10 for 6" and larger water mains.
4. Crispin model AR10 valve construction consists of a 1" PST inlet & 1/2" PST outlet, cast iron body and top flange with stainless steel foot and trim.
5. The air release assembly shall be located out of the path of traffic but within the right-of-way or easement.

QTY.	FITTINGS SCHEDULE	
1	Mueller BR2B Bronze Service Saddle - Double Strap	1
2	1" Mueller B-25008 Taper x Comp. Ball Corp Stop	1
3	1" Type 'K' Copper w/NO Splices - Field Fit	As Req'd
4	1" Mueller B-25028 IP x Comp. Ball Corp Stop	1
5	3" PVC Pipe w/ Cap (Loose Fit)	1
6	1" x 4" Brass Nipple w/90° Elbow	1
7	Crispin 1" Air Release Valve, Model AR10	1
8	1/2" Brass Street Elbow	2
9	1/2" Galvanized Pipe - Length as req'd	2
10	1/2" Galvanized 90° El	2
11	Number 1 Meter Box	2
12	2" Sized AB (Fill Meter Box To The Top Of The Air Release Valve)	As Req'd
13	No.16 Wire Mesh Screen (Non-Corroding)	1
14	4" Thick Concrete Pad - Class 'C' Concrete	1
15	Guardhook, Model GS-1, Available From BPD, Inc. Available In Leaf Green Or Desert Tan	1

ARIZONA WATER COMPANY

STANDARD SPECIFICATION FOR THE INSTALLATION OF				
AIR RELEASE VALVE FOR THE NORTHERN REGION				
DRAWN BY: CB	APPROVED BY: MW	DATE: 03.20.1997	△ 08.24.2006	E-9-B-3



SADDLE TAP TO CA, PVC, OR DI PIPE

NOTE: The minimum distance between tops on mains other than ductile iron is 12"

NOTE: Only the meter is supplied by Arizona Water Company



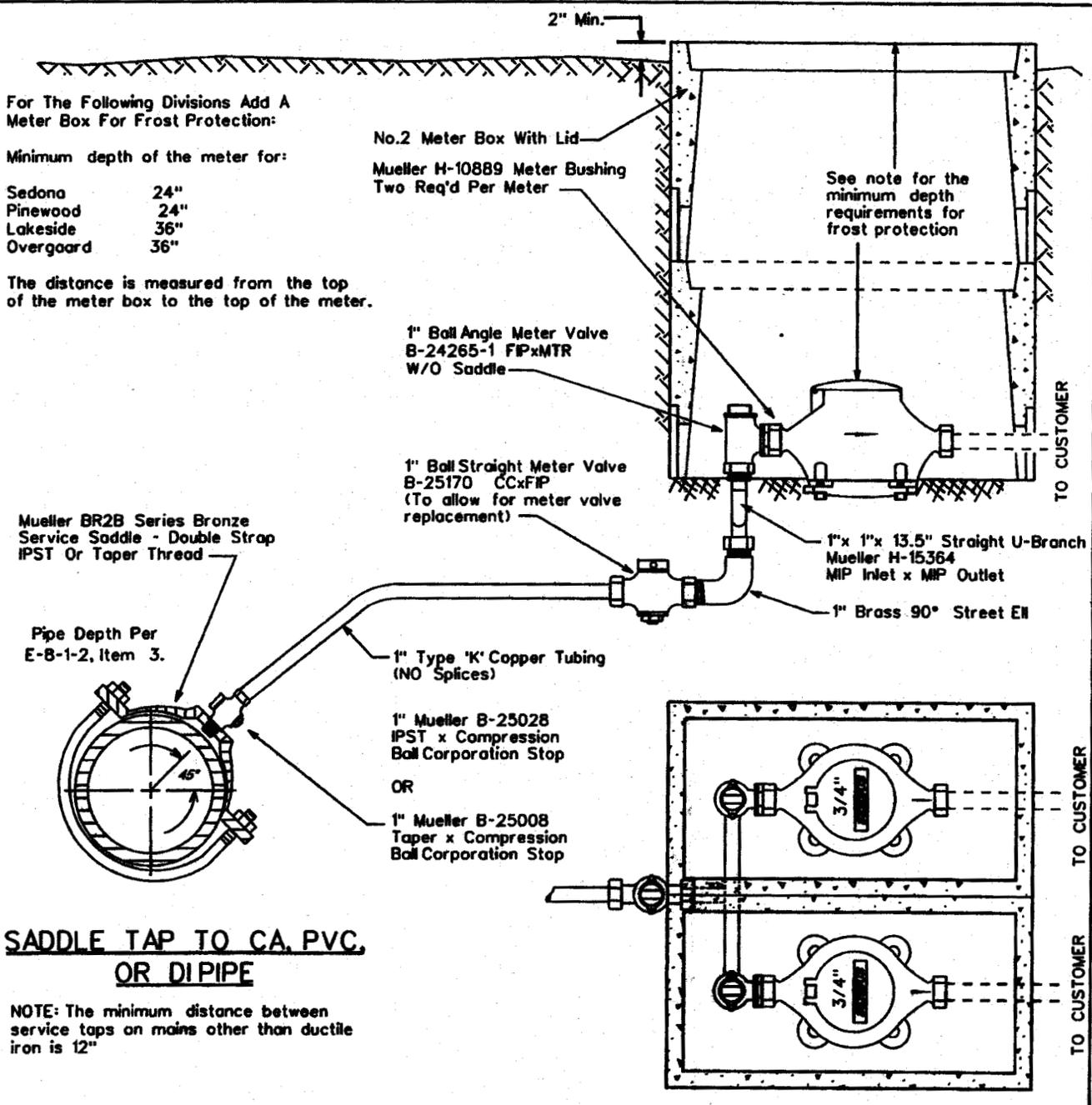
STANDARD SPECIFICATION FOR THE INSTALLATION OF			
SINGLE SERVICE CONNECTION FOR A 3/4" OR 1" METER			
DRAWN BY:	APPROVED BY:	DATE:	REV:
CCO	M.W.	3/20/86	△ 03.17.2006
			E-9-9-1

For The Following Divisions Add A Meter Box For Frost Protection:

Minimum depth of the meter for:

Sedona	24"
Pinewood	24"
Lakeside	36"
Overgaard	36"

The distance is measured from the top of the meter box to the top of the meter.



**SADDLE TAP TO CA PVC,
OR DI PIPE**

NOTE: The minimum distance between service taps on mains other than ductile iron is 12"

NOTE:
Only the meter is supplied by
Arizona Water Company

ARIZONA WATER COMPANY

STANDARD SPECIFICATION FOR THE INSTALLATION OF				
DOUBLE SERVICE CONNECTION FOR 3/4" METERS				
DRAWN BY:	APPROVED BY:	DATE:		
CCO	M.W.	3-20-86	△ 08.25.2006	E-9-10-1

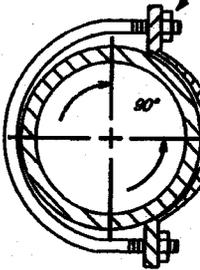
For The Following Divisions Add A
Meter Box For Frost Protection:

Minimum depth of the meter for:

Sedona	24"
Pinewood	24"
Lakeside	36"
Overgaard	36"

The distance is measured from the top of the meter box to the top of the meter.

Mueller BR2B Series Bronze Service Saddle - Double Strap IPST Or Taper Thread



Pipe Depth Per E-8-1-2, Item 3.

No.2 Meter Box With Lid

See note for the minimum depth requirements for frost protection

1" Ball Angle Meter Valve B-24265-1 FIPxMTR W/O Saddle

2" Mueller Ball Curb Valve B-25172 CCxFIP (To allow for meter valve replacement)

2" Type 'K' Copper Tubing (NO Splices)

2" Mueller B-25028 IPST x Compression Ball Corporation Stop

OR

2" Mueller B-25008 Taper x Compression Ball Corporation Stop

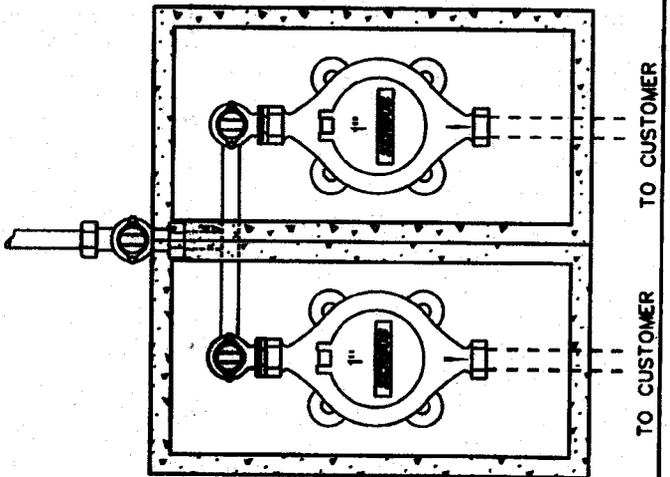
1"x 1"x 13.5" Straight U-Branch Mueller H-15364 MIP Inlet x MIP Outlet

1" Brass 90° Street El

Mueller 47164 Brass Bushing 2" MIP x 1" FIP

**SADDLE TAP TO CA, PVC,
OR DIPIPE**

NOTE: The minimum distance between service taps on mains other than ductile iron is 12"



NOTE: THE LENGTH OF SERVICE IS LIMITED TO COMMERCIALY AVAILABLE ROLLS, TYPICALLY 60 FEET

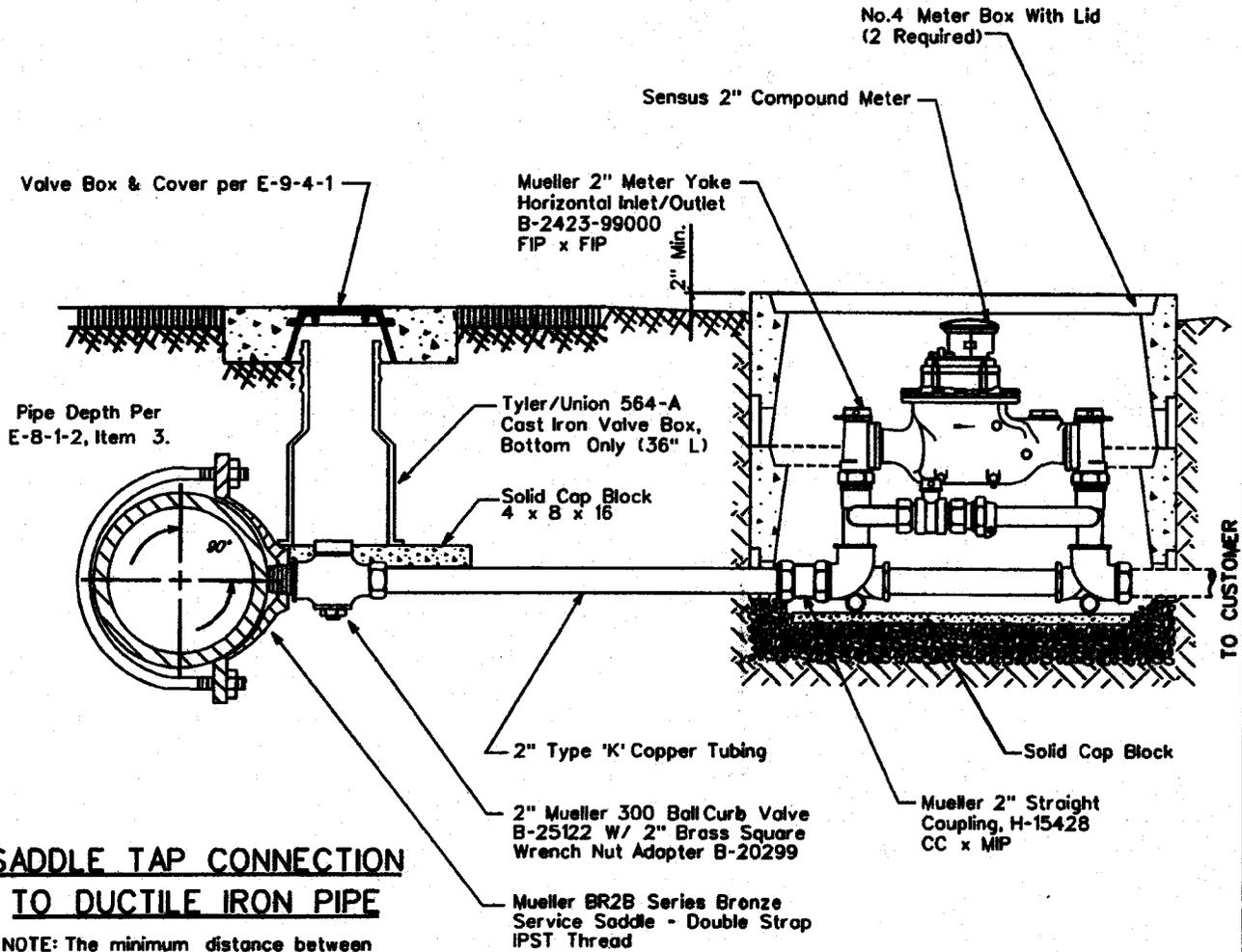
NOTE: Only the meter is supplied by Arizona Water Company

ARIZONA WATER COMPANY

STANDARD SPECIFICATION
FOR THE INSTALLATION OF

DOUBLE SERVICE CONNECTION FOR 1" METERS

DRAWN BY: CB	APPROVED BY: M.W.	DATE 03.17.2006	△ 08.29.2006	E-9-10-2
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**SADDLE TAP CONNECTION
TO DUCTILE IRON PIPE**

NOTE: The minimum distance between service taps on mains other than ductile iron is 12"

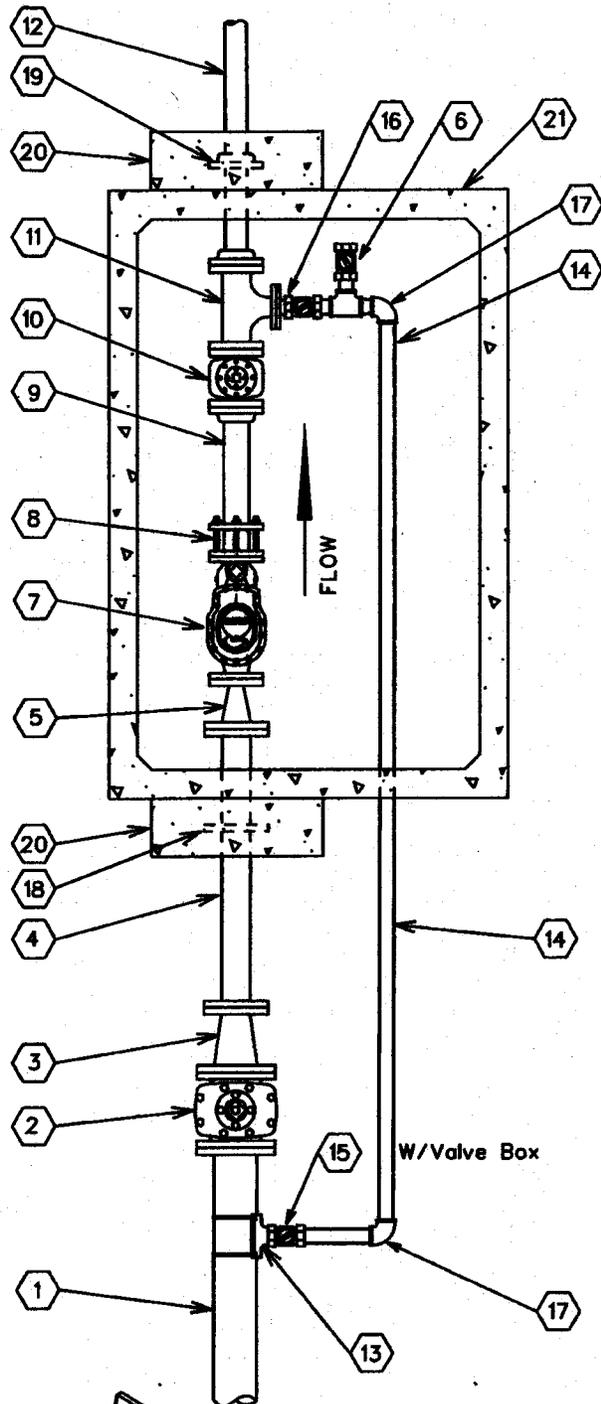
NOTE: THE LENGTH OF SERVICE IS LIMITED TO COMMERCIALY AVAILABLE ROLLS, TYPICALLY 60 FEET

NOTE:

Only the meter is supplied by Arizona Water Company



STANDARD SPECIFICATION FOR THE INSTALLATION OF				
TYPICAL 2" SERVICE CONNECTIONS				
DRAWN BY:	APPROVED BY:	DATE:	REV:	E-9-11-1
JW	M.W.	3/20/86	△ 08.29.2006	



No.	FITTINGS SCHEDULE
1.	6" D.I.P.
2.	6" G.V.B.&C. mj x flng
3.	6"x4" Reducer flng x mj
4.	4"x3'-0" D.I.P. Spool flng x pe
5.	4" x 3" Reducer flng
6.	2" Test Port
7.	3" Compound Meter
8.	3" F.C.A.
9.	3"x2'-0" D.I. Spool flng x pe
10.	3" Gate Valve flng
11.	3"x2" Flg Tee w/ 2" Companion Flange
12.	3"x4'-0" D.I. Spool flng x pe
13.	6"x2" Tapping Saddle
14.	2" Copper Pipe
15.	2" Mueller B25122 Ball Valve w/B20299 Nut
16.	2" Locking Ball Valve (normally closed)
17.	2" Mueller H-15526 90° EllCC x CC
18.	4" Megalug
19.	3" Slip-On Welding Flange
20.	24"x24"x8" Conc. Thrust Block P.I.P.
21.	575-LA Conc. Vault

NOTE:

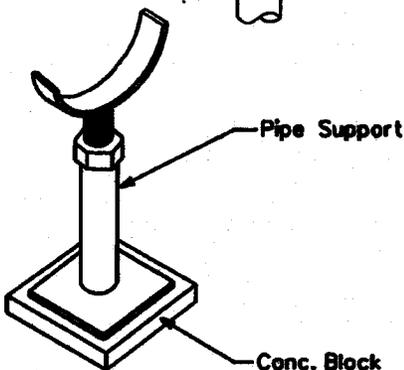
1. Use Rowley pipe supports or equivalent as needed (See detail below).
2. Pipe support locations to be determined by field personnel.
3. All copper pipe that comes in contact with concrete to be wrapped w/10-20 Mil. Scotchwrap corrosion protection tape.
4. All mechanical joint fittings are to be megalugged.
5. Use deflection fittings (45° Ells.) to achieve necessary depths & cover as shown on the standard specification for the installation of a concrete vault (E-9-12-5).

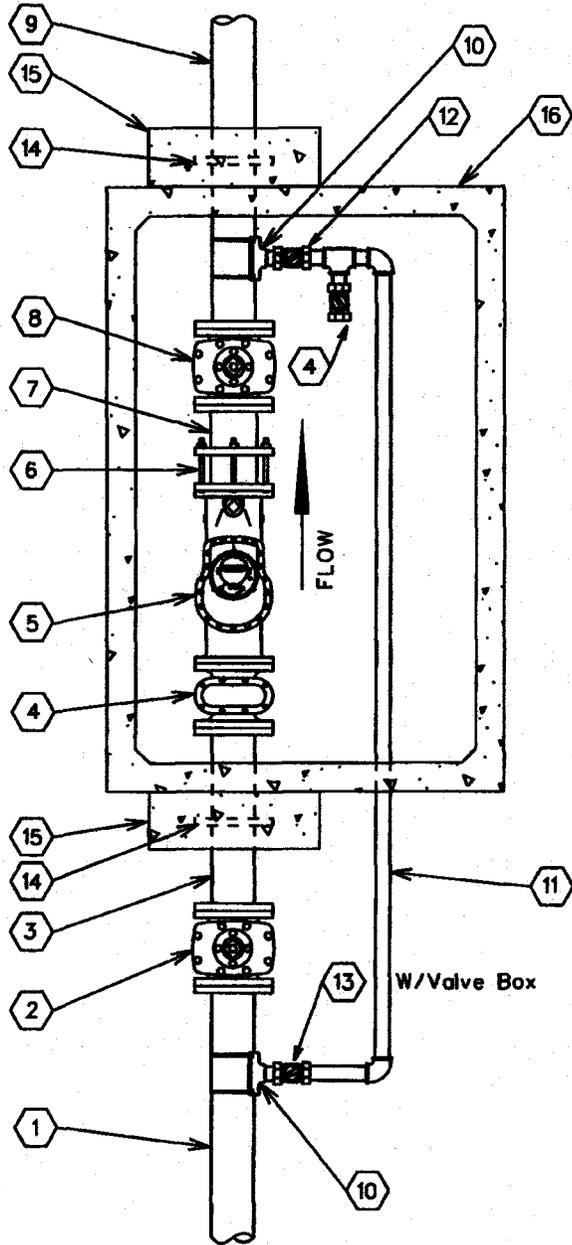
ARIZONA WATER COMPANY

**STANDARD SPECIFICATION
FOR THE INSTALLATION OF**

3" COMPOUND METER

DRAWN BY: CCO	APPROVED BY: MW	DATE: 10/5/1993	△08.29.2006	E-9-12-1
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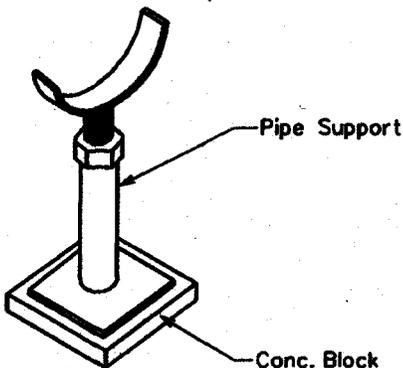




No.	FITTINGS SCHEDULE
1.	6" D.I.P.
2.	6" G.V.B.&C. mj
3.	6"x 3'-0" D.I.P. Spool flng x pe
4.	2" Test Port
5.	6" Compound Meter
6.	6" F.C.A.
7.	6"x 1'-0" D.I.P. Spool flng x pe
8.	6" Gate Valve flng
9.	6"x 4'-0" D.I.P. Spool flng x pe
10.	6"x2" Tapping Saddle
11.	2" Copper Pipe
12.	2" Ball Valve / Locking (Normally Closed)
13.	2" Mueller B25122 Ball Valve w/B20299 Nut
14.	6" Megalog
15.	24"x24"x8" Conc. Thrust Block P.I.P.
16.	575-LA Conc. Vault

NOTE:

1. Use Rowley pipe supports or equivalent as needed (See detail below).
2. Pipe support locations to be determined by field personnel.
3. All copper pipe that comes in contact with concrete to be wrapped w/10-20 Mil. Scotchwrap corrosion protection tape.
4. All mechanical joint fittings are to be megalogged.
5. Use deflection fittings (45° Ells.) to achieve necessary depths & cover as shown on the standard specification for the installation of a concrete vault (E-9-12-5).

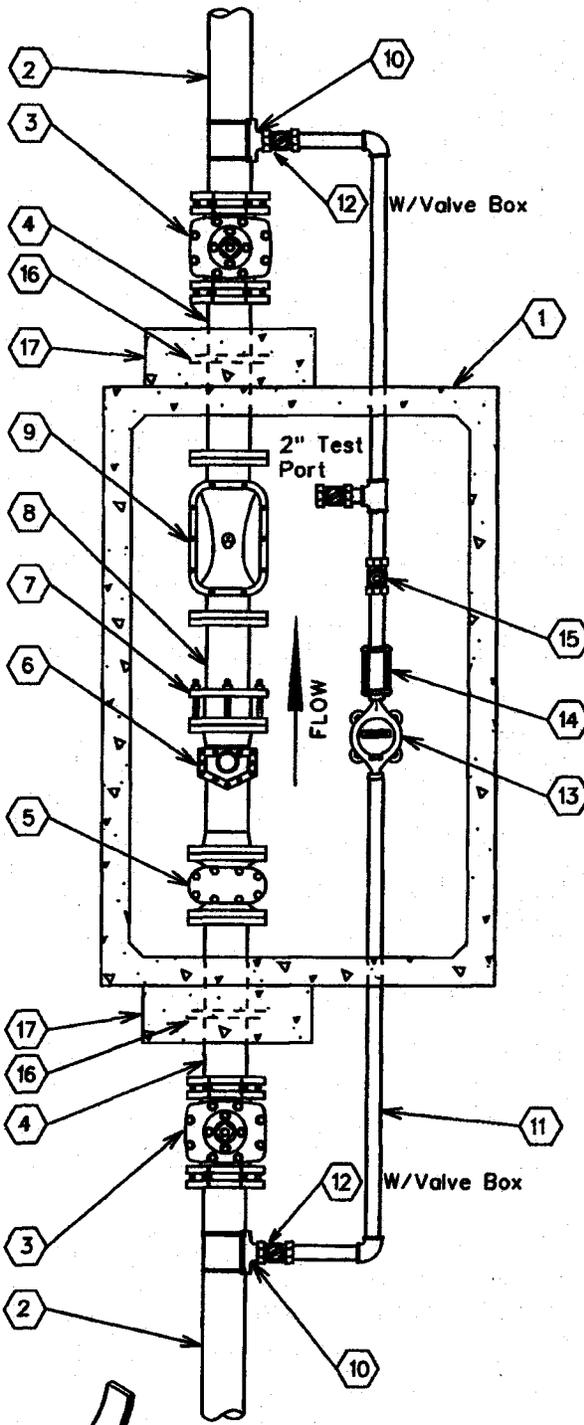


ARIZONA WATER COMPANY

STANDARD SPECIFICATION FOR THE INSTALLATION OF

6" COMPOUND METER

DRAWN BY:	CCO	APPROVED BY:	MW	DATE:	10/5/1993	△08.29.2006	E-9-12-3
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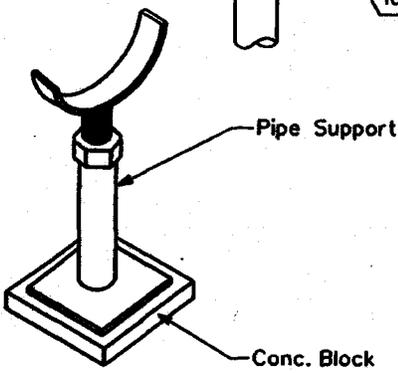


No.	FITTINGS SCHEDULE
1.	575-LA Conc. Vault
2.	6" D.I.P.
3.	6" G.V.B.&C. m.j.
4.	6" x 3'-0" D.I.P. SpoolPiece flng x pe
5.	6" Strainer
6.	6" Turbo Meter
7.	6" F.C.A.
8.	6" x 2'-0" D.I.P. SpoolPiece flng x pe (TRM SPDOL PIECE TO 3x THE PIPE DIA.)
9.	6" Detector Check
10.	6"x"N" Tapping Saddle
11.	"N" Copper Pipe
12.	"N" Ball Valve (Locking)
13.	"N" Meter
14.	"N" Coup. Adapt.
15.	"N" Flapper Check Valve
16.	6" Megalug
17.	24"x24"x8" Conc. Thrust Block P.I.P.

"N - Size To Be determined By A.W.Co.

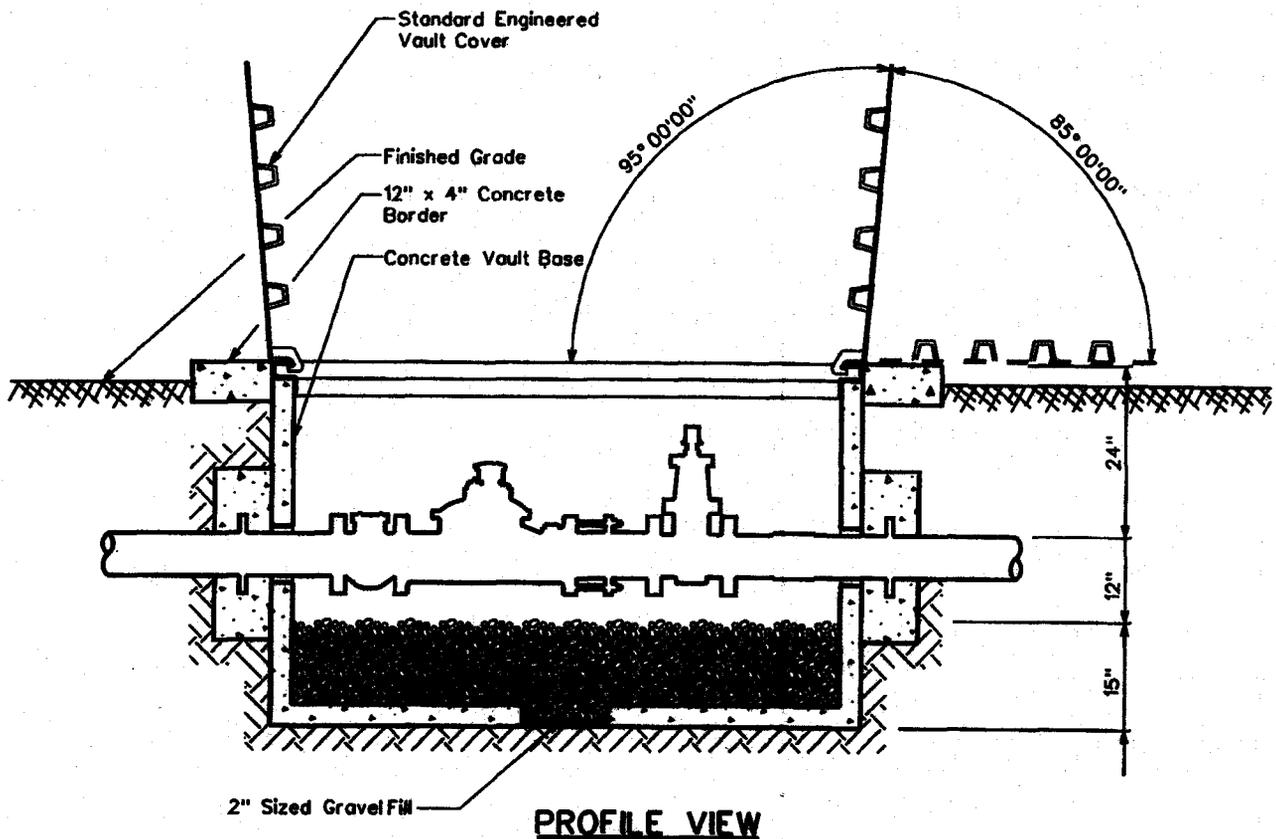
NOTE:

1. Use Rowley pipe supports or equivalent as needed (See detail below).
2. Pipe support locations to be determined by field personnel.
3. All copper pipe that comes in contact with concrete to be wrapped w/10-20 Mil. Scotchwrap corrosion protection tape.
4. All mechanical joint fittings are to be megalugged.
5. Use deflection fittings (45° Ells.) to achieve necessary depths & cover as shown on the standard specification for the installation of a concrete vault (E-9-12-5).
6. To change from a 6" service to a 4" service, change all listed 6" materials to 4" materials.



ARIZONA WATER COMPANY

STANDARD SPECIFICATION			
FOR THE INSTALLATION OF			
6" COMPOUND SERVICE			
DRAWN BY:	APPROVED BY:	DATE:	E-9-12-4
CCO	MW	10/05/1993	△08.29.2006



CONCRETE VAULT & COVER SPECIFICATIONS

- Vault - Base No. 575-BL
- Cover - Standard Engineered Vault Cover
- .4874 Aluminum Diamond Plate Cover For Non-Traffic Loading Areas
- Or
- .4874 Galvanized Steel Diamond Plate Cover W/ H-20 Traffic Loading
- . Double Torsion Spring Assisted Doors W/ Recessed Hasp & Safety Latches

NOTES

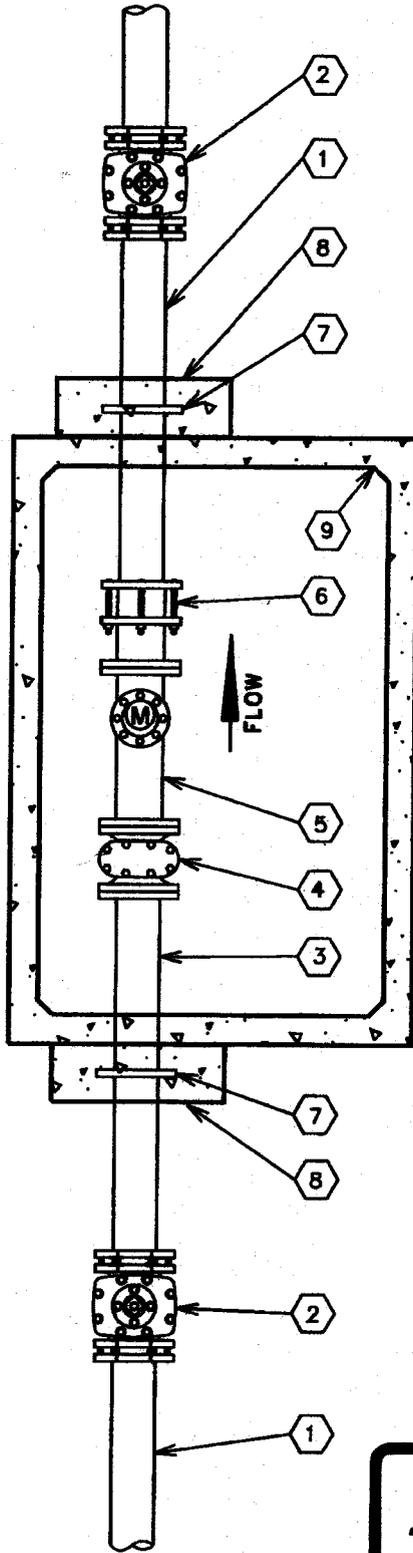
1. Total Depth Of Concrete Vault To Be A Maximum Of 3'-0" From Top Of Vault Cover To Top Of Gravel Fill.
2. Service Connections Larger Than 6" In Diameter Will Conform To The Same Vault & Cover Specifications. Size Of Vault & Cover To Be Determined By A.W.Co. Engineers.

ARIZONA WATER COMPANY

**STANDARD SPECIFICATION
FOR THE INSTALLATION OF**

CONCRETE VAULT

DRAWN BY: CCO	APPROVED BY: MW	DATE: 10/5/1993	△ 05.17.2001	E-9-12-5
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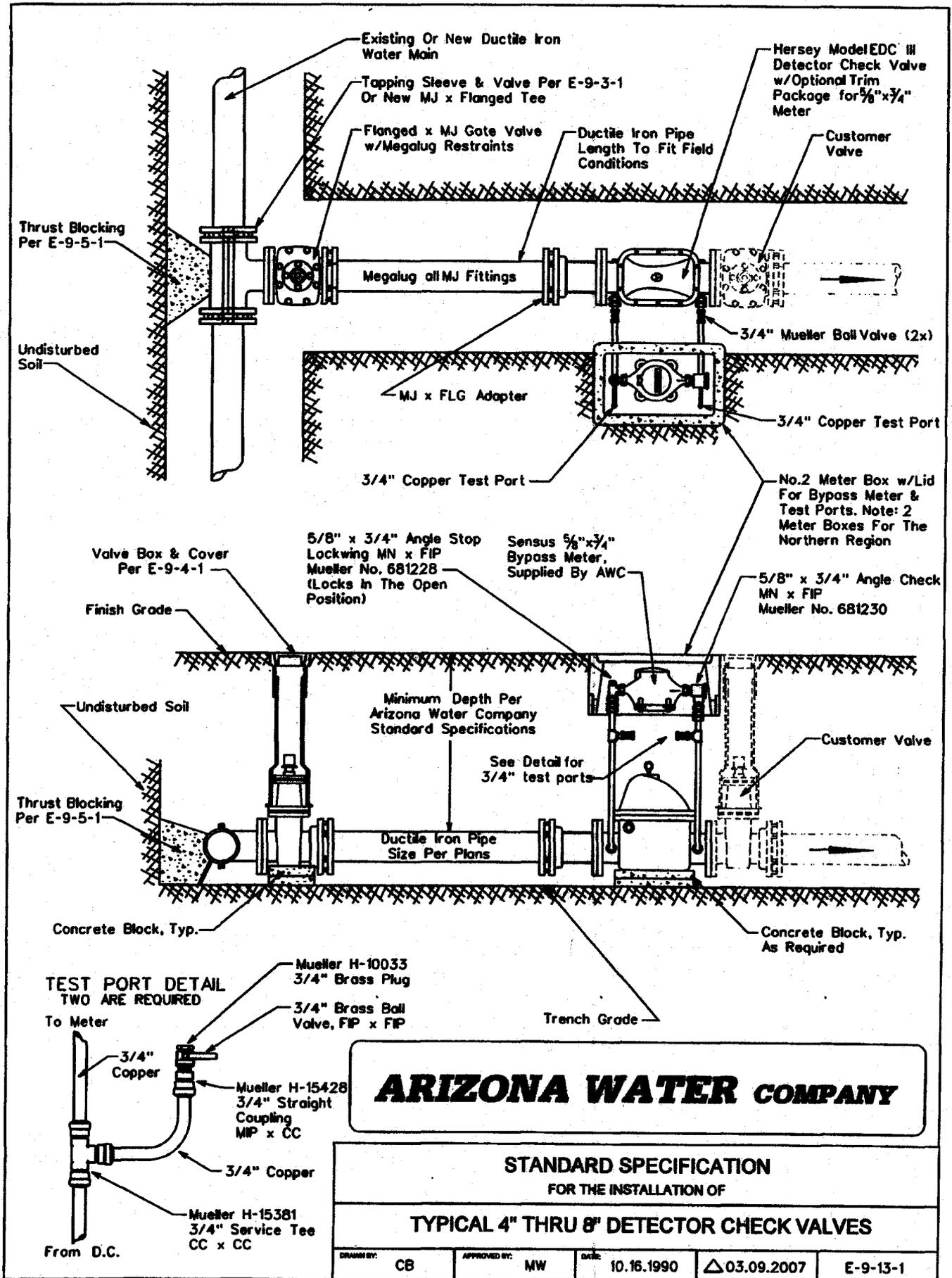
No.	FITTINGS SCHEDULE
1.	Ductile Iron Pipe
2.	Gate Valve M.J.
3.	D.I.P. Spool Piece Flg x Pe (10xDia.)
4.	Meter Strainer
5.	Propeller Meter
6.	Flanged Coupling Adapter
7.	Megalug Gland (Thrust Anchor)
8.	Concrete Thrust Block P.I.P.
9.	Concrete Vault

NOTE:

1. Use Rowley pipe supports or equivalent as needed (See E-9-12-4).
2. Pipe support locations to be determined by field personnel.
3. All Sched. 40 Stl. pipe outside of vault to be wrapped w/10-20 Mil. Scotchwrap corrosion protection tape.
4. All mechanical joint fittings to are to be megalugged.
5. Use deflection fittings (45° Ells.) to achieve necessary depths & cover as shown on the standard specification for the installation of a concrete vault (E-9-12-5).

ARIZONA WATER COMPANY

STANDARD SPECIFICATION FOR THE INSTALLATION OF			
NON-POTABLE PROPELLER METER			
DRAWN BY:	APPROVED BY:	DATE:	E-9-12-6
JPK	MW	7-20-95	△

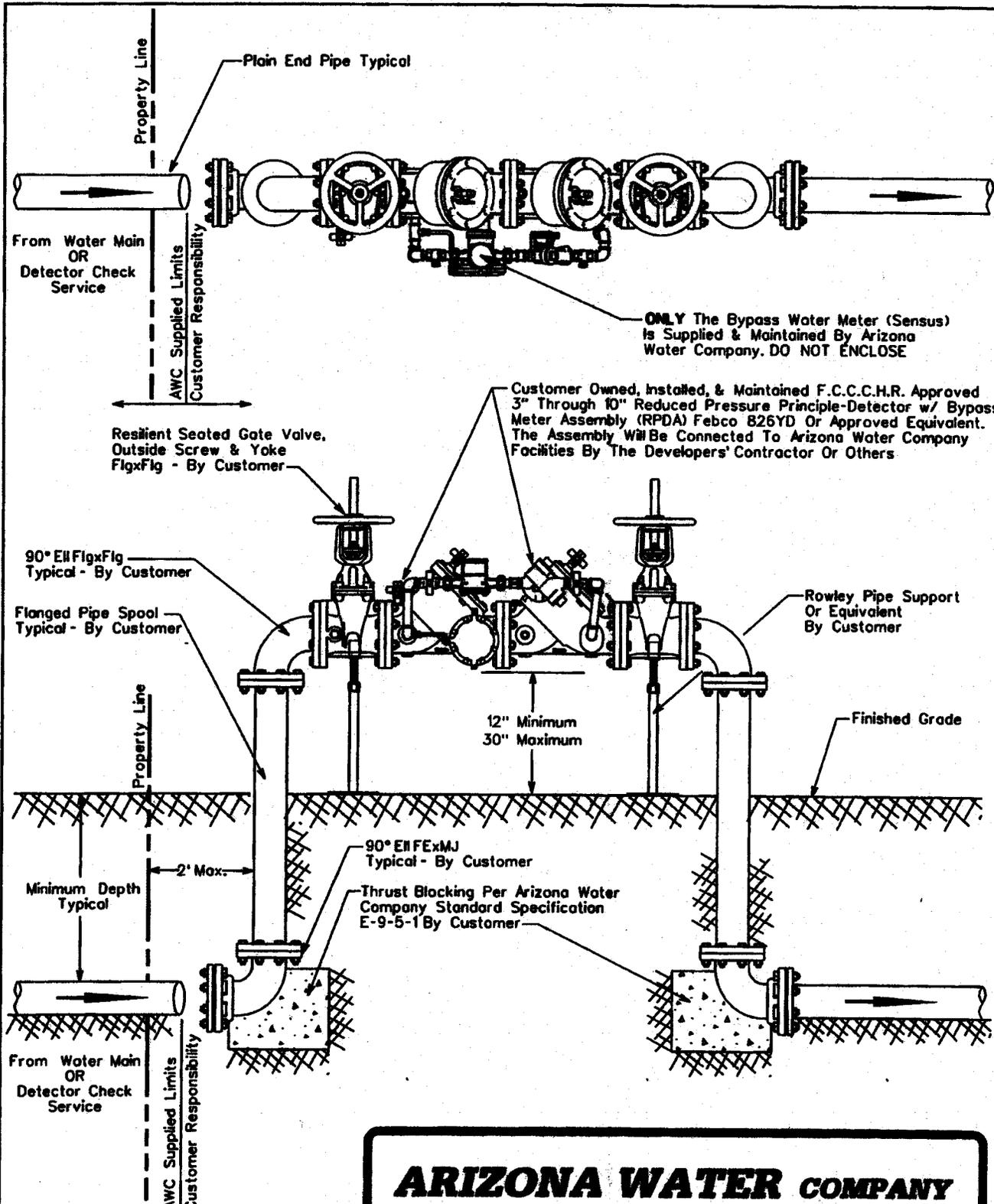


ARIZONA WATER COMPANY

STANDARD SPECIFICATION
FOR THE INSTALLATION OF

TYPICAL 4" THRU 8" DETECTOR CHECK VALVES

DRAWN BY: CB	APPROVED BY: MW	DATE: 10.16.1990	△ 03.09.2007	E-9-13-1
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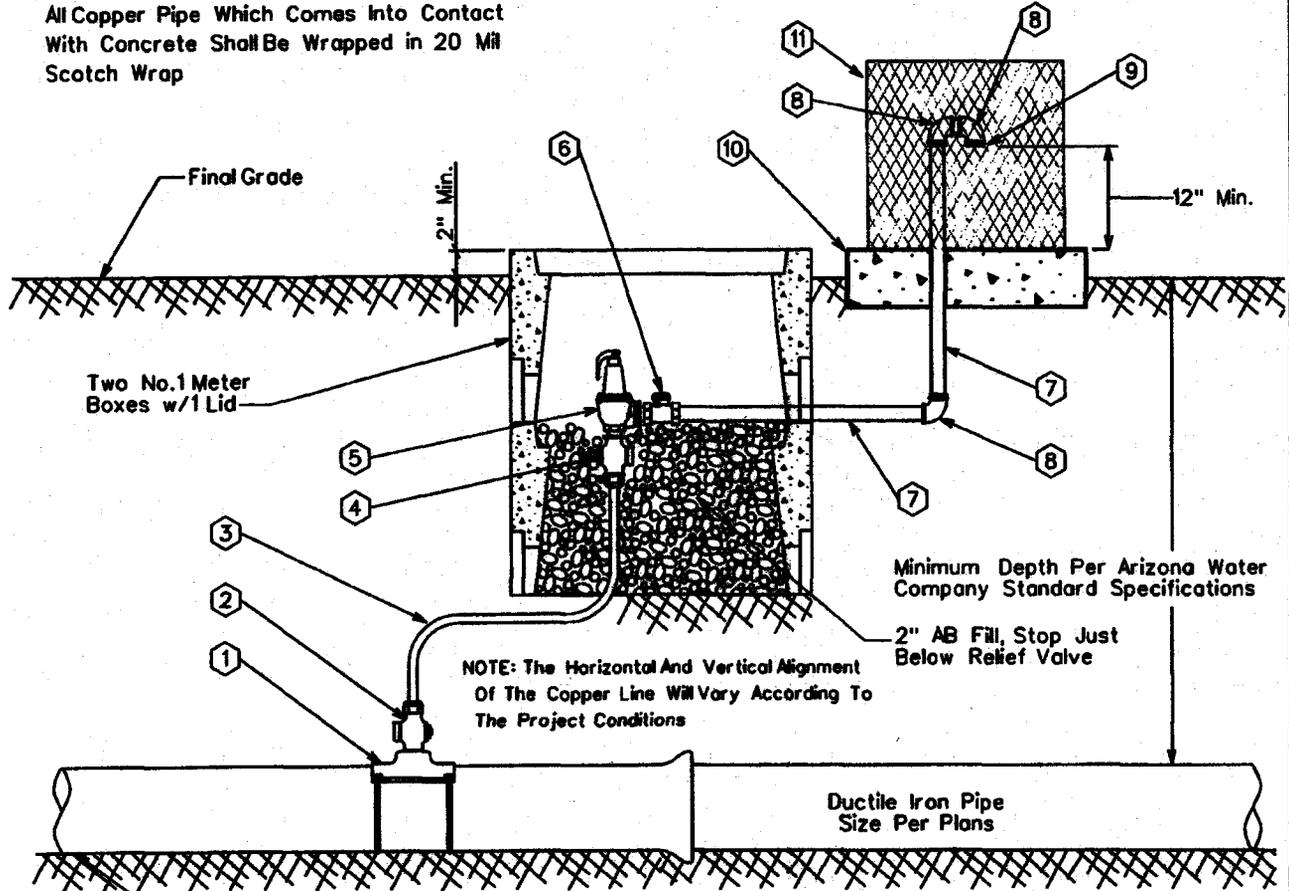


NOTE:
 Minimum Depth Of Cover Over
 6" & 8" Mains is 36 inches,
 12" & Greater is 48 inches
 Unless Otherwise Specified

ARIZONA WATER COMPANY

STANDARD SPECIFICATION			
FOR THE INSTALLATION OF			
3" THRU 10" REDUCED PRESSURE PRINCIPLE-DETECTOR WITH BYPASS METER ASSEMBLY (RPDA) FOR FIRELINE SERVICES			
DRAWN BY: CB	APPROVED BY: MW	DATE: 10-13-98	△ 1-19-2000 E-9-13-2

All Copper Pipe Which Comes Into Contact With Concrete Shall Be Wrapped in 20 Mil Scotch Wrap



NOTE:

1. Pressure relief valves are typically located just down stream of a pressure reducing station or where system conditions might be subject to greater than allowable pressures.
2. The relief valve assembly and vandal enclosure shall be located out of the roadway, but within the right-of-way or easement.

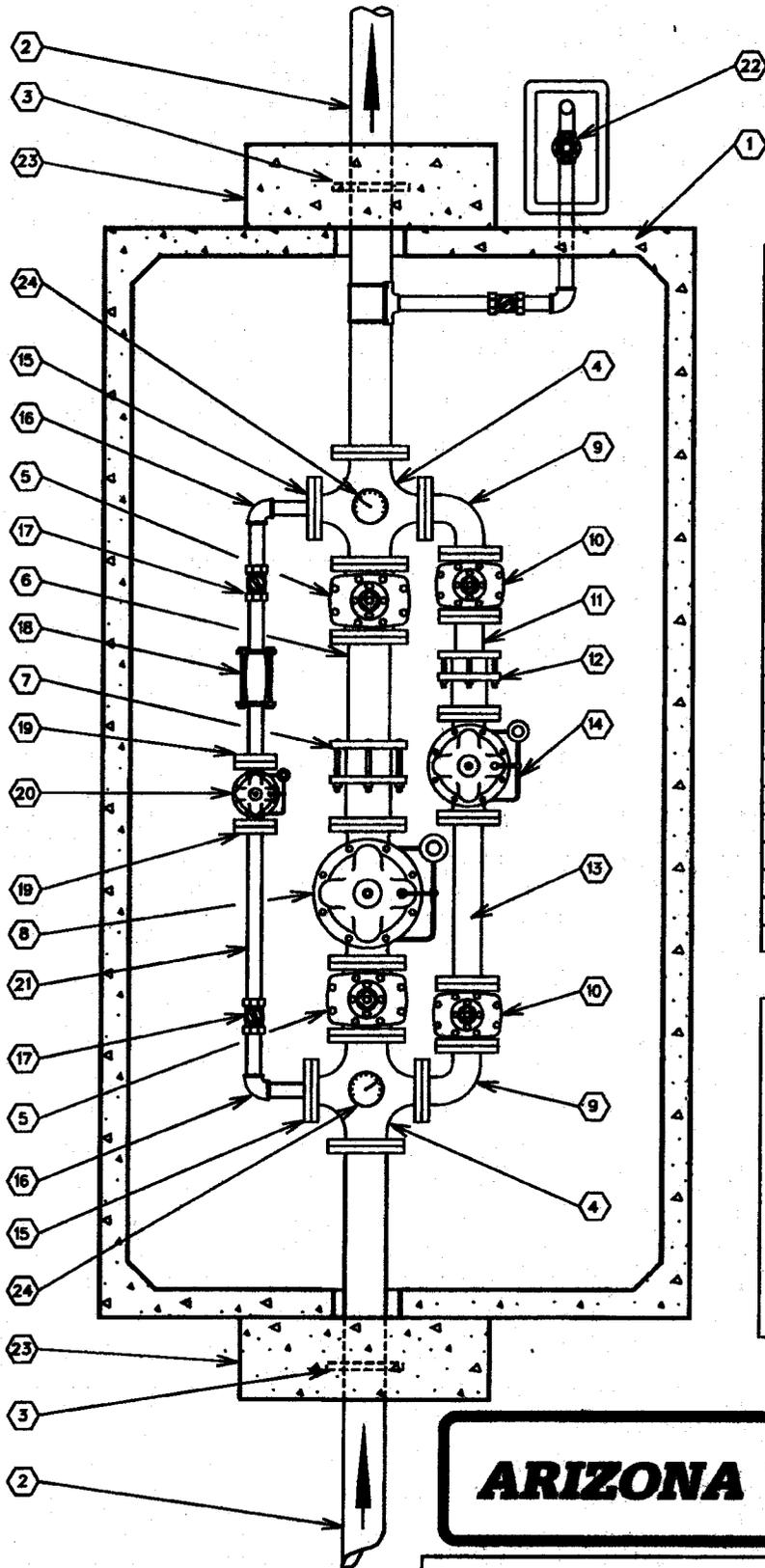
FITTINGS SCHEDULE	
1.	Mueller BR2B Bronze Service Saddle - Double Strap
2.	2" Mueller B-25008 Taper x Comp. Ball Corp Stop
3.	2" Type 'M' Rigid Copper w/NO Splices - Field Fit
4.	2" Mueller B-25028 IP x Comp. Ball Corp Stop
5.	2" Pressure Relief Valve Watts 174A With A 2" Inlet / 2" Outlet 30-150 psi W/ Bronze Body
6.	2" Bronze Check Valve Watts Series CV
7.	2" Schedule 40 Cut Pipe - Field Fit
8.	2" Brass Street Elbow
9.	No.16 Wire Mesh Screen (Non-Corrosible)
10.	4" Thick Concrete Pad - Class 'C' Concrete
11.	Guardshack, Model GS-1, Available From BFDI, Inc. Available In Leaf Green Or Desert Tan

ARIZONA WATER COMPANY

STANDARD SPECIFICATION
FOR THE INSTALLATION OF

PRESSURE RELIEF VALVE - NORTHERN REGION

DRAWN BY: CCO	APPROVED BY: MW	DATE: 3/20/1986	△08.29.2006 E-9-14-2
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No.	FITTINGS SCHEDULE
1.	612 LA Conc. Vault (See Note 3)
2.	6"x6'-0" D.I.P. Spool Fig.xP.E.
3.	6" Megalug (Thrust Anchor)
4.	6"x4" Cross Fig.
5.	6" Gate Valve Fig.
6.	6"x2'-0" D.I.P. Spool Fig.xP.E.
7.	6" Fig. Coup. Adapt. (Rockwell 913)
8.	6" High Flow Pressure Reducing Valve Fig.
9.	4" 90° Ell Fig.
10.	4" Gate Valve Fig.
11.	4"x1'-0" D.I.P. Spool Fig.xP.E.
12.	4" Flg. Coup. Adapt. (Rockwell 913)
13.	4"x2'-0" D.I.P. Spool Fig.
14.	4" Medium Flow Pressure Reducing Valve Fig.
15.	2"x9" O.D. Reducing Fig. (I.P.T.)
16.	2" 90° Ell. F.I.P.
17.	2" Ball Valve F.I.P.
18.	2" Comp. Coup. (Rockwell 411)
19.	2" Companion Fig. (I.P.T.)
20.	2" Low Flow Pressure Reducing Valve Fig.
21.	2" Sched. 40 Stl. Pipe
22.	2" Pressure Relief Valve (See E-9-14-1)
23.	12"x36"x36" Conc. Thrust Block P.I.P.
24.	Pressure Gauge w/shut off valve

NOTE:

1. Use Rowley pipe supports or equivalent as needed. (See E-9-12-4)
2. Pipe support locations to be determined by field personnel.
3. Vault-612 LA top section w/12" Dia. sump hole. Cover-concrete slab top w/(4) 4'-0" x2'-6" aluminum spring loaded hinged style covers for non-traffic loading areas. For areas w/low density traffic, cover is to be designed for H-20 traffic loading.
4. All Sched. 40 Stl. pipe outside of vault to be wrapped w/10-20 Mil. Scotchwrap corrosion protection tape.
5. Use deflection fittings (45° Ells.) to achieve necessary depths & cover as shown on the standard specification for the installation of a concrete vault (E-9-12-5).

ARIZONA WATER COMPANY

STANDARD SPECIFICATION FOR THE INSTALLATION OF

PRESSURE REDUCING STATION

DRAWN BY: JPK	APPROVED BY: MW	DATE: 11-16-88	△ 9-27-95	E-9-15-1
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1. Specific Items To Be Painted Deer-O Pure White Enamel:

- A. All Booster Pumps.
- B. All Electrical Motors And Gas Engines.
- C. Well Pump Discharge Heads.
- D. Electrical Panel.

2. Specific Items To Be Painted Frost Cap White Or Deer-O Pure White Enamel:

- A. Well Shelter.

3. Specific Items To Be Painted OSHA Orange:

- A. Electrical Conduit.

4. All Other Items To Be Painted With Either:
(At Manager's Discretion)

- A. Cholla Green
- B. Forest Green
- C. Sonora Beige
- D. Red Rock
- E. Rock Brown
- F. Deer-O Pure White
- G. Elkhorn Cactus

ARIZONA WATER COMPANY

STANDARD SPECIFICATION
FOR THE INSTALLATION OF

PAINT COLOR SELECTION

DRAWN BY: CCO	APPROVED BY:	DATE: 3/20/1986	△ 2/13/2001	E-9-16-1
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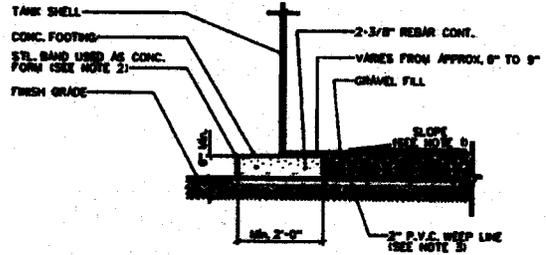
1. Tank shell conforms to AWSA Specification D200-84 with exceptions noted below.
2. $\frac{1}{4}$ " minimum shell plate.
3. Minimum of 12" diameter roof vent, screened with No. 16 non-corrosible wire mesh, to be located on a 24" diameter round hinged manhole opening at the center of the tank to provide access to the dollar plate.
4. Overflow pipe shall be the same diameter as the inlet pipe and shall terminate 12 to 24 inches above splash pad or a minimum of 2 overflow pipe diameters above water high water level.
5. Storage tank shall be placed upon adequately compacted base material.
6. 6" minimum floor mounted tank drain outlet to be located close to the outer shell.
7. Tank and related fittings shall be enclosed with a 6 foot chain link fence with lockable gates and anti-personnel on top of fence.
8. Liquid level shall be indicated by a target and target board on the outside surface of the tank.
9. 24 inch diameter manholes shall be provided on the roof and on the shell near the bottom of the tank. The roof manhole cover shall overlap the manhole by at least 2 inches to provide a rain tight closure. Roof manhole shall be hinged and equipped with a lock. Shell manhole cover to be hinged and bolted in place. Tanks larger than a 80 foot diameter require 2 shell manholes.
10. Inside and outside ladders shall be located at the roof manhole. Outside ladder shall be caged with locking trap door. Bottom 3 feet of cage shall be enclosed to within $\frac{1}{2}$ " of shell with 10 gauge sheet steel.
11. Finished tank shall be delivered in accordance with Arizona Department of Health Services Engineering Bulletin No. 8 before being placed into service.
12. The following information will be included with application for approval to construct:
 1. Tank location _____
 2. Tank height _____
 3. Tank diameter _____
 4. Tank capacity _____
 5. Method of water level control _____

13. The storage tank shall be constructed with the 100 year flood plain and the tank site will be graded to slope away from the tank.
14. The welded steel storage tank will be coated as per AWSA Specification D202 and N.S.F. Standard 81.

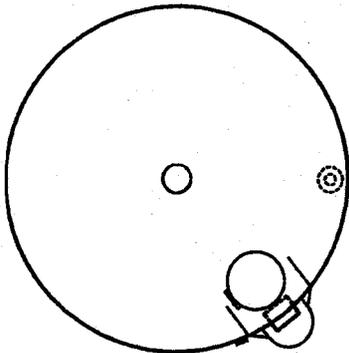
-Exceptions to AWSA Specification D200-84

FOUNDATION NOTES

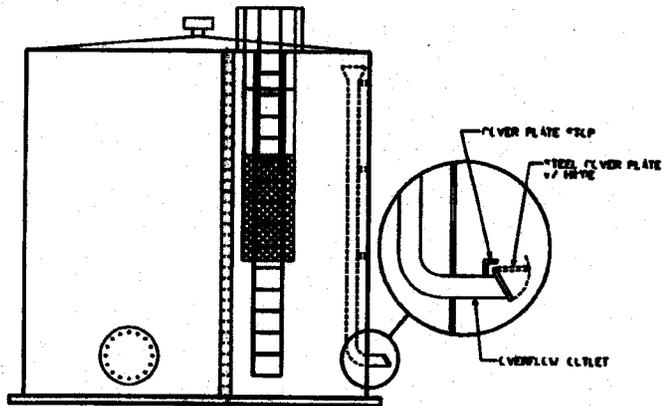
1. FINISH CONCRETE SURFACE MUST SLOPE UPWARDS FROM THE STEEL BAND APPROX. 1" IN 8'-0".
2. TOP OF STEEL BAND MUST BE MAINTAINED LEVEL TO WITHIN $\frac{1}{8}$ ".
3. INSTALL 8'-2" DIA. 8'-0" P.V.C. WEED LINES, EQUALLY SPACED EVERY 48" L, PERFORATE 8'-0" OF LINE WITH $\frac{1}{2}$ " DIA. HOLES @ 8" O.C. PLUG INTERIOR END OF LINE w/2" CAP.



FOUNDATION DETAIL



PLAN VIEW



PROFILE VIEW

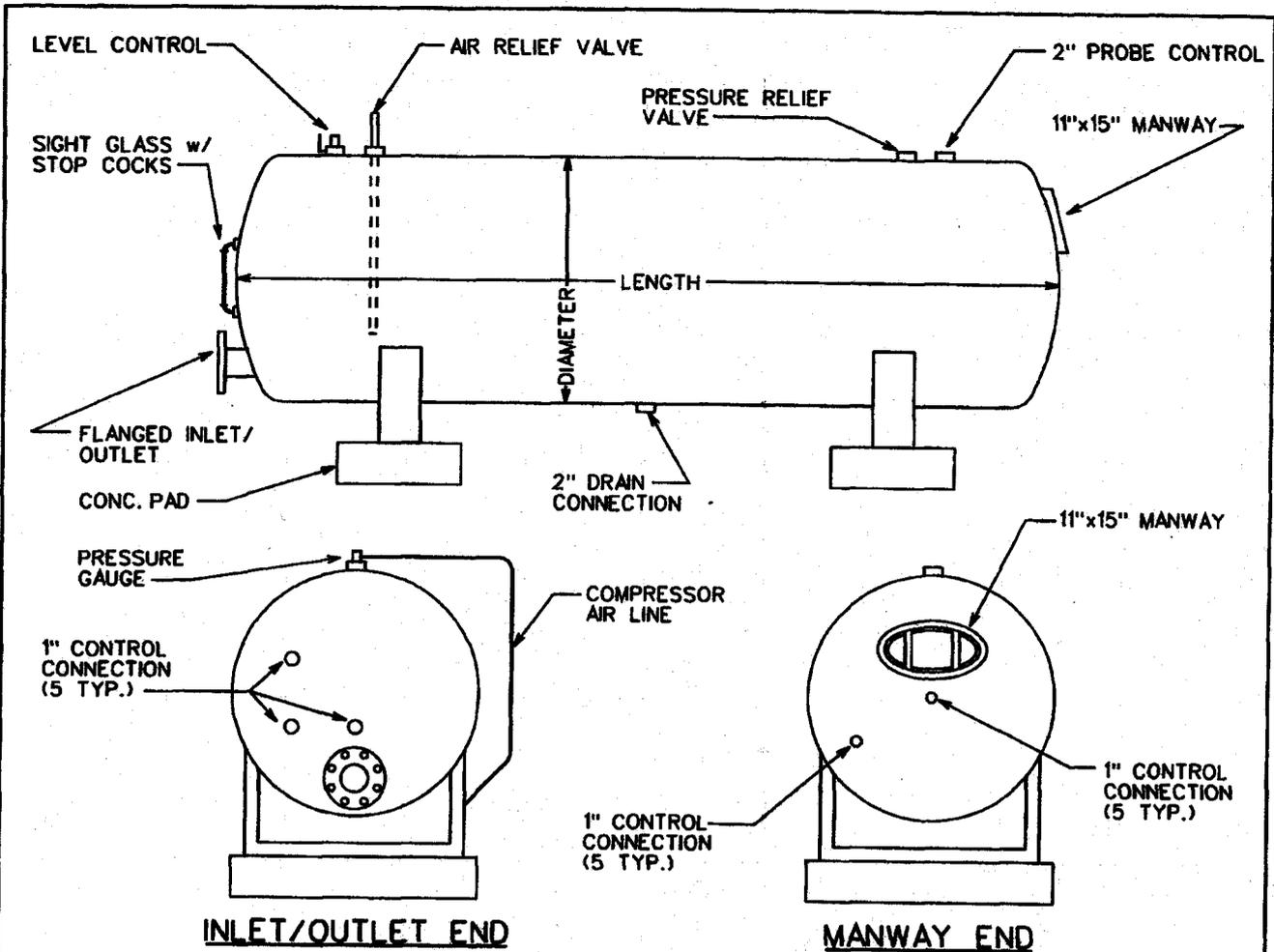
ARIZONA WATER COMPANY

**STANDARD SPECIFICATION
FOR THE INSTALLATION OF**

STEEL WATER STORAGE TANK

DRAWN BY: JPK	APPROVED BY: MJW	DATE: 10-17-88	△ 2-12-96
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E-9-17-1



1. ALL HYDROPNEUMATIC TANKS SHALL BE DESIGNED & CONSTRUCTED IN ACCORDANCE WITH THE CURRENT REQUIREMENTS OF THE ASME CODE FOR UNFIRED PRESSURE VESSELS, SECTION VIII, DIVISION 1.
2. FINISHED TANK SHALL BE DISINFECTED IN ACCORDANCE WITH ADEQ BULLETIN No. 8 BEFORE BEING PLACED INTO SERVICE.
3. THE WELDED STEEL HYDROPNEUMATIC TANK WILL BE COATED AS PER AWWA SPECIFICATION D102 & NSF STANDARD 61.
4. THE FOLLOWING INFORMATION WILL BE INCLUDED WITH THE APPLICATION FOR APPROVAL TO CONSTRUCT.
 1. Tank Location _____
 2. Tank Length _____
 3. Tank Diameter _____
 4. Tank Capacity _____
 5. Maximum Working Pressure _____

ARIZONA WATER COMPANY

STANDARD SPECIFICATION			
FOR THE INSTALLATION OF			
HYDROPNEUMATIC TANK			
DRAWN BY: JPK	APPROVED BY: MW	DATE: 3-20-1986	△ 01.16.2007 E-9-18-1

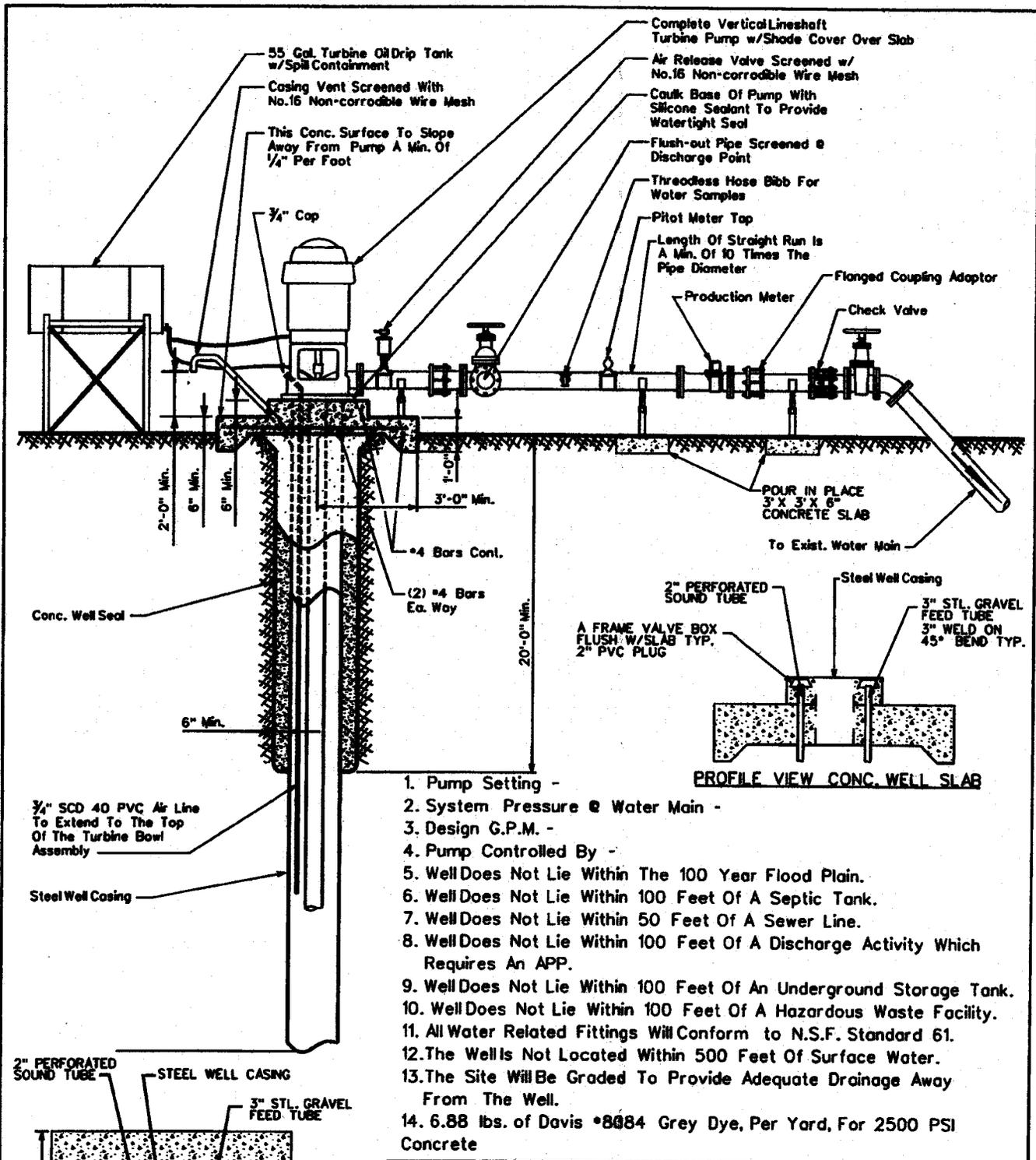
NOT
CONVERTED
TO
CAD

ARIZONA WATER COMPANY

STANDARD SPECIFICATION
FOR THE INSTALLATION OF

WELL SHELTER

DRAWN BY: CB	APPROVED BY:	DATE: 03.20.1986	△ 04.03.2001	E-9-19-1
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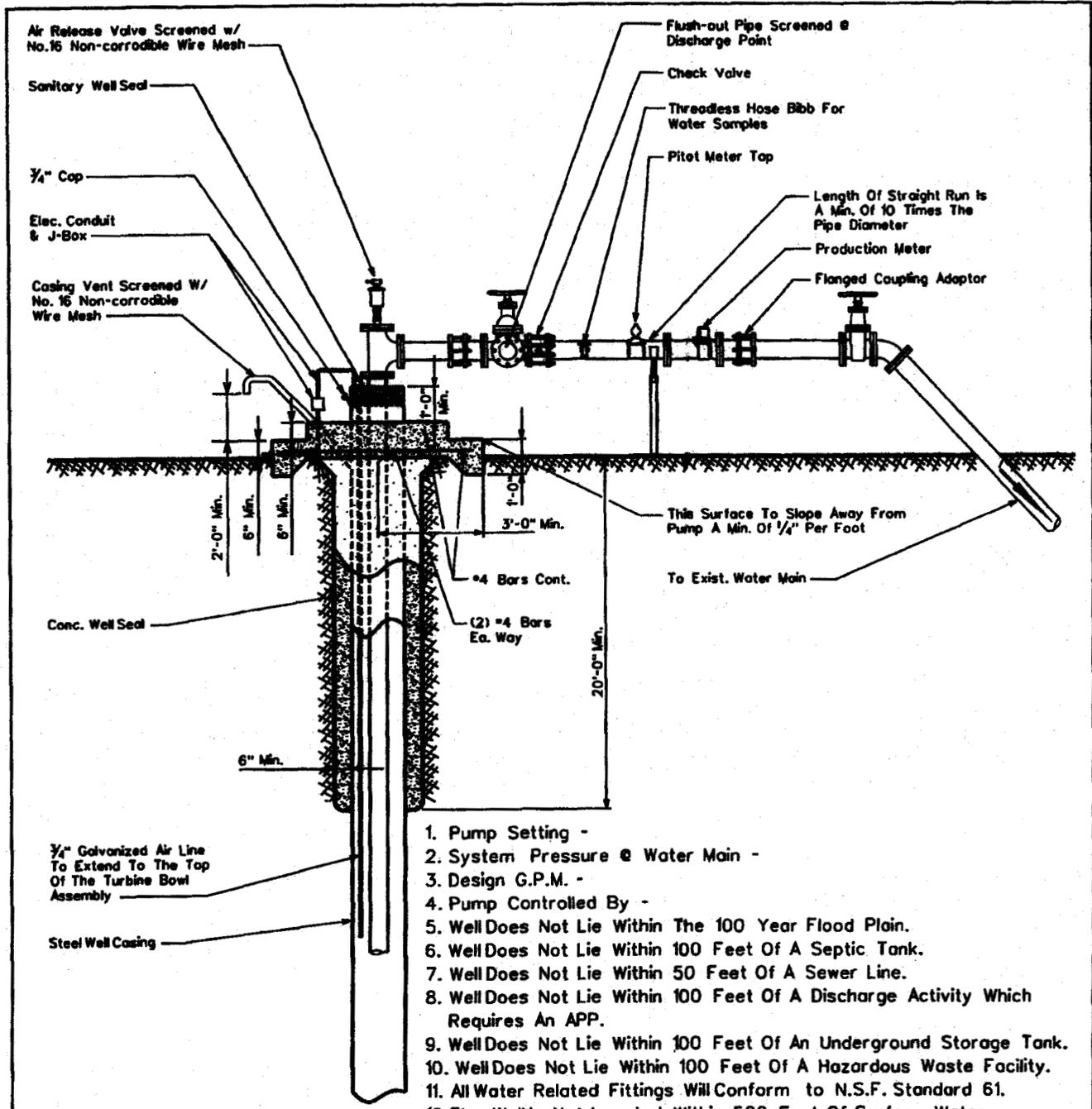
ARIZONA WATER COMPANY

STANDARD SPECIFICATION FOR THE INSTALLATION OF

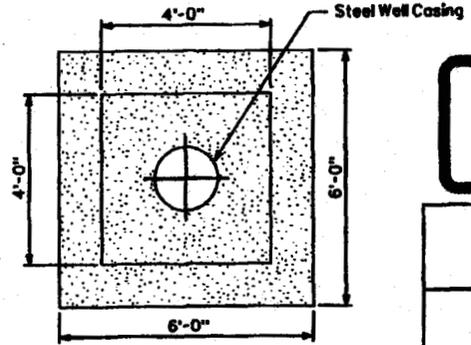
TYPICAL WELL W/ LINESHAFT TURBINE PUMP

DRAWN BY:	JW	APPROVED BY:	M.W.	DATE:	3-20-86		
					△	9/15/04	E-9-20-1

PLAN VIEW CONC. WELL SLAB



1. Pump Setting -
2. System Pressure @ Water Main -
3. Design G.P.M. -
4. Pump Controlled By -
5. Well Does Not Lie Within The 100 Year Flood Plain.
6. Well Does Not Lie Within 100 Feet Of A Septic Tank.
7. Well Does Not Lie Within 50 Feet Of A Sewer Line.
8. Well Does Not Lie Within 100 Feet Of A Discharge Activity Which Requires An APP.
9. Well Does Not Lie Within 100 Feet Of An Underground Storage Tank.
10. Well Does Not Lie Within 100 Feet Of A Hazardous Waste Facility.
11. All Water Related Fittings Will Conform to N.S.F. Standard 61.
12. The Wells Not Located Within 500 Feet Of Surface Water.
13. The Site Will Be Graded To Provide Adequate Drainage Away From The Well.



PLAN VIEW CONC. WELL SLAB

ARIZONA WATER COMPANY

STANDARD SPECIFICATION FOR THE INSTALLATION OF TYPICAL WELL W/ SUBMERSIBLE TURBINE PUMP

DRAWN BY: jpk	APPROVED BY: M.W.	DATE: 3-20-86	△ 2-16-01
			E-9-21-1

All New Purchases To Conform To The Following:

Column Pipe

4" I.D. - 8	Threads	Per	Inch	Tapered	$\frac{3}{4}$ "	Per	Foot	Right	Hand
6" I.D. - 8	"	"	"	"	"	"	"	"	"
8" I.D. - 8	"	"	"	"	"	"	"	"	"
10" I.D. - 8	"	"	"	"	"	"	"	"	"
12" I.D. - 8	"	"	"	"	"	"	"	"	"
14" I.D. - 8	"	"	"	"	"	"	"	"	"

Oil Tube - Peerless Type

$\frac{1}{2}$ "	O.D. - 14	Threads	Per	Inch	Right	Hand
2"	O.D. - 12	"	"	"	"	"
$2\frac{1}{2}$ "	O.D. - 10	"	"	"	"	"
3"	O.D. - 10	"	"	"	"	"
$3\frac{1}{2}$ "	O.D. - 10	"	"	"	"	"
4"	O.D. - 10	"	"	"	"	"

Line Shaft

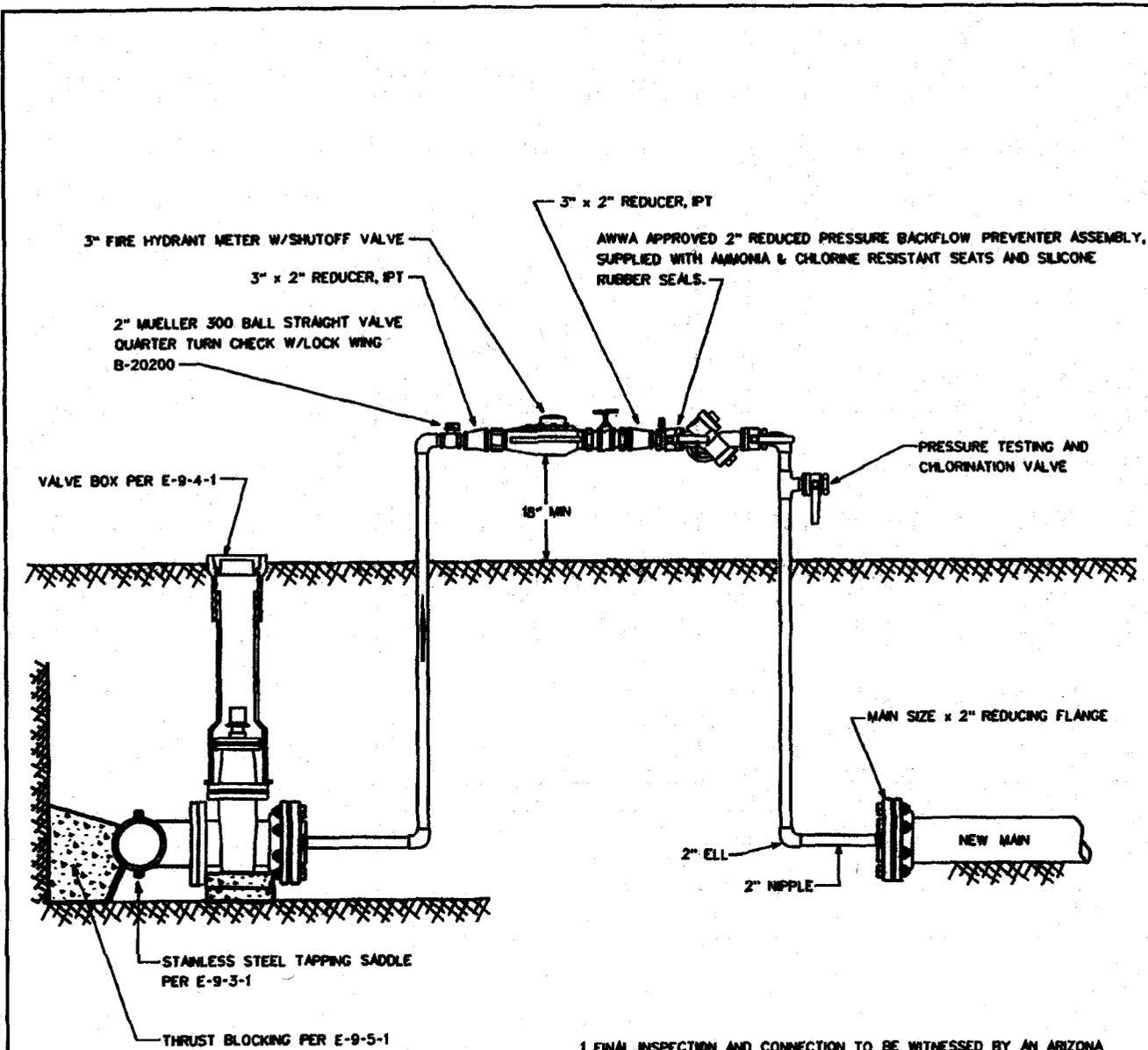
$\frac{3}{4}$ "	O.D. - 10	Threads	Per	Inch	Left	Hand
1"	O.D. - 14	"	"	"	"	"
1- $\frac{3}{16}$ "	O.D. - 10	"	"	"	"	"
1- $\frac{1}{2}$ "	O.D. - 10	"	"	"	"	"
1- $\frac{11}{16}$ "	O.D. - 10	"	"	"	"	"
1- $\frac{15}{16}$ "	O.D. - 10	"	"	"	"	"
2- $\frac{3}{16}$ "	O.D. - 10	"	"	"	"	"
2- $\frac{7}{16}$ "	O.D. - 8	"	"	"	"	"

ARIZONA WATER COMPANY

STANDARD SPECIFICATION
FOR THE INSTALLATION OF

COLUMN PIPE, OIL TUBE AND LINE SHAFT

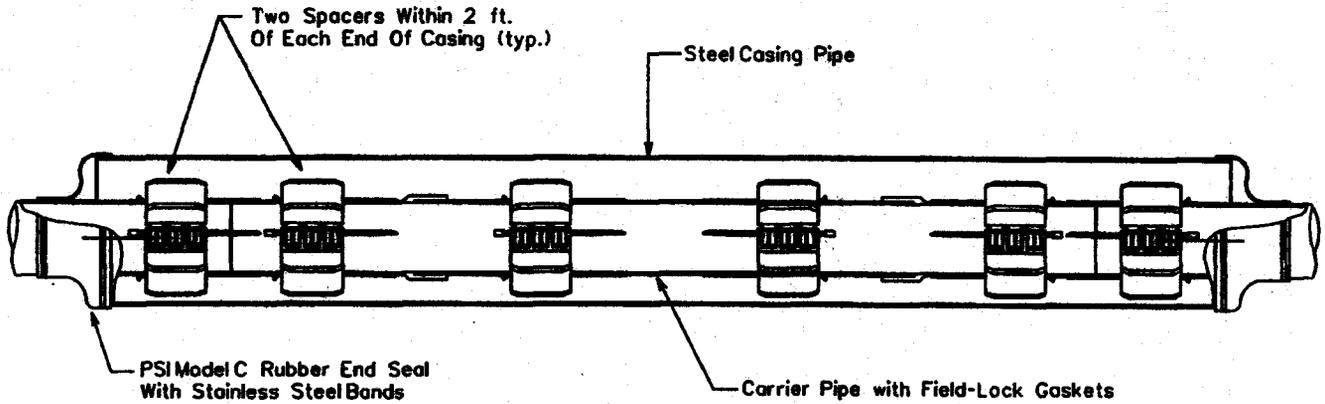
DRAWN BY: CCO	APPROVED BY:	DATE: 3/20/1996	Δ 2/13/2001	E-9-22-1
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1. FINAL INSPECTION AND CONNECTION TO BE WITNESSED BY AN ARIZONA WATER COMPANY REPRESENTATIVE.
2. REDUCING FLANGES TO BE PROPERLY RESTRAINED.
3. INSTALL JUMPER TAP FOR TEMPORARY METER DOWNSTREAM OF THE REDUCING FLANGE FOR PRESSURE AND BACTEE TESTING.
4. JUMPER ASSEMBLY MUST BE A MINIMUM OF 18" ABOVE FINISHED GRADE.
5. BACKFLOW ASSEMBLY REQUIRES CERTIFICATION.
6. ASSEMBLY NOT TO BE REMOVED AND SPOOL PIECE INSTALLED FOR FINAL CONNECTION UNTIL ALL TESTING, BACTERIAL CLEARANCE AND FINAL INSPECTIONS HAVE BEEN OBTAINED.
7. ALL NEW PIPING SHALL BE PROPERLY RESTRAINED.

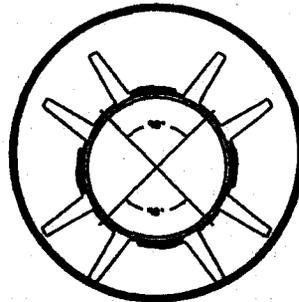
ARIZONA WATER COMPANY

STANDARD SPECIFICATION FOR THE INSTALLATION OF			
HOT TAP & JUMPER METER CONNECTION			
<small>DRAWN BY:</small> CB	<small>APPROVED BY:</small> MJW	<small>DATE:</small> 05.14.2004	△
			E-9-23-1



CROSS SECTION

The casing spacers shall be the PSIRanger II Casing Spacers as manufactured by Pipeline Seal and Insulator, Inc., Houston, Texas.



SECTION CUT

End Seals

After insertion of the carrier pipe into the casing, the ends of the casing shall be closed by installing 1/8" thick synthetic rubber end seals equal to the PSI Model "C" end seals as manufactured by Pipeline Seal and Insulator, Inc., Houston, Texas.

NOTE: The Carrier Pipe Shall Be Polywrapped Prior To The Skid Installation & Insertion Into The Carrier Casing For Divisions Requiring Polywrapped Pipe.

*Thickness Of Skid To Extend A Minimum of 1/2" Above The O.D. Of The Pipe Bell or Gland.

OD Push On Joint Bell	OD M.J. BELL
6" - 8.66"	6" - 11.12"
8" - 10.82"	8" - 13.37"
12" - 15.05"	12" - 17.94"
16" - 19.74"	16" - 22.56"
20" - 23.98"	20" - 27.08"
24" - 28.16"	24" - 31.58"
30" - 35.40"	30" - 39.12"
36" - 41.84"	36" - 46.00"
48" - 55.94"	48" - 60.00"

PIPE SIZE	CASING SIZE	CASING SIZE ID	CASING SCHEDULE	WALL THICKNESS	SKID SIZE
6"	16"	15.25"	STD.	.375	*x4x12
8"	18"	18.25"	STD.	.375	*x4x12
12"	22"	21.25"	STD.	.375	*x4x12
16"	28"	27.25"	STD.	.375	*x4x12
20"	32"	31.25"	STD.	.375	*x4x12
24"	36"	35.25"	STD.	.375	*x4x12
30"	48"	47.25"	STD.	.375	*x4x12
36"	54"	53.25"	STD.	.375	*x4x12
48"	66"	65.25"	STD.	.375	*x4x12



STANDARD SPECIFICATION				
FOR THE INSTALLATION OF				
TYPICAL WATER LINE ENCASEMENT				
DRAWN BY: CB	APPROVED BY:	DATE: 3/20/1996	△ 09.27.2006	E-9-24-1

CALCIUM HYPOCHLORITE TABLET CHLORINATOR FEEDER SPECIFICATIONS

SCOPE - This specification describes an ARCH Chemicals Calcium Hypochlorite Tablet Chlorinator System as manufactured by ARCH Chemicals, 801 Merrill Street, P.O. Box 8224, Newark, CT, 06866-8224.

DESCRIPTION - The chlorination system shall be completely assembled, ready to install. The chlorination system shall be a ARCH Chemicals Calcium Hypochlorite Tablet Feeder, or its equivalent, and shall be supplied with all its component's factory mounted.

COMPONENTS - The Chlorination system shall have the following components:

- A. 1-50' ARCH Chemicals solid calcium hypochlorite tablet feeder
- B. Polyethylene system enclosure
- C. 1/2" diameter control and solution tank
- D. 1/2" diameter line control and solution tank
- E. 1/2" diameter control valve (2 per tank)
- F. Chemical metering pump
- G. Check pump control switch
- H. Computer controlled junction box
- I. Control panel with 40 piping
- J. Reverse flow check valve
- K. Total solution output control valve

ELECTRICAL FIXTURES - The following electrical fixtures shall be provided:
 A. Single phase power.
 B. 20 Amps, 2 pole, fused for 120 Volts, 60 cycles.

CHLORINATOR DESIGN - The chlorination facility shall be designed and constructed in accordance with Arizona State Department of Health Engineering Bulletin Number 8 - "Distribution of Water Systems" - Latest Revision.

CHLORINATION EQUIPMENT - The chlorination equipment shall be a ARCH Chemicals Calcium Hypochlorite Tablet Chlorinator, approved by NSF Standard 61.

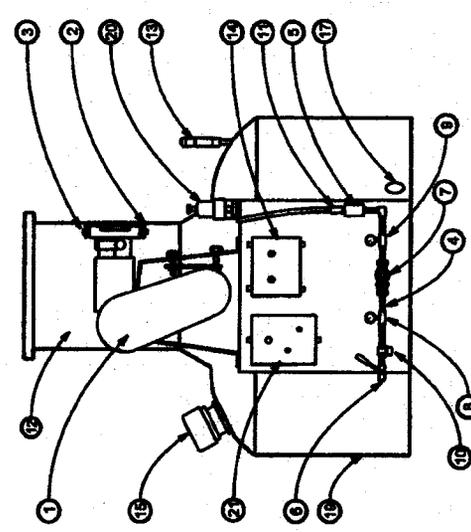
CHLORINATOR OPERATION - The chlorination facility shall be operated in accordance with Arizona State Department of Health Engineering Bulletin Number 8, "Distribution of Water Systems", Table 1, latest revision.

CHLORINATOR SYSTEM DESCRIPTION - ARCH Chemicals tablet chlorinator systems incorporate a patented chlorinator which is designed to utilize ARCH Chemicals 1-50' solid calcium hypochlorite tablets (Arch Part No. 20000 09). These ARCH Chemicals tablets are contained in a polyethylene system enclosure. The tablet feeder is mounted on a polyethylene control and solution tank. The tablets are fed into the hypochlorite tablet and contacted in a solution tank. The chlorinated solution is then pumped out of the tank through a chemical metering pump. This metering pump is then regulated to obtain the desired CL residual.

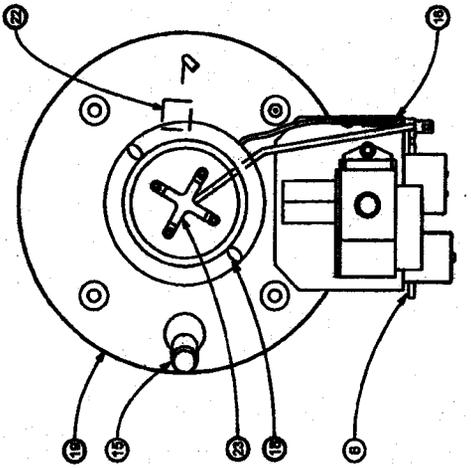
ARCH Chemicals Calcium Hypochlorite Tablet Chlorinator NTS

HYPOCHLORINATOR COMPONENTS:

- 1. Chemical Metering Pump
- 2. Pump Suction Connection
- 3. Pump Discharge Connection
- 4. Inlet Water Assembly
- 5. Inlet Water Solenoid Valve
- 6. Inlet Shut-Off Valve
- 7. Inlet Pressure Regulator
- 8. Inlet Water Pressure Gauge
- 9. Spring Nozzle Water Pressure Gauge
- 10. Inlet Strainer
- 11. Inlet Tubing Connection
- 12. Dry Chemical Hopper
- 13. Solution Line
- 14. Electrical Control Box With Power On/Off
- 15. Electrical Meter
- 16. Solution Discharge Connection
- 17. Inlet Drain Valve
- 18. Chlorination Port
- 19. Meter Chamber
- 20. Pressure Relief Valve
- 21. Pump Speed Control
- 22. High Level Shut-Off Float Switch
- 23. Water Spray Nozzle

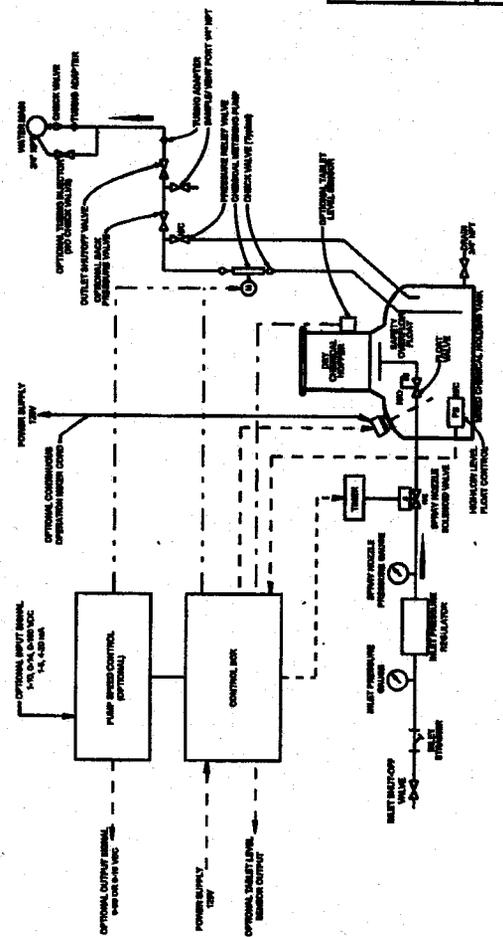


FRONT VIEW



TOP VIEW
HOPPER REMOVED FOR CLARITY

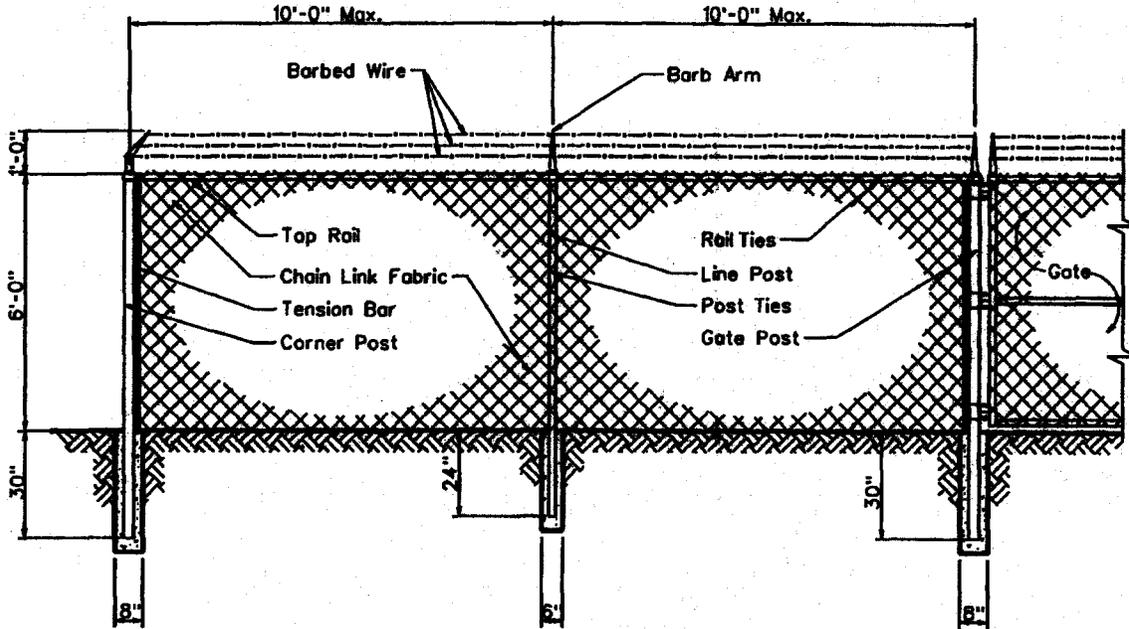
Chlorinator Fluid Schematic NTS



STANDARD SPECIFICATION
FOR THE INSTALLATION OF

CALCIUM HYPOCHLORITE TABLET CHLORINATOR

ISSUED BY:	CB	APPROVED BY:	MW	DATE:	02-09-2000	REV:	△	NO.	E-9-25-1
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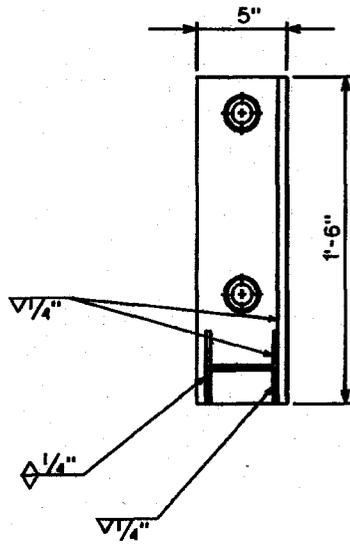
Line Post:	1-7/8" O.D.	1.74 lbs. P/L.F.	ASTM A-256
End Post:	2-7/8" O.D.	4.64 lbs. P/L.F.	ASTM A-256
Corner Post:	2-7/8" O.D.	4.64 lbs. P/L.F.	ASTM A-256
Gate Post:	2-7/8" O.D.	4.64 lbs. P/L.F.	ASTM A-256
Top Rail:	1-5/8" O.D.	4.64 lbs. P/L.F.	ASTM A-256
Chain Link Fabric:	9 Ga. 2" Mesh Galv. Before Weave		
Salvage:	Barb/Knuckle		
Fittings:	Pressed Steel		
Barb Wire:	2-1/2 Ga./2 Point		
Barb Arm:	1 Piece/45° Arm		
Tension Wire:	9 Ga./Galv.		
Line Post Set:	6"x24" In Concrete		
Terminal Post Set:	8"x30" In Concrete		

ARIZONA WATER COMPANY

**STANDARD SPECIFICATION
FOR THE INSTALLATION OF**

CHAIN LINK FENCE

<small>DRAWN BY:</small> CCO	<small>APPROVED BY:</small> MW	<small>DATE:</small> 7/7/1992	<small>REVISED:</small> 2/9/2001	E-9-26-1
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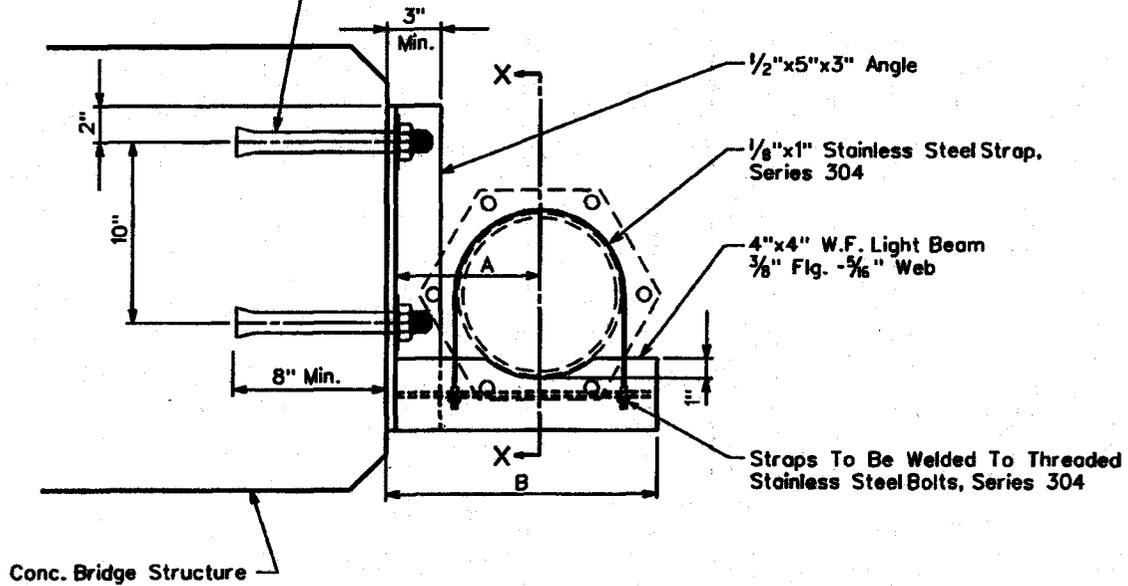
SECTION X-X

NOTES

1. Minimum 2 Supports Per Joint Of Pipe.
2. All Bolts Shall Have A Lock Washer Under The Nut.
3. All Nuts Shall Be Stainless Steel Series 304.

PIPE SIZE	A	B
8"	8"	15"
10"	9"	17"
12"	10"	19"

1/8"x12" Stainless Steel Wedge Bolts, Series 304



SUSPENSION DETAIL

ARIZONA WATER COMPANY

STANDARD SPECIFICATION
FOR THE INSTALLATION OF

SIDE HUNG WATER LINE SUSPENSION

DRAWN BY:

JPK

APPROVED BY:

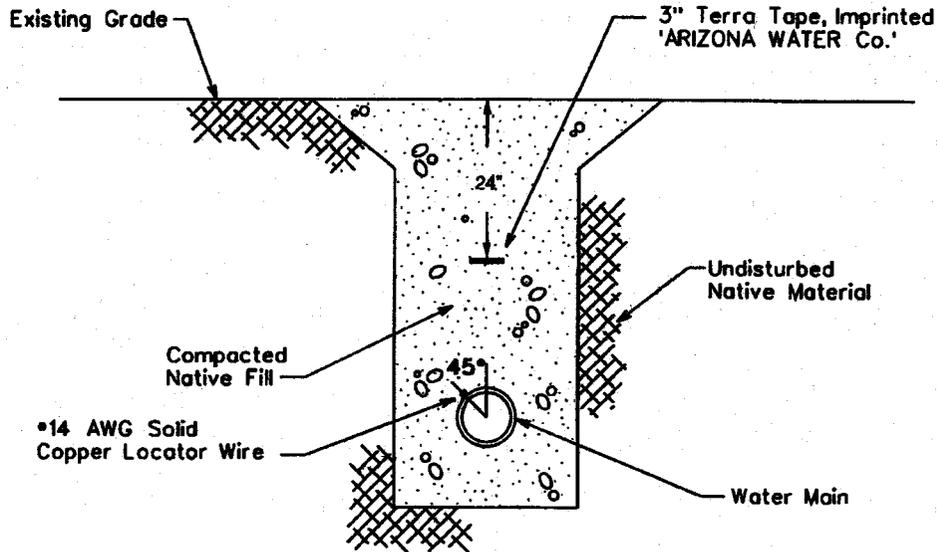
MJW

DATE:

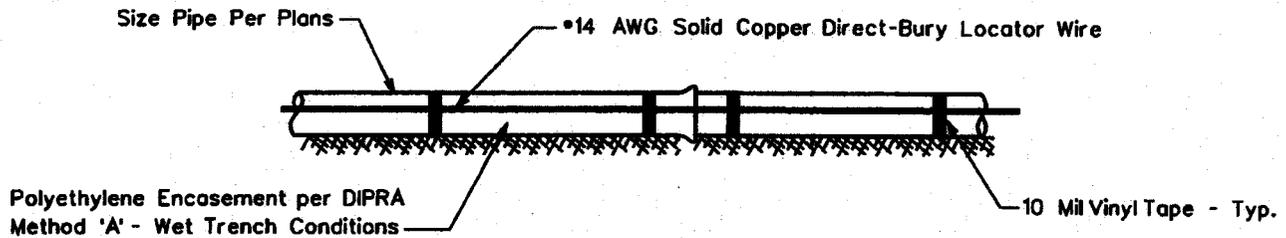
7-12-96

△

E-9-27-1



TYPICAL WATER TRENCH DETAIL



TYPICAL PROFILE VIEW

WIRE GENERAL NOTES:

1. All pipe shall have #14 AWG Solid Copper Direct-Bury Locator Wire installed directly to the Polywrap at 45° from the vertical center of the pipe and shall be attached using 10 Mil Vinyl Tape.
2. The Locating Wire shall terminate at the top of each valve box and be capable of extending 12" above the top of the box in such a manner so as not to interfere with valve operation.

TAPE GENERAL NOTES:

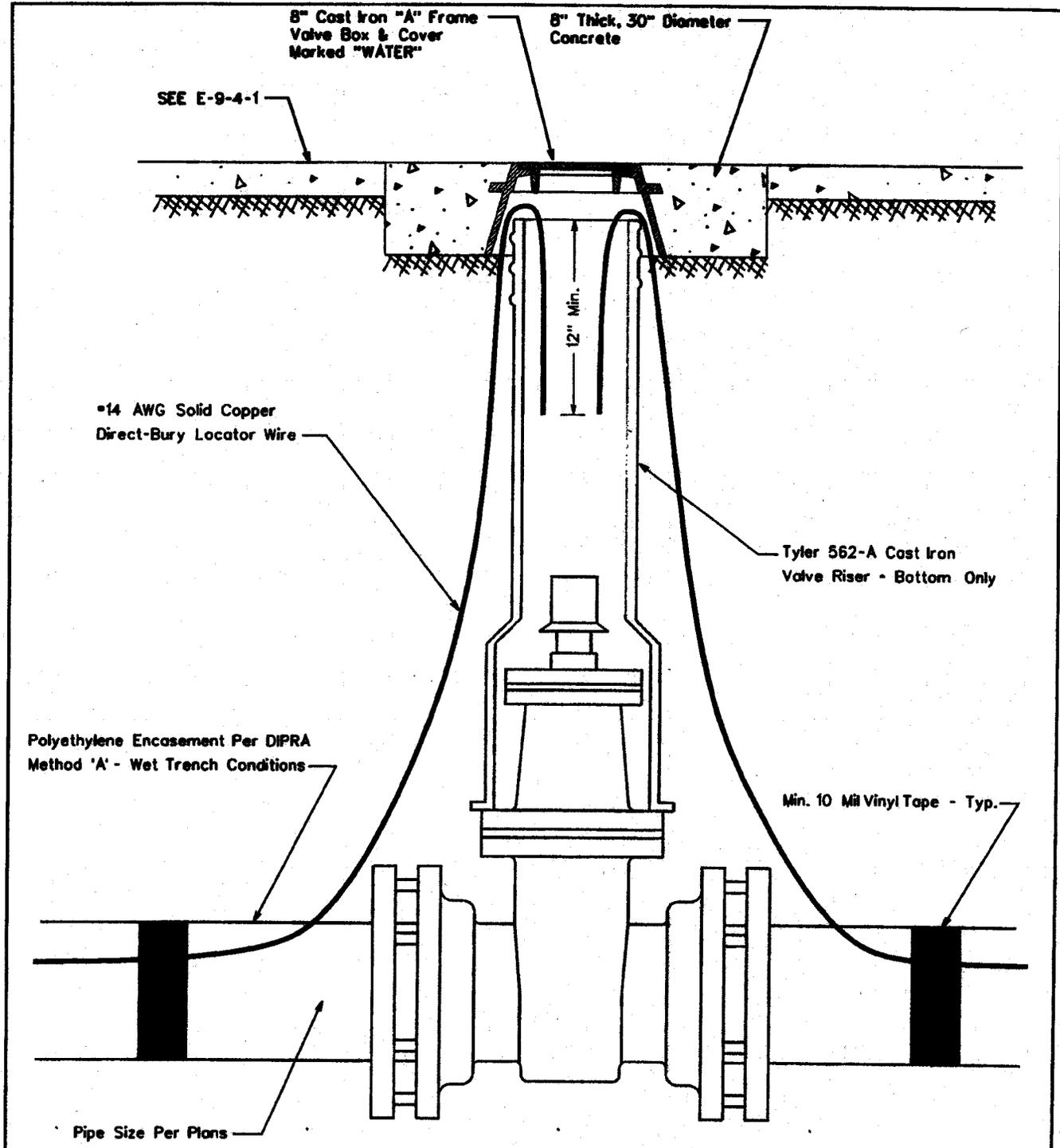
1. Use Terra Tape 3" Marking Tape As Manufactured By Reef Industries Inc. Of Houston, Texas (1-800-231-2417)
2. The Tape Is Blue & Imprinted 'ARIZONA WATER Co.'
3. INSTALLATION: The Pipe Warning Tape Shall Be Installed Over All Water Mains And Shall Be Buried 24 inches Below The Surface Over The Center Of The Pipe.
 - A) The Backfill Shall Be Sufficiently Leveled So That The Tape Is Installed On A Flat Surface.
 - B) The Tape Shall Be Centered In The Trench With The Printed Side Up.
 - C) Care Shall Be Exercised To Avoid Movement Of The Tape While The Remaining Backfills Moved Into The Trench.

ARIZONA WATER COMPANY

STANDARD SPECIFICATION
FOR THE INSTALLATION OF

PIPE WARNING TAPE AND LOCATOR WIRE

DRAWN BY: CB	APPROVED BY:	DATE: 03.24.1997	△09.27.2006	E-9-28-1
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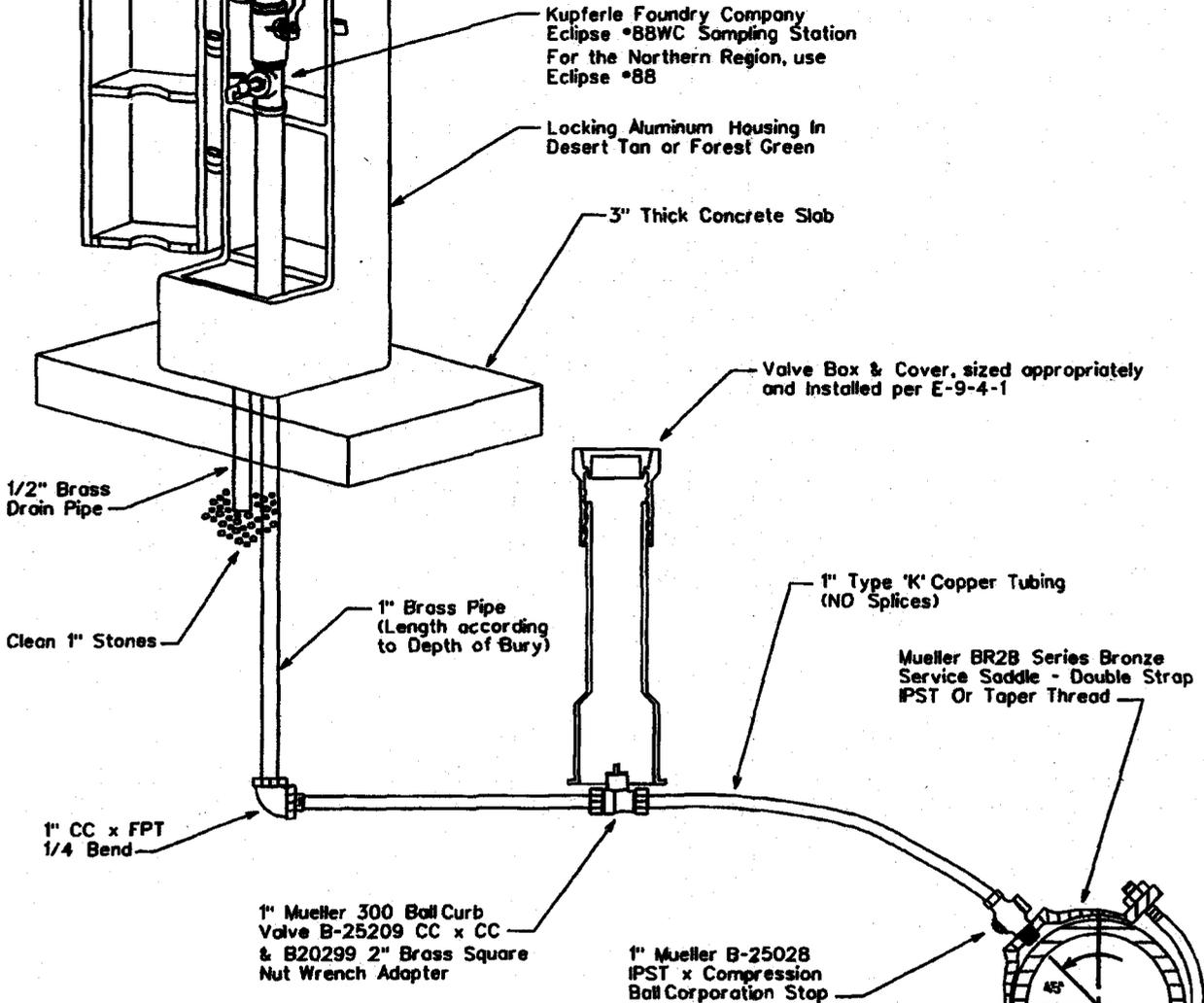
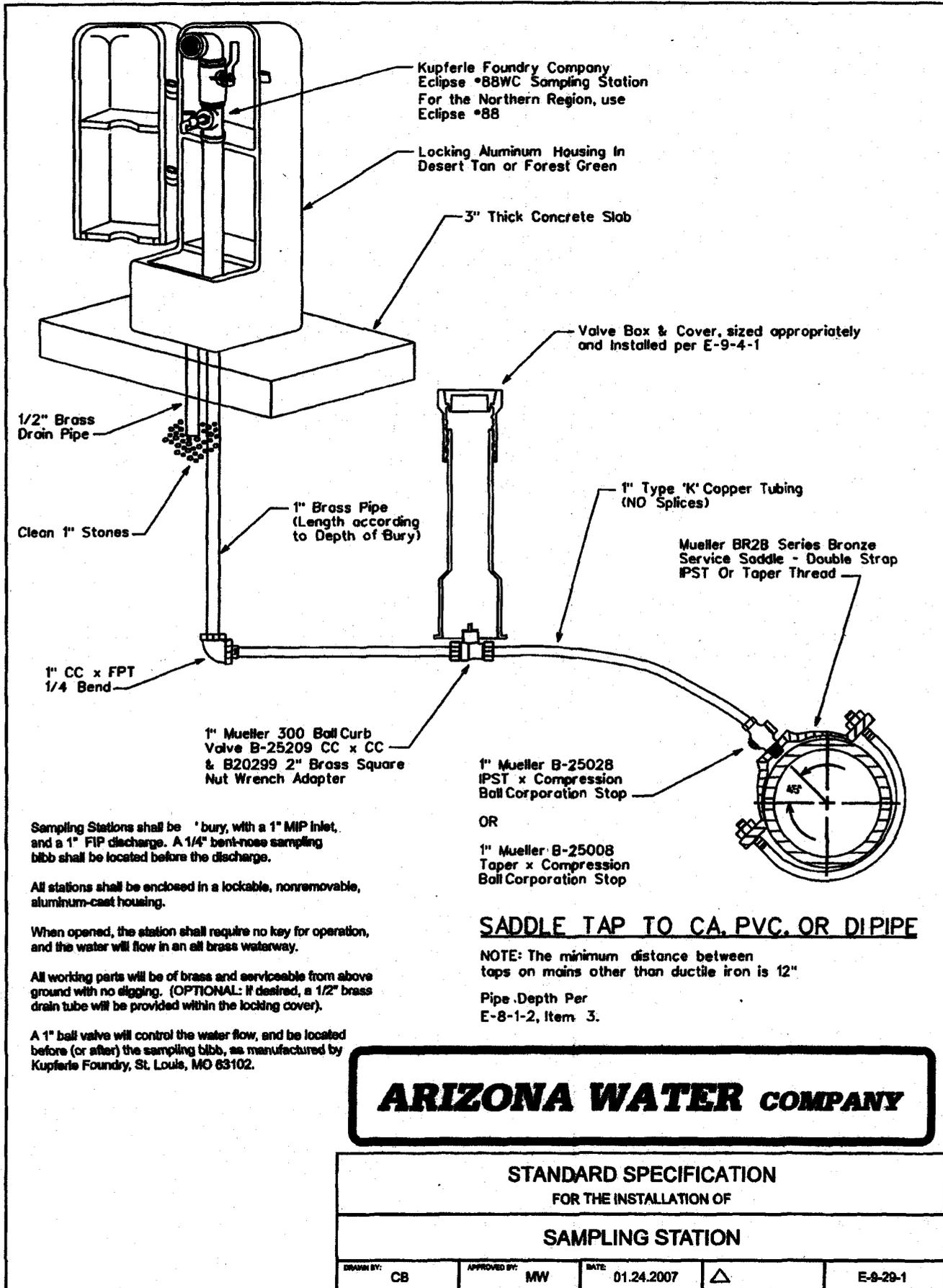
ARIZONA WATER COMPANY

STANDARD SPECIFICATION
FOR THE INSTALLATION OF

LOCATOR WIRE TERMINATION

DRAWN BY: CB	APPROVED BY:	DATE 09.27.2006	△
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E-9-28-2



Sampling Stations shall be 1' bury, with a 1" MIP inlet, and a 1" FIP discharge. A 1/4" bent-nose sampling bibb shall be located before the discharge.

All stations shall be enclosed in a lockable, nonremovable, aluminum-cast housing.

When opened, the station shall require no key for operation, and the water will flow in an all brass waterway.

All working parts will be of brass and serviceable from above ground with no digging. (OPTIONAL: If desired, a 1/2" brass drain tube will be provided within the locking cover).

A 1" ball valve will control the water flow, and be located before (or after) the sampling bibb, as manufactured by Kupferle Foundry, St. Louis, MO 63102.

SADDLE TAP TO CA. PVC. OR DI PIPE

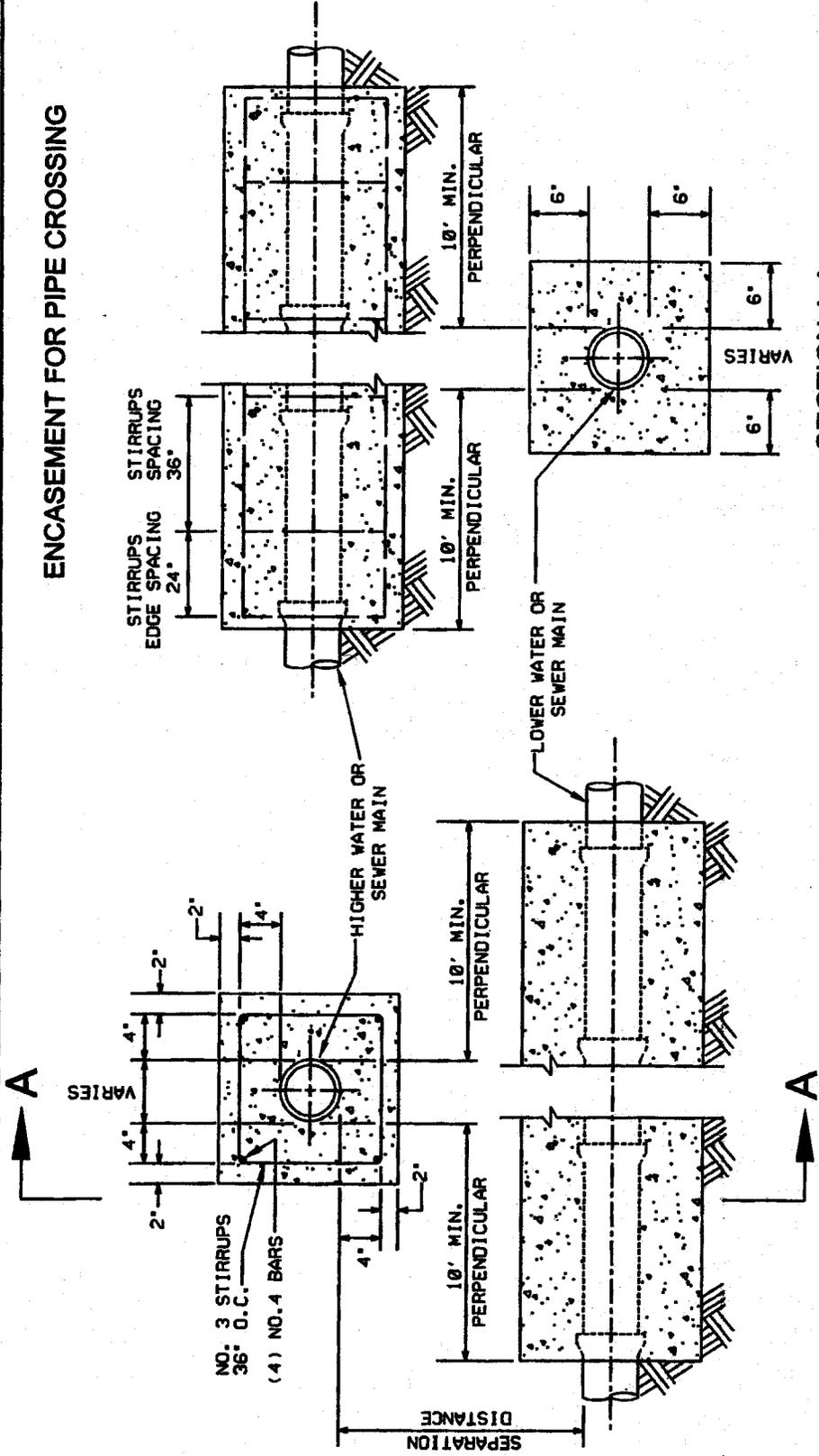
NOTE: The minimum distance between taps on mains other than ductile iron is 12"

Pipe Depth Per E-8-1-2, Item 3.

ARIZONA WATER COMPANY

STANDARD SPECIFICATION FOR THE INSTALLATION OF			
SAMPLING STATION			
DRAWN BY: CB	APPROVED BY: MW	DATE: 01.24.2007	△
			E-8-29-1

ENCASUREMENT FOR PIPE CROSSING



SECTION A-A

1. 2,000 PSI CONCRETE

2. SEPARATION DISTANCES AND/OR OTHER EXTRA PROTECTION SHALL BE REQUIRED TO PROTECT WATER MAINS FROM CONTAMINATION BY SANITARY SEWER MAINS. SEE AWC STANDARD SPECIFICATION PAGES E-8-1-9 AND E-8-1-10.

3. SEE CROSS SECTION DETAIL FOR LIMITS OF SEPARATION/EXTRA PROTECTION. ALL DISTANCES ARE MEASURED PERPENDICULARLY FROM THE OUTSIDE OF THE PIPES.

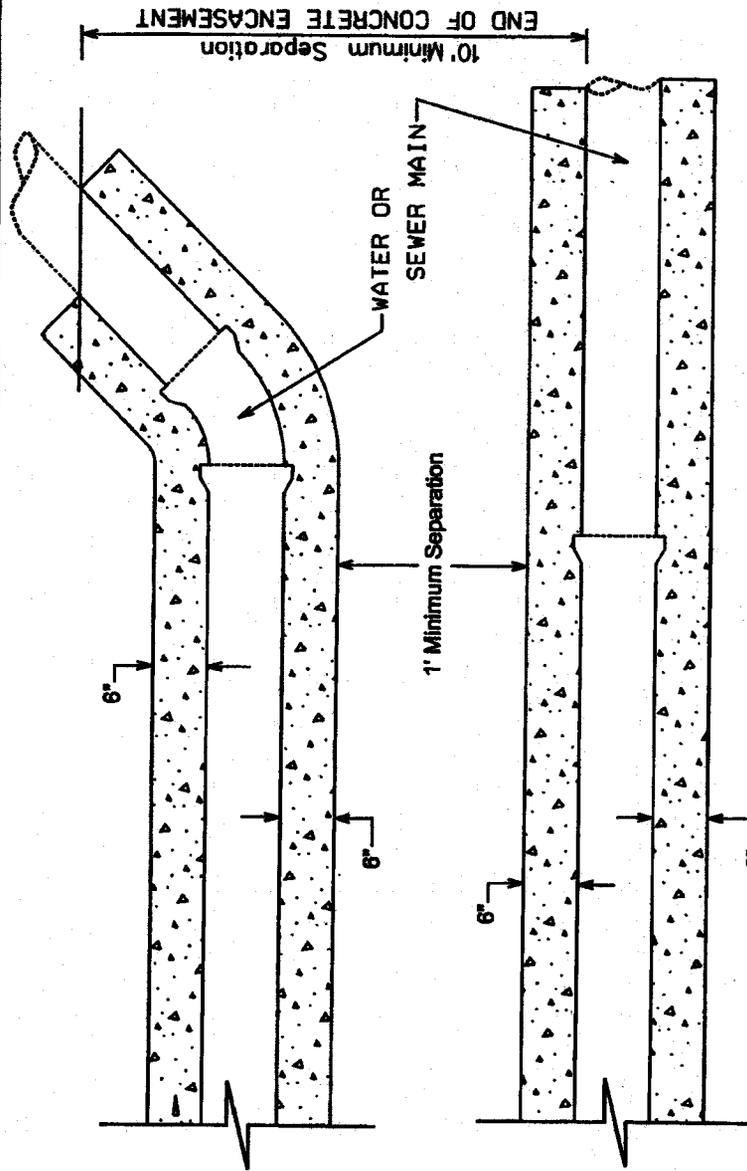
4. RECLAIMED WATER SHALL BE CONSIDERED A SANITARY SEWER WHEN PLACED NEXT TO A POTABLE WATER MAIN.

ARIZONA WATER COMPANY

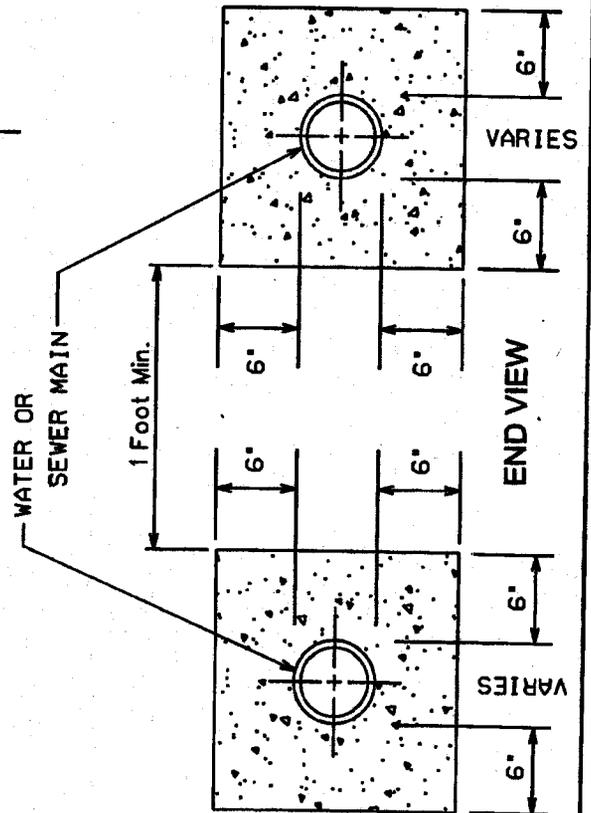
STANDARD SPECIFICATION FOR THE INSTALLATION OF		
WATER AND SANITARY SEWER SEPARATION/PROTECTION		
DRAWN BY: CB	APPROVED BY: JW	DATE: 04.07.2008
		△
		E-9-30-1

NOTES:

1. 2,000 PSI CONCRETE
2. SEPARATION DISTANCES AND/OR OTHER EXTRA PROTECTION SHALL BE REQUIRED TO PROTECT WATER MAINS FROM CONTAMINATION BY SANITARY SEWER MAINS. SEE AWC STANDARD SPECIFICATION PAGES E-8-1-9 AND E-8-1-10.
3. SEE CROSS SECTION DETAIL FOR LIMITS OF SEPARATION/EXTRA PROTECTION. ALL DISTANCES ARE MEASURED PERPENDICULARLY FROM THE OUTSIDE OF THE PIPES.
4. RECLAIMED WATER SHALL BE CONSIDERED A SANITARY SEWER WHEN PLACED NEXT TO A POTABLE WATER MAIN.



PLAN VIEW



ENCASUREMENT FOR PARALLEL PIPES

ARIZONA WATER COMPANY

STANDARD SPECIFICATION

FOR THE INSTALLATION OF

WATER AND SANITARY SEWER SEPARATION/PROTECTION

DRAWN BY: CB

APPROVED BY: JW

DATE: 04.07.2008



E-9-30-2

ENGINEERING SERVICES

Configuration, RTU Application Software (Globe Miami): \$9,600

The System Engineer will configure the RTU application according to the system requirements.

Integration, On-site at Customer Location (Globe Miami): \$8,850

- Test communications between RTUs
- Test and Debug as needed
- Obtain signoff and acceptance

Configuration, RTU Application Software (Lakeside): \$4,800

The System Engineer will configure the RTU application according to the system requirements.

Integration, On-site at Customer Location (Lakeside): \$4,065

- Test communications between RTUs
- Test and Debug as needed
- Obtain signoff and acceptance

Configuration, RTU Application Software (Heber): \$4,800

The System Engineer will configure the RTU application according to the system requirements.

Integration, On-site at Customer Location (Heber): \$4,665

- Test communications between RTUs
- Test and Debug as needed
- Obtain signoff and acceptance

Configuration, RTU Application Software (Superior): \$4,800

The System Engineer will configure the RTU application according to the system requirements.

Integration, On-site at Customer Location (Superior): \$2,900

- Test communications between RTUs
- Test and Debug as needed
- Obtain signoff and acceptance

Configuration, RTU Application Software (Sedona): \$9,600

The System Engineer will configure the RTU application according to the system requirements.

Integration, On-site at Customer Location (Sedona): \$6,275

- Test communications between RTUs
- Test and Debug as needed
- Obtain signoff and acceptance

Configuration, RTU Application Software (Bisbee): \$9,600

The System Engineer will configure the RTU application according to the system requirements.

Integration, On-site at Customer Location (Bisbee): \$4,665

- Test communications between RTUs
- Test and Debug as needed
- Obtain signoff and acceptance

Configuration, RTU Application Software (Casa Grande): \$9,600

The System Engineer will configure the RTU application according to the system requirements.

0001	V118	ADD: 4 AO MODULE	\$ 495.00	\$ 495.00
0001	V261	ADD: AC PS 85-264 V WITH BATTERY CHARGER	\$ 310.00	\$ 310.00
0001	V114	ADD: 6.5 AH BACKUP BATTERY	\$ 140.00	\$ 140.00
0001	GD3572-16DI/FET	16 DI/DO FET I/O Interface Kit (16DI)	\$ 255.00	\$ 255.00
0001	GD3572-16DO	16 DO I/O Interface Kit	\$ 650.00	\$ 650.00
0001	GD3572-4AO	4 AO I/O Interface Kit	\$ 255.00	\$ 255.00

Sedona: \$ 22,890.00

Note: Rancho Rojo Well, Sedona Golf Course Resort Tank, Sedona Golf Course Resort Well were previously quoted under a different project

QTY	Part No	Description	Unit Price	Extended
0010	GD5188	Lo Power Replacement Radio Kits (Southwest Center Well #8, Rainbow Well #6, Williams Well #7, Harmony High Park Tank, Valley Vista #13, Rimrock Well #2, Montezuma Haven Well #3, Montezuma Hills Tank, Rim Well #1, Harmony Well)	\$ 450.00	\$ 4,500.00
0010	FRN5907	DPSK BOARD (Southwest Center Well #8, Rainbow Well #6, Williams Well #7, Harmony High Park Tank, Valley Vista #13, Rimrock Well #2, Montezuma Haven Well #3, Montezuma Hills Tank, Rim Well #1, Harmony Well)	\$ 180.00	\$ 1,800.00
0001	GD2421	Electrical Install	\$ 5,655.00	\$ 5,655.00
0001	F7563	ACE3600 WITH CDM750 136-174 MHZ (Office)	\$ 1,850.00	\$ 1,850.00
0001	V103	ADD: 3 I/O SLOTS FRAME	\$ 70.00	\$ 70.00
0001	V228	ADD: 50X50 CM PAINTED METAL HOUSING	\$ 300.00	\$ 300.00
0001	V224	ADD: HOUSING TAMPER SWITCH	\$ 40.00	\$ 40.00
0001	V480	ADD: 16 DO / DI FET	\$ 250.00	\$ 250.00
0001	V118	ADD: 4 AO MODULE	\$ 495.00	\$ 495.00
0001	V261	ADD: AC PS 85-264 V WITH BATTERY CHARGER	\$ 310.00	\$ 310.00
0001	V114	ADD: 6.5 AH BACKUP BATTERY	\$ 140.00	\$ 140.00
0001	GD3572-16DI/FET	16 DI/DO FET I/O Interface Kit (16DI)	\$ 255.00	\$ 255.00
0001	GD3572-4AO	4 AO I/O Interface Kit	\$ 255.00	\$ 255.00
0002	F7563	ACE3600 WITH CDM750 136-174 MHZ (Wickiup Mesa Tank, Pinewood Tank)	\$ 1,850.00	\$ 3,700.00
0002	V103	ADD: 3 I/O SLOTS FRAME	\$ 70.00	\$ 140.00
0002	V228	ADD: 50X50 CM PAINTED METAL HOUSING	\$ 300.00	\$ 600.00
0002	V245	ADD: 16DI 4DO EE 4AI +/-20MA	\$ 430.00	\$ 860.00

0002	V261	ADD: AC PS 85-264 V WITH BATTERY CHARGER	\$ 310.00	\$ 620.00
0002	V114	ADD: 6.5 AH BACKUP BATTERY	\$ 140.00	\$ 280.00
0002	GD3572-Mixed	Mixed I/O Interface Kit	\$ 385.00	\$ 770.00

Bisbee: \$ 15,341.00

QTY	Part No	Description	Unit Price	Extended
0009	GD4378	Hi Power Replacement Radio Kits (Tintown, Greaves Well, Stuart Pump Station, Fuller, Village Meadows, Sulger, Tombstone Canyon Tank, Spring Canyon Tank, Bisbee Office)	\$ 733.00	\$ 6,597.00
0003	GD6266	Radio Reprogramming (Tintown Booster, Naco, Tintown Tank)	\$ 95.00	\$ 285.00
0012	FRN5708	DPSK BOARD (Tintown, Greeves Well, Stuart Pump Station, Fuller, Village Meadows, Sulger, Tombstone Canyon Tank, Tintown Booster, Naco Tintown Tank, Spring Canyon Tank, Bisbee Office FIU)	\$ 207.00	\$ 2,484.00
0001	GD2421	Electrical Install	\$ 2,625.00	\$ 2,625.00

0001	F7563	ACE3600 WITH CDM750 136-174 MHZ (Naco MDLC (Formerly Intrac))	\$ 1,850.00	\$ 1,850.00
0001	V103	ADD: 3 I/O SLOTS FRAME	\$ 70.00	\$ 70.00
0001	V228	ADD: 50X50 CM PAINTED METAL HOUSING	\$ 300.00	\$ 300.00
0001	V508	ADD: 8 DO EE RELAY 2A	\$ 260.00	\$ 260.00
0001	V261	ADD: AC PS 85-264 V WITH BATTERY CHARGER	\$ 310.00	\$ 310.00
0001	V114	ADD: 6.5 AH BACKUP BATTERY	\$ 140.00	\$ 140.00
0001	GD3572-8DO	8 DO I/O Interface Kit	\$ 420.00	\$ 420.00

Casa Grande: \$ 24,705.00

QTY	Part No	Description	Unit Price	Extended
0005	GD5188	Lo Power Replacement Radio Kits (Casa Grande Tank, North Park Tank, Pinal Booster Pump Site, Well 27, Well 29)	\$ 450.00	\$ 2,250.00
0003	GD6266	Radio Reprogramming (Stanfield Tank, Table Top, Tierra Grande Tank (spare))	\$ 95.00	\$ 285.00
0007	FRN5907	DPSK BOARD (Casa Grande Tank, North Park Tank, Pinal Booster Pump Site, Stanfield Tank, Table Top, Well 27, Well 29)	\$ 180.00	\$ 1,260.00
0001	GD2421	Electrical Install	\$ 6,650.00	\$ 6,650.00

0001	F7563	ACE3600 WITH CDM750 136-174 MHZ (Scott Drive Booster Station)	\$ 1,850.00	\$ 1,850.00
0001	V103	ADD: 3 I/O SLOTS FRAME	\$ 70.00	\$ 70.00
0001	V228	ADD: 50X50 CM PAINTED METAL HOUSING	\$ 300.00	\$ 300.00
0001	V245	ADD: 16DI 4DO EE 4AI +/-20MA	\$ 430.00	\$ 430.00

TERMS

1. **Validity of quotation:** This quotation is valid for 30 days, and is based on the information provided to us at the time of quotation. We are not responsible for incorrect or missing information. New information provided to us after the quotation is generated may result in a revised quotation containing additional products or services required.
2. **Delivery date:** Delivery dates are not guaranteed. Orders are generally delivered in the most expeditious manner possible. A planned delivery schedule will be provided upon order placement. Change orders placed subsequent to the original PO may delay delivery.
3. **Order placement:** We reserve the right to reject orders that do not contain all quoted products and services except those items indicated in the optional products and services section. For radio programming, please provide radio frequencies at the time of order placement.
4. **Invoicing:** Orders are invoiced only when they are ready for delivery. The only exception to this policy is when the customer requests early billing.
5. **Payment:** 100% payment is due within 30 days of the invoice date. Invoices not paid within 30 days are subject to interest at the rate of 1.5% monthly, and your placement on COD basis for future orders. Early pay discount is not available.
6. **Payment method:** We accept payment by bank transfer (ACH), Check, and Cards (Visa and MasterCard only). Card payments must be processed on the same date that the invoice is generated. Payments made after the invoice date can be made only via ACH or Check.
7. **New Customers:** Credit application and references required for all new customers. Alternatively, you may pay by one of the payment methods above on the date of order delivery.
8. **Shipment FOB:** Global Data Specialists, 1815 W 1st Ave, Suite 110, Mesa, AZ. For Dataradio drop-shipped orders shipment FOB is CalAmp, Waseca, MN.
9. **Shipping charges:** If the quotation includes shipping, handling or delivery fees, it is only an estimate. Actual shipping charges will be determined only at the time of order shipment.
10. **Taxes:** Applicable sales taxes will be added to all orders unless a valid tax exemption certificate is presented at the time of order placement.
11. **Warranty is specific to the policies of each respective OEM (Original Equipment Manufacturer). No additional warranties are expressed or implied. Please contact us for all warranty and non-warranty repairs with the exception of Dataradio. For Dataradio warranty and non-warranty repairs, call 800-992-7774 x6707. Warranty service includes standard depot repair only, and does not include shipping charges or service calls to remove, repair or reinstall equipment. Emergency repair and swap service costs extra and is subject to parts availability. Warranty labor includes direct in-house labor costs only. If warranty service requires our personnel to travel out of our office, additional time and materials charges will be invoiced separately.**
12. **Order cancellation: The following order cancellation charges shall apply:**
 - Prior to 30 days of planned delivery date: 25% of the quoted amount shall be invoiced.
 - Less than 30 days of planned delivery date: 50% of the quoted amount shall be invoiced.
 - After order is ready for delivery: 100% of the quoted amount shall be invoiced.
13. **Contractors:** At our discretion, we will file a pre-lien when required. Please provide full project name and number, project location, and General Contractor and owner information at the time of order placement.
14. **Delinquent pick up:** You will be notified when the order is ready for pick up. Orders not picked up within 7 days of notification date are subject to storage fees of \$25 per unit per day.

2. Exclusions and Clarifications

- a. Proposal is based on re-using existing wiring and devices.
- b. Delays or additional work that are found as a result of existing field conditions, may require a change order.
- c. Only work, equipment, and materials explicitly stated in this document are part of this proposal. Electrician accepts the responsibility for the coordination and furnishing of small and incidental equipment and services normally associated with this type of work and for coordination with other disciplines. Any additional significant equipment, materials, or services will be furnished only upon execution of a change order.
- d. All other equipment and services not specifically mentioned in this scope of work nor defined above shall be the responsibility of others.
- e. This proposal is based upon electrician executing their work in reasonable coordination with other disciplines and entities. Additional electrician costs due to significant or extraordinary delays by others will be grounds for change orders.

3. Taxes and Freight

- a. Taxes are not included in this proposal. Upon request, electrician will furnish an estimate of taxes for this work. Owner to furnish electrician with tax exempt information.
- b. Unless noted differently, this proposal includes freight cost for delivery of electrician manufactured products to the project site.
- c. Unless noted differently, freight cost for equipment shipped FOB manufacturer's facility or FOB port-of-entry is not included in this proposal.

4. Warranty:

- a. The warranty period for electrician manufactured electrical and control equipment is 18 months from ship date or 12 months from startup date. During this period, electrician will repair or replace at no cost to owner any failed component or system.
- b. Unless noted differently, electrician will honor a manufacturer's warranty for all purchased equipment and will coordinate with the manufacturer to repair or replace the equipment in accordance with the manufacturer's warranty.
- c. The electrician warranty covers only electrician furnished equipment and explicitly excludes all costs of lost production, loss of facility availability, and any and all other incidental costs.
- d. Electrician will make every effort to honor the warranty in a timely manner. Delays in getting parts or equipment from manufacturers may affect the time to implement repairs or replacement.

If you have any questions or need additional information please let me know.

Also please note that tax and shipping has not been included in this proposal.

Best Regards,

Duane Moody
Sales Manager

ENGINEERING SERVICES

Configuration, FIU and RTU Applications

The System Engineer will configure the FIU and RTU applications according to the system requirements.

Integration, On-site at Customer Location

- Test communications and operation between OIT and RTU
- Test and Debug as needed
- Conduct operator training on OIT
- Obtain signoff and acceptance

Engineering Services Sub-Total \$ 6,525.00

MATERIALS

Office FIU: \$ 6,489.00

QTY	Part No	Description	Unit Price	Extended	
0001	F7500	ACE3600 SYSTEM TOOL SUITE	\$ 500.00	\$ 500.00	
ACE3600 software tools environment for system building and maintenance. Includes installation CD and RS-232 PC to RTU cable.					
0001	GD5677-ACE	ACE3600 RTU/FIU Application Program	\$ 2,600.00	\$ 2,600.00	
	J01	F7509	ACE3600 BASIC MODEL NO RADIO	\$ 1,150.00	\$ 1,150.00
0001	V102	ADD: 2 I/O SLOTS FRAME	\$ 50.00	\$ 50.00	
0001	V228	ADD: 50X50 CM PAINTED METAL HOUSING	\$ 300.00	\$ 300.00	
0001	V118	ADD: 4 AO MODULE	\$ 495.00	\$ 495.00	
0001	V261	ADD: AC PS 85-264 V WITH BATTERY CHARGER	\$ 310.00	\$ 310.00	
0001	V328	ADD: 10 AH BACKUP BATTERY	\$ 207.00	\$ 207.00	
0001	FRN5769	SHARED RADIO INTERFACE	\$ 622.00	\$ 622.00	
0001	GD3572-4AO	4 AO I/O Interface Kit	\$ 255.00	\$ 255.00	

Valley Vista System RTU's: \$ 14,428.00

QTY	Part No	Description	Unit Price	Extended
0004	F7563	ACE3600 WITH CDM750 136-174 MHZ	\$ 1,850.00	\$ 7,400.00
The model default includes CDM750 136-174 MHz radio, radio installation kit, PS 12V DC, CPU3640 ,basic frame (no I/O slots) and plug-in radio port for CPU. Must be ordered with Metal chassis or housing option. CDM750 is only shipped to North America at this time				
0004	V102	ADD: 2 I/O SLOTS FRAME	\$ 50.00	\$ 200.00
0004	V228	ADD: 50X50 CM PAINTED METAL HOUSING	\$ 300.00	\$ 1,200.00
0004	V245	ADD: 16DI 4DO EE 4AI +/-20MA		

0004	V261	ADD: AC PS 85-264 V WITH BATTERY CHARGER	\$ 430.00	\$ 1,720.00
0004	V328	ADD: 10 AH BACKUP BATTERY	\$ 310.00	\$ 1,240.00
0004	FPN1653	ASSEMBLY, POWER SUPPLY, 24V PS PLUG IN KIT	\$ 207.00	\$ 828.00
0004	GD3572-Mixed	Mixed I/O Interface Kit	\$ 75.00	\$ 300.00
			\$ 385.00	\$ 1,540.00

OIT Option: \$ 1,550.00

QTY	Part No	Description	Unit Price	Extended
0001	GD5370	Operator Interface Terminal: 5.6 inch Graphic HMI with High-Resolution Analog Touchscreen Color TFT Display. Includes 120VAC to 24 VDC power supply (159mmLx 97mmW x 38mmH), Software, 5ft OIT to PLC communications cable, and 5 pack of protective touch screens. Includes mounting hardware.	\$ 1,550.00	\$ 1,550.00

NOTE: Does not include installation of OIT or power supply, AC power cable/wiring, or power supply to OIT cable/wiring.

Shipping: \$ 325.00

QTY	Part No	Description	Unit Price	Extended
0001	GD7336	Federal Express Ground	\$ 325.00	\$ 325.00

Materials Sub-Total \$ 22,792.00

OTALS

Engineering Services	\$ 6,525.00
Materials	\$ 22,792.00
TOTAL	\$ 29,317.00

OPTIONAL SERVICES (Not Included in Quote Totals)

Programming and On-Site Integration of OIT \$ 5,760.00

The System Engineer will create the OIT Application Program for the levels and pump set point adjustment of the tank site.

On-Site Integration Includes

- Test communications and operation between OIT and RTU
- Test and Debug as needed
- Conduct operator training on OIT
- Obtain signoff and acceptance

Radio Path Survey \$ 4,365.00

To conduct a radio path survey at all of the RTU sites in the Sedona system to evaluate and determine radio power requirements and optimal path considerations.

OPTIONAL MATERIALS (Not Included in Quote Totals)

QTY	Part No	Description	Unit Price	Extended
0001	Y1503	Antenna, Gold Anodized Directional Yagi 3 Element 7.1 dB Gain VHF50-174 MHz)	\$ 183.00	\$ 183.00
0001	RG213	RG213 (Cost Per Foot)	\$ 1.15	\$ 1.15
0001	FSJ4-50B	1/2" Superflex (Cost Per Foot)	\$ 3.58	\$ 3.58
0001	GD1555-1	N-Male Connectors (ea) (1/2" Superflex)	\$ 25.00	\$ 25.00
0001	GD1555-2	N-Male Connectors (ea) (RG213)	\$ 6.00	\$ 6.00
0001	GDISB50LN-C2	Polyphaser (N-Male to N-Male) with 2ft Pigtail	\$ 145.00	\$ 145.00
0001	FG1683	Antenna, Fiberglass Omnidirectional 3 dB Gain VHF	\$ 185.00	\$ 185.00
0001	FM2	Mounting Bracket, Heavy Duty for Omni Fiberglass Base Antenna	\$ 30.00	\$ 30.00

Optional Wall Mount Housing for OIT and RTU (Includes mounting of OIT and RTU within enclosure.: \$ 4,642.00

QTY	Part No	Description	Unit Price	Extended
0001	GD3612	Lamax SST Housing (36x24x12), NEMA 4 Wall Mount (Painted Steel) with cutout for OIT. Includes installation and cabling of ACE3600 and OITas well as installation of the I/O interface kit. AC wiring to the OIT power supply is not included.	\$ 4,242.00	\$ 4,242.00

If this option is purchase, (1) V228 50x50cm housing can be deducted from the ACE3600 configuration. A V056 option
ADD: 48 X 48 CM METAL CHASSIS, \$100) will need to be substituted for the V228 option.

0001	GD7336	Shipping	\$ 400.00	\$ 400.00
------	--------	----------	-----------	-----------

TERMS

NOTE 1: Quote does not include shipping.
NOTE 2: Quote does not include taxes.

Payment:..... 100% Upon Receipt of Invoice, Net 30 Days. 1% discount if payment is received Net 15. We also accept Visa, Master Card, and American Express.

Delivery:..... TBD Upon Order Placement

Validity: Quotation is valid for 90 days. The above quotation is based upon the information provided at the time of quotation. Global Data Specialists is not responsible for any information that is missing or incorrect. Any new information that is received after the quotation has been submitted may result in a revised quotation being issued to cover the costs of additional equipment or services as identified.

Shipment:..... Global Data Specialists, Mesa, AZ.

Warranty: The Motorola equipment is warranted for 1 year upon shipment for parts and labor. Non-Motorola equipment warranties are vendor specific and will apply. No additional warranties are expressed or implied. Warranty labor does not include the cost associated with any out of the office related travel or hourly time expenses and will be billed separately.

Cancellation:..... 10% Penalty prior to 30 days of shipment, 25% Penalty less than 30 days prior to shipment.

Note: Please reference quotation number on all correspondence.



1815 W. First Ave., Suite 110, Mesa, AZ 85202
Phone: 480-461-3401 FAX: 480-461-3411

QUOTE: **MDM03931C**
by Duane Moody
480-461-3401, Ext. 223, duane@gbf-data.com
Expires 07-Sep-11

June 09, 2011

Quoted To: **Andy Haas**
Email: ahaas@azwater.com

Arizona Water
3805 N. Black Canyon Hwy.
Phoenix, AZ 85015
Phone: 602-240-6860
FAX: 602-240-6878

End User: **Valley Vista System**

Description

Global Data Specialists is pleased to provide you with the following BUDGETARY quotation for the Sedona system as per your request. The quote includes as follows:

Replacing the RTUs communicating Intrac protocol at the Sedona Golf Course Resort Tank and 3 associated wells (Rancho Rojo, Sedona Golf Resort Well, and Valley Vista Well) with the Motorola ACE3600. This would also include another FIU at the office with analog output module for interface to a strip chart recorder (currently interfaced to Intrac FIU). The ACE3600 FIU would share the same radio as the current Intrac FIU.

An option for an Operator Interface Terminal (OIT) would be interfaced to the Tank as an option and would include the following:

- a. OIT with software
- b. 120VAC to 24VDC power supply needed for the OIT (159mmLx97mmWx38mmH)
- c. A 5ft comm. cable from the OIT to the PLC
- d. A 5 pack of protective screen covers for the touchscreen
- e. The Engineering Services for programming of the OIT and RTU

NOTE: This Option can also be included with Option 3 below.

This will not include installation of the OIT in the housing/cabinet or AC to power supply or power supply to OIT wiring/cables. A separate housing for the OIT will need to be provided or a larger housing at the Tank may be needed to house the ACE3600 and OIT. A separate housing for installation of the OIT and RTU (wall mount) is included in the Optional Materials.

NOTE 1: The Optional Materials section of the quote lists a VHF Yagi antenna individual price for those sites that may need to be replaced as needed for optimal system operation. Also, please note that any sites requiring new coax cable will be included on the invoice. Coax cable types, with cost per foot, has been included in the Optional Materials section of the proposal. Optional connectors and other items are also included in this section.

NOTE 2: The Optional Services also includes the budgetary estimate for a radio path survey for the RTU sites at Wikiup, Pinewood, Harmony High Point, Sedona Golf Course Resort, and Montezuma Hills Tanks and associated wells/pump sites.. This will also include the central computer FIU. This will also determine the optimal location of the repeater as well as antenna height. The radio path survey is needed to evaluate and determine the radio communications path between the various sites to determine if a 5 watt VHF radio is sufficient or if a higher power radio configuration is required. If a higher power radio is needed, this will also determine if any hardware changes need to be made at the site(s) for larger power supply and larger radio.

NOTE 3: Quotation does not include RTU equipment installation.

To provide cost effective installation of the ACE3600 RTU, Global Data Specialists has created I/O interface kits that can be used for faster and easier installation of the equipment. The kit consists of DIN rail mounted terminal blocks and relay blocks, along with a direct interface connector to the front of the I/O module, and a 3 ft cable. Additional lengths are optional.

These kits have been designed for the Mixed I/O module, 8/16 AI module, 8/16 DO module, 16/32 DI module, 4 AO module, 4AO/8AI module, 16DI FET, 8 DI/8DO FET, 16DO FET, and the 16 DI 120-230V module. Additional modules can be designed upon request.

The kits can be mounted within a wall mount enclosure along with the ACE3600 RTU, or within a separate housing or for outside the enclosure mounting depending upon the site requirements.

In addition, these kits were created for the following issues.

- a. The maximum wire size for the terminals on the ACE3600 I/O modules is 18 ga.
- b. The relays in the DO and Mixed I/O modules do not have a high capacity compared to the MOSCAD RTU's or be able to drive external devices. As a result, interpose relays may need to be required. The interface kit includes relays that provide higher capacity relays than those included with the ACE I/O modules.
- c. The terminals provided with the interface kit allow for easier installation and up to 12ga wiring. The terminals, "linkles" on the I/O modules can be hard to access within the module housing and can be cramped for the wiring to the module. The interface kit terminals can be installed for more readily available access and easier wire routing.

NOTE: The add-on power supply for the DI and AI modules will be needed to provide wetting voltage for the DI's and the AI loop power.

If you have any questions or need additional information please let me know.

Best Regards,

Duane Moody
Sales Manager

WA 1-4814

ARIZONA WATER COMPANY
WORK AUTHORIZATION

W.A. NUMBER: 1-4814
 P.E. NUMBER:
 BUDGET ITEM NO.: B-1
 SHEET NO.: 1 of 2

SYSTEM: VERDE VALLEY	WORK TO START BY: UPON AUTHORIZATION
DIVISION: VERDE VALLEY	WORK TO BE FINISHED BY: WITHIN 180 DAYS
TAX CODE: 0976	

DESCRIPTION OF WORK:

Design and Construct Arsenic Removal Facility to remove arsenic from Harmony Hills Wells #5 and #12 (Part 1 of 2) to comply with the Safe Drinking Water Act. An evaluation of the best available treatment method has been completed whereby adsorptive technology was selected. Construct in accordance with attached drawings and/or Arizona Water Company specifications.

FACTORS JUSTIFYING WORK:

APPROVED 2011 BUDGET ITEM (\$350,000)

COST ESTIMATE		AUTHORIZATION	DATE
COST OF WORK:		PREPARED BY: <i>Andy Haas</i> Andy Haas ADH 12-2-11	12-1-11
MATERIAL	0	REVIEWED FOR ESTIMATE VERIFICATION:	
LABOR	23,350	<i>Charles Briggs</i> Charles Briggs CB 12-02-2011	12-01-2011
CONTRACT PORTION	237,105	REVIEWED BY:	
OVERHEAD	39,088	<i>Mike Loggins</i> Mike Loggins ML 12-2-11	12-1-11
TOTAL AUTHORIZED EXPENDITURES CHARGEABLE TO THIS W.A.	\$ 299,523	APPROVED BY ENGINEERING:	
FUNDS RECEIVED:		<i>Fredrick Schneider</i> Fredrick Schneider	12-2-11
CONTRIBUTIONS RECEIVED	0	APPROVED BY PRESIDENT:	
REFUNDABLE ADVANCES RECEIVED	0	<i>Joseph Harris</i> Joseph Harris	12/2/11
TOTAL CONTRIBUTIONS/ADVANCES	0	AUTHORIZED BY PRESIDENT:	
NET CASH REQUIRED	\$ 299,523	<i>William M Garfield</i> William Garfield	12-2-2011

COMMENTS:
 Balance of \$1,050,000 to be released in 2012.
 Subject to AWC Board Approval. *W*

CONSTRUCTION RELEASE:

RELEASED TO CONSTRUCTION
 Authorized by **FRED SCHNEIDER**
 Date 12/2/2011

AFH

ARIZONA WATER COMPANY
WORK AUTHORIZATION - DETAIL SHEET

W.A. NUMBER: 1-4814
P.E. NUMBER:
BUDGET ITEM NO.: B-1
SHEET NO.: 2 of 2

RETIREMENT PROPERTY UNITS	PLANT PROPERTY NUMBER	UNIT DESCRIPTION	QUANTITY	UNIT COST	TOTAL
PRODUCT DESCRIPTION					
Design and Construct Arsenic Removal Facility to remove arsenic from Harmony Hills Wells #5 and #12 (Part 1 of 2) to comply with the Safe Drinking Water Act. An evaluation of the best available treatment method has been completed whereby adsorptive technology was selected.					
C O N T R A C T W O R K	DESCRIPTION	PLANT PROP ADST	QUANTITY	UNIT COST	TOTAL
	Design Arsenic Removal Facility	332	1	\$ 69,946.75	\$ 69,947
	Construction Administrative Services	332	1	13,950.00	13,950
	Provide and Install On-Site Piping	332	1	50,000.00	50,000
	Provide and Install Arsenic Removal Facility	332	1	25,000.00	25,000
	Provide and Install Backwash Recovery System	332	1	30,000.00	30,000
	Provide and Install On-Site Electrical	332	1	40,000.00	40,000
	100% Performance and Payment Bonds	332	1	6,708.00	6,708
	Geotech Analysis	332	1	1,500.00	1,500
	SERVICE CONNECTIONS COMPLETE: DOUBLE-LONG	345			
	SERVICE CONNECTIONS COMPLETE: DOUBLE-SHORT	345			
	SERVICE CONNECTIONS COMPLETE: SINGLE-LONG	345			
	SERVICE CONNECTIONS COMPLETE: SINGLE-SHORT	345			
TOTAL CONTRACT WORK				\$ 237,105	
M A T E R I A L S					
	SERVICE CONNECTIONS: DOUBLE-LONG	345			
	SERVICE CONNECTIONS: DOUBLE-SHORT	345			
	SERVICE CONNECTIONS: SINGLE-LONG	345			
SERVICE CONNECTIONS: SINGLE-SHORT	345				
METERS	346				
TOTAL MATERIALS				\$ -	
L A B O R	Engineering Design	332	120	\$ 50.00	\$ 6,000
	Submittal Reviews	332	120	50.00	6,000
	Project Management	332	20	50.00	1,000
	TESTING FEE				
	PERMIT FEE	332	1	6,100.00	6,100
	SURVEY FEE	332	1	3,250.00	3,250
	FIELD INSPECTION	332	20	50.00	1,000
	INSTALL SERVICE CONNECTIONS: DOUBLE-LONG	345			
	INSTALL SERVICE CONNECTIONS: DOUBLE-SHORT	345			
INSTALL SERVICE CONNECTIONS: SINGLE-LONG	345				
INSTALL SERVICE CONNECTIONS: SINGLE-SHORT	345				
TOTAL LABOR				\$ 23,350	
SUBTOTAL - CONTRACT WORK, MATERIALS, AND LABOR					\$ 260,455
OVERHEAD					39,068
TOTAL	REFUNDABLE PORTION <input type="checkbox"/>	NON-REFUNDABLE PORTION <input type="checkbox"/>	COST ESTIMATE		\$ 299,523

AFH



EXPIRES 09-30-2012

ARIZONA WATER COMPANY

**SEDONA HARMONY HILLS AND SOUTHWEST
CENTER ARSENIC TREATMENT ADSORPTIVE MEDIA**

**TECHNICAL MEMORANDUM
ALTERNATIVES EVALUATION**

May 2011

ARIZONA WATER COMPANY

**SEDONA HARMONY HILLS AND SOUTHWEST CENTER ARSENIC
TREATMENT ADSORPTIVE MEDIA ALTERNATIVES EVALUATION**

TECHNICAL MEMORANDUM

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ADSORPTIVE MEDIA ALTERNATIVES EVALUATION

1.0 INTRODUCTION / BACKGROUND

Arizona Water Company (AWC) owns two groundwater production well sites in Sedona, Arizona: Harmony Hills and Southwest Center, which are part of this analysis. Both sites are located north of Highway 89A in Sedona, in residential areas, and are approximately 3,000 feet apart. Two wells are located at the Harmony Hills site. The first (Harmony Hills #5) well has a production capacity of 155 gpm and the second (Harmony Hills #12) has a capacity of 900 gpm. One 810-gpm well is located at the Southwest Center site (Southwest Center #8). Based on historic total arsenic concentrations from December 2009 to September 2010, the arsenic concentrations at all three wells range from approximately 0.009 to 0.011 mg/L.

In 2010 AWC contracted with Carollo Engineers (Carollo) to conduct an evaluation of the best available arsenic treatment technologies or mitigation strategies for the Harmony Hills and Southwest Center sites. The results of that previous study were as follows:

- Both sites are small and have limited area available for new/additional equipment (i.e., equipment footprint is critical).
- Sorptive media (SM) treatment operated in parallel provides the smallest footprint (see Figure 1).
- SM treatment ranked higher than coagulation filtration (C/F) or ion exchange (IX) in terms of AWC operational and maintenance goals.
- SM treatment at each site cost approximately \$1 million. Centralized treatment using SM technology that would treat water from both sites was approximately \$3.6 million
- SM with lead-lag only provided a small incremental cost savings in terms of the 20-year life cycle. This was primarily due to the low influent arsenic concentration.
- Both sites are in populated, residential areas. Harmony Hills has limited barrier security due to the City of Sedona permitting requirements.

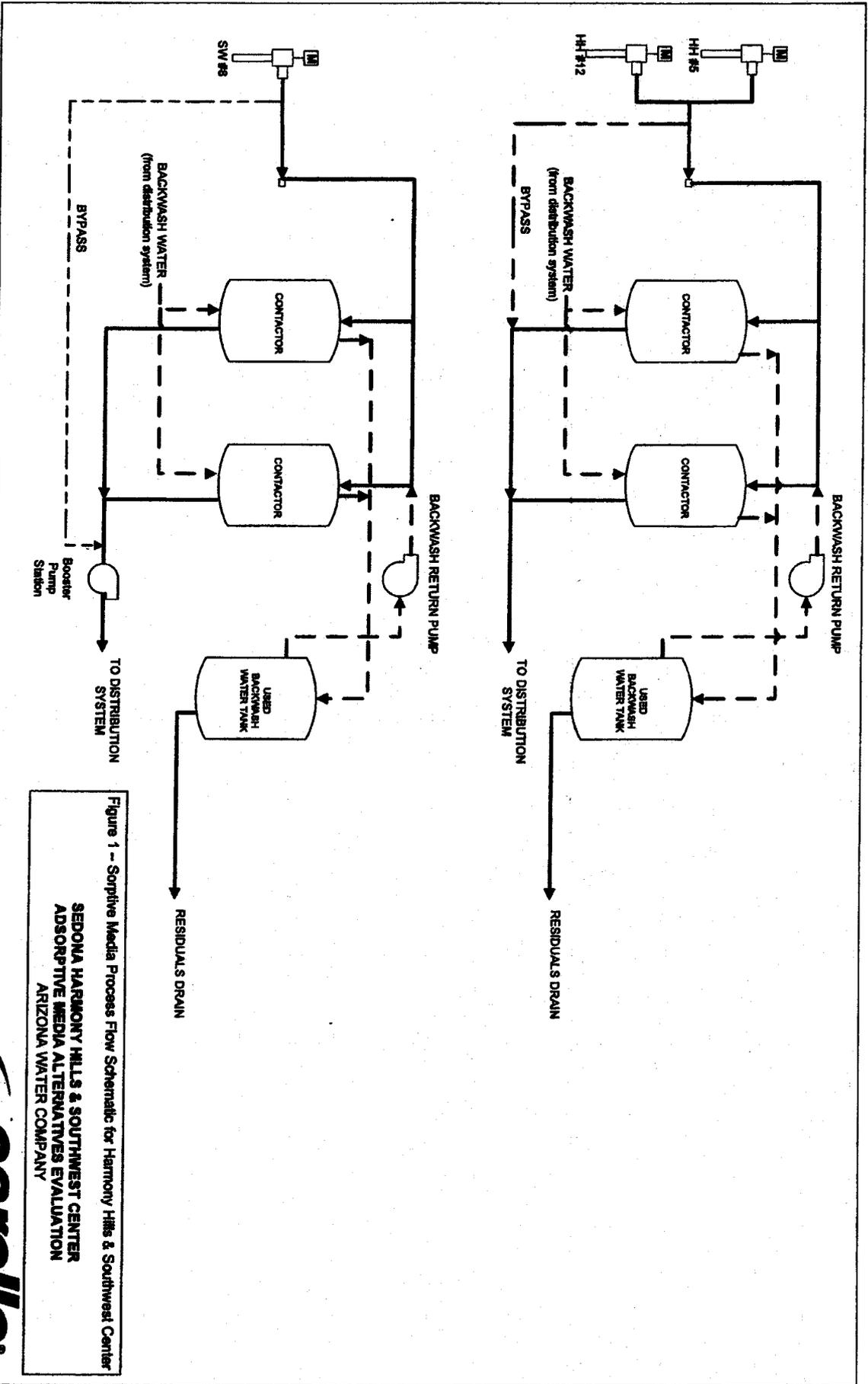


Figure 1 - Sorptive Media Process Flow Schematic for Harmony Hills & Southwest Center
 SEDONA HARMONY HILLS & SOUTHWEST CENTER
 ADSORPTIVE MEDIA ALTERNATIVES EVALUATION
 ARIZONA WATER COMPANY



In 2011, AWC contracted with Carollo to provide additional review of SM treatment technologies using parallel vessels and blending at the Harmony Hills and Southwest Center sites, which is summarized in this technical memorandum. The objectives of this additional work were as follows:

- Assess the current state of technology for medias used in SM treatment systems to aid in determining the best available adsorptive media.
- Review those medias that appear to be viable options for full-scale use, and collect additional information. Specific characteristics evaluated for each viable media were as follows:
 - Projected bed life of media until exhaustion.
 - Footprint of treatment system and ability to fit at the Southwest Center site and Harmony Hills sites.
 - Ability of media supplier to provide a performance guarantee related to effluent arsenic levels and media bed life.
 - Ability of supplier to take full responsibility of disposed media and indemnify AWC.
 - Flexibility to allow use of new/advancing/emerging media technology in the future.
 - Proven media performance on groundwater in the Southwest United States, most importantly Arizona.
- Develop construction, operation and maintenance (O&M) and life-cycle costs for each SM system.
- Develop model for determining the optimum size of the treatment system (i.e., vessel diameter) based on SM system design criteria and equipment quotes.

2.0 CURRENT STATE OF SORPTIVE MEDIAS

Since the initial promulgation of the Arsenic Rule by the U.S. EPA in 2001, many sorptive medias have become commercially available. Sorptive media works by passing water through a bed of media. Arsenic in the water sorbs or binds tightly to the media. Once the media is saturated with arsenic and no longer removes arsenic from the water, it is removed and replaced with fresh media. Regenerable media have also been developed for arsenic treatment. These systems can use on-site or off-site processes to regenerate the media.

Development of medias has focused on increasing arsenic storage capacity (i.e., bed life of media until exhaustion) and ability to remove arsenic under a variety of water qualities. For sorptive medias, high values for pH, silica, and phosphate all result in reduced ability to remove arsenic compared to water with lower values of these constituents.

Current literature and publications were reviewed to develop a list of potentially available medias that have been reported to remove arsenic from water. Table 1 provides a summary of these medias and unique features or reason why medias are or are not considered to viable alternatives for consideration at the next level of study. From a review of over 20 medias, four appear to be viable options for use at the Southwest Center and Harmony Hills sites.

Table 1 Current Status of Arsenic Sorptive Medias Sedona Harmony Hills and Southwest Center Adsorptive Media Alternatives Evaluation		
Media Name	Manufacturer	Status
AAFS-50	Alcan	<ul style="list-style-type: none"> • Requires low pH for arsenic removal.
Adsorbisia	Dow	<ul style="list-style-type: none"> • Similar to Metsorb media. • Supplier does not recommend use if pH > 7.5. • Loprest offers the system package.
AD33	AdEdge Technologies	<ul style="list-style-type: none"> • Same as E33, but experience is generally for smaller packaged systems.
Alumina Silicate	Turr Corp	<ul style="list-style-type: none"> • No longer advertising.
Aquabind	Apyron	<ul style="list-style-type: none"> • Only provide Point-of-Entry / Point-of-Use. No full-scale, municipal installations.
ARM 200	Englehard	<ul style="list-style-type: none"> • Sandia (pilot) testing only.
ArsenxNPO	Purolite	<ul style="list-style-type: none"> • Potential patent infringement with LayneRT.
ASM-10-HP	ResinTech	<ul style="list-style-type: none"> • Resin based media similar to LayneRT, also used by Envirogen. Off-site media regeneration required (which is a concern to AWC).
E33	Severn Trent	<ul style="list-style-type: none"> • Large supplier with several installations.
G2	ADI	<ul style="list-style-type: none"> • Limited installations in U.S. • Reduced system performance (2-3 gpm/ft²).
GFH	Siemens	<ul style="list-style-type: none"> • Large supplier with several installations.
Isolux	MEI	<ul style="list-style-type: none"> • Focus on small systems (POU/POE).
LayneRT	Layne Christensen	<ul style="list-style-type: none"> • Newer media with off-site regeneration. • Limited installations.
Metsorb	Graver Technologies	<ul style="list-style-type: none"> • Titanium-based media (similar to Dow product). • Ability to treat water less with pH greater than 7.5.
NXT-2	Filtronics	<ul style="list-style-type: none"> • No current installations in Arizona
NZNPf	ChK Group	<ul style="list-style-type: none"> • No longer marketing this media

Table 1 Current Status of Arsenic Sorptive Medias Sedona Harmony Hills and Southwest Center Adsorptive Media Alternatives Evaluation		
Media Name	Manufacturer	Status
Surface Modified Zeolite (SMZ)	New Mexico Institute of Mining & Tech	<ul style="list-style-type: none"> • Only testing at research level.
SAMMS	HydoPure Technologies	<ul style="list-style-type: none"> • Primary use is residential (e.g., pools).
SMI-III	SMI-PS/Hoganas	<ul style="list-style-type: none"> • Focus is on nitrate removal. • Requires low pH and high bed contact times.
Ultrasorb A,F,T	Kinetico	<ul style="list-style-type: none"> • Focus on small systems (POU/POE).
Z-33	WRT	<ul style="list-style-type: none"> • Requires low pH
ZS500As	GSA Resources	<ul style="list-style-type: none"> • No advancement of product since 2000.
<p>Note: Shaded entries indicate those medias that appear viable for use at the Harmony Hills and Southwest Center sites. Additional design criteria and cost information was subsequently collected from these manufacturers/suppliers.</p>		

3.0 DETAILED EVALUATION OF FEASIBLE MEDIAS

Based on site constraints and AWC's evaluation criteria for the Sedona area, four SM suppliers (i.e., Dow / Metsorb, Layne Christensen, Severn Trent, and Siemens) from Table 1 were determined to be the most viable and were examined in greater detail. AdEdge Technologies could potentially also supply an SM system. As noted in Table 1, AdEdge historically has provided only smaller SM systems using E33 media, as per their licensing agreement with Severn Trent. AdEdge's sales representative recently indicated that they now have the ability to provide large-capacity systems (i.e. 1,000 gpm) suitable for the Sedona Harmony Hills and Southwest Center sites. Pricing was not obtained from AdEdge as part of this study. However, they could be included as a potential supplier if their capabilities are confirmed during the detailed design phase. Other SM system suppliers can also supply vessels and Severn Trent E33 media, but Severn Trent generally does not guarantee the media performance if they have not supplied the system.

Dow / Metsorb, Layne Christensen, Severn Trent, and Siemens were contacted directly to provide design criteria for their system packages, qualitative design considerations, and associated equipment and media replacement costs.

3.1 Supplier's Proposed Design Criteria

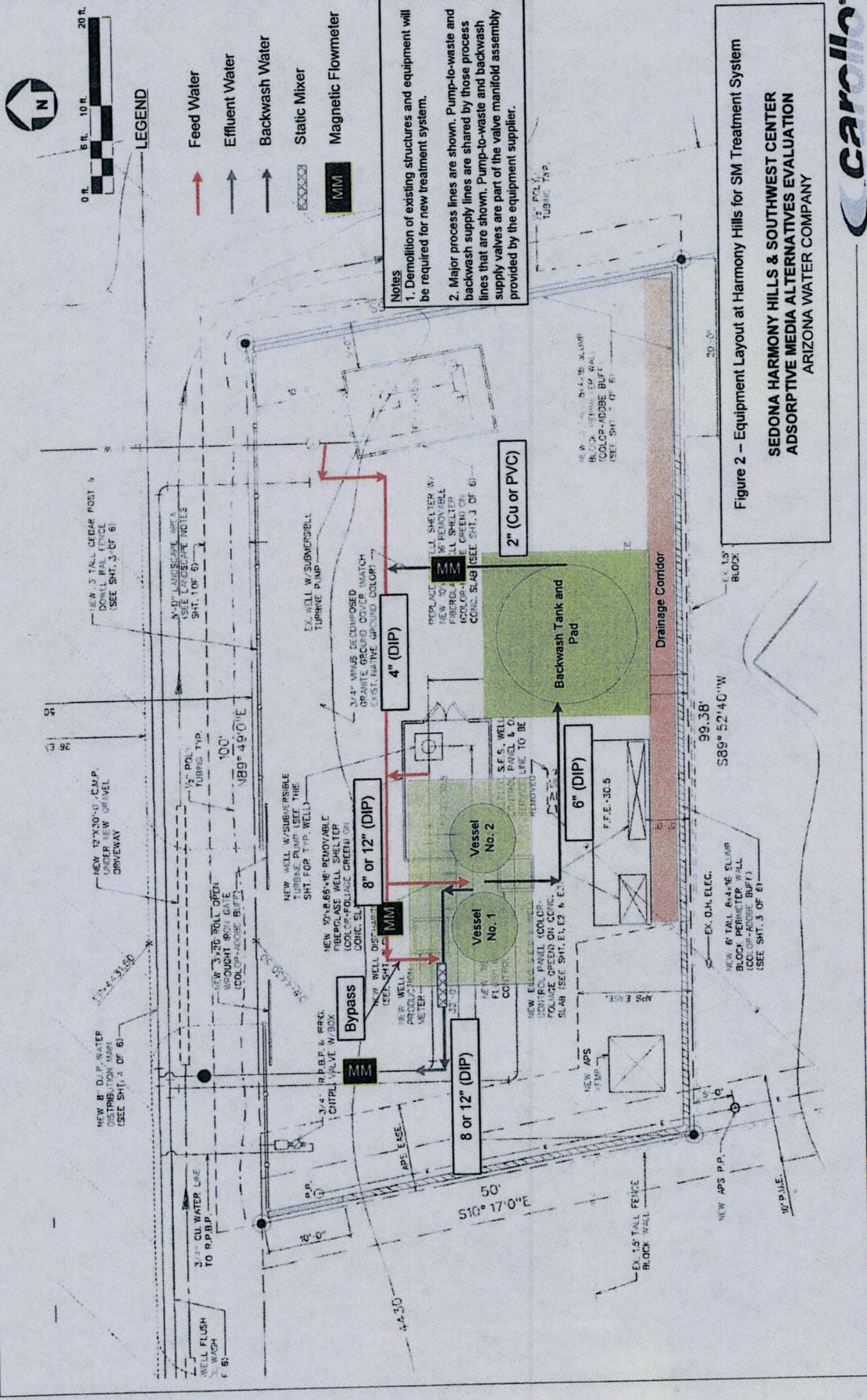
Table 2 presents preliminary design criteria information proposed by the media suppliers, based on the water quality data included in Appendix A. The Dow / Metsorb and Layne Christensen media operates at a lower bed contact time in part due to the different physical characteristics that enable these medias to withstand higher differential pressures and head losses. While the results are smaller-diameter vessels, the overall footprints for all four systems are similar. One benefit of installing a larger vessel system with conservative loading rates is that it can potentially be operated using a different media. This provides flexibility to AWC when reviewing future media options, or when negotiating new media contracts with suppliers.

Figure 2 and Figure 3 present proposed potential layouts for the SM systems at Harmony Hills and Southwest Center respectively. The largest sized footprint for the SM system (i.e., Severn Trent) and associated yard piping, backwash system and bypass system are shown on these layouts to be conservative. These layouts were used as the basis for developing capital costs.

Table 2 Preliminary Sorptive Media Design Criteria Sedona Harmony Hills and Southwest Center Adsorptive Media Alternatives Evaluation				
Supplier	Vessels	Treatment Capacity (gpm)	Footprint⁽¹⁾ (ft x ft)	Empty Bed Contact Time (min)
Dow / Metsorb ⁽²⁾	Two, 5.5-ft diameter vessels	500	20 x 12	3
Layne Christensen	Two, 6-ft diameter vessels ⁽³⁾	500	23 x 12	3
Severn Trent	Two, 8-ft diameter vessels	500	26 x 14	5
Siemens	Two, 8-ft diameter vessels ⁽⁴⁾	500	23 x 14	5

Notes:

- (1) Three feet added to supplier's equipment layout on all sides to account for edge distance between vessel pads and outside edge of concrete.
- (2) Graver Technologies and/or Loprest would provide the system package.
- (3) Original proposal listed two 10-ft diameter vessels in lead-lag. Proposal adjusted to normalize costs based on a parallel design but maintain supplier's head loss and empty bed contact time.
- (4) Original proposal listed three 9.5-ft diameter vessels. Proposal adjusted to normalize costs based on a two vessel design but maintaining supplier's loading rate and empty bed contact time.



- LEGEND**
- Feed Water →
 - Effluent Water →
 - Backwash Water →
 - Static Mixer MM
 - Magnetic Flowmeter MM

NOTES

1. Demolition of existing structures and equipment will be required for new treatment system.
2. Major process lines are shown. Pump-to-waste and backwash supply lines are shared by those process lines that are shown. Pump-to-waste and backwash supply valves are part of the valve manifold assembly provided by the equipment supplier.

Figure 2 – Equipment Layout at Harmony Hills for SM Treatment System
SEDONA HARMONY HILLS & SOUTHWEST CENTER
ADSORPTIVE MEDIA ALTERNATIVES EVALUATION
 ARIZONA WATER COMPANY





LEGEND

-  Feed Water
-  Effluent Water
-  Backwash Water
-  Static Mixer
-  Magnetic Flowmeter

Notes

1. Demolition of existing structures and equipment will be required for new treatment system.
2. Major process lines are shown. Pump-to-waste and backwash supply lines are shared by those process lines that are shown. Pump-to-waste and backwash supply valves are part of the valve manifold assembly provided by the equipment supplier.

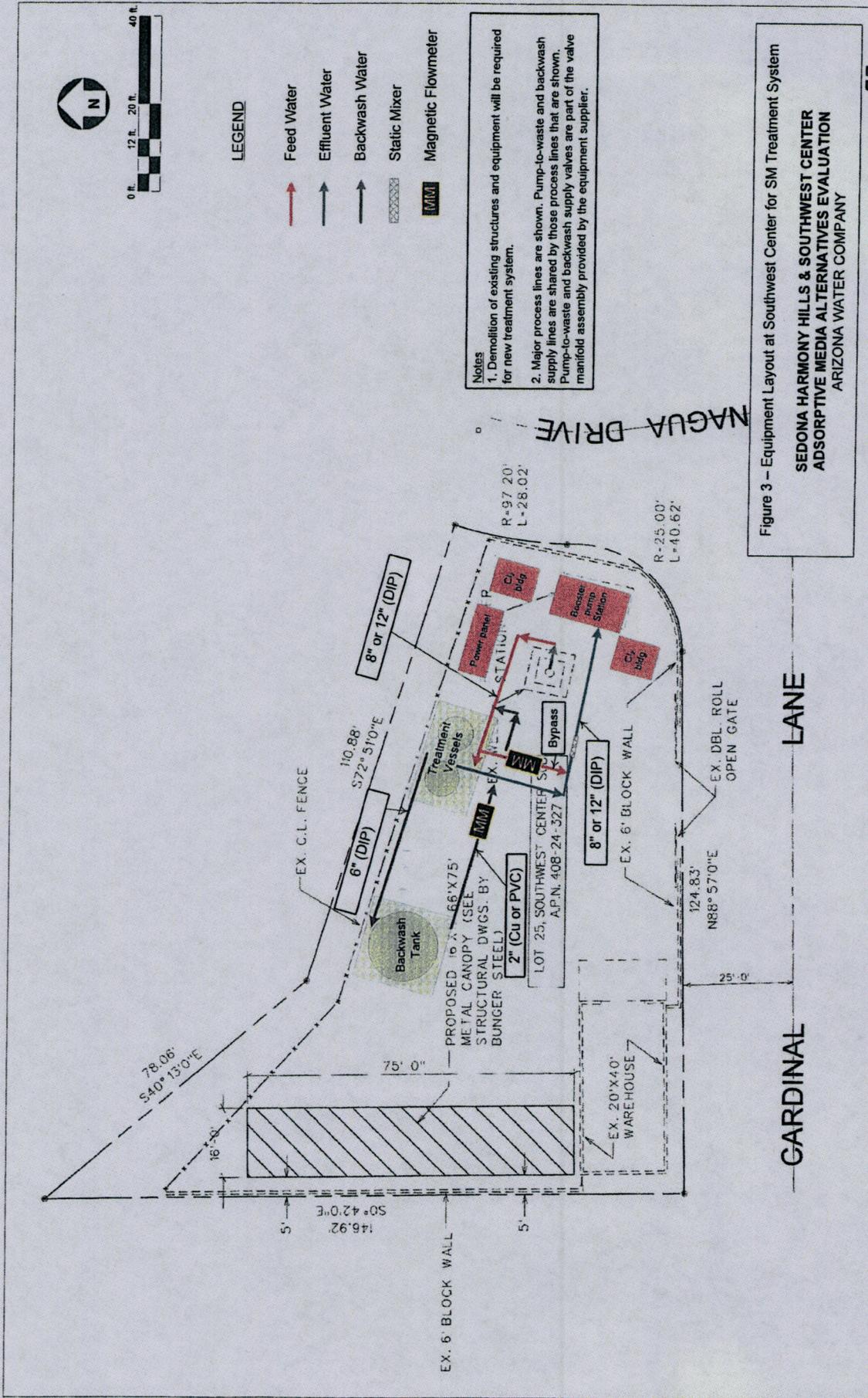


Figure 3 – Equipment Layout at Southwest Center for SM Treatment System
SEDONA HARMONY HILLS & SOUTHWEST CENTER
ADSORPTIVE MEDIA ALTERNATIVES EVALUATION
 ARIZONA WATER COMPANY



3.2 Sorptive Media Supplier's Performance Guarantees

The SM system suppliers listed in Table 3 have developed models to estimate performance of their respective arsenic removal medias. Table 3 summarizes parameters of particular importance to AWC, and includes the following:

- Arsenic concentration in effluent is less than a specified level.
- Media lasts for "x" bed volumes until effluent exceeds a specified level (0.008 mg/L).
- Indemnification of AWC for any future costs (e.g., landfill remediation) once media leaves the site.

Table 3 Sorptive Media Supplier System Guarantees Sedona Harmony Hills and Southwest Center Adsorptive Media Alternatives Evaluation			
Supplier	Arsenic Effluent Concentration Less than 0.008 mg/L	Bed Volumes Until Media Exhaustion	Indemnification of AWC
Dow / Metsorb ⁽¹⁾	Yes	77,000 ⁽²⁾	No
Layne Christensen	Yes	137,000	Yes
Severn Trent	Yes	167,000	Maybe
Siemens	Yes	225,000	Maybe
Notes:			
(1) Dow titanium dioxide product would not guarantee bed volumes due to raw water pH being greater than 7.5.			
(2) Metsorb / Graver Technologies will provide a guarantee once pilot testing is complete.			

4.0 QUALITATIVE ASSESSMENT OF MEDIAS

A qualitative assessment of the medias listed in Table 4 was conducted to provide a relative ranking of SM suppliers. Characteristics were developed based on operations, maintenance and management considerations specific to AWC. Each SM system supplier was contacted, and they aided in completing the qualitative assessment for their respective systems. Weighting factors were also developed for each qualitative evaluation parameter, on the basis of a 100-percent scale. For each parameter, a score of 1, 2, or 3 was given with the scores defined as follows:

1. Poor characteristics (color coded as red).
2. Neutral or balance point (color coded as yellow).
3. Good characteristics (color coded as green).

5.0 COST ANALYSIS

This section presents construction costs, operating and maintenance (O&M) costs, and life-cycle costs for each SM system. Both the Harmony Hills site and Southwest Center site have similar well production rates, yard piping layouts, and ancillary equipment (e.g., backwash storage tank and bypass system). The utilization rate used for this study was 50%, for both sites. AWC predicts that in the future the Southwest Center site utilization will be approximately 75%, and the Harmony Hills utilization will be approximately 50-60%. Costs presented herein are applicable to both sites but have been specifically developed based on quantity take-offs and layouts for the Harmony Hills site. Costs were developed for each of the four SM systems.

Construction costs were developed using a combination of sources including Carollo cost databases, RS Means, and supplier quotations. Table 5 presents the construction, O&M and life-cycle costs broken down for major disciplines of work or equipment. Details of construction and O&M costs may be found in Appendix B and C respectively. Key assumptions used for developing cost estimates include the following:

Construction Costs

- Equipment costs based on SM supplier quotes (vessels, piping, valves, and media).
- Percentage markups of direct cost for materials and installation:
 - E&IC: 20%
 - Civil Site Work: 5%
 - Design Contingency: 15%
- General Conditions, Overhead, Profit, and Risk: 10%.
- Sales Tax: 4% (of half of all costs).

O&M Costs

- Media replacement interval and media costs based on SM supplier quotes.
- Separate waste disposal quote collected from Chemical Transportation, Inc. (CTi) for hauling and disposing of solids (i.e., thickened liquid waste) that settle and collect on bottom of the backwash waste tank. Settled spent backwash water will be returned to the head of the plant.
- Media likely to be classified as non-hazardous waste. Non-hazardous waste disposal costs are used.
- New LayneRT media pricing used for media replacement to reduce the chance for mixing of media from other sources and also retain NSF61 designation.

Table 5 Capital and O&M Cost Summary for SM Alternatives at Harmony Hills Sedona Harmony Hills and Southwest Center Adsorptive Media Alternatives Evaluation				
DESCRIPTION	SORPTIVE MEDIA SUPPLIERS			
	Loprest / Graver (Dow / Metsorb)	Layne Christensen (LayneRT)	Severn Trent (E33)	Siemens (GFH)
Capital Cost				
Civil	\$30,000	\$20,000	\$30,000	\$30,000
Yard Piping	\$60,000	\$50,000	\$60,000	\$60,000
Treatment Equipment	\$310,000	\$320,000	\$370,000	\$410,000
E&IC	\$150,000	\$120,000	\$160,000	\$180,000
Building	\$120,000	\$80,000	\$110,000	\$130,000
Waste Storage / Treatment	\$90,000	\$0	\$90,000	\$90,000
Direct Costs	\$760,000	\$590,000	\$820,000	\$900,000
Contingency	\$110,000	\$90,000	\$120,000	\$140,000
General Conditions	\$90,000	\$70,000	\$90,000	\$100,000
Sales Tax	\$20,000	\$20,000	\$20,000	\$20,000
Indirect Costs	\$220,000	\$180,000	\$230,000	\$260,000
TOTAL CONSTRUCTION COSTS	\$980,000	\$770,000	\$1,050,000	\$1,160,000
Annual O&M Cost				
Labor	\$21,200	\$21,200	\$21,200	\$21,200
Electricity	\$136,200	\$136,200	\$133,800	\$133,800
Consumables	\$900	\$2,400	\$900	\$900
Media / Equipment Replacement	\$55,300	\$47,300	\$30,300	\$24,700
Waste Handling/Disposal	\$23,000	\$4,900	\$14,300	\$14,300
TOTAL ANNUAL COSTS	\$236,900	\$212,000	\$200,500	\$184,900
Life-Cycle Cost (2011 USD)				
Capital Cost	\$980,000	\$770,000	\$1,050,000	\$1,160,000
O&M Cost	\$7,330,000	\$6,570,000	\$6,210,000	\$6,040,000
TOTAL VALUE	\$8,310,000	\$7,340,000	\$7,260,000	\$7,200,000

Life-Cycle Costs

- Developed by forecasting O&M cost to a specific year based on a 4-percent annual inflation rate.
- Total costs paid at end of year "x" used over 20-year life-cycle to determine break-even point (e.g., Figure 5).

5.1 Costs

Figure 4 presents the capital, O&M and life-cycle costs for each SM alternative. Capital costs for all four SM suppliers were approximately \$1 million. The Layne Christensen system has the lowest the capital cost. However, the Layne Christensen system costs slightly more (i.e., \$7.34 million) after twenty years of operation compared to Severn Trent's (i.e., \$7.26 million) or Siemens' systems (i.e., \$7.20 million). The Loprest or Graver system was the most expensive, costing \$8.31 million at year 20.

Figure 5 shows several break-even points between the various SM systems. The Severn Trent system is estimated to be slightly lower in capital cost than the Siemens' systems. However after year 14, the total costs paid for the Siemens' system is less than the Severn Trent system. Likewise, Loprest (or Graver) is lower in cost than the Siemens' system but after year 3, the Loprest (or Graver) system represents the highest cost of all four systems evaluated.

5.2 Vessel Size Optimization

SM treatment may be designed with or without blending (or bypass). While the blending option offers the lowest construction cost due to smaller treatment vessel(s), less media and smaller piping, the flow rate in the bypass must be reduced once arsenic breakthrough occurs in the vessels due to blending.

Sizing the treatment system may be undertaken from either of two approaches:

1. Determine minimum flow demands required by the distribution system for each well site.
2. Determine optimum (or lowest) unit cost for finished water based on different treatment capacities (or vessel diameters).

The first option requires a distribution system model to determine daily and seasonally changes in water demand. Additionally, model results would need to be verified with field measurements (e.g., pressure measurements) before selecting the treatment capacity. Any changes in demands of the system (e.g., new homes or businesses) or supplies (e.g., abandonment or bringing a new well online) would require changes to the model, and thus potential changes to the treatment capacity. The second option determines treatment capacity based on optimizing the life-cycle cost for treating water.



Figure 4
LIFE-CYCLE COSTS FOR SM TREATMENT AT HARMONY HILLS
Sedona Harmony Hills & Southwest Center
Adsorptive Media Alternatives Evaluation

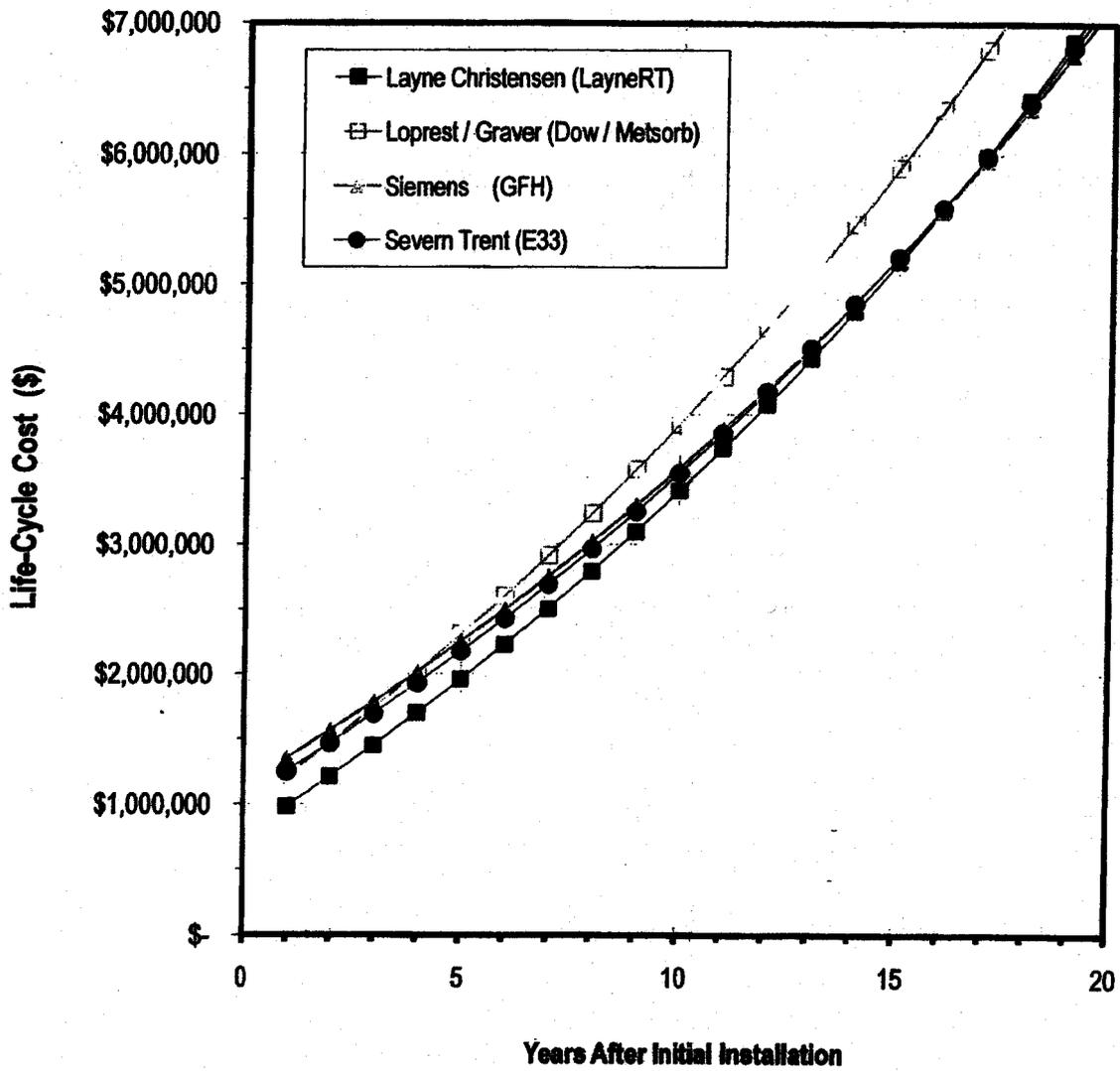


Figure 5
BREAK-EVEN POINT BETWEEN SM SYSTEMS
Sedona Harmony Hills & Southwest Center
Adsorptive Media Alternatives Evaluation

For this study, an example analysis was performed to develop how an 'optimal' vessel size could be selected based on the second option. This analysis included the AWC treatment goals and flows for Harmony Hills, and SM system design requirements for Severn Trent E33 media. Four different design treatment capacities were selected for this exercise, and comparative life-cycle costs on a dollars per acre-ft basis were calculated for each scenario. Treatment system with treated flow design capacities of 1100, 750, 500 and 250 gpm were evaluated, with the remaining flow going to bypass. For example, the 750 gpm treated flow system assumes a bypass flow capability of 350 gpm, for a total production flow rate of 1,100 gpm to match the wells production capacity. Each scenario included vessels sized to maintain the minimum requirements for varied in regards to the size and number of vessels.

5.2.1 Vessel Size Optimization Example

This section describes how the cost comparison model was setup and presents costs for each flow scenario. Inputs and assumptions to the model are summarized below. Detailed calculations for this model are located in Appendix D.

AWC Design Criteria:

- Total water production capacity of the site = 1,100 gpm.
- Well flow cannot be reduced (i.e., 1,100 gpm must be maintained).
- Raw water arsenic = 0.010 mg/L.
- Finished water arsenic goal = 0.008 mg/L.
- Maximum allowable pipe velocity = 5 ft/s.
- SM vessels operated in parallel (if more than one vessel is used).
- Bypass system to allow blending of raw water with SM system effluent.

SM Supplier Design Criteria:

- Loading rates (LR):
 - Average = 5 gpm/ft².
 - Minimum = 2 gpm/ft².
 - Maximum = 8 gpm/ft².
- Empty bed contact times (EBCT):
 - Average = 5 minutes.
 - Minimum = 2.5 minutes.
- Bed volumes until arsenic breakthrough = 167,000 (as reported by Severn Trent media performance prediction model for E33).
- Vessel, piping, valves, media, and disposal costs: (see Appendix D).

- Average EBCT and LR are used by Severn Trent when sizing the vessels and media depths.

Table 6 Treatment Size Optimization Sedona Harmony Hills and Southwest Center Adsorptive Media Alternatives Evaluation					
Description	Units	Scenarios			
		1	2	3	4
Design Treatment Flow Rate ⁽¹⁾	(gpm)	1,100	750	500	250
No. of Vessels	(no.)	2	2	1	1
Diameter of Vessel	(ft)	12	10	12	8
Bed Volumes until Exhaustion ⁽²⁾	---	167,000	167,000	140,000	62,000
Media Replacements per Year	(no.)	0.6	0.6	0.8	1.7
Life-Cycle Unit Cost ⁽³⁾	(\$/ac-ft)	70	51	37	35

Notes:

(1) Based on total capacity of wells and arsenic levels, a minimum treatment capacity of 244 gpm is required. All four scenarios meet this minimum requirement.

(2) Values are based on Severn Trent quote for E33 media. Bed volumes for Scenarios 3 and 4 were derated (i.e., design loading rate divided by average loading rate) since the media will need to be replaced before media is fully exhausted.

(3) 20 year life-cycle at 100 percent well utilization. Refer to Appendix D for additional details.

Results from the model output were as follows:

- The least capital and life-cycle cost design alternative has the most bypass flow. In other words, the less well water that is treated, the smaller the vessel size and the less media that is used. However, the incremental comparative costs for life cycle savings is minimal for very small treatment systems (e.g., 5 % for 250 vs. 500 gpm systems). In addition, a safety factor is generally included in system designs to account for system variations, increases in raw water arsenic concentrations, and other operational variables.
- Smaller systems will require more media exchanges. If the unit cost of media increases or new transportation and disposal costs are incurred, smaller systems will not be as cost effective. For example, if the unit cost of media is increased from \$250 per cubic foot (used in Table 6) to \$475 per cubic foot of media, Scenario 3 would be more cost effective than Scenario 4 (data not shown).
- Bed volumes for Scenario 3 and 4 were derated due to exceeding Severn Trent's recommended hydraulic design criteria. Carollo assumed that smaller systems will incur significant derating (e.g., 63% reduction for Scenario 4). It should be noted that Severn Trent's media usage prediction model is based solely on raw water quality. Media suppliers will typically not commit to specific performance of media outside of their normal operating ranges, unless pilot testing is performed.

- For Harmony Hills site, with only Well #5 on (i.e., 190 gpm) the vessel diameter should be no larger than 11 feet to stay within the system supplier's minimum loading rate of 2 gpm/ft². Thus, Scenarios 1, 3 and 4 would not be able meet this requirement.
- Media replacement will occur less than once a year (at 100% utilization) except for small systems (e.g., Scenario 4) where media would be replaced more frequently.

6.0 EVALUATION SUMMARY

Arsenic medias were evaluated for the Harmony Hills site and Southwest Center site. Both sites have similar water qualities and well production rates and thus will be very similar in terms of SM design criteria, layout and costs. Key findings from this evaluations are as follows:

- Over 20 sorptive medias were considered, and four of these medias were deemed viable for AWC's Sedona and Harmony Hills sites.
- The four medias reviewed in detail included two iron-based medias (i.e., Severn Trent and Siemens), one iron-doped ion exchange media (i.e., LayneRT) and one titanium-based media (i.e., Dow or Metsorb).
- A qualitative evaluation indicated shows that the highest ranking systems were the iron-based SM Severn Trent and Siemens and Siemens systems.
- Cost evaluations indicated that capital cost and life-cycle will be around \$1 million and \$7 million respectively, for an iron-based system.
- A single vessel configuration will provide a cost-effective SM system. A second vessel in parallel would increase the factor of safety and reduce the number of media exchanges. If a single-vessel system is selected, the site layout and piping can be developed to readily facilitate the addition of a second vessel in the future.
- During detailed design, equipment and media costs should be confirmed by system suppliers based on specific system configurations (e.g., number of vessels, bed volumes until exhaustion, vessel diameter, and bed depth) to confirm the most cost-effective treatment vessel size. Bed volumes from suppliers should be calculated for when either hydraulic (e.g., loading rates or contact times) or water quality (e.g., effluent arsenic limits) design criteria are exceeded.

Appendix A
WATER QUALITY

May 2011

pw://Carollo/Documents/Client/AZ/Arizona Water Co/8672A00/Deliverables/AH_Eval_TM.docx (Final)

Description	Units	Value	
		Max	Ave
Arsenic Conc. (100% as As ⁵⁺)	mg/L	0.0103	0.098
pH		—	8.0
Alkalinity	mg/L as CaCO ₃	323	313
Hardness	mg/L as CaCO ₃	352	340
Antimony	mg/L	<0.005	<0.005
Cadmium	mg/L	<0.001	<0.001
Chromium	mg/L	<0.005	<0.005
Iron	mg/L	<0.05	<0.05
Manganese	mg/L	<0.02	<0.02
Phosphorus	mg/L	—	<0.01
Selenium	mg/L	<0.005	<0.005
Silica	mg/L	19	17
Turbidity	NTU	<1.00	<1.00
Uranium	ppb	2.3	1.9
Vanadium	mg/L	0.011	0.0079

Description	Units	Value	
		Max	Ave
Arsenic Conc. (100% as As ⁵⁺)	mg/L	0.0108	0.0097
pH		—	8.0
Alkalinity	mg/L as CaCO ₃	335	331
Hardness	mg/L as CaCO ₃	362	354
Antimony	mg/L	<0.005	<0.005
Cadmium	mg/L	<0.001	<0.001
Chromium	mg/L	<0.005	<0.005
Iron	mg/L	<0.05	<0.05
Manganese	mg/L	<0.02	<0.02
Phosphorus	mg/L	—	<0.01
Selenium	mg/L	<0.005	<0.005
Silica	mg/L	17	16
Turbidity	NTU	<1.00	<1.00
Uranium	ppb	1.5	1.5
Vanadium	mg/L	0.010	0.0078

Description	Units	Value	
		Max	Ave
Arsenic Conc. (100% as As ⁵⁺)	mg/L	0.0108	0.0097
pH		—	7.8
Alkalinity	mg/L as CaCO ₃	326	323
Hardness	mg/L as CaCO ₃	378	357
Antimony	mg/L	<0.005	<0.005
Cadmium	mg/L	<0.001	<0.001
Chromium	mg/L	<0.005	<0.005
Iron	mg/L	<0.05	<0.05
Manganese	mg/L	<0.02	<0.02
Phosphorus	mg/L	—	<0.01
Selenium	mg/L	<0.005	<0.005
Silica	mg/L	17	16
Turbidity	NTU	<1.00	<1.00
Uranium	ppb	1.5	1.4
Vanadium	mg/L	0.010	0.074

Appendix B

CONSTRUCTION COST DETAILS

May 2011

pw://CarolloDocuments/Client/AZ/Arizona Water Co/8672A00Deliverables/Air_Eval_TM.docx (Final)

Unit Cost	SYSTEM ALTERNATIVE		
	ST	Siemens	LC Loprest
Installation Factor			
Pressure Vessels & Face Piping			
Equipment			
Installation			
Vessel Footprint			
Diameter			
Length			
Width			
SM Media			
BUILDING			
YARD PIPING			
TREATMENT EQUIPMENT			
WASTE STORAGE / TREATMENT			
CIVIL			
E&C			
TOTAL DIRECT COST			
Contingency			
General Conditions, Overhead, Profit & Risk			
Sales Tax			

Unit Cost	ST	Siemens	LC	Loprest
Installation Factor				
Pressure Vessels & Face Piping				
Equipment				
Installation				
Vessel Footprint				
Diameter				
Length				
Width				
SM Media				
BUILDING				
YARD PIPING				
TREATMENT EQUIPMENT				
WASTE STORAGE / TREATMENT				
CIVIL				
E&C				
TOTAL DIRECT COST				
Contingency				
General Conditions, Overhead, Profit & Risk				
Sales Tax				

Appendix C
O&M COST DETAILS

May 2011

per:/Carollo/Documents/Client/AZ/Arizona Water Co/8672A00/Deliverables/AI_Eval_TM.docx (Final)

Element	Item	Units	Value
MEDIA / MECHANICAL	Mac. Mec. Parts	\$/yr	8000 SM
		\$/yr	4514 SM

		ST	Siemens	LC	Loprest
EBCT	min	5	5	4	4
Treated Bed Volume before Exhaustion	EVs	167,000	225,000	137,000	77,000
	gal	426,850,000	562,500,000	274,000,000	154,000,000
Time before Exhaustion (at 100% utilization rate)	days	591	781	381	214
Time before Exhaustion (at utilization rate)	days	1,048	1,384	674	370
No. of Exchanges per year	no.	0.35	0.28	0.54	0.98
Bed Size	ft ³ /bed	119	86	145	257
Cost of media	\$/ft ³	341	334	267	267
Cost per bed exchange	\$/bed	250	285	300	225 includes disposal (ST and Siemens)
		85,227	88,570	90,214	60,180
	Subtotal \$	34,183	27,864	53,340	92,446

CONSUMABLES			
NaOCl	\$/lb	0.12	
Operating Doses	mg/L	2	
Cost	\$/gpm/yr	0.6	
	\$/yr	622	
Bag Filters (Recycle Line)	\$	160	per sk
	months	3	replacement interval @ 100% utilization rate
	months	5	replacement interval @ actual utilization rate
	no.	3	per filter
Bag Filters (Feed Line)	\$	300	per sk
	months	1	replacement interval @ 100% utilization rate
	months	2	replacement interval @ actual utilization rate
	no.	6	per filter
	\$/yr	330	ST, Siemens, and Loprest
	\$/yr	2031	Layne
	Subtotal \$/yr	961	ST, Siemens, and Loprest
	Subtotal \$/yr	2654	Layne

ELECTRICAL			
	Local electrical costs	\$/kWh	0.12
ST, Siemens	Treatment Headloss + System Pressure	psi	158
LC, Dow		psi	127
	Well Static Lift	ft	288
	Pump Efficiency	%	78 water to wire efficiency
ST, Siemens	Estimated electrical demand (pumping)	kW	242
	Production time	kWh	1,198,574
LC, Dow	Estimated electrical demand (pumping)	kW	247
	Production time	kWh	1,221,166
	Misc. Power Consumption	%	5 metering pump, lights, fans, BW recycle, etc.
		kWh	59829
ST, Siemens		\$/yr	151,020
LC, Dow		\$/yr	163,730

LABOR

Annual Workload	hr	2040
Overhead and Benefits	%	50
Hourly Rates (no OH&Benefits)		
Operator	\$/hr	22
Supervisor	\$/hr	25
Hourly Rates (w/ OH&Benefits)		
Operator	\$/hr	33
Supervisor	\$/hr	42
Daily Operation / Sampling		
Operator	hrs	2.50 At 100% utilization rate
Supervisor	hrs	6.50 At 100% utilization rate
Operator	hrs	1.41 At actual utilization rate
Supervisor	hrs	0.28 At actual utilization rate
Monthly Maintenance/Admin		
Operator	hrs	19.80 At 100% utilization rate
Supervisor	hrs	1.50 At 100% utilization rate
Operator	hrs	5.84 At actual utilization rate
Supervisor	hrs	0.85 At actual utilization rate
Cost		
Operator	\$	19,227
Supervisor	\$	4,762
TOTAL \$		23,978

WASTE DISPOSAL

		ST	Siemens	LC	Loport
Media Waste					
Waste Produced	lb/yr	3,680	2,732	7,380	10,290
	ton/yr	1.8	1.4	3.7	5.1
	lb/R ³	31	31	51	40 bulk density
Cost	\$/ton	35			
	\$/trip	10,000			
	\$/yr			5,541	9,810 media waste disposal
Sludge Waste					
Waste/Treated Water	gal/gal	0.0003	0.0003		0.0003
Trips every "x" weeks	gal/day	121	121		121
	weeks	4	4		4
	gal/trip	3,388	3,388		3,388
Specific gravity		1.0	1.0		1.0
	gal/yr	44,014	44,014		44,014
	ton/yr	187	187		187
Cost	\$/trip	1,057			
	\$/yr	14,288	14,288		
Cost	\$/yr	14,288	14,288	5,541	24,076 media + sludge waste

Life Cycle	years	20
Inflation Rate	%	4
Adjustment Factor		31.0
Well Capacity	mgd	1.81
	gpm	1850
Treatment Capacity	gpm	500 difference is bypassed and blended
Utilization Rate	%	88
	gal/yr	311,418,000

Appendix D

**EXAMPLE CALCULATION FOR OPTIMIZING TREATMENT
CAPACITY**

May 2011

pw://Carollo/Documents/Client/AZ/Arizona Water Co/8672A00/Deliverables/Air_Eval_TM.docx (Final)

Flowrates					
Total Flowrate at Site	(gpm)	1100	1100	1100	1100
Treatment Flowrate	(gpm)				
Design / Nominal		1100	750	500	250
Minimum (per blending calc)		244	244	244	244
Minimum (per loading rate)		452	314	226	101
Maximum (per loading rate)		1810	1257	905	402
Bypass Flowrate	(gpm)				
Design / Nominal		0	350	600	850
Minimum		0	0	0	0
Maximum (per blending calc)		856	856	856	856
Arsenic Concentrations					
Raw Water	(mg/L)	0.010	0.010	0.010	0.010
Contacto Effluent	(mg/L)	0.001	0.001	0.001	0.001
Finished Water Goal	(mg/L)	0.008	0.008	0.008	0.008
Vessel Design					
No. of Vessels	(no.)	2	2	1	1
Vessel Diameter	(ft)	12	10	12	8
Surface Area (per vessel)	(ft ²)	113	79	113	50
Surface Area (total)	(ft ²)	226	157	113	50
Loading Rates					
	(gpm/ft ²)				
Goal (Average per supplier)		5	5	5	5
Actual @ Design Treatment Flowrate		4.9	4.8	4.4	5.0
Actual @ Min. Treatment Flowrate		1.1	1.6	2.2	4.9
Actual @ Max. Treatment Flowrate		4.9	7.0	9.7	21.9
Actual @ Average of Min. and Max.		3.0	4.3	5.9	13.4
Min. Required (per supplier)		2	2	2	2
Max. Allowable (per supplier)		8	8	8	8
Empty Bed Contact Times					
	(min)				
Goal (Average per supplier)		5	5	5	5
Actual @ Min. Treatment Flowrate		22.5	15.3	10.2	5.1
Actual @ Max. Treatment Flowrate		5.0	3.4	2.3	1.1
Min. Required (per supplier)		2.5	2.5	2.5	2.5
Volume of Media	(ft ³)	735	501	334	167
	(gal)	5,500	3,750	2,500	1,250
Media Depth	(in)	39	38	35	40

BVs of Production

Total BVs Until Exhaustion (Eff = 0.008 mg/L) (BVs)
 Derating Due to Vessel's Inability to Treat Full Flow (BVs)

167,000	167,000	167,000	167,000
167,000	167,000	140,484	62,437

Total Production (gal)
 No. of replacements in a year (days)
 (no.)

918,500,000	626,250,000	351,209,288	78,046,508
580	580	488	217
0.63	0.63	0.75	1.68

Bypass Design Criteria

Velocity (ft/s)
 Pipe Diameter (Calc) (in)
 Pipe Diameter (Actual) (in)

5	5	5	5
0	5.4	7.0	8.3
0	6	8	8

Capital Costs

Indirect Cost Markup Factor
 Bypass Piping (ft)
 (\$/ft-in)
 (\$)

1.5	1.5	1.5	1.5
20	20	20	20
16.9	16.9	16.9	16.9
0	2025	2700	2700

Bypass Valve (\$/in)
 (\$)

420	420	420	420
0	2520	3360	3360

Bypass Fittings (no.)
 (\$/in)
 (\$)

4	4	4	4
150	150	150	150
0	3600	4800	4800

Vessel Cost (\$/dia)
 (\$)

29,762	29,762	29,762	29,762
714,276	596,230	357,138	238,092

Media Cost (Initial Fill) (\$/ft^3)
 (\$)

250	250	250	250
183,824	128,334	83,556	41,778

Total (\$)

898,100	728,710	451,554	290,730
---------	---------	---------	---------

Annual O&M Costs

Media Cost (Replacement & Disposal) (\$)

115,393	78,677	62,351	70,145
---------	--------	--------	--------

Life-cycle (yr)

20	20	20	20
----	----	----	----

Present-Worth Multiplier
 Present-Worth (\$)

13.6	13.6	13.6	13.6
1,568,225	1,069,244	847,376	953,298

Total Present-Worth (Capital + O&M) (\$)

2,466,325	1,797,954	1,298,930	1,244,028
-----------	-----------	-----------	-----------

Water Production

Utilization Rate (%)
 Annual Production (gal)
 (ft^3)
 (ac-ft)

100	100	100	100
576,576,000	576,576,000	576,576,000	576,576,000
77,082,353	77,082,353	77,082,353	77,082,353
1770	1770	1770	1770

Life-Cycle Production (ac-ft)

35,391	35,391	35,391	35,391
--------	--------	--------	--------

Unit Cost of Water (\$/ ac-ft)

70	51	37	35
----	----	----	----

**AGREEMENT FOR CONSULTING SERVICES BETWEEN
ARIZONA WATER COMPANY AND
RICKER, ATKINSON, MCBEE, NORMAN & ASSOCIATES, INC.**

THIS AGREEMENT is made and entered into on this 10th day of May, 2011, by and between Arizona Water Company, an Arizona corporation, hereinafter referred to as "Company," and Ricker, Atkinson, McBee, Morman & Associates, an Arizona corporation hereinafter referred to as "Consultant".

RECITALS

WHEREAS, Company is authorized to and desires to retain Consultant to provide engineering design, post design and construction administration services for Geotechnical evaluation at the Southwest Center & Harmony Hills Wells site in Sedona, Arizona.

WHEREAS, Consultant is agreeable to providing personnel and facilities necessary to perform the desired services within Company's required time; and

WHEREAS, Company desires to retain Consultant to perform the services in the manner, at the time, and for the compensation set forth herein;

NOW, THEREFORE, Company and Consultant agree as follows:

1. Description of Project.

Company and Consultant agree that Project is as described in Exhibit A, hereto, incorporated by reference herein and entitled "Scope of Work," dated April 22, 2011. If, during the course of Project, Company and Consultant agree to changes in Project, such changes shall be effective only after being incorporated in this Agreement by written amendment, signed by representative of Company and Consultant.

2. Scope of Consultant Services.

Consultant agrees to perform those services described hereafter. Unless modified in writing by both parties, duties of Consultant shall not be construed to exceed those services specifically set forth herein.

a. **Basic Services.** Consultant agrees to perform those services described in the Scope of Work (the "Services"). Any tasks not specifically described in the Scope of Work will be Additional Services.

b. **Additional Services.** Company shall pay Consultant all fees and costs incurred in performing Additional Services provided the services were authorized by Company in writing. Unless otherwise agreed in writing, Additional Services shall be compensated in accordance with Consultant's standard billing rates at the time the Additional Services are performed.

c. Litigation Assistance. Unless specifically stated therein, the Scope of Work does not include assistance to support, prepare, document, bring, defend or assist in litigation undertaken or defended by Company. All such services required or requested of the Consultant by Company or any third party (except claims between Company and Consultant) will be reimbursed at Consultant's applicable rates for such litigation services.

3. Responsibilities of Company.

In addition to payment for the Services performed under this Agreement, Company shall:

a. Assist and cooperate with Consultant in any manner necessary and within its ability to facilitate Consultant's performance under this Agreement.

b. Designate in writing a person to act as Company's representative with respect to this Agreement. Such person shall have complete authority to transmit instructions, receive information, interpret and define Company's policies, make decisions and execute documents on Company's behalf.

c. Furnish Consultant with all technical data in Company's possession including, but not limited to, maps, surveys, drawings, soils or geotechnical reports and any other information required by or useful to Consultant in performance of the Services under this Agreement.

d. Notify Consultant of any known or potential health or safety hazards existing at or near the project site.

e. Provide access to and/or obtain permission for Consultant to enter upon project related property during normal business hours, whether or not owned by Company, as required to perform and complete the Services.

4. Americans with Disabilities Act.

Any other provision of this Agreement to the contrary notwithstanding, unless otherwise specified in the Scope of Services, Company's contractors shall have sole responsibility as between Company and Consultant for compliance with the Americans With Disabilities Act ("ADA") 42 U.S.C. 12101 et. Seq. and the related regulations. Consultant shall provide Company with applicable ADA criteria, which may be required.

5. Authorization and Completion.

In signing this Agreement Company grants Consultant specific authorization to proceed with work as described in Scope of Work and under the terms of this Agreement.

6. Compensation.

a. Amount. For the Services described in Exhibit A, Company agrees to pay, and Consultant agrees to accept compensation in accordance with Exhibit B, attached hereto and incorporated herein. Where Consultant has provided Company with a breakdown of the total compensation into subtasks, such breakdowns are estimates only. Consultant may reallocate compensation between tasks, provided total compensation is not exceeded without the prior written approval of Company.

b. Payment. As long as Consultant has not defaulted under this Agreement, Company shall pay Consultant within thirty (30) days of the date of Consultant's invoices for services performed and reimbursable expenses incurred under this Agreement. If Company has reason to question or contest any portion of any such invoice, amounts questioned or contested shall be identified and notice given to Consultant within thirty (30) days of the date of the invoice. Any portion of any invoice not contested shall be deemed to be accepted and approved for payment and shall be paid to Consultant within thirty (30) days of the date of the invoice. Company agrees to cooperate with Consultant in a mutual effort to resolve promptly any contested portions of Consultant's invoices.

In the event any uncontested portions of any invoice are not paid within thirty (30) days of the date of Consultant's invoice, interest on the unpaid balance shall accrue beginning with the 31st day at the rate of 1.5% per month, and Consultant shall have the right to suspend work per Article XV, Suspension of Work.

7. Responsibility of Consultant.

a. Standard of Care Professional Services.

Subject to the limitations inherent in the agreed scope of work as to the degree of care, amount of time and expenses to be incurred, and subject to any other limitations contained in this Agreement, Consultant shall perform the Services and any Additional Services in accordance with generally accepted standards and practices customarily utilized by competent engineering firms in effect at the time Services and any Additional Services are rendered. Consultant does not expressly or impliedly warrant or guarantee its Services.

b. Reliance upon Information Provided by Others.

If Consultant's performance of services hereunder requires Consultant to rely on information provided by other parties (excepting Consultant's subcontractors), Consultant shall not independently verify the validity, completeness, or accuracy of such information unless otherwise expressly engaged to do so in writing by Company.

c. Consultant's Opinion of Costs.

Company acknowledges that construction cost estimates, financial analyses and feasibility projections are subject to many influences including, but not limited to, price of labor and materials, unknown or latent conditions of existing equipment or structures, and time or quality of performance by third parties. Company acknowledges that such influences may not be precisely forecasted and are beyond the control of Consultant and that actual costs incurred may vary substantially from the estimates prepared by Consultant. Consultant does not warrant or guarantee the accuracy of construction or development cost estimates, however, Consultant agrees to exercise its best Professional Judgment in rendering its opinions.

d. Construction Phase Services.

1. Consultant's Activities at Construction Site. The presence of Consultant's personnel at a construction site, whether as on-site representative, resident engineer, construction manager, or otherwise, does not make Consultant responsible for those duties that belong to Company and/or construction contractors or others, and does not relieve construction contractors or others of their obligations, duties, and responsibilities, including, but not limited to, construction methods, means, techniques, sequences, and procedures necessary for completing all portions of the construction work in accordance with the contract documents, any health or safety programs and precautions required by such construction work, and any compliance with applicable laws and regulations. Any inspection or observation of the contractor's work is for the purpose of determining that the work is proceeding in conformance with the intent of the project specifications and contract documents. Consultant has no authority to exercise control over any construction contractor in connection with their work or health or safety programs and precautions. Except to protect Consultant's own personnel and except as may be expressly required elsewhere in the Scope of Work, Consultant has no duty to inspect, observe, correct, or report on health or safety deficiencies of the construction contractor.

2. Shop Drawing and Submittal Review. If required by Consultant's Scope of Services, Consultant shall review shop drawings or other contractor submittals for general conformance with the intent of the contract documents. Except for services completed under direct contract to Consultant, Consultant shall not be required to verify dimensions, to engineer contractor's shop drawings or submittals, nor to coordinate shop drawings or other submittals with other shop drawings or submittals provided by contractor.

3. Record Drawings. Record drawings, if required, will be prepared, in part, on the basis of information compiled and furnished by others, and may not always represent the exact location, type of various components, or exact manner in which the Project was finally constructed. Except for services completed under direct contract to Consultant, Consultant is not responsible for any errors or omissions in the information from others that are incorporated into the record drawings.

e. Scope of Work.

1. Before preparing the scope of work, Consultant specifically acknowledges and agrees that it has inspected and familiarized itself with Company's well site. The Consultant has received, or had the opportunity to inquire about and/or request all relevant information concerning the Scope of Work from Company or any other source Consultant deems necessary. The Scope of Work has been prepared by the Consultant and to the best of its knowledge includes all applicable work required to successfully complete Geotechnical evaluation at the Southwest Center & Harmony Hills Well site in Sedona, Arizona.

8. Asbestos/Hazardous Material.

Consultant and Consultant's subcontractors shall have no responsibility for the discovery, handling, removal, or disposal of, or exposure of persons to asbestos or hazardous or toxic materials that are present in any form at the Project site. Professional services related to or in any way connected with the investigation, detection, abatement, replacement, use, specification, or removal of products, materials, or processes containing asbestos or hazardous or toxic materials are beyond the scope of this Agreement.

In the event Consultant encounters asbestos or hazardous materials at the jobsite, Consultant may, at its option and without liability for damages, suspend the performance of services on the Project until such time as Company and Consultant mutually agree on an amendment to this Agreement to address the issue, or Company retains another specialist consultant or contractor to identify, classify, abate and/or remove the asbestos and/or hazardous materials.

9. Consultant's Work Product.

a. Scope.

Consultant's work product which is prepared solely for the purposes of this Agreement, including, but not limited to, drawings, test results, recommendations and technical specifications, whether in hard copy or electronic form, shall become the property of Company when Consultant has been fully compensated as set forth herein. Consultant may keep copies of all work product(s) for its records.

Consultant and Company recognize that Consultant's work product submitted in performance of this Agreement is intended only for the project described in this Agreement. Company's alteration of Consultant's work product or its use by Company for any other purpose shall be at Company's sole risk.

b. Electronic Copies.

If requested, solely as an aid and accommodation to Company, Consultant may provide copies of its work product documents in computer-readable media ("electronic copies", "CADD"). These documents will duplicate the documents provided as work product, but will not bear the signature and professional seals of the registered

professionals responsible for the work. Company is cautioned that the accuracy of electronic copies and CADD documents may be compromised by electronic media degradation, errors in format translation, file corruption, printing errors and incompatibilities, operator inexperience and file modification. Consultant will maintain the original copy, which shall serve as the official, archived record of the electronic and CADD documents.

10. Indemnification.

a. The Consultant shall indemnify the Company against, and save and hold it harmless from, any and all liability, claims, demands, loss, actions, causes of action, expense, penalties, fines, assessments, damages and costs of every kind and nature for injury to or death of any and all persons, including, without limitation, employees or representatives of the Company or of the Consultant or of any subcontractor, or any other person or persons, and for damage, destruction or loss, consequential or otherwise, to or of any and all property, real or personal, including, without limitation, property of the Company or of the Consultant or of any subcontractor, or of any other person or persons, and the violation of any law, ordinance, rule, regulation, standard, or order resulting from, or in any manner arising out of, or in connection with, the performance of the work under the Contract, howsoever same may be caused, including, without limitation, the Company's active or passive negligence. The Consultant shall also, upon request by the Company, and at no expense to the Company, defend the Company in any and all suits, concerning such injury to or death of any and all persons, and concerning such damage, destruction or loss, consequential or otherwise, to or of any and all property, real or personal, including, without limitation, suits by employees or representatives of the Company or of the Consultant or of any subcontractor, or any other person or persons, or concerning any court or administrative proceeding concerning the violation of any law, ordinance, rule, regulation, standard, or order. Excluded from this paragraph are only those injuries to or deaths of persons and damage, destruction or loss, to or of property arising from the sole negligence or willful misconduct of the Company.

b. Consultant shall indemnify the Company against, and save and hold it harmless from, any and all liability, claims, demands, damages, costs, expenses and attorney's fees, suffered or incurred on account of any breach of any obligation, covenant or other provision of this contract, including without limitation, breach of the indemnity provisions of subsection A of this Section 10.

c. Consultant further agrees to defend, indemnify and hold harmless the Company, its directors, officers, employees, and agents, from and against any and all costs, damages, claims, expenses, violations, notices of violations, penalties, liens, assessments, and liabilities of every kind and nature, foreseeable or unforeseeable, directly or indirectly, arising from any release, removal, generation, use, storage or disposal on, under, around, or from the well site of any material, substance, or waste, hazardous or nonhazardous, including, without limitation, drilling fluids, mud, cuttings

and development and test water howsoever same may be caused, including, without limitation, the Company's active or passive negligence.

11. Consultant's Insurance.

Consultant shall procure and maintain the following minimum insurance:

a. Commercial general liability insurance, including personal injury liability, blanket contractual liability and broad-form property damage liability coverage. The combined single limit for bodily injury and property damage shall be not less than \$1,000,000.

b. Automobile bodily injury and property damage liability insurance covering owned, non-owned, rented, and hired cars. The combined single limit for bodily injury and property damage shall be not less than \$1,000,000.

c. Statutory workers' compensation and employer's liability insurance as required by state law.

d. Professional liability insurance. The policy limit shall be not less than \$1,000,000.

Consultant shall either require each of its subconsultants to procure and to maintain the insurance specified in this section or insure its subconsultants in the Consultants own policy, in like amounts.

Company shall be named as additional insured on policies a and b above. Upon execution of this Agreement, Consultant will provide a certificate of insurance to Company. Consultant will keep the certificate current at all times while this Agreement is in effect. The Consultant will provide a 30-day written notice in the event the above policies are cancelled.

12. Confidentiality.

Consultant agrees it will maintain the confidentiality of all material it receives from Company and will not disclose, distribute, or publish to any third party such information without the prior permission of Company. Notwithstanding the foregoing, Consultant shall have no confidentiality obligation with respect to information that:

a. becomes generally available to the public other than as a result of disclosure by Consultant or its agents or employees;

b. was available to Consultant prior to its disclosure by Company;

c. becomes available to Consultant from a third party who is not, to the knowledge of Consultant, bound to retain such information in confidence.

In the event Consultant is compelled by subpoena, court order, or administrative order to disclose any confidential information, Consultant shall promptly notify Company and shall cooperate with Company prior to disclosure so that Company may take necessary actions to protect such confidential information from disclosure.

13. Subcontracts.

Consultant shall be entitled, to the extent determined appropriate by Consultant, to subcontract any portion of the services to be performed under this Agreement.

14. Suspension of Work.

Work under this Agreement may be suspended as follows:

a. By Company. By written notice to Consultant, Company may suspend all or a portion of the Work under this Agreement if unforeseen circumstances beyond Company's control make normal progress of the Work impracticable.

b. By Consultant. By written notice to Company, Consultant may suspend the work if Consultant reasonably determines that working conditions at the Site (outside Consultant's control) are unsafe, or in violation of applicable laws, or in the event Company has not made timely payment in accordance with Article VI, compensation.

15. Termination of Work.

a. This Agreement may be terminated by Company as follows: (1) for its convenience on thirty (30) days' notice to Consultant, or (2) for cause, if Consultant materially breaches this Agreement through no fault of Company and Consultant neither cures such material breach nor makes reasonable progress toward cure within fifteen (15) days after Company has given written notice of the alleged breach to Consultant.

b. This Agreement may be terminated by Consultant as follows: (1) for cause, if Company materially breaches this Agreement through no fault of Consultant and Company neither cures such material breach nor makes reasonable progress toward cure within thirty (30) days after Consultant has given written notice of the alleged breach to Company.

c. Payment upon Termination. In the event of termination, Consultant shall perform such additional work as is reasonably necessary for the orderly closing of the work. Consultant shall be compensated for all work performed prior to the effective date of termination, plus work required for the orderly closing of the work, including: (1) authorized work performed up to the termination date plus termination expenses, including all labor and expenses, at Consultant's standard billing rates,

directly attributable to termination; (2) all efforts necessary to document the work completed or in progress; and (3) any termination reports requested by Company.

16. Assignment.

This Agreement is binding on the heirs, successors, and assigns of the parties hereto. Except as otherwise set forth under Article VIII, Assignment of Tasks to Affiliates, this Agreement may not be assigned by Company or Consultant without prior, written consent of the other.

17. No Benefit for Third Parties.

The services to be performed by Consultant are intended solely for the benefit of Company, and no benefit is conferred on, nor contractual relationship established with any person or entity not a party to this Agreement. No such person or entity shall be entitled to rely on Consultant's services, opinions, recommendations, plans, or specifications without the express written consent of Consultant. No right to assert a claim against the Consultant, its officers, employees, agents, or consultants shall accrue to the construction Contractor or to any subcontractor, supplier, manufacturer, lender, insurer, surety, or any other third party as a result of this Agreement or the performance or nonperformance of the Consultant's services hereunder.

18. Force Majeure.

Consultant and Company shall not be responsible for delays caused by circumstances beyond their reasonable control, including, but not limited to: (1) strikes, lockouts, work slowdowns or stoppages, or accidents; (2) acts of God; (3) failure of Company to furnish timely information or to approve or disapprove Consultant's instruments of service promptly; and (4) faulty performance or nonperformance by Consultant or Company, Company's or Consultant independent consultants or contractors, or governmental agencies. Consultant and Company shall not be liable for damages arising out of any such delay, nor shall the Consultant or Company be deemed to be in breach of this Agreement as a result thereof.

19. Integration.

This Agreement represents the entire understanding of Company and Consultant as to those matters contained herein. No prior oral or written understanding shall be of any force or effect with respect to those matters covered herein. This Agreement may not be modified or altered except in writing signed by both parties.

20. Severability.

If any part of this Agreement is found unenforceable under applicable laws, such part shall be inoperative, null, and void insofar as it conflicts with said laws, but the remainder of this Agreement shall be in full force and effect.

21. Choice of Law/Jurisdiction.

This Agreement shall be administered and interpreted under the laws of the State of Arizona. Jurisdiction of litigation arising from the Agreement shall be in The State of Arizona.

22. Attorneys' Fees.

In the event any claim, controversy, or legal action arises under this Agreement, the prevailing party shall be entitled to recover from the other party all attorneys' fees, costs, expenses and other fees incurred by the prevailing party.

23. Notice Provisions.

Notices concerning this Agreement shall be in writing and sent by certified mail or by courier (such as Federal Express), or by hand-delivery addressed as follows:

To the Company: Arizona Water Company
3805 North Black Canyon Highway
Phoenix, Arizona 85015-5351
Attention: President

or

Arizona Water Company
Post Office Box 29006
Phoenix, Arizona 85038-9006
Attention: President

To Consultant: Ricker, Atkinson, McBee, Morman & Associates, Inc.
2105 South Hardy Drive, Suite 13
Tempe, Arizona 85282-1924
Attention: President

Either party may change its address for purposes of this Section by giving written notice of such change of address to the other party.

24. Authorization.

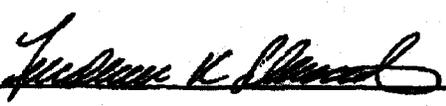
The persons executing this Agreement on behalf of the parties hereto represent and warrant that the parties have all legal authority and authorization necessary to enter into this Agreement, and that such persons have been duly authorized to execute this Agreement on their behalf.

IN WITNESS WHEREOF, each of the parties hereto has caused this instrument to be executed by their respective duly authorized officers as of the date first written above.

**RICKER, ATKINSON, MCBEE,
MORMAN & ASSOCIATES.**
an Arizona Corporation

ARIZONA WATER COMPANY,
an Arizona corporation

By: 

By: 

Its: President

Its: VP-Engineering

THIS ENDORSEMENT CHANGES THE POLICY, PLEASE READ IT CAREFULLY.

OTHER ADDITIONAL INSURED

This endorsement modifies insurance provided under the following:
COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

NAME OF PERSON(S) OR ORGANIZATION(S):

Arizona Water Company

PROJECT/LOCATION OF COVERED OPERATIONS:

Southwest Center & Harmony Hills Well Sites

PROVISIONS

1. WHO IS AN INSURED (SECTION II) is amended to include as an insured any person or organization (called hereafter "additional insured") with whom you have agreed in a written contract, executed prior to loss, to name as an additional insured, but:
 - a. Only with respect to liability because of "bodily injury" or "property damage" arising out of "your work" for that additional insured performed by you or for you; and
 - b. Subject to any limitations in the written contract regarding the scope of the additional insured status.

This insurance does not apply to "bodily injury" or "property damage" arising out of "your work" included in the "products-completed operations hazard" unless you are required to provide such coverage by written contract and then only for the period of time required by the contract, but in no event beyond the expiration date of the policy.

2. The Limits of Insurance provided to such additional insured shall be:
 - a. The limits which you have agreed to provide; or,
 - b. The limits shown on the Declarations, whichever is less.
3. This insurance is excess over any valid and collectible insurance unless you have agreed in a written contract for this insurance to apply on a primary or contributory basis.
4. This insurance does not apply on any basis:
 - a. To any person or organization for whom you have purchased an Owners and Contractors Protective policy.
 - b. To any person or organization who distributes or sells "your products" in the regular course of its business.
 - c. To any person or organization from whom you have acquired any products, or any ingredient, part or container entering into, accompanying or containing such products.
 - d. To any manager or lessor of premises with respect to liability arising out of the ownership, maintenance, or use of that part of any premises leased to you.
 - e. To any lessor or leased equipment.
 - f. To any architect, engineer or surveyor for injury or damage arising out of:
 - (1) The preparing, approving or failing to prepare or approve maps, drawings, opinions, reports, surveys, change orders, designs or specifications; and
 - (2) Supervisory, inspection or engineering services.

Exhibit A

RICKER, ATKINSON, McBEK, MORMAN & ASSOCIATES, INC.

ATTACHMENT "A" Proposal for Geotechnical Engineering Services

For: Arizona Water Company

RAMM Proposal No. PG12059

**PROJECT: Harmony Hills and Southwest Center Well Site Improvements
2645 Lyric Drive and 100 Cardinal Lane
Sedona, Arizona**

DESCRIPTION:

The proposed improvements consist of installation of a stainless steel arsenic treatment pressure vessel and two HDPE backwash tanks at two existing well sites.

SCOPE OF SERVICES:

1. RAMM will contact Arizona Blue Stake. Utility clearance and field exploration will be coordinated with Arizona Water Company personnel.
2. Test borings will be performed to determine subsurface conditions and obtain representative samples for laboratory analyses. Two test borings, one per well site, 20 feet in depth or prior auger refusal are proposed in the improvement areas.
3. Laboratory analyses of representative samples will include:
 - Moisture Content and Dry Density
 - Compression
 - Swell
 - Minus No. 200 Sieve and Plasticity Index
 - pH, Minimum Resistivity, Sulfates, Sulfate Chloride
4. An Engineer's report for each site will be provided presenting the results of the field and laboratory testing, corrosion potential and concrete durability parameters of site soils in contact with buried ferrous material and concrete and recommendations for foundation support (including footing depth, bearing capacity, and estimated settlement), lateral earth pressures, site development, materials suitability requirements and site grading and preparation procedures.

COMPLETION TIME:

Final report approximately 2 to 3 weeks after authorized to proceed.
Contingent upon utility clearance and field exploration coordination.

Exhibit B

RICKER, ATKINSON, McBEE, MORMAN & ASSOCIATES, INC.

ATTACHMENT "A" Proposal for Geotechnical Engineering Services

For: Arizona Water Company

RAMM Proposal No. PG12059

FEE: \$ 3,000.00

Our Fee Schedule presenting Geotechnical Engineering Unit Rates is presented below.

FEE SCHEDULE

GEOTECHNICAL ENGINEERING UNIT RATES

FIELD EXPLORATIONS

Field Technician	\$50.00/hour
Drill Rig & Crew (typically \$135/hour portal-to-portal)	Cost
Vehicle	\$0.75/mile
Barricading (typically \$400-500/day)	Cost
Private Utility Locator	Cost

LABORATORY TESTING

Minus No. 200 Sieve & Plasticity Index	\$110.00/each
Sieve Analysis & Plasticity Index	\$150.00/each
Swell Potential	\$80.00/each
Moisture Content and Dry Density on Rings	\$12.00/each
Standard Proctor	\$110.00/each
Compression	\$100.00/each
Direct Shear (Three Points)	\$160.00/each
R-Value	\$350.00/each

ENGINEERING ANALYSIS AND REPORT

Project Engineer	\$85.00/hour
Clerical	\$45.00/hour
Reproduction	Cost



RICKER • ATKINSON • McBEE • MORMAN & ASSOCIATES, INC.
Geotechnical Engineering • Construction Materials Testing

RECEIVED
APR 25 2011

ARIZONA WATER COMPANY
PHOENIX - ENGINEERING

Arizona Water Company
P.O. Box 29006
Phoenix, Arizona 85015-5351

April 22, 2011

Attn: John Knobbe, Senior Eng. Tech/Email: jknobbe@arizonawater.com

Re: Proposal for Geotechnical Engineering Services RAMM Proposal No. PG12059
Harmony Hills and Southwest Center Well Site Improvements
2645 Lyric Drive and 100 Cardinal Lane
Sedona, Arizona

Ricker, Atkinson, McBee, Morman & Associates, Inc. is pleased to submit this proposal to conduct Geotechnical Engineering Services for the above-referenced project.

If this proposal meets with your approval, please sign, date and return one copy of the enclosed Attachment "A", which outlines project description, our scope of services, completion time and fee to perform services.

If there are any questions regarding the proposed scope of work, please call. Thank you for considering our firm for this project.

Respectfully submitted,

RICKER, ATKINSON, MCBEE, MORMAN & ASSOCIATES, INC.

Kip E. Reese, P.E.
Project Engineer

/dcw

**AGREEMENT FOR CONSULTING SERVICES BETWEEN
ARIZONA WATER COMPANY AND
WATERWORKS ENGINEERS, LLC.**

THIS AGREEMENT is made and entered into on this 13th day of ~~May~~ June, 2011, by and between Arizona Water Company, an Arizona corporation, hereinafter referred to as "Company," and Waterworks Engineers, a limited liability company hereinafter referred to as "Consultant".

RECITALS

WHEREAS, Company is authorized to and desires to retain Consultant to provide engineering design, post design and construction administration services for the Harmony Hills Arsenic Treatment Plant.

WHEREAS, Consultant is agreeable to providing personnel and facilities necessary to perform the desired services within Company's required time; and

WHEREAS, Company desires to retain Consultant to perform the services in the manner, at the time, and for the compensation set forth herein;

NOW, THEREFORE, Company and Consultant agree as follows:

1. **Description of Project.**

Company and Consultant agree that Project is as described in Exhibit A, hereto, incorporated by reference herein and entitled "Scope of Work," dated May 26, 2011. If, during the course of Project, Company and Consultant agree to changes in Project, such changes shall be effective only after being incorporated in this Agreement by written amendment, signed by representative of Company and Consultant.

2. **Scope of Consultant Services.**

Consultant agrees to perform those services described hereafter. Unless modified in writing by both parties, duties of Consultant shall not be construed to exceed those services specifically set forth herein.

a. **Basic Services.** Consultant agrees to perform those services described in the Scope of Work (the "Services"). Any tasks not specifically described in the Scope of Work will be Additional Services.

b. **Additional Services.** Company shall pay Consultant all fees and costs incurred in performing Additional Services provided the services were authorized by Company in writing. Unless otherwise agreed in writing, Additional Services shall be compensated in accordance with Consultant's standard billing rates at the time the Additional Services are performed.

c. Litigation Assistance. Unless specifically stated therein, the Scope of Work does not include assistance to support, prepare, document, bring, defend or assist in litigation undertaken or defended by Company. All such services required or requested of the Consultant by Company or any third party (except claims between Company and Consultant) will be reimbursed at Consultant's applicable rates for such litigation services.

3. Responsibilities of Company.

In addition to payment for the Services performed under this Agreement, Company shall:

a. Assist and cooperate with Consultant in any manner necessary and within its ability to facilitate Consultant's performance under this Agreement.

b. Designate in writing a person to act as Company's representative with respect to this Agreement. Such person shall have complete authority to transmit instructions, receive information, interpret and define Company's policies, make decisions and execute documents on Company's behalf.

c. Furnish Consultant with all technical data in Company's possession including, but not limited to, maps, surveys, drawings, soils or geotechnical reports and any other information required by or useful to Consultant in performance of the Services under this Agreement.

d. Notify Consultant of any known or potential health or safety hazards existing at or near the project site.

e. Provide access to and/or obtain permission for Consultant to enter upon project related property during normal business hours, whether or not owned by Company, as required to perform and complete the Services.

4. Americans with Disabilities Act.

Any other provision of this Agreement to the contrary notwithstanding, unless otherwise specified in the Scope of Services, Company's contractors shall have sole responsibility as between Company and Consultant for compliance with the Americans With Disabilities Act ("ADA") 42 U.S.C. 12101 et. Seq. and the related regulations. Consultant shall provide Company with applicable ADA criteria, which maybe required.

5. Authorization and Completion.

In signing this Agreement Company grants Consultant specific authorization to proceed with work as described in Scope of Work and under the terms of this Agreement.

6. Compensation.

a. Amount. For the Services described in Exhibit A, Company agrees to pay, and Consultant agrees to accept compensation in accordance with Exhibit B, attached hereto and incorporated herein. Where Consultant has provided Company with a breakdown of the total compensation into subtasks, such breakdowns are estimates only. Consultant may reallocate compensation between tasks, provided total compensation is not exceeded without the prior written approval of Company.

b. Payment. As long as Consultant has not defaulted under this Agreement, Company shall pay Consultant within thirty (30) days of the date of Consultant's invoices for services performed and reimbursable expenses incurred under this Agreement. If Company has reason to question or contest any portion of any such invoice, amounts questioned or contested shall be identified and notice given to Consultant within thirty (30) days of the date of the invoice. Any portion of any invoice not contested shall be deemed to be accepted and approved for payment and shall be paid to Consultant within thirty (30) days of the date of the invoice. Company agrees to cooperate with Consultant in a mutual effort to resolve promptly any contested portions of Consultant's invoices.

In the event any uncontested portions of any invoice are not paid within thirty (30) days of the date of Consultant's invoice, interest on the unpaid balance shall accrue beginning with the 31st day at the rate of 1.5% per month, and Consultant shall have the right to suspend work per Article XV, Suspension of Work.

7. Responsibility of Consultant.

a. Standard of Care Professional Services.

Subject to the limitations inherent in the agreed scope of work as to the degree of care, amount of time and expenses to be incurred, and subject to any other limitations contained in this Agreement, Consultant shall perform the Services and any Additional Services in accordance with generally accepted standards and practices customarily utilized by competent engineering firms in effect at the time Services and any Additional Services are rendered. Consultant does not expressly or impliedly warrant or guarantee its Services.

b. Reliance upon Information Provided by Others.

If Consultant's performance of services hereunder requires Consultant to rely on information provided by other parties (excepting Consultant's subcontractors), Consultant shall not independently verify the validity, completeness, or accuracy of such information unless otherwise expressly engaged to do so in writing by Company.

c. Consultant's Opinion of Costs.

Company acknowledges that construction cost estimates, financial analyses and feasibility projections are subject to many influences including, but not limited to, price of labor and materials, unknown or latent conditions of existing equipment or structures, and time or quality of performance by third parties. Company acknowledges that such influences may not be precisely forecasted and are beyond the control of Consultant and that actual costs incurred may vary substantially from the estimates prepared by Consultant. Consultant does not warrant or guarantee the accuracy of construction or development cost estimates, however, Consultant agrees to exercise its best Professional Judgment in rendering its opinions.

d. Construction Phase Services.

1. Consultant's Activities at Construction Site. The presence of Consultant's personnel at a construction site, whether as on-site representative, resident engineer, construction manager, or otherwise, does not make Consultant responsible for those duties that belong to Company and/or construction contractors or others, and does not relieve construction contractors or others of their obligations, duties, and responsibilities, including, but not limited to, construction methods, means, techniques, sequences, and procedures necessary for completing all portions of the construction work in accordance with the contract documents, any health or safety programs and precautions required by such construction work, and any compliance with applicable laws and regulations. Any inspection or observation of the contractor's work is for the purpose of determining that the work is proceeding in conformance with the intent of the project specifications and contract documents. Consultant has no authority to exercise control over any construction contractor in connection with their work or health or safety programs and precautions. Except to protect Consultant's own personnel and except as may be expressly required elsewhere in the Scope of Work, Consultant has no duty to inspect, observe, correct, or report on health or safety deficiencies of the construction contractor.

2. Shop Drawing and Submittal Review. If required by Consultant's Scope of Services, Consultant shall review shop drawings or other contractor submittals for general conformance with the intent of the contract documents. Except for services completed under direct contract to Consultant, Consultant shall not be required to verify dimensions, to engineer contractor's shop drawings or submittals, nor to coordinate shop drawings or other submittals with other shop drawings or submittals provided by contractor.

3. Record Drawings. Record drawings, if required, will be prepared, in part, on the basis of information compiled and furnished by others, and may not always represent the exact location, type of various components, or exact manner in which the Project was finally constructed. Except for services completed under direct contract to Consultant, Consultant is not responsible for any errors or omissions in the information from others that are incorporated into the record drawings.

e. Scope of Work.

1. Before preparing the scope of work, Consultant specifically acknowledges and agrees that it has inspected and familiarized itself with Company's Harmony Hills Well site. The Consultant has received, or had the opportunity to inquire about and/or request all relevant information concerning the Scope of Work from Company or any other source Consultant deems necessary. The Scope of Work has been prepared by the Consultant and to the best of its knowledge includes all applicable work required to successfully design the Harmony Hills Arsenic Treatment Plant.

8. Asbestos/Hazardous Material.

Consultant and Consultant's subcontractors shall have no responsibility for the discovery, handling, removal, or disposal of, or exposure of persons to asbestos or hazardous or toxic materials that are present in any form at the Project site. Professional services related to or in any way connected with the investigation, detection, abatement, replacement, use, specification, or removal of products, materials, or processes containing asbestos or hazardous or toxic materials are beyond the scope of this Agreement.

In the event Consultant encounters asbestos or hazardous materials at the jobsite, Consultant may, at its option and without liability for damages, suspend the performance of services on the Project until such time as Company and Consultant mutually agree on an amendment to this Agreement to address the issue, or Company retains another specialist consultant or contractor to identify, classify, abate and/or remove the asbestos and/or hazardous materials.

9. Consultant's Work Product.

a. Scope.

Consultant's work product which is prepared solely for the purposes of this Agreement, including, but not limited to, drawings, test results, recommendations and technical specifications, whether in hard copy or electronic form, shall become the property of Company when Consultant has been fully compensated as set forth herein. Consultant may keep copies of all work product(s) for its records.

Consultant and Company recognize that Consultant's work product submitted in performance of this Agreement is intended only for the project described in this Agreement. Company's alteration of Consultant's work product or its use by Company for any other purpose shall be at Company's sole risk.

b. Electronic Copies.

If requested, solely as an aid and accommodation to Company, Consultant may provide copies of its work product documents in computer-readable media ("electronic copies", "CADD"). These documents will duplicate the documents provided as work

product, but will not bear the signature and professional seals of the registered professionals responsible for the work. Company is cautioned that the accuracy of electronic copies and CADD documents may be compromised by electronic media degradation, errors in format translation, file corruption, printing errors and incompatibilities, operator inexperience and file modification. Consultant will maintain the original copy, which shall serve as the official, archived record of the electronic and CADD documents.

10. Indemnification.

a. The Consultant shall indemnify the Company against, and save and hold it harmless from, any and all liability, claims, demands, loss, actions, causes of action, expense, penalties, fines, assessments, damages and costs of every kind and nature for injury to or death of any and all persons, including, without limitation, employees or representatives of the Company or of the Consultant or of any subcontractor, or any other person or persons, and for damage, destruction or loss, consequential or otherwise, to or of any and all property, real or personal, including, without limitation, property of the Company or of the Consultant or of any subcontractor, or of any other person or persons, and the violation of any law, ordinance, rule, regulation, standard, or order resulting from, or in any manner arising out of, or in connection with, the performance of the work under the Contract, howsoever same may be caused, including, without limitation, the Company's active or passive negligence. The Consultant shall also, upon request by the Company, and at no expense to the Company, defend the Company in any and all suits, concerning such injury to or death of any and all persons, and concerning such damage, destruction or loss, consequential or otherwise, to or of any and all property, real or personal, including, without limitation, suits by employees or representatives of the Company or of the Consultant or of any subcontractor, or any other person or persons, or concerning any court or administrative proceeding concerning the violation of any law, ordinance, rule, regulation, standard, or order. Excluded from this paragraph are only those injuries to or deaths of persons and damage, destruction or loss, to or of property arising from the sole negligence or willful misconduct of the Company.

b. Consultant shall indemnify the Company against, and save and hold it harmless from, any and all liability, claims, demands, damages, costs, expenses and attorney's fees, suffered or incurred on account of any breach of any obligation, covenant or other provision of this contract, including without limitation, breach of the indemnity provisions of subsection A of this Section 10.

c. Consultant further agrees to defend, indemnify and hold harmless the Company, its directors, officers, employees, and agents, from and against any and all costs, damages, claims, expenses, violations, notices of violations, penalties, liens, assessments, and liabilities of every kind and nature, foreseeable or unforeseeable, directly or indirectly, arising from any release, removal, generation, use, storage or disposal on, under, around, or from the Harmony Hills Arsenic Treatment Plant of any material, substance, or waste, hazardous or nonhazardous, including, without limitation,

drilling fluids, mud, cuttings and development and test water howsoever same may be caused, including, without limitation, the Company's active or passive negligence.

11. Consultant's Insurance.

Consultant shall procure and maintain the following minimum insurance:

a. Commercial general liability insurance, including personal injury liability, blanket contractual liability and broad-form property damage liability coverage. The combined single limit for bodily injury and property damage shall be not less than \$1,000,000.

b. Automobile bodily injury and property damage liability insurance covering owned, non-owned, rented, and hired cars. The combined single limit for bodily injury and property damage shall be not less than \$1,000,000.

c. Statutory workers' compensation and employer's liability insurance as required by state law.

d. Professional liability insurance. The policy limit shall be not less than \$1,000,000.

Consultant shall either require each of its subconsultants to procure and to maintain the insurance specified in this section or insure its subconsultants in the Consultants own policy, in like amounts.

Company shall be named as additional insured on policies a and b above. Upon execution of this Agreement, Consultant will provide a certificate of insurance to Company. Consultant will keep the certificate current at all times while this Agreement is in effect. The Consultant will provide a 30-day written notice in the event the above policies are cancelled.

12. Confidentiality.

Consultant agrees it will maintain the confidentiality of all material it receives from Company and will not disclose, distribute, or publish to any third party such information without the prior permission of Company. Notwithstanding the foregoing, Consultant shall have no confidentiality obligation with respect to information that:

a. becomes generally available to the public other than as a result of disclosure by Consultant or its agents or employees;

b. was available to Consultant prior to its disclosure by Company;

c. becomes available to Consultant from a third party who is not, to the knowledge of Consultant, bound to retain such information in confidence.

In the event Consultant is compelled by subpoena, court order, or administrative order to disclose any confidential information, Consultant shall promptly notify Company and shall cooperate with Company prior to disclosure so that Company may take necessary actions to protect such confidential information from disclosure.

13. Subcontracts.

Consultant shall be entitled, to the extent determined appropriate by Consultant, to subcontract any portion of the services to be performed under this Agreement.

14. Suspension of Work.

Work under this Agreement may be suspended as follows:

a. By Company. By written notice to Consultant, Company may suspend all or a portion of the Work under this Agreement if unforeseen circumstances beyond Company's control make normal progress of the Work impracticable.

b. By Consultant. By written notice to Company, Consultant may suspend the work if Consultant reasonably determines that working conditions at the Site (outside Consultant's control) are unsafe, or in violation of applicable laws, or in the event Company has not made timely payment in accordance with Article VI, compensation.

15. Termination of Work.

a. This Agreement may be terminated by Company as follows: (1) for its convenience on thirty (30) days' notice to Consultant, or (2) for cause, if Consultant materially breaches this Agreement through no fault of Company and Consultant neither cures such material breach nor makes reasonable progress toward cure within fifteen (15) days after Company has given written notice of the alleged breach to Consultant.

b. This Agreement may be terminated by Consultant as follows: (1) for cause, if Company materially breaches this Agreement through no fault of Consultant and Company neither cures such material breach nor makes reasonable progress toward cure within thirty (30) days after Consultant has given written notice of the alleged breach to Company.

c. Payment upon Termination. In the event of termination, Consultant shall perform such additional work as is reasonably necessary for the orderly closing of the work. Consultant shall be compensated for all work performed prior to the effective date of termination, plus work required for the orderly closing of the work, including: (1) authorized work performed up to the termination date plus termination expenses, including all labor and expenses, at Consultant's standard billing rates, directly attributable to termination; (2) all efforts necessary to document the work completed or in progress; and (3) any termination reports requested by Company.

16. Assignment.

This Agreement is binding on the heirs, successors, and assigns of the parties hereto. Except as otherwise set forth under Article VIII, Assignment of Tasks to Affiliates, this Agreement may not be assigned by Company or Consultant without prior, written consent of the other.

17. No Benefit for Third Parties.

The services to be performed by Consultant are intended solely for the benefit of Company, and no benefit is conferred on, nor contractual relationship established with any person or entity not a party to this Agreement. No such person or entity shall be entitled to rely on Consultant's services, opinions, recommendations, plans, or specifications without the express written consent of Consultant. No right to assert a claim against the Consultant, its officers, employees, agents, or consultants shall accrue to the construction Contractor or to any subcontractor, supplier, manufacturer, lender, insurer, surety, or any other third party as a result of this Agreement or the performance or nonperformance of the Consultant's services hereunder.

18. Force Majeure.

Consultant and Company shall not be responsible for delays caused by circumstances beyond their reasonable control, including, but not limited to: (1) strikes, lockouts, work slowdowns or stoppages, or accidents; (2) acts of God; (3) failure of Company to furnish timely information or to approve or disapprove Consultant's instruments of service promptly; and (4) faulty performance or nonperformance by Consultant or Company, Company's or Consultant independent consultants or contractors, or governmental agencies. Consultant and Company shall not be liable for damages arising out of any such delay, nor shall the Consultant or Company be deemed to be in breach of this Agreement as a result thereof.

19. Integration.

This Agreement represents the entire understanding of Company and Consultant as to those matters contained herein. No prior oral or written understanding shall be of any force or effect with respect to those matters covered herein. This Agreement may not be modified or altered except in writing signed by both parties.

20. Severability.

If any part of this Agreement is found unenforceable under applicable laws, such part shall be inoperative, null, and void insofar as it conflicts with said laws, but the remainder of this Agreement shall be in full force and effect.

21. Choice of Law/Jurisdiction.

This Agreement shall be administered and interpreted under the laws of the State of Arizona. Jurisdiction of litigation arising from the Agreement shall be in The State of Arizona.

22. Attorneys' Fees.

In the event any claim, controversy, or legal action arises under this Agreement, the prevailing party shall be entitled to recover from the other party all attorneys' fees, costs, expenses and other fees incurred by the prevailing party.

23. Notice Provisions.

Notices concerning this Agreement shall be in writing and sent by certified mail or by courier (such as Federal Express), or by hand-delivery addressed as follows:

To the Company: Arizona Water Company
 3805 North Black Canyon Highway
 Phoenix, Arizona 85015-5351
 Attention: President

or

Arizona Water Company
Post Office Box 29006
Phoenix, Arizona 85038-9006
Attention: President

To Consultant: Waterworks Engineers, LLC
 8840 E. Chaparral Road, Suite 280
 Scottsdale, Arizona 85250
 Attention: John Matta

Either party may change its address for purposes of this Section by giving written notice of such change of address to the other party.

24. Authorization.

The persons executing this Agreement on behalf of the parties hereto represent and warrant that the parties have all legal authority and authorization necessary to enter into this Agreement, and that such persons have been duly authorized to execute this Agreement on their behalf.

IN WITNESS WHEREOF, each of the parties hereto has caused this instrument to be executed by their respective duly authorized officers as of the date first written above.

WATERWORKS ENGINEERS,
a limited liability company

ARIZONA WATER COMPANY,
an Arizona corporation

By: John Malta
Its: Principal

By: Thomas K. Starnes
Its: VP-Engineering

EXHIBIT A



Scope of Work

**Harmony Hills Wells No. 5 & 12
Arsenic Removal Facility
Sedona, Arizona
May 26, 2011
Project No. 1-4814**

**Arizona Water Company
3805 N. Black Canyon Highway
Phoenix, Arizona 85015
(602) 240-6860**

With



**Water Works Engineers, LLC
8840 E. Chaparral Rd., Suite 280
Scottsdale, AZ 85250**

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I. PROJECT DESCRIPTION

This project consists of services which will be provided by Water Works Engineers ("the Consultant") for a wellhead arsenic treatment facility (ATF) at Arizona Water Company's (the "Company") Harmony Hills well site (the "Site") located at 2645 Lyric Drive, Sedona, Arizona. There are two wells located at the Site that pump directly into the distribution system, Well No. 5 (160 gpm) and Well No. 12 (900 gpm). The current arsenic concentration in both wells is approximately 10 ppb and has been trending upward. The new arsenic removal facility shall be designed to reduce the arsenic concentrations in the groundwater to less than 7 ppb. The influent arsenic design parameter shall be 15 ppb. Currently the operation of the Well No. 12 is controlled by existing offsite water storage tank levels, however, Well No. 5 typically runs 24 hours a day 7 days a week. Well No. 12 runs for approximately 16 hours a day during peak demands. The new arsenic removal facility is anticipated to operate in a similar manner.

An Arsenic Treatment/Mitigation Alternatives Evaluation Technical Memorandum has been recently completed whereby various arsenic removal options were evaluated and adsorptive media was selected as the Best Available Technology for arsenic removal at these wells. The Consultant shall design the arsenic removal facility to accommodate either Severn Trent Services Bayoxide E33® or Siemens GFH® media. The Technical Memorandum will be provided to the Consultant upon the Notice to Proceed, and results from the evaluation will be used as supporting data for the design of the new ATFs.

II. SCOPE OF SERVICES

Task Series 100 - Project Management & Schedule Updates Includes:

Task 110 – Provide a detailed schedule, in Gantt chart form, beginning with the award of design contract and ending with the award of construction contract with an estimated time for construction, start-up and applicable regulatory agency approvals.

Task 120 - Monitor progress and provide design phase progress meeting minutes

Task 130 - Conduct meetings and distribute meeting minutes

Task 140 - Assess data gathering needs and evaluate existing data.

Assumptions: Maximum 12 week design phase duration, one project kick-off meeting, and up to 3 design phase progress meetings.

AWC Inputs: 1) Confirm schedule for project meetings. 2) Review and approve schedule updates. 3) Provide applicable data for Southwest Center well site including pump curve, existing RTU equipment records, existing electric SES/MCC panel as-builts and electronic CAD files of existing facilities including a site plan.

Deliverables: 1) Detailed schedule (Gantt chart form), meeting minutes.

Task Series 200 - 30% Design Includes:

Task 210 - Collect site data and perform site survey

Task 220 - Meet with the City of Sedona to discuss site screening

Task 230 - Thirty Percent (30%) design (site plan, process schematic and P&ID drawings)

Task 240 - Prepare Preliminary Design Report (30% design level)

Task 250 - Prepare Opinion of Probable Cost for Construction

Task 260 - Prepare pre-selection specifications bid package for media, vessel and underdrain system. A determination will be made during 30% design on whether to design a packaged system (e.g. a Severn Trent Services system) or a component system (e.g. vessels specified separately from other equipment).

Assumptions: 1) If sufficient geotechnical information is currently not available for site, additional services shall be provided by the Company at the request of the Consultant. 2) The site survey shall include on-site topographic and existing facility data collection. If a boundary survey or easements/right-of-way delineation level of survey is required, additional scope may be required. 3) The Company will coordinate the meeting with the City of Sedona to discuss a site screening plan and Consultant shall attend meeting to provide input regarding the design. 4) Consultant shall incorporate a freeze protection plan as part of the design for those components of the ATF that are subject to freezing.

AWC Inputs: 30% Design Drawings\Report review comments, Pre-selection specifications bid package review.

Deliverables: 30% Design Drawings, Preliminary Design Report, Opinion of Probable Cost for Construction and pre-selection specifications bid package, Copy of site survey

Task Series 300 - Design Development Includes:

Task 310 - Ninety Percent (90%) design (site plan, exterior elevations/facility screening plan, process schematic, P&ID, electrical and structural drawings)

Task 320 - Design Report (90% design level)

Task 330 - Regulatory agency coordination and permit packages development and submittal, including ADEQ ATC and City of Sedona building permit

Task 340 - Construction sequence plan

Task 350 - One Hundred Percent (100%) Submittal

Task 360 - Opinion of Construction Cost (90% & 100%)

Task 370 - Submit pre-selection specifications bid package to Severn Trent Services and Siemens (the "Vendor") or vessel manufacturers

Assumptions: 1) Existing electrical utility service to well-site is sufficient for on-site arsenic removal system and will be able to service new electrical load from the on-site panel, so minimal electrical utility coordination will be required. 2) The Company will pay all permit fees to regulatory agencies. 3) Consultant shall submit a complete building permit package with the required information to the City of Sedona for the purpose of obtaining a building permit. The Consultant shall take the lead in coordinating all permits and if necessary, Consultant shall provide rendering(s) and site plan for a public hearing or outreach meeting. There is uncertainty whether the Town of Sedona will require a Special Use or Conditional Use Permit; therefore, an allowance has been established to provide this service as required. The Company will conduct the public hearing or outreach meeting and Consultant shall provide technical support and send a representative to the public hearing or outreach meeting. 4) For the 90% design drawings, Consultant shall provide hard copies as needed to submit signed/sealed drawings and specifications packages to regulatory agencies for review. For the 100% submittal, Consultant shall provide the Company with one (1) hardcopy set signed/sealed full size (22"x34") documents (drawings and specifications) and unsigned electronic documents (drawings and specifications) on CD for their in-house reproduction needs. 5) Design drawings shall be produced in Microstation V8 or AutoCad in 2-D format. 6) The Company will select a vessel manufacturer or Vendor from the proposals received as a result of the pre-selection bid process. If changes to the selected vessel manufacturer or Vendor proposal are required, the Consultant shall coordinate the changes with the vessel manufacturer or Vendor and obtain a revised proposal. Consultant shall use office engineering budget under Task Series 500 for submittal reviews, Vendor or vessel manufacturer coordination, and review of media performance guarantees. 7) Fire protection will not be required for the arsenic removal system. 8) Landscape drawings are not anticipated, and if required additional scope and associated fees may be needed. Existing landscaping shall be shown on the civil drawings and on the exterior elevation/facility screening plan.

AWC Inputs: 90% Design Drawings\Report review comments, ADEQ ATC package review comments and City of Sedona permit package review comments, Review Vendor proposals, participate in the selection of the Vendor and provide selected Vendor proposal changes

Deliverables: 90% design package, Copy of permit packages submitted to regulatory agencies, 100% design package, Opinion of construction cost, Detailed construction schedule, Vendor proposals or vessel manufacturer proposals.

Task Series 400 - Bidding Phase Services Includes:

Task 410 - Conduct pre-bid meeting and issue pre-bid meeting minutes

Task 420 - Prepare clarifications and addenda, respond to Contractor questions

Task 430 - Issue conformed construction documents and specifications

Task 440 - Assign pre-purchase contract for media, vessel and underdrain to successful bid Contractor

Assumptions: 1) The Consultant shall provide the Company with one (1) hard copy set of signed/sealed full size (22"x34") conformed construction documents and specifications for distribution to bidding Contractors. 2) The Consultant shall conduct the pre-bid meeting with the Company in attendance.

AWC Inputs: 1) The Company will make copies of the conformed construction documents and specifications and provide the bid package directly to pre-selected Contractors.

Deliverables: Pre-bid meeting minutes, clarifications & addenda, conformed construction documents and specifications.

III. Assumption Relative to Task Series 500-700

Task Series 500 - Office Engineering and Construction Phase Services, Task Series 600 - Resident Inspection Services and Task Series 700 - Other Additional Services, which were defined in the Company's Request for Proposal, have not been included at the request of the Company. These services are anticipated under a contract amendment upon completion of Task Series 400.

IV. Fees

The lump sum fee estimate for Task Series 100-400 is provided below with allowances, which will, as needed, be authorized by the Company before proceeding with the task.

Assumption: The fees are based on conducting designs for the Harmony Hills and Southwest Center ATFs at the same time.

Task	Water Works Engineers	Jensen Eng - E&IC
Task Series 100 – Project Management and Schedule Updates	\$4,032.00	\$2,400.00
Task Series 200 – 30% Design	\$12,764.25	\$2,900.00
Task Series 300 - Design Development	\$28,853.50	\$7,400.00
Task Series 400 - Bidding Phase Services	\$3,433.50	\$3,500.00
DESIGN AND BIDDING	\$48,883.25	\$18,200.00
TOTAL - DESIGN AND BIDDING	\$63,083.25	
Allowances		
A-1 Electrical Design Allowance for Component System		\$5,000.00
A-2 Special or Conditional Use Permit	\$10,000.00	
A-3 Public Relations	\$5,000.00	
TOTAL - ALLOWANCES		\$20,000.00
TOTAL - DESIGN AND BIDDING INCLUDING ALLOWANCES	\$83,083.25	
SURVEY SERVICES DURING DESIGN		
- Control, Topographic Survey, Location of Existing Facilities	\$1,800.00	
- Boundary Verification (Lyon to be provided legal descriptions or title report)	\$600.00	
- Drafting of topo, Existing improvements, and boundary information	\$850.00	
Surveying Totals	\$3,250.00	
TOTAL - PROJECT	\$86,333.25	

V. Hourly Rates

The fee estimates provided in the previous section are based on the following hourly rates including overhead costs. The rates herein will be utilized for determining appropriate compensation or reimbursement for changes in the scope of work.

Principal-in-Charge	165
Project Manager/Water Quality Specialist	150
Senior Project Engineer	130
Project Engineer	110
Structural Engineer	125
Electrical Engineer (Jensen Engineering)	150
Survey Crew (Lyon Engineering)	150
Designer 1	95
Designer 2	75
Admin. Support	55
Other Direct Costs; Subconsultants	At cost – no mark-ups

VI. *Architectural tasks will be performed in house by our designers using microstation 3D modeling.

VII. Schedule

The schedule is provided on the next page.

EXHIBIT B

TOTALS CHECK

	Harmony Hills		SW Center		REVISED AND ADJUSTED BUDGETS		SW Center	
					Harmony Hills			
Task Series 100 - Project Management and Schedule Updates	\$ 4,480.00	\$ 2,400.00	\$ 4,480.00	\$ 2,400.00	\$ 4,032.00	\$ 2,400.00	\$ 4,032.00	\$ 2,400.00
Task Series 200 - 30% Design	\$ 14,182.50	\$ 4,900.00	\$ 14,182.50	\$ 4,900.00	\$ 12,764.25	\$ 2,800.00	\$ 12,764.25	\$ 2,800.00
Task Series 300 - Design Developments	\$ 29,615.00	\$ 19,200.00	\$ 29,615.00	\$ 19,200.00	\$ 26,653.50	\$ 7,400.00	\$ 26,653.50	\$ 7,400.00
Task Series 400 - Building Phase Services	\$ 3,815.00	\$ 3,500.00	\$ 3,815.00	\$ 3,500.00	\$ 3,453.50	\$ 3,500.00	\$ 3,453.50	\$ 3,500.00
TOTAL - DESIGN AND BIDDING FOR BOTH SITES	\$ 52,092.50	\$ 30,000.00	\$ 52,092.50	\$ 30,000.00	\$ 46,843.25	\$ 16,200.00	\$ 46,843.25	\$ 16,200.00
A-1 Electrical Design Allowances for Component Systems	\$ 82,892.98	\$ -	\$ 82,892.98	\$ -	\$ 63,883.35	\$ -	\$ 63,883.35	\$ -
A-2 Special or Conditional Use Permit	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
A-3 Public Relations	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOTAL - ALLOWANCES	\$ -	\$ -	\$ -	\$ -	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00
TOTAL - DESIGN AND BIDDING INCLUDING ALLOWANCES	\$ 82,092.50	\$ 82,092.50	\$ 82,092.50	\$ 82,092.50	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00
Task Series 500 - Office Engineering and Construction Phase Services	\$ 28,210.00	\$ 6,600.00	\$ 28,210.00	\$ 6,600.00	\$ 25,389.00	\$ 5,940.00	\$ 25,389.00	\$ 5,940.00
Task Series 600 - Resident Monitoring Services	\$ 51,880.00	\$ 1,800.00	\$ 51,880.00	\$ 1,800.00	\$ 46,692.00	\$ 1,620.00	\$ 46,692.00	\$ 1,620.00
Task Series 700 - Other Additional Services	\$ 560.00	\$ -	\$ 560.00	\$ -	\$ 504.00	\$ -	\$ 504.00	\$ -
TOTAL - CONSTRUCTION PHASE SUPPORT	\$ 80,650.00	\$ 8,400.00	\$ 80,650.00	\$ 8,400.00	\$ 72,585.00	\$ 7,560.00	\$ 72,585.00	\$ 7,560.00
TOTAL - CONSTRUCTION WATERWORKS + JENSEN	\$ 89,050.00	\$ 89,050.00	\$ 89,050.00	\$ 89,050.00	\$ 81,654.00	\$ 81,654.00	\$ 81,654.00	\$ 81,654.00
SURVEY SERVICES DURING DESIGN	\$ -	\$ -	\$ -	\$ -				
- Control, Impositionable Survey, Location of Existing Facilities	\$ 1,800.00	\$ -	\$ 1,800.00	\$ -	\$ 1,800.00	\$ -	\$ 1,800.00	\$ -
- Boundary Verifications (Open to be provided legal descriptions or site re)	\$ 600.00	\$ -	\$ 600.00	\$ -	\$ 600.00	\$ -	\$ 600.00	\$ -
- Drafting of topo, Building Improvements, and boundary information	\$ 850.00	\$ -	\$ 850.00	\$ -	\$ 850.00	\$ -	\$ 850.00	\$ -
- Surveying Totals	\$ 3,250.00	\$ -	\$ 3,250.00	\$ -	\$ 3,250.00	\$ -	\$ 3,250.00	\$ -
TOTAL - PROJECT	\$ 174,382.60	\$ 174,382.60	\$ 174,382.60	\$ 174,382.60	\$ 168,478.25	\$ 168,478.25	\$ 168,478.25	\$ 168,478.25

\$ 84,333.25

\$ 186,166.50

\$ 332,966.50

\$ 6,800.00

\$ 186,166.50

\$ 186,166.50

\$ 186,166.50

\$ 186,166.50

\$ 186,166.50

JOB - B11605

STRUCTURAL CALCULATION COVER SHEET



WATERWORKS
ENGINEERS

Arizona Water Company

Harmony Hills Wells No 5 & 12

City of Sedona

Design Codes

2006 International Building Code

Contents

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Structural Calcs 1-10

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CITY OF SEDONA
COMMUNITY DEVELOPMENT



Expires 12-31-13



Project No. 11-027

Title HARMONY HILLS

Computed By JK

Date 8/1/11

Checked By

Date

Sheet No. 1 of

WORKS
ENGINEERS

WIND LOAD ON (E) CMU FENCE

Note: (E) FENCE CANNOT SUPPORT CURRENT WIND LOAD AS IS DUE TO UNDER-SIZED FOOTING UNDER THE 6" FENCE. THEREFORE, WE CANNOT ADD TO THE (E) FENCE. PROVIDE SEPARATE SUPPORT FOR NEW WROUGHT IRON FENCE

WIND LOADS:

ASCE 7-05, 6.5.14

$$F = q_z G C F A_p \quad \text{WHERE } q_z = 0.00256 K_z K_{zt} K_d V^2 I$$

$$= (17.2)(0.85)(1.0)(A_p) \quad = (0.00256)(0.85)(1.0)(0.85)(90)^2(1.15)$$

$$= 25 \text{ psf} \quad = 17.2$$

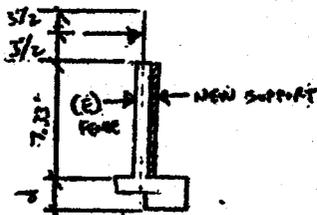
WROUGHT IRON FENCE IS MOSTLY OPEN; ASSUME 40% OF AREA IS CLOSED

$$\text{WIND LOAD/ft} = (25)(0.4)(1)(0.40)$$

$$= 29 \text{ #/ft}$$

MAX POST SPACING = 8'

$$\text{LOAD TO NEW SUPPORT} = (29 \text{ #/ft})(8') = 232 \text{ #}$$



$$M_{\text{DESG. SUPPORT}} = (232 \text{ #})(15' + 7.33')$$

$$= 2,05 \text{ k-ft}$$

$$Z_{\text{REQD}} = \frac{(2,05)(12)(1.07)}{46 \text{ ksi}}$$

$$= 0.29 \text{ in}^3$$

HS 4x4x7/16 $Z = 3.67 \text{ in}^3$ OK

↳ 4" SA NEEDED FOR ANCHOR BOLTS

TRY #6 w/ $d = 2.25'$

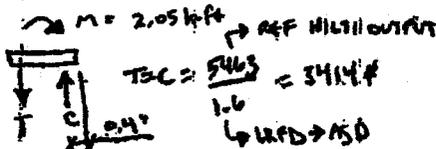
$$M_{\text{OT}} = (232 \text{ #})(45' + 20' + 7.33') = 2500 \text{ #-ft}$$

$$M_{\text{BASE}} = (0.6) \left[\frac{(120)(2.05)(2.5)^2}{2} + \frac{(120)(1.33)(2.5)^2}{2} + (0.4)(7.33)(1) \right]$$

$$= 2372 \text{ #-ft}$$

$$\frac{M_{\text{OT}}}{M_{\text{BASE}}} = 1.05 \text{ w/n } 5\% \text{ OK}$$

SIDE BASE RL



$$M = 2,05 \text{ k-ft} \rightarrow \text{REF. MULLION OUT}$$

$$TBC = \frac{5463}{1.6} = 3414 \text{ #}$$

↳ UFD → ASD

$$M_R = (3414)(0.1) = 341 \text{ #-in}$$

$$Z_{\text{MIN}} = \frac{(341)(1.07)}{36,000} = 0.02 \text{ in}^3$$

$$w/ 1/2 \text{ # } Z = (1/4)(10)(0.5)^2 = 0.025 \text{ OK}$$



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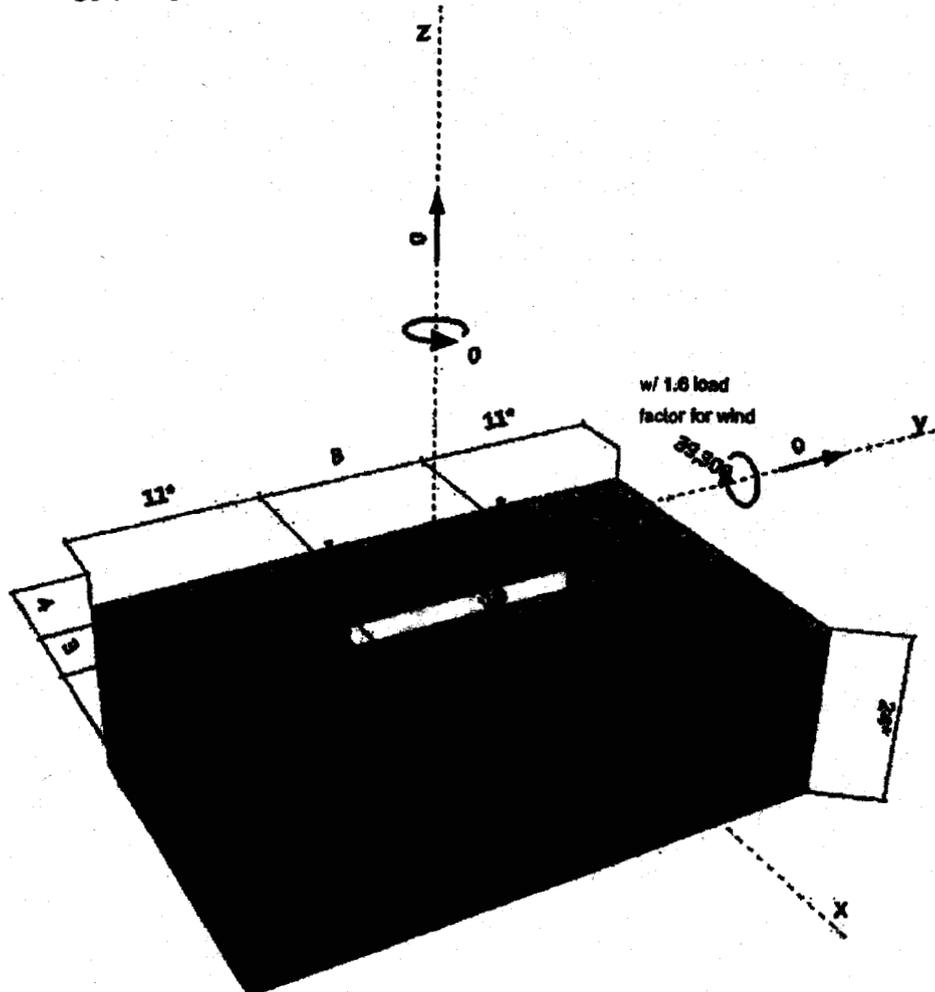
Specifier's comments:

1. Input data

Anchor type and diameter: Heavy Hex Head ASTM F 1554 GR. 85, 1/2
Effective embedment depth: $h_{ef} = 10.000$ in.
Material: ASTM F 1554

Proof: design method ACI 318 / CIP
Stand-off installation: without damping (anchor); restraint level (anchor plate): 2.0; $e_s = 1.000$ in.; $t = 0.500$ in.
Hilti Grout: CB-G EG, epoxy, $f_{grout} = 13924$ psi
Anchor plate: $l_p \times l_p \times t = 5.000 \times 10.000 \times 0.500$ in. (Recommended plate thickness: not calculated)
Profile: Square HSS (AISC); $(L \times W \times T) = 4.000$ in. \times 4.000 in. \times 0.250 in.
Base material: cracked concrete, 2500, $f'_c = 2500$ psi; $h = 24.000$ in.
Reinforcement: tension: condition B, shear: condition B;
edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F): no

Geometry [in.] & Loading [lb, in.-lb]





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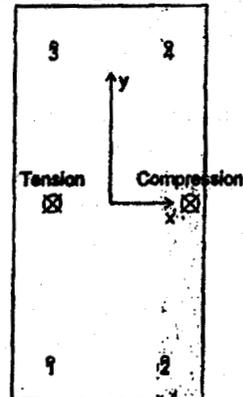
2. Load case/Resulting anchor forces

Load case (governing):

Anchor reactions [lb]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	5463	50	50	0
2	0	50	50	0
3	5463	50	50	0
4	0	50	50	0



max. concrete compressive strain [‰]: 0.42
 max. concrete compressive stress [psi]: 1807
 resulting tension force in (x/y)=[-1.498/0.000] [lb]: 10926
 resulting compression force in (x/y)=[2.087/0.000] [lb]: 10926

3. Tension load

Proof	Load N_{ed} [lb]	Capacity ϕN_s [lb]	Utilization β_u [%] = $N_{ed}/\phi N_s$	Status
Steel Strength*	5462	7967	68	OK
Pullout Strength*	5462	6538	84	OK
Concrete Breakout Strength**	10926	12649	87	OK
Concrete Side-Face Blowout, direction x**	10926	20410	54	OK

* anchor having the highest loading ** anchor group (anchors in tension)

Steel Strength

Equations
 $N_{ed} = n A_{s,ed} f_{ed}$
 $\phi N_{s,ed} \geq N_{ed}$

ACI 318-08 Eq. (D-3)
 ACI 318-08 Eq. (D-1)

Variables

n	$A_{s,ed}$ [in. ²]	f_{ed} [psi]
1	0.14	78000

Calculations

N_{ed} [lb]
 10660

Results

N_{ed} [lb]	$\phi_{s,ed}$	$\phi N_{s,ed}$ [lb]	N_{ed} [lb]
10660	0.750	7967	5462



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Pullout Strength

Equations
 $N_{pr} = \psi_{ef} N_p$ ACI 318-08 Eq. (D-14)
 $N_p = 8 A_{brg} f_c$ ACI 318-08 Eq. (D-15)
 $\phi N_{pr} \geq N_{sa}$ ACI 318-08 Eq. (D-1)

Variables

ψ_{ef}	A_{brg} [in. ²]	f_c [psi]
1.000	0.47	2500

Calculations

N_p [lb]
9340

Results

N_{pr} [lb]	$\phi_{concrete}$	ϕN_{pr} [lb]	N_{sa} [lb]
9340	0.700	6538	5462

Concrete Breakout Strength

Equations
 $N_{cb} = \left(\frac{A_{brg}}{A_{brg0}} \right) \psi_{ec,N} \psi_{ed,N} \psi_{ef,N} \psi_{pr,N} N_b$ ACI 318-08 Eq. (D-5)
 $\phi N_{cb} \geq N_{sa}$ ACI 318-08 Eq. (D-1)
 A_{brg0} see ACI 318-08, Part D.5.2.1, Fig. RD.5.2.1(b)
 $A_{brg0} = 9 h_{ef}^2$ ACI 318-08 Eq. (D-6)
 $\psi_{ec,N} = \left(\frac{1}{1 + \frac{2 c_{brg}}{3 h_{ef}}} \right) \leq 1.0$ ACI 318-08 Eq. (D-9)
 $\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{brg}}{1.5 h_{ef}} \right) \leq 1.0$ ACI 318-08 Eq. (D-11)
 $\psi_{ef,N} = \text{MAX} \left(\frac{c_{brg}}{c_{brg0}}, \frac{1.5 h_{ef}}{c_{brg0}} \right) \leq 1.0$ ACI 318-08 Eq. (D-13)
 $N_b = k_c \lambda \sqrt{f_c} h_{ef}^{1.5}$ ACI 318-08 Eq. (D-7)

Variables

h_{ef} [in.]	c_{brg} [in.]	c_{brg0} [in.]	c_{brg0} [in.]	$\psi_{ec,N}$	$\psi_{ed,N}$	$\psi_{ef,N}$	k_c	λ
7.333	0.000	0.000	4.000	1.000	-	1.000	24	1

f_c [psi]
2500

Calculations

A_{brg} [in. ²]	A_{brg0} [in. ²]	$\psi_{ec,N}$	$\psi_{ed,N}$	$\psi_{ef,N}$	$\psi_{pr,N}$	N_b [lb]
450.00	464.00	1.000	1.000	0.809	1.000	23830

Results

N_{cb} [lb]	$\phi_{concrete}$	ϕN_{cb} [lb]	N_{sa} [lb]
17927	0.700	12549	10825



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Concrete Side-Face Blowout, direction x-

Equations

$$N_{sh} = 160 c_{s1} \sqrt{A_{brg}} \lambda \sqrt{f_c}$$

ACI 318-08 Eq. (D-17)

$$N_{shg} = \alpha_{group} N_{sh}$$

ACI 318-08 Eq. (D-18)

$$\phi N_{shg} \geq N_{req}$$

ACI 318-08 Eq. (D-1)

$$\alpha_{group} = \left(1 + \frac{s}{8 c_{s1}}\right)$$

see ACI 318-08, Part D.5.4.2 Eq. (D-18)

Variables

c_{s1} [in.]	c_{s2} [in.]	A_{brg} [in. ²]	λ	f_c [psi]	s [in.]
4.000	11.000	0.47	1	2600	8.000

Calculations

α_{group}	N_{sh} [lb]
1.333	21868

Results

N_{shg} [lb]	$\phi_{concrete}$	ϕN_{shg} [lb]	$N_{req, edge}$ [lb]
29157	0.700	20410	10825



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4. Shear load

Proof	Load V_{ed} [lb]	Capacity ϕV_s [lb]	Utilization β_v [%] = $V_{ed}/\phi V_s$	Status
Steel Strength*	50	3323	2	OK
Steel failure (with lever arm)*	50	302	17	OK
Pryout Strength**	201	30117	1	OK
Concrete edge failure in direction x^+ **	201	8797	2	OK

* anchor having the highest loading ** anchor group (relevant anchors)

Steel Strength

Equations
 $V_{ed} = n \cdot 0.6 \cdot A_{s,v} \cdot f_{td}$ ACI 318-08 Eq. (D-20)
 $\phi V_{steel} \geq V_{ed}$ ACI 318-08 Eq. (D-1)

Variables

n	$A_{s,v}$ [in. ²]	f_{td} [psi]
1	0.14	78000

Calculations

V_{ed} [lb]
6300

Results

V_{ed} [lb]	ϕ_{steel}	ϕ_{con}	ϕV_{s1} [lb]	V_{s2} [lb]
6300	0.650	0.800	3323	50



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Steel failure (with lever arm), acc. to ETAG Annex C 4.2.2.4

Equations

$V_s^M = \frac{\alpha_M \cdot M_s}{L_b}$ bending equation for stand-off

$M_s = M_{sa} \left(1 - \frac{N_{sa}}{\phi N_{sa}}\right)$ resultant flexural resistance of anchor

$M_{sa} = (1.2) (S) (f_{a,sa})$ characteristic flexural resistance of anchor

$\left(1 - \frac{N_{sa}}{\phi N_{sa}}\right)$ reduction for tensile force acting simultaneously with a shear force on the anchor

$S = \frac{\pi(d)^3}{32}$ elastic section modulus of anchor bolt at concrete surface

$L_b = z + (n)(d_b)$ internal lever arm adjusted for spalling of the surface concrete

$\phi V_s^M \geq V_{sa}$ ACI 318-08 Eq. (D-2)

Variables

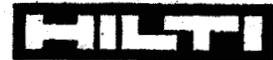
α_M	$f_{a,sa}$ [psi]	N_{sa} [lb]	ϕN_{sa} [lb]	z [in.]	n	d_b [in.]
2.00	75000	5463	7987	1.250	0.500	0.500

Calculations

M_s^c [in.lb]	$\left(1 - \frac{N_{sa}}{\phi N_{sa}}\right)$	M_s [in.lb]	L_b [in.]
1104.486	0.316	349.011	1.500

Results

V_s^M [lb]	ϕ_{total}	ϕV_s^M [lb]	V_{sa} [lb]
465	0.850	302	50



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Pryout Strength (Concrete Breakout Strength controls)

Equations

$$V_{pr} = k_{cp} \left[\left(\frac{A_{Ne}}{A_{No}} \right) \psi_{ec,N} \psi_{ed,N} \psi_{cs,N} \psi_{cp,N} N_b \right] \quad \text{ACI 318-08 Eq. (D-31)}$$

$$\phi V_{pr} \geq V_u \quad \text{ACI 318-08 Eq. (D-1)}$$

A_{Ne} see ACI 318-08, Part D.5.2.1, Fig. RD.5.2.1(b)

$$A_{No} = 9 h_{ef}^2 \quad \text{ACI 318-08 Eq. (D-6)}$$

$$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2 c_{ef}}{3 h_{ef}}} \right) \leq 1.0 \quad \text{ACI 318-08 Eq. (D-9)}$$

$$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{min}}{1.5 h_{ef}} \right) \leq 1.0 \quad \text{ACI 318-08 Eq. (D-11)}$$

$$\psi_{cp,N} = \text{MAX} \left(\frac{c_{min}}{c_{max}}, \frac{1.5 h_{ef}}{c_{max}} \right) \leq 1.0 \quad \text{ACI 318-08 Eq. (D-13)}$$

$$N_b = k_c \lambda \sqrt{f_c} h_{ef}^3 \quad \text{ACI 318-08 Eq. (D-7)}$$

Variables

k_{cp}	h_{ef} [in.]	$c_{ef,N}$ [in.]	$c_{ed,N}$ [in.]	c_{min} [in.]	$\psi_{ec,N}$	c_{cp} [in.]	k_c
2	7.333	0.000	0.000	4.000	1.000	-	24
λ	f_c [psi]						
1	2500						

Calculations

A_{Ne} [in. ²]	A_{No} [in. ²]	$\psi_{ec,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	$\psi_{cp,N}$	N_b [lb]
540.00	484.00	1.000	1.000	0.800	1.000	23630

Results

V_{pr} [lb]	ϕ_{pr}	ϕV_{pr} [lb]	V_u [lb]
43024	0.700	30117	201



PROFIS Anchor 2.2.0

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Concrete edge failure in direction x*

Equations

$$V_{dn} = \left(\frac{A_{ve}}{A_{vc}} \right) \psi_{ec,v} \psi_{ed,v} \psi_{es,v} \psi_{h,v} \psi_{l,v} \psi_{\lambda,v} V_b \quad \text{ACI 318-08 Eq. (D-22)}$$

$$\phi V_{dn} \geq V_u \quad \text{ACI 318-08 Eq. (D-1)}$$

A_{vc} see ACI 318-08, Part D.6.2.1, Fig. RD.6.2.1(b)

$$A_{ve} = 4.5 c_{s1}^2 \quad \text{ACI 318-08 Eq. (D-23)}$$

$$\psi_{ec,v} \left(\frac{1}{1 + \frac{2e_v}{3c_{s1}}} \right) \leq 1.0 \quad \text{ACI 318-08 Eq. (D-26)}$$

$$\psi_{ed,v} = 0.7 + 0.3 \left(\frac{c_{s2}}{1.5c_{s1}} \right) \leq 1.0 \quad \text{ACI 318-08 Eq. (D-28)}$$

$$\psi_{es,v} = \sqrt{\frac{1.5c_{s1}}{h_e}} \geq 1.0 \quad \text{ACI 318-08 Eq. (D-29)}$$

$$V_b = \left(7 \left(\frac{h}{d} \right)^{1.5} \sqrt{d_e} \right) \lambda \sqrt{f_c} c_{s1}^{1.5} \quad \text{ACI 318-08 Eq. (D-24)}$$

Variables

c_{s1} [in.]	c_{s2} [in.]	e_v [in.]	e_v/v	h_e [in.]	l_e [in.]	λ	d_e [in.]
16.000	11.000	0.000	1.000	24.000	4.000	1	0.800
f_c [psi]	$\psi_{\lambda,v}$						
2600	1.000						

Calculations

A_{ve} [in. ²]	A_{vc} [in. ²]	$\psi_{ec,v}$	$\psi_{ed,v}$	$\psi_{es,v}$	V_b [lb]
720.00	1162.00	1.000	0.837	1.000	24008

Results

V_{dn} [lb]	ϕ_{concrete}	ϕV_{dn} [lb]	V_u [lb]
12566	0.700	8797	201

5. Combined tension and shear loads

$\beta_n = N_u / \phi N_c$	$\beta_v = V_u / \phi V_c$	ζ	Utilization β_{uv} [%]	Status
0.671	0.168	5/3	84	OK

$$\beta_{uv} = \beta_n^2 + \beta_v^2 \leq 1$$

6. Warnings

- Condition A applies when supplementary reinforcement is used. The ϕ factor is increased for non-steel Design Strengths except Pullout Strength and Pryout strength. Condition B applies when supplementary reinforcement is not used and for Pullout Strength and Pryout Strength. Refer to ACI 318, Part D.4.4(c).
- ACI 318 does not specifically address anchor bending when a stand-off condition exists. PROFIS Anchor calculates a shear load corresponding to anchor bending when stand-off exists and includes the results as a shear Design Strength!
- Checking the transfer of loads into the base material and the shear resistance are required in accordance with ACI 318 or the relevant standard!
- The anchor plate is assumed to be sufficiently stiff in order to be not deformed when subjected to the actions!

Fastening meets the design criteria!



FOUNDATION DESIGN W/O MOMENT

FOOTING LOCATION: Adsorption Vessel Slab

ALLOWABLE SOIL PRESSURE:

D	=	1.50 ksf
D+L+S	=	1.50 ksf
D+L+W	=	2.00 ksf
D+L+E	=	2.00 ksf

COLUMN LOAD:

DEAD LOAD	LIVE LOAD	SNOW LOAD	*WIND LOAD	*SEISMIC
1.75 k	15.00 k	0.00 k	0.00 k	0.00 k
Total Load = 80k, w/ 7k DL				

FOOTING SIZE:

TRANS.	LONG.	LOAD COMBINATION	AREA REQUIRED
PAD SIZE = 3.50 ft X 3.50 ft = 12.25 ft ²		D	1.17 ft ²
COL SIZE = 8.00 in X 8.00 in		D+L+S	11.17 ft ²
P _{ult1} = 1.40	= 2.46 k	D+L+W+S/2	8.40 ft ²
P _{ult2} = 1.2D+1.6L+0.5S	= 26.10 k	D+L+E+(0.2)S	8.40 ft ²
*P _{ult3} = 1.2D+1.6S+(0.5L or 0.5W)	= 9.60 k		
*P _{ult4} = 1.2D+1.6W+0.5L+0.5S	= 9.60 k		
*P _{ult5} = 1.2D+1.4E+0.5L+0.2S	= 9.60 k		
(USP) ULTIMATE SOIL PRESSURE = 2.13 ksf			

SOIL PRESSURES			
D	D+L+S	D+L+W+S/2	D+L+E+(0.2)S
1.00 ksf	1.37 ksf	1.37 ksf	1.37 ksf

*Use 1.0L for garages, areas of public assembly, and areas where LL > 100pcf

FOOTING DESIGN:

M_{ult Long} = (USP)(PAD TRANS.)(PAD LONG. - COL LONG.)/2 = 7.48 k-ft
 M_{ult Trans} = (USP)(PAD LONG.)(PAD TRANS. - COL TRANS.)/2 = 7.48 k-ft

Minimum Steel Requirements:

ACI 10.5.1 A_{s, min} = 200 b d / f_y in² = 1.23 #1 < 4600psi
 ACI 10.5.3 OR DESIGN FOR M_{ult} = 1.33 M_u
 ASI 10.5.4 A_{s, min} A_s > 0.0018

F_y = 60 ksi f'_c = 3.0 ksi
 a/2 = A_s F_y / (1.7 b f'_c)
 #M_u = 0.9 A_s F_y (d - a/2) / 12
 BEAM v = (USP)(PAD LENGTH - COL)/2 - d / PAD WIDTH
 PUNCH v = (USP)(PAD AREA - (COL + d)²) / 2
 BEAM v_{allow} = 2(0.75)(f'_c)^{1/2} = 0.082 ksi
 PUNCH v_{allow} = 4(0.75)(f'_c)^{1/2} = 0.184 ksi

Max reinf spacing = 16"

	LONG.	TRANS.
h	12.00	12.00
d	8.75	8.25
Reinf. # @ 12" oc	3 - #5	#5
A _s	0.92	0.92
A _s /A _c	0.0018	0.0018
1.33M _u	9.95	9.95
a/2	0.26	0.26
#M _u	35.17	33.10
BEAM v	0.014	0.016
PUNCH v		0.038

BACKWASH TANK SLAB

Bearing pressure under slab = 780 pcf OK

Use same slab thickness as adsorption slab for ease of construction and simplicity



FIELD INSPECTION RECORD

TO BE POSTED ON JOB SITE AT ALL TIMES
FOR INSPECTIONS, CALL 282-3268 PRIOR TO 7 A.M.

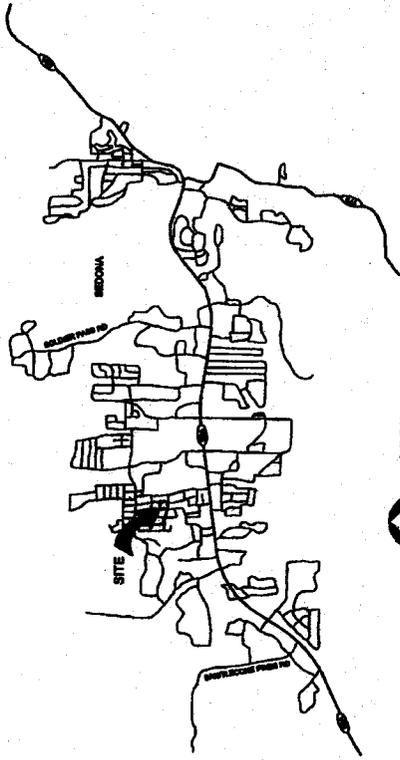
B11605

Owner / Tenant: ARIZONA WATER COMPANY
 Contractor: TBD
 Project Address: 2846 LYRIC DRIVE SEDONA AZ 86336

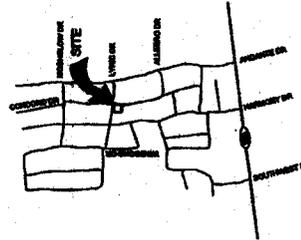
		DATE	REMARKS	BY:	
PRE-CONST/SETBACK					
FOUNDATIONS: REINFORCEMENT					
UFERGE	DATE	BY			
MASONRY/CONCRETE WALLS/BOND BMS.					
UNDERSLAB			PRESS TEST		
FRAMING					
ROOF SHEATHING					
WALL SHEATHING					
INSULATION					
VAPOR BARRIER					
EXTERIOR LATH					
PLUMBING TOP-OUT			PRESS TEST		
INTERIOR GAS TEST			PRESS TEST		
ELECTRICAL ROUGH-IN					
MECHANICAL ROUGH-IN					
DRYWALL FASTENERS					
SEWER LINE			PRESS TEST		
GAS YARD LINE			PRESS TEST		
TEMP. ELEC. SERVICE					
BUILDING	DATE	BY	ENGINEERING	DATE	BY
ZONING	DATE	BY	FIRE DEPARTMENT	DATE	BY
SWIMMING POOL PREGUNITE/ELEC.	DATE	BY	BARRIERS	DATE	BY
NOTE: FINAL INSPECTION CANNOT BE RECORDED OR C OF O ISSUED UNTIL ALL APPLICABLE DIVISIONS HAVE SIGNED THE DEPARTMENT INSPECTION RECORD.			REMARKS:		

ARIZONA WATER COMPANY
HARMONY HILLS WELLS NO. 5 & 12
ARSENIC REMOVAL FACILITY
2645 LYRIC DRIVE, SEDONA, AZ 86336

PROJECT NO. 1-4814
OCTOBER 2011



VICINITY MAP
NS



PROJECT LOCATION MAP
NS

ARIZONA WATER COMPANY - APPROVAL	
APPROVED BY:	DATE:
OPERATIONS:	DATE:
BY:	DATE:

ENGINEER
WATERWORKS ENGINEERS
 1000 N. CENTRAL AVENUE
 PHOENIX, AZ 85004
 Phone: (602) 944-1742
 Fax: (602) 944-1742
 Contact: Ben Lee, P.E.

OWNER
ARIZONA WATER COMPANY
 2645 LYRIC DRIVE
 SEDONA, AZ 86336
 Phone: (928) 284-0000
 Fax: (928) 284-0100
 Contact: Andrew Hahn



CALL TWO TRUCKING DAYS
 BEFORE YOU USE
802-383-1100
1-800-STAKE-IT
participating trucking company



DISCIPLINE

LETTER	DISCIPLINE
G	GENERAL
D	DEMOLITION
C	CIVIL YARD
A	ARCHITECTURAL
S	STRUCTURAL
M	MECHANICAL
H	HEATING, VENTILATION AND COOLING
P	PLUMBING
E	ELECTRICAL
N	INSTALLATION

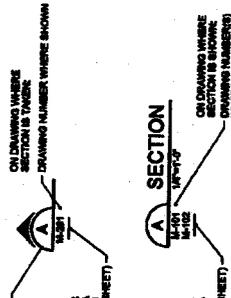
DRAWING NUMBERING

AREA NUMBER	AREA DESCRIPTION
00	GENERAL / OVERALL
10	PLANS
20	SECTIONS
30	DETAILS
40	ELEVATIONS
50	SCHEDULES

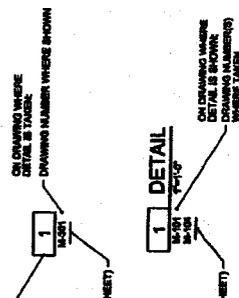
DRAWING NUMBER



SECTION



DETAIL



STANDARD DETAIL

AS SHOWN ON DRAWING
 AS SHOWN ON STANDARD DETAIL

NOTE:
 1. STANDARD DETAIL CALLOUTS ARE SHOWN TO INDICATE DETAIL REQUIRED. NUMBER AND LOCATION. DETAILS ARE NOT CALLED OUT AT ALL LOCATIONS. ALL DETAILS SHALL BE CALLED OUT AT ALL LOCATIONS. ALL DETAILS SHALL USE THE STANDARD DETAIL MOST APPLICABLE AND CONSISTENT WITH OTHER WORK UNDER THE CONTRACT.

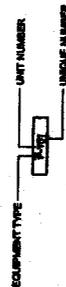
STANDARD VALVE AND OPERATOR



UNIQUE VALVE AND OPERATOR



EQUIPMENT DESIGNATION



LINE TYPE APPEARANCE

- BLACK - NEW OFF DISCIPLINE
- LIGHT OR DARK GRAY - EXISTING OR NEW OFF DISCIPLINE
- DARK GRAY - NEW OFF DISCIPLINE

GENERAL SYMBOLOGY

- [Cross-hatch symbol] - STRUCTURE OR EQUIPMENT TO BE REMOVED OR DEMOLISHED
- [XXXX symbol] - LINE OF REMOVAL OR DEMOLITION

PROCESS FLOW STREAM IDENTIFIERS

PROCESS SYSTEM ABBREVIATION	PROCESS SYSTEM DESCRIPTION
BW	BACKWASH
DR	DRAIN
GW	GROUND WATER
OP	OVERFLOW
RSC	ROSIAM HYPOCHLORITE
PW	POTABLE WATER
V	VENT

EQUIPMENT TYPE IDENTIFIERS

ABBREVIATION	DESCRIPTION
BSK	STATIC HEADER
LE	LEVEL ELEMENT
SV	SHALL VALVE
CV	CHECK VALVE
AV	AIR RELEASE VALVE
FE	FLOW ELEMENT
GV	GATE VALVE
RP	RECYCLE PUMP
BPV	BUTTERFLY VALVE
IS	ISOLATION CULL
T	TANK
CV	CONTROL VALVE

WATERWORKS ENGINEERS

1000 CHERRY BLVD. • SUITE 100 • WASHINGTON, DC 20004

ARIZONA WATER COMPANY
 HANCOCK FIELD STATION FACILITY

STANDARD DESIGNATIONS

GENERAL

SCALE: 1" = 10'

DATE: 10/11/11

PROJECT: 10-001

REUSE OF DOCUMENTS: THE DOCUMENT AND THE DATA AND DESIGN INFORMATION HEREIN ARE AN INTELLECTUAL PROPERTY OF WATERWORKS ENGINEERS, L.L.C. AND IS NOT TO BE REPRODUCED, COPIED, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF WATERWORKS ENGINEERS, L.L.C.

PIPE AND FITTING SYMBOLS

DOUBLE LINE	SINGLE LINE	DESCRIPTION
		EXISTING PIPE (REMOVED)
		NEW PIPE
		EXISTING PIPE TO BE ABANDONED
		EXISTING PIPE TO BE REMOVED
		BALL JOINT
		FLANGE COUPLING ADAPTER
		FLEXIBLE COUPLING
		FLEXIBLE COUPLING WITH THRUST FIT
		DRAWBELL JOINT
		ELASTOMER BELLOWS EXPANSION JOINT
		ELBOW - 90 DEGREE
		ELBOW UP - 45 DEGREE
		ELBOW DOWN - 45 DEGREE
		ELBOW - 45 DEGREE
		ELBOW UP - 45 DEGREE
		ELBOW DOWN - 45 DEGREE
		TEE
		TEE UP
		TEE DOWN
		CROSS
		LATERAL
		LATERAL UP
		LATERAL DOWN
		REDUCER - CONCENTRIC

PIPE AND FITTING SYMBOLS

DOUBLE LINE	SINGLE LINE	DESCRIPTION
		REDUCER - ECCENTRIC
		UNION
		BLIND FLANGE
		PLUG
		CAP
VALVE SYMBOLS	SINGLE LINE	
		GATE
		KNIFE GATE
		BUTTERFLY
		GLOBE
		BALL
		PLUG OR COCK
		ECCENTRIC PLUG WITH REQUIRED SEAT LOCATION
		FULL PORT PLUG
		NEEDLE
		DIAPHRAGM
		FULL PORT PLUG
		SWING CHECK
		DOUBLE DISK OR SILENT CHECK
		BALL CHECK
		NON RETURN HOSE VALVE
		NON PRESSURE HOSE VALVE
		NON PRESSURE HOSE VALVE WITH HOSE NECK
		SAMPLE
		MUD
		PRESSURE RELIEF
		AIR AND/OR VACUUM RELEASE
		REGULATED SIZE
		PRESSURE CONTROL
		MULTI-PORT VALVE
		ARROWS INDICATE FLOW PATTERN. ONLY PATTERNS IMPLIED BY INDICATED FLOW
		BALL VALVE SYMBOL FOR OTHER VALVE
		FIRE HYDRANT
		CATHODIC PROTECTION TEST STATION
		CATHODIC PROTECTION ANODE

FLOW METERS

DOUBLE LINE	SINGLE LINE	DESCRIPTION
		MAGNETIC
		PROPELLER METER
		INSERTION METER

PUMPS

	CENTRIFUGAL
	PERISTALTIC
	STATIC MIXER
	PULSATING
	MOTORIZED
	SOLENOID

MIXERS

	STATIC MIXER
	PULSATING
	MOTORIZED
	SOLENOID

ACTUATORS

	PNEUMATIC
	MOTORIZED
	SOLENOID

MISCELLANEOUS PIPING SYMBOLS

	STRAINER
	SIGHT GLASS
	FLEXIBLE ELASTOMER PIPE CONNECTION
	GAUGE WITH COCK
	THERMOMETER
	ROTAMETER
	GALVANIC ANODE
	AIR JET
	XX - SUPPLY PRESSURE - PSC TYPICAL INSTRUMENT SYMBOL (SEE LEGEND)
	DRAIN
	DOUBLE CONTAINMENT PIPE
	RUPTURE DISK

INSTRUMENTATION SYMBOLS

SYMBOL	DESCRIPTION
	PRESSURE SWITCH
	PRESSURE SWITCH HIGH
	PRESSURE INDICATOR
	LOW LEVEL SWITCH
	LEVEL SWITCH LOW LOW
	LEVEL SWITCH HIGH
	LEVEL SWITCH HIGH HIGH
	DIFFERENTIAL PRESSURE INDICATOR
	FLOW SWITCH
	FLOW METER

PIPING DESIGNATION

DOUBLE LINE	SINGLE LINE	DESCRIPTION
		DOUBLE LINE / SINGLE LINE
		2.5 FT DIA
		1/2" DIA
		1/4" DIA
		1/8" DIA
		1/16" DIA

VALVE DESIGNATIONS

	VALVE WITH ACTUATOR
	VALVE WITH FLOW DIRECTION
	VALVE WITH FLOW DIRECTION AND ACTUATOR
	VALVE WITH FLOW DIRECTION AND ACTUATOR AND FLOW DIRECTION

LEGEND

1. ONLY PLANNED END CONNECTIONS ARE SHOWN HERE FOR DOUBLE AND TRIPLE LINE CONNECTIONS. ALL OTHER END POINTS ARE SHOWN SIMPLY ON THE CONNECTIONS AND THE FITTINGS. ALSO SEE PIPING SPECIFICATIONS AND THE FITTING SCHEDULE. ALSO SEE PIPING SPECIFICATIONS AND THE FITTING SCHEDULE. ALSO SEE PIPING SPECIFICATIONS AND THE FITTING SCHEDULE.



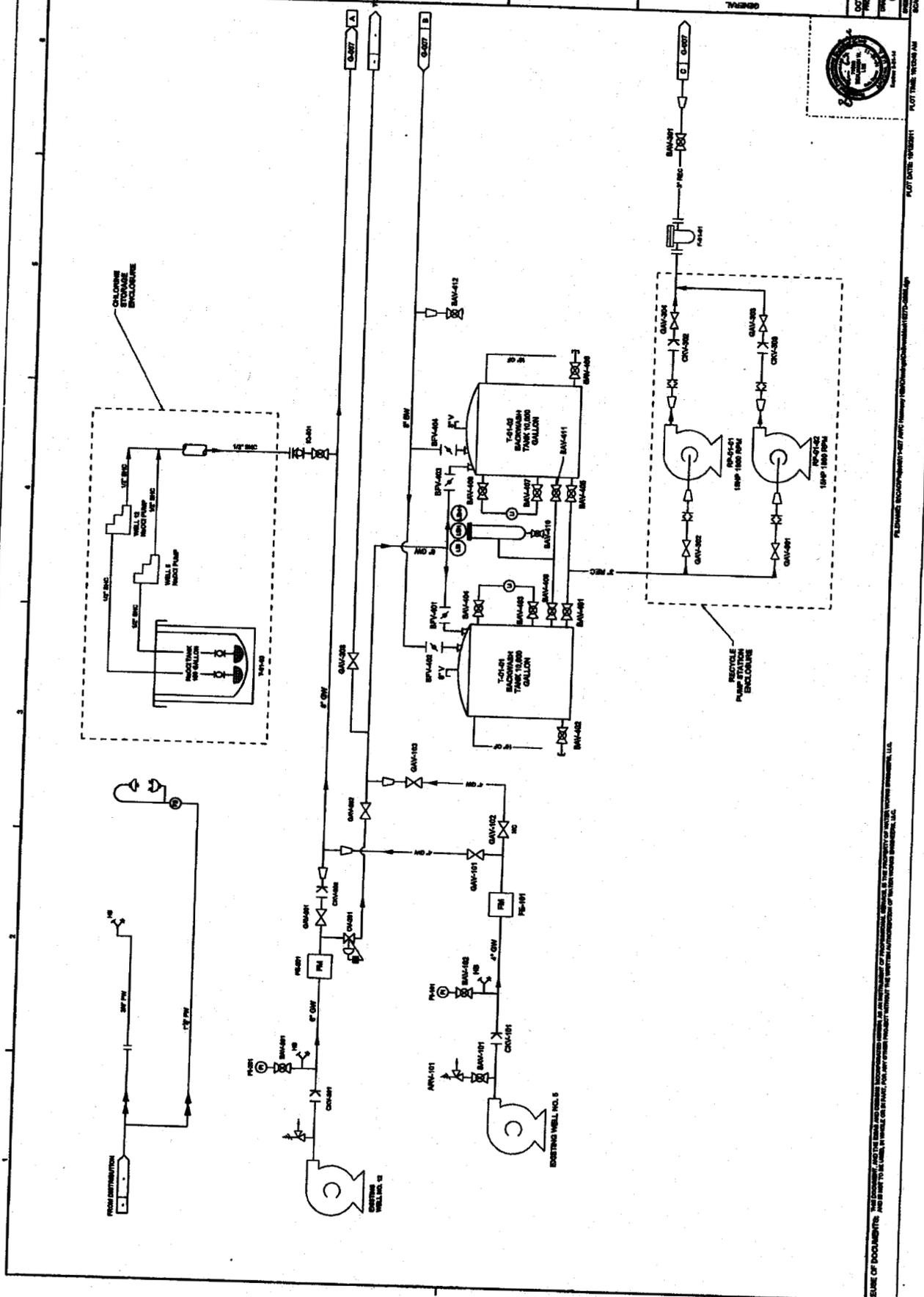
DESIGN	DATE
CHECKED	DATE
APPROVED	DATE
PROJECT NO.	
PROJECT NAME	
CLIENT	
SCALE	

WATERWORKS ENGINEERS

ARIZONA WATER COMPANY
 ARIZONA WELLS NO. 8 & 12
 WASTEWATER TREATMENT FACILITY

PROCESS FLOW DIAGRAM 1

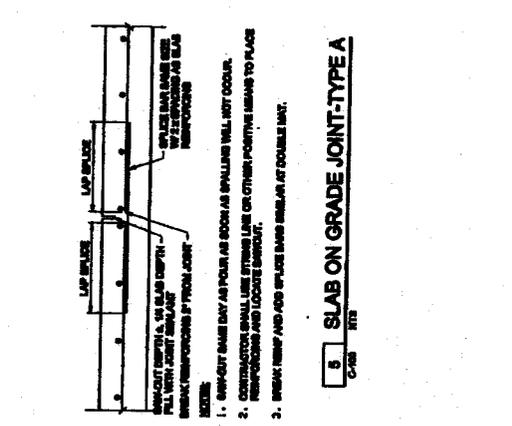
DATE	11/19/07
PROJECT NO.	11-007
CLIENT	AWC
SCALE	AS SHOWN



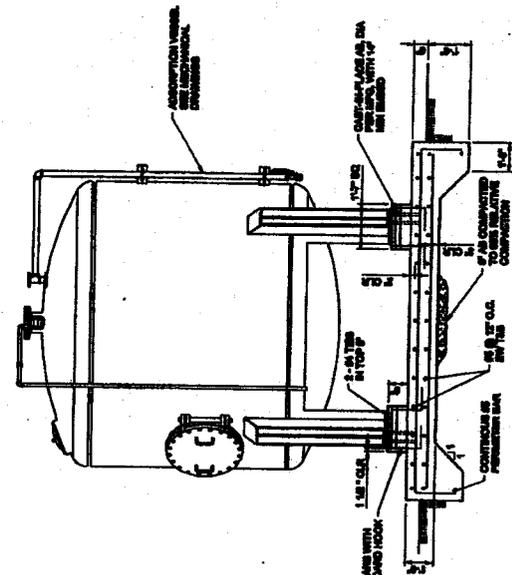
GENERAL
 PLANT DATE: 11/19/07
 PLANT NAME: WASTEWATER TREATMENT FACILITY
 PROJECT NO.: 11-007
 CLIENT: AWC
 SCALE: AS SHOWN

REVIEW OF DOCUMENTS AND DRAWINGS IS THE SOLE RESPONSIBILITY OF THE ENGINEER. THE ENGINEER SHALL BE RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED TO HIM BY THE CLIENT. THE ENGINEER SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED BY THE CLIENT. THE ENGINEER SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED BY THE CLIENT.

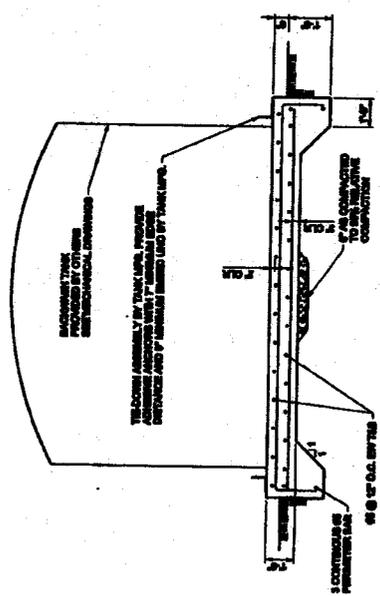
REVISIONS	DATE	BY	APP'D



1 CHLORINE ENCLOSURE SLAB
 101-101 1/10



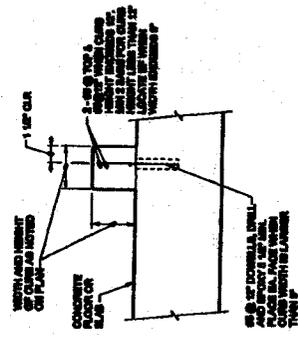
2 ADSORPTION VESSEL SLAB
 101-101 1/10



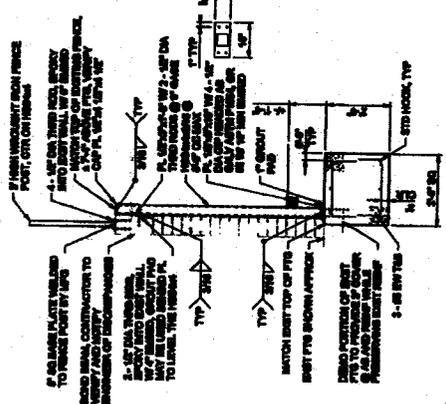
3 BACKWASH TANK SLAB
 101-101 1/10

5 SLAB ON GRADE JOINT-TYPE A
 101-101 1/10

1. JOINT SHALL BE PLACED AS SHOWN AS SOON AS WALLS WILL NOT COULDER.
 2. CONTRACTOR SHALL USE STRIPS LIKE OR OTHER POSITIVE MEANS TO PLACE REINFORCING AND LOCATE JOINTS.
 3. BREAK TEMP AND JOBS JOINTS SHALL BE SIMILAR AT DOUBLE END.



6 CONCRETE CURB
 101-101 1/10



4 MASONRY PILASTER
 101-101 1/10



SCALE: 1/4\"/>



**ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY
 CERTIFICATE OF APPROVAL TO CONSTRUCT
 WATER FACILITIES**

Page 1 Of 2

ADEQ File No: 20110204	LTF No: 54693
System Name: Az Water Co-Sedona	System Number: 03-003
Project Owner: Arizona Water Company	
Address: P O Box 29006, Phoenix, AZ 85038	
Project Location: Sedona	County: Yavapai
Description: INSTALLATION OF ARSENIC REMOVAL SYSTEM (GRANULAR IRON MEDIA) AT HARMONY HILLS WELLS NO. 5 AND 12. FINAL TREATED VALUE 7.0 PPB ARSENIC. MAXIMUM TREATED WATER FLOW 1160 GPM.	

Approval to construct the above-described facilities as represented in the approved documents on file with the Arizona Department of Environmental Quality is hereby given subject to provisions 1 through 7 continued on page 2 through 2

1. This project must be constructed in accordance with all applicable laws, including Title 49, Chapter 2, Article 9 of the Arizona Revised Statutes and Title 18, Chapter 5, Article 5 of the Arizona Administrative Code.
2. Upon completion of construction, the engineer shall fill out the Engineer's Certificate of Completion and forward it to the Central Regional Office located in Phoenix. If all requirements have been completed, that unit will issue a Certificate of Approval of Construction. R18-5-507(B), Ariz. Admin. Code. At the project owner's request, the Department may conduct the final inspection required pursuant to R18-5-507(B); such a request must be made in writing in accordance with the time requirements of R18-5-507(C), Ariz. Admin. Code.
3. This certificate will be void if construction has not started within one year after the Certificate of Approval to Construct is issued, there is a halt in construction of more than one year, or construction is not completed within three years of the approval date. Upon receipt of a written request for an extension of time, the Department may grant an extension of time; an extension of time must be in writing. R18-5-505(E), Ariz. Admin. Code.
4. Operation of a newly constructed facility shall not begin until a Certificate of Approval of Construction has been issued by the Department. R18-5-507(A), Ariz. Admin. Code.

Reviewed by: AD4

By: Janak K. Desai 11/31/2011
 Janak K. Desai, P.E. Unit Manager Date
 Engineering Review Section
 Water Quality Division

cc: File No: 20110204
 Regional Office: Central
 Owner: Arizona Water Company
 County Health Department: Yavapai
 Engineer: Water Works Engineers
 Planning and Zoning/Az Corp. Commission
 Engineering Review Database - Etr021

**APPROVAL TO CONSTRUCT
ARSENIC TREATMENT PLANT
ADEQ FILE No. 20110204
PAGE 2 OF 2: PROVISIONS CONTINUED**

5. Arsenic treatment equipment shall be disinfected prior to being put into service according to AWWA C653-87.
6. All water lines shall be disinfected prior to being put into service per Engineering Bulletin No. 8.
7. The Arizona Department of Environmental Quality's review of this application was subject to the requirements of the licensing time frames ("LTF") statute under Arizona Revised Statutes ("A.R.S.") § 41-1072 through § 41-1079 and the LTF rules under Arizona Administrative Code ("A.A.C.") R18-1-501 through R18-1-525. This Notice is being issued within the overall time frame for your application.

ADEQ hereby approves your application for Approval to Construct Water Facilities under A.R.S. § 49-351. Your copy is enclosed.

This decision is an appealable agency action under A.R.S. § 41-1092. You have a right to request a hearing and file an appeal under A.R.S. § 41-1092.03(B). You must file a written Request for Hearing or Notice of Appeal within 30 days of your receipt of this Notice. A Request for Hearing or Notice of Appeal is filed when it is received by ADEQ's Hearing Administrator as follows:

Office of Administrative Counsel
Arizona Department of Environmental Quality
1110 W. Washington Street
Phoenix, AZ 85007

The Request for Hearing or Notice of Appeal shall identify the party, the party's address, the agency and the action being appealed and shall contain a concise statement of the reasons for the appeal. Upon proper filing of a Request for Hearing or Notice of Appeal, ADEQ will serve a Notice of Hearing on all parties to the appeal. If you file a timely Request for Hearing or Notice of Appeal you have a right to request an informal settlement conference with ADEQ under A.R.S. § 41-1092.06. This request must be made in writing no later than 20 days before a scheduled hearing and must be filed with the Hearing Administrator at the above address.

Please contact Adrian Dumitrescu at 602-771-4201 or ad4@azdeq.gov if you have questions regarding this Notice or the Certificate of Approval to Construct.



ARIZONA WATER COMPANY

Verde Valley - Sedona
66 Coffee Pot Drive, #7
Sedona, AZ 86001 PH: 928-362-7002

PROPOSAL/CONTRACT

CONTRACTOR: MGC Contractors, Inc.	SYSTEM: VERDE VALLEY
ADDRESS: 4110 E. Elwood Street	W.A. No: 1-4814
CITY ST ZIP: Phoenix, AZ 85040	BID DUE DATE: November 15, 2011

CONTRACTOR SUBMITS THIS PROPOSAL/CONTRACT TO ARIZONA WATER COMPANY, an Arizona corporation (the "Company"), to perform the work and complete the project described on Page 2 (the "Project"), as an independent price contractor.

- Contractor certifies that it has a complete copy of, and has read, understood and accepts, the Company's General Conditions of Contract, and the Company's Construction Specifications and Standard Specification Drawings, (the "Specifications"), all of which are attached hereto. Contractor has examined the specific plans and related construction drawings for the Project (the "Drawings"), copies of which are also attached hereto. The General Conditions of Contract, Specifications and Drawings are incorporated into this Proposal/Contract. Contractor affirms that all work and materials to be furnished or purchased for the Project will be in strict conformance with the General Conditions of Contract, Specifications and Drawings.
- Contractor represents and warrants that it has notified and complied with the provisions of Section 6, Contractor Understands Work and Working Conditions, of the General Conditions of Contract prior to submitting this Proposal/Contract.
- Contractor represents that this Proposal/Contract is fair and honest in all respects, is submitted in good faith and is not submitted in collusion with any other company, entity or person.
- Contractor acknowledges that one hundred percent (100%) Performance and Payment Bonds are required and must be provided to the Company prior to the commencement of work.
- Prior to the commencement of work, Contractor will submit to the Company a list of all materials to be used in the Project. The materials list will include the manufacturer, part number, price and quantity included in this Proposal/Contract.
- Contractor will furnish all labor, tools, equipment and materials required to complete the Project according to the General Conditions of Contract, Specifications and Drawings. No materials purchased by Contractor to be incorporated into the Project are subject to tax at the time of purchase and Contractor will not charge the Company for any such tax. Contractor will pay the applicable transaction privilege tax (the "Contracting Tax") on the Project after Contractor receives payment of the final Project Invoice from the Company. The cost of materials incorporated into the Project which are exempt by Arizona Revised State Statutes ("A.R.S.") from the Contracting Tax, for example, pipes or valves having a diameter of four (4) inches or larger, including equipment, fittings and any other related part that is used in operating the pipes or valves (A.R.S. §42-6061 B.6.), will not be included in the total cost of the labor and materials upon which the Contracting Tax is computed. Contractor retains full liability and obligation to pay the Contracting Tax and will defend and indemnify the Company against any demand or obligation to pay the Contracting Tax.
- Contractor will maintain detailed accounting records of all materials purchased and incorporated into the Project. Such records will include all supporting original vendor invoices for all materials purchased. Following completion of the Project, Contractor will submit an itemized accounting to the Company which will include all supporting original vendor invoices and satisfactory evidence of payment therefor. The Company will not pay Contractor for materials not actually incorporated into the Project, and the disposition of such materials will remain Contractor's responsibility.
- The Estimated Total Cost of the Project, shown on Page 2, is based on estimated labor and material quantities to be furnished. It includes an estimate of the Contracting Tax and the cost of the required Performance and Payment Bonds. Contractor will not cancel, modify or withdraw this Proposal/Contract during a ninety-day (90) period commencing on the Bid Due Date. The Company may accept this Proposal/Contract by signing and mailing, or otherwise delivering, a copy hereof to Contractor during such ninety-day (90) period. If the Company does not accept this Proposal/Contract during such ninety-day (90) period, Contractor may cancel this Proposal/Contract by giving written notice of cancellation to the Company.
- Prior to the commencement of work, Contractor will provide the Company with a detailed construction schedule, in either Gantt or CPM form, identifying all tasks to be performed from the date of the written Commencement Notice through completion of the Project, including testing, training of Company Personnel and final Project Invoicing. Contractor will provide the Company with a copy of such construction schedule documenting the progress of work on the Project at least monthly.
- Contractor will not commence work on the Project until the Company gives Contractor a written Commencement Notice. Contractor will complete the Project within 140 CD calendar days after the Commencement Notice is issued.
- Following the Company's written notice of satisfactory completion of the Project, and upon receipt of the final Project Invoice from Contractor, the Company shall pay Contractor the actual total cost of the Project, which will be calculated as shown on Page 2, except that actual labor and material quantities installed/constructed will be substituted for the estimated labor and material quantities and the Contracting Tax will be recalculated based on such actual labor and material quantities.
- The amount of applicable liquidated damages for Contractor's failure to deliver or perform within the time limit shown in Paragraph 10 may be deducted from the Company's payment of the final Project Invoice. This provision shall not limit the Company's ability to terminate this Proposal/Contract for Contractor's unsatisfactory performance or failure to perform as provided in the General Conditions of Contract, Specifications or Drawings, or in this Proposal/Contract.

SPECIAL CONDITIONS:

Construct arsenic removal facility in accordance with the attached drawings and specifications dated October 14, 2011

CONTRACTOR	PROPOSAL/CONTRACT ACCEPTED:
MGC Contractors, Inc.	ARIZONA WATER COMPANY
By:	By:
Print Name: Randy L. Gates	Print Name: Frederick K. Schneider, PE
Title: President	Title: Vice President - Engineering
Date: 11/15/2011	Date: 12-2-2011



ARIZONA WATER COMPANY

Verde Valley - Sedona
 88 Coffee Pot Drive, SE
 Sedona, AZ 86331 PH: 928-282-7982

PROPOSAL/CONTRACT

CONTRACTOR: MGC Contractors, Inc.		SYSTEM: VERDE VALLEY
AZ CONTRACTOR LICENSE NO:	CLASSIFICATION:	W.A. No(s): 1-4814
ADDRESS: 4110 E. Elwood Street		BID DUE DATE: November 15, 2011
CITY ST ZIP: Phoenix, AZ 85040		BID BOND REQUIRED: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

DESCRIPTION OF PROJECT: **Construct and make operational an arsenic removal facility at Harmony Hills Well Nos. 5 and 12.**

****MGC acknowledges receipt of Addendum No. 1 dated 11/10/2011**

	QUANTITY	UNIT PRICE		TOTAL COST	
		LABOR	MATERIALS	LABOR	MATERIALS
1-2. MATERIALS EXEMPT FROM CONTRACTING TAX (per Paragraph 6)					
Provide and Install On-Site Piping	Lot			17,641	72,335
Provide and Install Arsenic Removal Facility	Lot			7,573	415,150
Provide and Install Backwash Recovery System	Lot			5,820	61,615
Provide and Install On-Site Electrical	Lot			9,962	28,679
Testing, Commissioning, and On-Site Operator Training	Lot			1,740	0
3. Total Labor to Install Exempt Materials (add the amounts in column 1)				3 42,736	
4. Total Exempt Materials (add the amounts in column 2)					4 577,779

	QUANTITY	UNIT PRICE		TOTAL COST	
		LABOR	MATERIALS	LABOR	MATERIALS
6-6. NON-EXEMPT MATERIALS					
* Provide and Install On-Site Piping	Lot			38,732	95,910
Provide and Install Arsenic Removal Facility	Lot			5,385	18,538
Provide and Install Backwash Recovery System	Lot			4,399	26,738
Provide and Install On-Site Electrical	Lot			28,662	22,280
Testing, Commissioning, and On-Site Operator Training	Lot			1,740	575
* Includes: concrete, site work, fence					
7. Total Labor to Install Non-Exempt Materials (add the amounts in column 5)				7 78,918	164,041
8. Total Non-Exempt Materials (add the amounts in column 6)					8 285,695
9. Subtotal A (add lines 3, 7 and 8)				9 185,702	9 882,694
10. Contracting Tax Base (multiply the amount on line 9 by 0.86)				10 0.10350	11 19,220
11. Applicable Contracting Tax Rate					
12. Contracting Tax (multiply the amount on line 10 by line 11)					12 6,708
13. Subtotal B (add lines 4, 9 and 12)					13 889,403
14. 100% Performance and Payment Bonds Cost					
15. Estimated Total Cost (add lines 13 and 14)					15

NOTE: The Estimated Total Cost includes all labor and materials for backfill, pavement replacement, chip seal, and traffic control necessary for the Project.



ARIZONA WATER COMPANY

**COMMENCEMENT
NOTICE**

CONTRACTOR:

Mr. Randy Gates
MGC Contractors, Inc.
4110 E. Elwood Street
Phoenix, Arizona 85040

DATE: November 28, 2011
DIVISION: VERDE VALLEY
SYSTEM: VERDE VALLEY
W.A.: 1-4814

THIS IS YOUR NOTICE TO PROCEED WITH THE FOLLOWING PROJECT(S):

DESCRIPTION OF WORK:

Construct and make operational an arsenic removal facility at
Harmony Hills Well Nos. 5 and 12.

PERFORMANCE AND
PAYMENT BONDS
REQUIRED: Yes No

TOTAL DAYS
ALLOWED: 140

COMPLETION
DATE: April 16, 2012

ARIZONA WATER COMPANY
Company

MGC CONTRACTORS, INC.
Contractor (type name)

By *Jessica K. Stewart*
Title Vice President - Engineering
AFN

By _____
Title _____



**SORB 33® Performance / Capacity Guarantee
Bayoxide® E33 Granular Iron Media
Arizona Water Company (AWC)
Harmony Hills Wells 5 & 12**

Proposal No. 35557
Issue Date – November 11, 2011

Severn Trent Services, Inc. (STS) guarantees the capacity of Bayoxide E33 iron oxide media in accordance with the water assay conditions (Appendix A). Arsenic (As) will be treated to below the new required EPA MCL of 10 µg/L for this contaminant that began in January 2006. In the event that Bayoxide E33 does not meet the guaranteed performance / capacity, STS will provide a prorated savings on the future purchases of Bayoxide E33, for a period of five (5) years. In the event that STS develops a "new" or "improved" Bayoxide E33 Arsenic removal media that would have a performance benefit to the Utility, over the present Bayoxide E33 media, STS does agree to offer such "new" or "improved" media to the Utility at an equally reflective discount.

Design Parameters for Media Capacity Guarantee:

- A. AWC's (Owner) Harmony Hills Wells Feeding the As Removal System
- B. Total Flow = 1,160 gpm; Treatment Flow = 580 gpm
- C. Arsenic: Average Analysis – 10.0 µg/L
- D. Treatment Objective – <7 ppb
- E. Configuration – Parallel.
- F. Pretreatment – Chlorination with NaOCl or Cl₂ to Maintain a Minimum Residual of 0.4 mg/L free Cl₂.
- G. Two 10'-Ø Adsorbers each with 281 ft³ E33 Granular Media Volume.
- H. Bayoxide® E33 Treatment Capacity – STS will guarantee a working capacity of 125,000 Bed Volumes (BV's). This value is equivalent to 526 million gallons through 583 ft³ of media.

If the effluent As level from the adsorbers exceeds 7 ppb in fewer bed volume stated above, STS will replace the media in that adsorber for a replacement media discount equivalent to the current base price, not to exceed \$185.00/cubic foot, as set forth by the following formula:

$$\text{Discount} = \text{Base Price} \cdot [(\text{Capacity BV's} - \text{Actual BV's}) / \text{Capacity BV's}]$$

To enact the capacity guarantee, STS requires the following:

- 1) AWC and STS agree that the water quality data in Section 11531 of the specifications provided to STS is representative of the water being treated in this facility. This water quality is the basis for the capacity guarantee of the media. Variances greater than 10% above these values (or +0.3 pH units) will result in recalculation of the BV's guarantee.

- 
- 2) On the Start-up Date, owner shall operate the Facilities and assign appropriately qualified and certified employees, trained by STS, to start-up (condition the media) and operate the Facilities in the manner and only for the purpose for which they were designed, consistent with prudent water utility operating standards, practices, and procedures, and all applicable regulatory requirements.
 - 3) Owner shall use its best efforts to maintain the quality of the influent stream to the System so as not to exceed baseline analyses used in design of capacity guarantee. The occurrence of oil & grease, abnormal suspended solids and biological matter not reported by the owner or not included in the water analysis will void the guarantee.
 - 4) Owner must operate and maintain the STS SORB 33® System in accordance with STS's standard O&M Manual and other applicable manuals, documents and specifications in order to assure the safe and proper operation of the System at all times.
 - 5) Owner must properly operate and maintain the wells, pumps and water pressure equipment connected to the System and ensures a consistent water pressure feed to the System as specified in STS Bayoxide E33 media handling procedures. Any sudden pressure surges or water hammers caused by the negligence or inaction by AWC resulting in crushing of the media will void the guarantee.
 - 6) Owner must, under normal operating conditions, properly shut down or start-up the System in accordance with the STS Bayoxide E33 media handling procedures.
 - 7) Owner shall be responsible for and shall promptly perform system operation and maintenance, including routine and preventive maintenance necessary to maintain the System in accordance with the O&M Manual including, without limitation, the following items:
 - i. Backwashing of the System when the pressure drop across the media bed exceeds 10 psi or at least once every 4 months.
 - ii. Performing an on-site overall System check on at least a weekly basis;
 - iii. Regular inspection and maintenance of valves;
 - iv. Regular inspection and calibration (if necessary) of System instrumentation and meters used for the monitoring of pressure and flow control; and
 - v. Properly calibrating, maintaining and replacing any water flow measurement meters used in the System as necessary to ensure an accurate measurement of the volumetric flow of influent water to the System. In such event, STS reserves the right, at its own expense, to test the water flow measurement meters at the System.
 - 8) Owner shall analyze the feed and treated water, record the flow totalizer readings and report the specified data in the electronic Excel form shown in Appendix A to STS on a quarterly basis. STS shall update the bottom of this form and reissue it to the Owner within 2 weeks of receiving it.

Relief from the Performance/Capacity Guarantee will be granted in the event that the above conditions were not met or were materially altered by either party. Compliance with all stated values or limits stated herein shall be based upon reasonable interpretations and generally

THE AMERICAN INSTITUTE OF ARCHITECTS



AIA Document A310 Bid Bond

KNOW ALL MEN BY THESE PRESENTS, that we **MGC CONTRACTORS, INC.**

P. O. Box 61748 Phoenix, AZ 85082

(Here insert full name, and address or legal title of Contractor)

as Principal, hereinafter called the Principal, and **Western Surety Company**

P.O. BOX 6077, Sioux Falls, SD 57117-6077

(Here insert full name, and address or legal title of Surety)

a corporation duly organized under the laws of the State of SD

as Surety, hereinafter called the Surety, are held and firmly bound unto

Arizona Water Company

3885 N. Black Canyon Highway Phoenix, AZ 85016-6361

(Here insert full name, and address or legal title of Owner)

as Oblige, hereinafter called the Oblige, in the sum of

Ten Percent (10%) of the Amount Bid _____ Dollars (\$ 10% of the Amount Bid),

for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for
Harmony Hills Well Numbers 6 and 12

(Here insert full name, address and description of project)

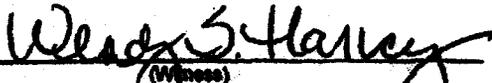
NOW, THEREFORE, if the Oblige shall accept the bid of the Principal and the Principal shall enter into a Contract with the Oblige in accordance with the terms of such bid and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Oblige the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Oblige may in good faith contract with another party to perform the Work covered by said bid then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed this 15th day of November 2011

MGC CONTRACTORS, INC.

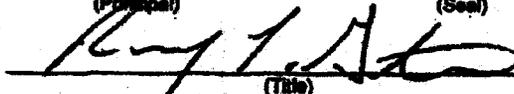
(Principal)

(Seal)



(Witness)

Wendy S. Harvey, Asst Secretary

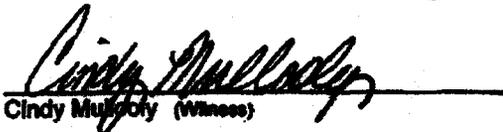


(Title)

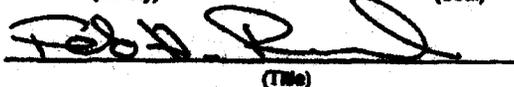
Randy L. Gates, President
Western Surety Company

(Surety)

(Seal)



Cindy Mulready (Witness)



(Title)

Ted H. Rarrick, Attorney-in-Fact

Western Surety Company

POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

Know All Men By These Presents, That WESTERN SURETY COMPANY, a South Dakota corporation, is a duly organized and existing corporation having its principal office in the City of Sioux Falls, and State of South Dakota, and that it does by virtue of the signature and seal herein affixed hereby make, constitute and appoint

Ted H Rarrick, Cindy K Mullooly, Individually

of Tempe, AZ, its true and lawful Attorney(s)-in-Fact with full power and authority hereby conferred to sign, seal and execute for and on its behalf bonds, undertakings and other obligatory instruments of similar nature

- In Unlimited Amounts -

and to bind it thereby as fully and to the same extent as if such instruments were signed by a duly authorized officer of the corporation and all the acts of said Attorney, pursuant to the authority hereby given, are hereby ratified and confirmed.

This Power of Attorney is made and executed pursuant to and by authority of the By-Law printed on the reverse hereof, duly adopted, as indicated, by the shareholders of the corporation.

In Witness Whereof, WESTERN SURETY COMPANY has caused these presents to be signed by its Senior Vice President and its corporate seal to be hereto affixed on this 28th day of July, 2011.



WESTERN SURETY COMPANY

Paul T. Bruffet

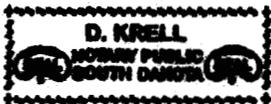
Paul T. Bruffet, Senior Vice President

State of South Dakota }
County of Minnehaha }

On this 28th day of July, 2011, before me personally came Paul T. Bruffet, to me known, who, being by me duly sworn, did depose and say: that he resides in the City of Sioux Falls, State of South Dakota; that he is the Senior Vice President of WESTERN SURETY COMPANY described in and which executed the above instrument; that he knows the seal of said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said corporation and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporation.

My commission expires

November 30, 2012



D. Krell

D. Krell, Notary Public

CERTIFICATE

I, L. Nelson, Assistant Secretary of WESTERN SURETY COMPANY do hereby certify that the Power of Attorney hereinabove set forth is still in force, and further certify that the By-Law of the corporation printed on the reverse hereof is still in force. In testimony whereof I have hereunto subscribed my name and affixed the seal of the said corporation this 15th day of November, 2011.



WESTERN SURETY COMPANY

L. Nelson

L. Nelson, Assistant Secretary

STATE OF

ARIZONA



DEPARTMENT

OF INSURANCE

Phoenix, Arizona

CERTIFICATE OF AUTHORITY

IT IS HEREBY CERTIFIED, That

WESTERN SURETY COMPANY
Sioux Falls, South Dakota

has complied with the requirements of the Arizona Revised Statutes and is hereby authorized, subject to the provisions thereof and the Charter Powers of said Company, to transact the following kinds of insurance, to-wit:

SURETY
CASUALTY (EXCLUDING WORKMEN'S COMPENSATION)

within the State of Arizona until terminated at the request of the insurer or suspended or revoked by the Director of Insurance.

Arizona Revised Statute 20-217 (C) states:

This Certificate of Authority remains the property of this Department. Upon termination at the request of the insurer or suspension by the Director, the insurer shall immediately deliver the Certificate of Authority to the Director.

IN TESTIMONY WHEREOF, I have herunto set my hand and affixed the official seal of the Director of Insurance at the City of Phoenix, this 21st day of July, 1979



[Handwritten Signature]

Director of Insurance

E-146 7/79

277581

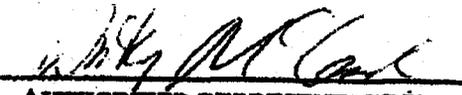
**STATE
OF
ARIZONA**

DEPARTMENT OF INSURANCE

***THIS IS TO CERTIFY, THAT THIS
INSTRUMENT IS A FULL, TRUE AND
CORRECT COPY OF THE ORIGINAL ON
FILE WITH THE DEPARTMENT OF
INSURANCE OF THE STATE OF ARIZONA
AND CONSISTS OF 1 PAGE(S)***

HEREUNTO SET MY HAND AND THE OFFICIAL SEAL OF THIS DEPARTMENT

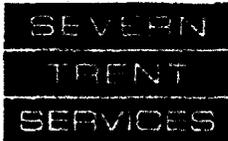
FOR THE DIRECTOR OF INSURANCE THIS 19 JULY 2011.


AUTHORIZED REPRESENTATIVE

CERTIFICATE No.:

277581





**SORB 33® Performance / Capacity Guarantee
Bayoxide® E33 Granular Iron Media**

**Arizona Water Company (AWC)
Harmony Hills Wells 5 & 12**

Proposal No. 35557
Issue Date – November 11, 2011

Severn Trent Services, Inc. (STS) guarantees the capacity of Bayoxide E33 iron oxide media in accordance with the water assay conditions (Appendix A). Arsenic (As) will be treated to below the new required EPA MCL of 10 µg/L for this contaminant that began in January 2006. In the event that Bayoxide E33 does not meet the guaranteed performance / capacity, STS will provide a prorated savings on the future purchases of Bayoxide E33, for a period of five (5) years. In the event that STS develops a "new" or "improved" Bayoxide E33 Arsenic removal media that would have a performance benefit to the Utility, over the present Bayoxide E33 media, STS does agree to offer such "new" or "improved" media to the Utility at an equally reflective discount.

Design Parameters for Media Capacity Guarantee:

- A. AWC's (Owner) Harmony Hills Wells Feeding the As Removal System
- B. Total Flow = 1,160 gpm; Treatment Flow = 580 gpm
- C. Arsenic: Average Analysis – 10.0 µg/L
- D. Treatment Objective – <7 ppb
- E. Configuration – Parallel.
- F. Pretreatment – Chlorination with NaOCl or Cl₂ to Maintain a Minimum Residual of 0.4 mg/L free Cl₂.
- G. Two 10'-Ø Adsorbers each with 281 ft³ E33 Granular Media Volume.
- H. Bayoxide® E33 Treatment Capacity – STS will guarantee a working capacity of 125,000 Bed Volumes (BVs). This value is equivalent to 526 million gallons through 563 ft³ of media.

If the effluent As level from the adsorbers exceeds 7 ppb in fewer bed volume stated above, STS will replace the media in that adsorber for a replacement media discount equivalent to the current base price, not to exceed \$185.00/cubic foot, as set forth by the following formula:

$$\text{Discount} = \text{Base Price} \bullet \left[\frac{\text{Capacity BV's} - \text{Actual BV's}}{\text{Capacity BV's}} \right]$$

To enact the capacity guarantee, STS requires the following:

- 1) AWC and STS agree that the water quality data in Section 11531 of the specifications provided to STS is representative of the water being treated in this facility. This water quality is the basis for the capacity guarantee of the media. Variances greater than 10% above these values (or +0.3 pH units) will result in recalculation of the BV's guarantee.



- 2) On the Start-up Date, owner shall operate the Facilities and assign appropriately qualified and certified employees, trained by STS, to start-up (condition the media) and operate the Facilities in the manner and only for the purpose for which they were designed, consistent with prudent water utility operating standards, practices, and procedures, and all applicable regulatory requirements.
- 3) Owner shall use its best efforts to maintain the quality of the influent stream to the System so as not to exceed baseline analyses used in design of capacity guarantee. The occurrence of oil & grease, abnormal suspended solids and biological matter not reported by the owner or not included in the water analysis will void the guarantee.
- 4) Owner must operate and maintain the STS SORB 330 System in accordance with STS's standard O&M Manual and other applicable manuals, documents and specifications in order to assure the safe and proper operation of the System at all times.
- 5) Owner must properly operate and maintain the wells, pumps and water pressure equipment connected to the System and ensures a consistent water pressure feed to the System as specified in STS Bayoxide E33 media handling procedures. Any sudden pressure surges or water hammers caused by the negligence or inaction by AWC resulting in crushing of the media will void the guarantee.
- 6) Owner must, under normal operating conditions, properly shut down or start-up the System in accordance with the STS Bayoxide E33 media handling procedures.
- 7) Owner shall be responsible for and shall promptly perform system operation and maintenance, including routine and preventive maintenance necessary to maintain the System in accordance with the O&M Manual including, without limitation, the following items:
 - i. Backwashing of the System when the pressure drop across the media bed exceeds 10 psi or at least once every 4 months.
 - ii. Performing an on-site overall System check on at least a weekly basis;
 - iii. Regular inspection and maintenance of valves;
 - iv. Regular inspection and calibration (if necessary) of System instrumentation and meters used for the monitoring of pressure and flow control; and
 - v. Properly calibrating, maintaining and replacing any water flow measurement meters used in the System as necessary to ensure an accurate measurement of the volumetric flow of influent water to the System. In such event, STS reserves the right, at its own expense, to test the water flow measurement meters at the System.
- 8) Owner shall analyze the feed and treated water, record the flow totalizer readings and report the specified data in the electronic Excel form shown in Appendix A to STS on a quarterly basis. STS shall update the bottom of this form and reissue it to the Owner within 2 weeks of receiving it.

Relief from the Performance/Capacity Guarantee will be granted in the event that the above conditions were not meet or were materially altered by either party. Compliance with all stated values or limits stated herein shall be based upon reasonable interpretations and generally

THE AMERICAN INSTITUTE OF ARCHITECTS



AIA Document A310 Bid Bond

KNOW ALL MEN BY THESE PRESENTS, that we **MGC CONTRACTORS, INC.**

P. O. Box 61748 Phoenix, AZ 85082

(Here insert full name, and address or legal title of Contractor)

as Principal, hereinafter called the Principal, and **Western Surety Company**

P.O. BOX 6077, Sioux Falls, SD 57117-6077

(Here insert full name, and address or legal title of Surety)

a corporation duly organized under the laws of the State of **SD**

as Surety, hereinafter called the Surety, are held and firmly bound unto

Arizona Water Company

3806 N. Black Canyon Highway Phoenix, AZ 85015-8381

(Here insert full name, and address or legal title of Owner)

as Obligee, hereinafter called the Obligee, in the sum of

Ten Percent (10%) of the Amount Bid _____

Dollars (\$ 10% of the Amount Bid),

for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for

Harmony Hills Well Numbers 5 and 12

(Here insert full name, address and description of project)

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bid then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed this 15th day of November 2011

MGC CONTRACTORS, INC.

(Principal)

(Seal)

(Witness)

Wendy S. Harvey, Asst Secretary

(Title)

Randy L. Gates, President

Western Surety Company

(Surety)

(Seal)

Cindy Mullooly (Witness)

(Title)

Ted H. Rarrick, Attorney-in-Fact

Western Surety Company

POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

Know All Men By These Presents, That WESTERN SURETY COMPANY, a South Dakota corporation, is a duly organized and existing corporation having its principal office in the City of Sioux Falls, and State of South Dakota, and that it does by virtue of the signature and seal herein affixed hereby make, constitute and appoint

Ted H Rarrick, Cindy K Mullooly, Individually

of Tempe, AZ, its true and lawful Attorney(s)-in-Fact with full power and authority hereby conferred to sign, seal and execute for and on its behalf bonds, undertakings and other obligatory instruments of similar nature

- In Unlimited Amounts -

and to bind it thereby as fully and to the same extent as if such instruments were signed by a duly authorized officer of the corporation and all the acts of said Attorney, pursuant to the authority hereby given, are hereby ratified and confirmed.

This Power of Attorney is made and executed pursuant to and by authority of the By-Law printed on the reverse hereof, duly adopted, as indicated, by the shareholders of the corporation.

In Witness Whereof, WESTERN SURETY COMPANY has caused these presents to be signed by its Senior Vice President and its corporate seal to be hereto affixed on this 28th day of July, 2011.



WESTERN SURETY COMPANY

Paul T. Brufat
Paul T. Brufat, Senior Vice President

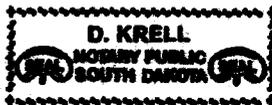
State of South Dakota }
County of Minnehaha }

ss

On this 28th day of July, 2011, before me personally came Paul T. Brufat, to me known, who, being by me duly sworn, did depose and say: that he resides in the City of Sioux Falls, State of South Dakota; that he is the Senior Vice President of WESTERN SURETY COMPANY described in and which executed the above instrument; that he knows the seal of said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said corporation and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporation.

My commission expires

November 30, 2012



D. Krell
D. Krell, Notary Public

CERTIFICATE

I, L. Nelson, Assistant Secretary of WESTERN SURETY COMPANY do hereby certify that the Power of Attorney hereinabove set forth is still in force, and further certify that the By-Law of the corporation printed on the reverse hereof is still in force. In testimony whereof I have hereunto subscribed my name and affixed the seal of the said corporation this 15th day of November, 2011.



WESTERN SURETY COMPANY

L. Nelson
L. Nelson, Assistant Secretary

STATE OF



ARIZONA

DEPARTMENT

OF INSURANCE

Phoenix, Arizona

CERTIFICATE OF AUTHORITY

IT IS HEREBY CERTIFIED, That

WESTERN SURETY COMPANY
Sioux Falls, South Dakota

has complied with the requirements of the Arizona Revised Statutes and is hereby authorized, subject to the provisions thereof and the Charter Powers of said Company, to transact the following kinds of insurance, to-wit:

SURETY
CASUALTY (EXCLUDING WORKMEN'S COMPENSATION)

within the State of Arizona until terminated at the request of the insurer or suspended or revoked by the Director of Insurance.

Arizona Revised Statute 20-217 (C) states:

Certificate of Authority remains the property of this office. Upon termination at the request of the insurer or revocation by the Director, the insurer shall immediately deliver the Certificate of Authority to the Director.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the official seal of the Director of Insurance at the City of Phoenix, this 21st day of July, 1979



[Signature]

Director of Insurance

277581

**STATE
OF
ARIZONA**

DEPARTMENT OF INSURANCE

***THIS IS TO CERTIFY, THAT THIS
INSTRUMENT IS A FULL, TRUE AND
CORRECT COPY OF THE ORIGINAL ON
FILE WITH THE DEPARTMENT OF
INSURANCE OF THE STATE OF ARIZONA
AND CONSISTS OF 1 PAGE(S)***

**HEREUNTO SET MY HAND AND THE OFFICIAL SEAL OF THIS DEPARTMENT
FOR THE DIRECTOR OF INSURANCE THIS 19 JULY 2011.**



AUTHORIZED REPRESENTATIVE

CERTIFICATE No.:

277581



November 15, 2011



Andy Haas
Arizona Water Company
3805 North Black Canyon Highway
Phoenix, AZ 85015

RE: Bid Proposals and Clarifications for Harmony Hills Well Nos. 5 and 12 Arsenic Removal Facility and the Southwest Center Well No. 8 Arsenic Removal Facility

MGC Contractors, Inc. is pleased to provide pricing for the above referenced projects.

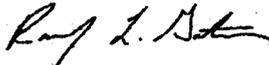
As stated in the RFP, the pricing shown in the PROPOSAL/CONTRACT forms represents the lump sum price associated with each site utilizing Severn Trent Arsenic Removal Systems and Keller Electrical. Replacement Media Costs for the 5 years as identified in Addendum No. 1 will be as follows and added to the Proposal amounts if required:

Harmony Hills	adder of \$131,946.00
Southwest Center	adder of \$106,867.00

Thank you for the opportunity to be of service to Arizona Water Company. We look forward to becoming valued partners in helping to construct many successful projects.

Sincerely,

MGC Contractors, Inc.



Randy L. Gates
President





