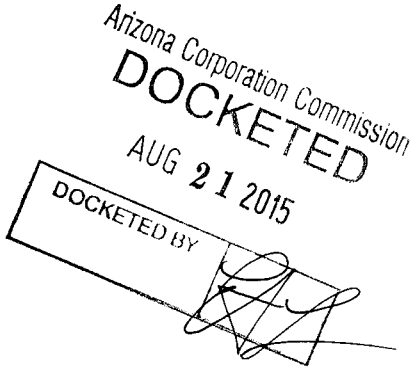
Arizona Water Company
W-01445A-15-0277

Amendment to Application

PART 12 OF 12



WA 1-5032

Western Group Rate Case

Exhibit FKS-1

5032 White Tank SCADA

ARIZONA WATER COMPANY
WORK AUTHORIZATION

W.A. NUMBER: 1-5032
P.E. NUMBER:
BUDGET ITEM NO.: 1-5032
SHEET NO.: 1 of 2

SYSTEM:	WHITE TANK	RETENTION REQUIRED:	☑ YES ☐ NO
DIVISION:	CASA GRANDE	WORK TO START BY:	UPON AUTHORIZATION
RESPONSIBLE PERSON:	MARIO MENDEZ	WORK TO BE FINISHED BY:	WITHIN 120 DAYS
TAX CODE:	2550		

DESCRIPTION OF WORK:

Construct Phase 1 of 4 of the White Tank Supervisory Control and Data Acquisition "SCADA" system. Construct and make operational SCADA monitoring and control equipment at Monte Vista Arsenic Removal Facility (ARF). Construct SCADA master computer, radio and antenna at Well No. 7.

FACTORS JUSTIFYING WORK:

APPROVED 2015 BUDGET ITEM ($165,000)
The White Tank water system consists of five wells that require arsenic removal and one that requires nitrate removal. The Monte Vista ARF removes arsenic from two onsite wells, Well Nos. 2 and 4 and one offsite well, Well No. 8. A Nitrate Removal Facility at Well No. 7 reduces the nitrate concentration to 18 mg/L before the water is pumped to Monte Vista for blending with effluent from Well Nos. 2, 4, and 8. The Monte Vista blend plan requires nitrate levels below 9 mg/L before water enters the distribution system. An online nitrate analyzer disables Well No 7 before the blended nitrate levels reach 9 mg/L. The Blue Horizon site has an arsenic removal facility, cooling towers, tank, and booster pump station. Well Nos. 9 and 10 are high in temperature and arsenic and are pumped to the Blue Horizon site for cooling and treatment. The Blue Horizons site has an existing localized SCADA system. The Company will integrate the Blue Horizons SCADA programming into the Company's new SCADA system. The White Tank water system has three employees and is managed from the Casa Grande office, which is approximately 90 minutes away. Currently, the water system has limited basic fault alarms and local controls. Operators will use the SCADA system everyday to trend tank levels, monitor well and blend plan status, and alarms when events occur which are outside the set points of the system. Constructing this phase will allow the management staff to monitor and control remotely.

COST ESTIMATE		AUTHORIZATION	DATE
COST OF WORK:		PREPARED BY: Mario Mendez MLM 2/20/15	2/10/15
MATERIAL	6,300		
LABOR	8,800	REVIEWED FOR ESMT/ROW VERIFICATION: Charles Briggs CB 02-20-2015	02-11-2015
CONTRACT PORTION	169,400		
OVERHEAD	22,100	REVIEWED BY: James Wilson JW 2/20/15	2/11/15
TOTAL AUTHORIZED EXPENDITURES CHARGEABLE TO THIS W.A.	$ 206,600		
FUNDS RECEIVED:		APPROVED BY ENGINEERING: Fredrick Schneider 2-20-15	2-17-2015
CONTRIBUTIONS RECEIVED	0		
REFUNDABLE ADVANCES RECEIVED	0	APPROVED BY FINANCE: Joseph Harris	2/18/15
TOTAL CONTRIBUTIONS/ADVANCES	0		
NET COMPANY CASH REQUIRED	$ 206,600	AUTHORIZED BY PRESIDENT: William Garfield	2-19-15

COMMENTS:

Transfer $41,600 from 1-5308: Construct 12-inch main along Camelback Road to fund the overages of this project.

CONSTRUCTION RELEASE:

RELEASED TO CONSTRUCTION
Authorized by FRED SCHNEIDER
Date 2/20/2015

2015 RE-RELEASE

AFH

AFH
03/26/08| MLM:afh | WA XLS

ARIZONA WATER COMPANY

WORK AUTHORIZATION - DETAIL SHEET

W.A. NUMBER: 1-5032
P.E. NUMBER:
BUDGET ITEM NO.: 1-5032
SHEET NO.: 2 of 2

RETIREMENT PROPERTY UNITS	PLANT PROPERTY ACCOUNT	UNIT DESCRIPTION	QUANTITY	YEAR INSTALLED AND W.A. NUMBER

PROJECT DESCRIPTION:

Construct Phase 1 of 4 of the White Tank Supervisory Control and Data Acquisition "SCADA" system. Construct and make operational SCADA monitoring and control equipment at Monte Vista Arsenic Removal Facility (ARF). Construct SCADA master computer, radio and antenna at Well No. 7.

	DESCRIPTION	PLANT PROP ACCT	QUANTITY	UNIT COST	TOTAL
CONTRACT WORK	**Monte Vista ARF**				
	Programming and control strategy	397.2	1	25,000.00	25,000
	RTU equipment and panels	397.2	1	4,000.00	4,000
	Instrumentation equipment	397.2	1	35,000.00	35,000
	Factory acceptance test	397.2	1	4,000.00	4,000
	RTU panels, instrumentation, wiring install	397.2	1	49,000.00	49,000
	Startup and loop check	397.2	1	10,000.00	10,000
	Training	397.2	1	2,000.00	2,000
	O & M Manuals and As-Built Drawings	397.2	1	6,000.00	6,000
	Well No. 7				
	Provide and Install Radio, Antenna and UPS	397.2	1	24,400.00	24,400
	Construction Contingency	397.2	1	10,000.00	10,000
	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					$ 169,400
MATERIALS	Master Computer	397.2	1	$ 6,000.00	$ 6,000
	Ethernet Switch	397.2	1	300.00	300
	SERVICE CONNECTIONS: SINGLE-SHORT	345			
	METERS	346			
TOTAL MATERIALS					$ 6,300
LABOR	Engineering and Project Management	397.2	100	$ 55.00	$ 5,500
	TESTING FEE				
	PERMIT FEE				
	SURVEY FEE				
	FIELD INSPECTION	397.2	60	55.00	3,300
	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					$ 8,800
SUBTOTAL - CONTRACT WORK, MATERIALS, AND LABOR					$ 184,500
OVERHEAD					22,100
TOTAL	REFUNDABLE PORTION ☐	NON-REFUNDABLE PORTION ☐		**COST ESTIMATE**	$ 206,600

AFH

ARIZONA WATER COMPANY
WORK AUTHORIZATION

W.A. NUMBER: 1-5032
P.E. NUMBER:
BUDGET ITEM NO.: B-1
SHEET NO.: 1 of 2

SYSTEM:	WHITE TANK	RETENTION REQUIRED:	☑ YES ☐ NO
DIVISION:	CASA GRANDE	WORK TO START BY:	UPON AUTHORIZATION
RESPONSIBLE PERSON:	JAMES WILSON	WORK TO BE FINISHED BY:	WITHIN 180 DAYS
TAX CODE:	2550		

DESCRIPTION OF WORK:

Design Supervisory Control and Data Acquisition "SCADA" system at Beautiful Arizona Estates booster station and storage tank site, Well No. 8, Well No. 7 Nitrate Removal Facility, and the Monte Vista Arsenic Removal Facility.

FACTORS JUSTIFYING WORK:

APPROVED 2014 BUDGET ITEM ($250,000)
The White Tank water system consists of five wells that require arsenic removal and one that requires nitrate removal. The Monte Vista ARF removes arsenic from two onsite wells, Well Nos. 2 and 4 and one remote well, Well No. 8. A Nitrate Removal Facility at Well No. 7 reduces the nitrate level to 18 mg/L before the water is pumped to Monte Vista for blending. The Monte Vista blend plan requires nitrate levels below 9 mg/L before water enters the distribution system. An online nitrate analyzer disables Well No 7 before the blended nitrate levels reach 9 mg/L. The Blue Horizon site has an arsenic removal facility, cooling towers, tank, and booster pump station. Well Nos. 9 and 10 are high in temperature and arsenic and are sent to the Blue Horizon site for treatment. The Blue Horizons site has an existing localized SCADA system that was constructed by the developer as part of the site design. The Company will integrate the Blue Horizons SCADA programming into the Company's new SCADA system. The White Tank water system has three employees and is managed from the Pinal Valley office, which is approximately 90 minutes away. Currently, the water system has limited basic fault alarms and local controls. Operators will use the SCADA system everyday to trend tank levels, monitor well and blend plan status, and alarms when events occur which are outside the set points of the system. The Pinal Valley Master SCADA computer allows the management staff to monitor and control remotely. The manager and superintendents use SCADA to assist the operators in trouble shooting the water distribution system. Preliminary design is complete.

COST ESTIMATE		AUTHORIZATION	DATE
COST OF WORK:		PREPARED BY: James Wilson JW 3/12/14	2/21/14
MATERIAL	0		
LABOR	4,100	REVIEWED FOR ESMT/ROW VERIFICATION: Charles Briggs CB 03-12-2014	02-24-2014
CONTRACT PORTION	48,411		
OVERHEAD	5,776	REVIEWED BY: Mario Mendez MM 3/12/14	2-25-14
TOTAL AUTHORIZED EXPENDITURES CHARGEABLE TO THIS W.A.	$ 58,287		
FUNDS RECEIVED:		APPROVED BY ENGINEERING: Fredrick Schneider FS 3-13-14	2-28-14
CONTRIBUTIONS RECEIVED	0		
REFUNDABLE ADVANCES RECEIVED	0	APPROVED BY FINANCE: Joseph Harris	2/28/14
TOTAL CONTRIBUTIONS/ADVANCES	0		
NET COMPANY CASH REQUIRED	$ 58,287	AUTHORIZED BY PRESIDENT: William Garfield	2-28-2014

COMMENTS:

250,000
-230,000
20,000 + 38,287 = 58,287 ✓ on

$230,000 was transferred to WA 1-4918 (Perryville TI). Transfer additional required funds ($38,287) from WA 1-4913 Henness ARF Expansion.

CONSTRUCTION RELEASE:

RELEASED TO CONSTRUCTION

Authorized by FRED SCHNEIDER
Date 3/4/2014

ARIZONA WATER COMPANY

WORK AUTHORIZATION - DETAIL SHEET

W.A. NUMBER: 1-5032
P.E. NUMBER:
BUDGET ITEM NO.: B-1
SHEET NO.: 2 of 2

RETIREMENT PROPERTY UNITS	PLANT PROPERTY ACCOUNT	UNIT DESCRIPTION	QUANTITY	YEAR INSTALLED AND W.A. NUMBER

PROJECT DESCRIPTION:

Design and construct Supervisory Control and Data Acquisition "SCADA" system at Beautiful Arizona Estates booster station and storage tank site, Well No. 8, Well No. 7 Nitrate Removal Facility, and the Monte Vista Arsenic Removal Facility.

	DESCRIPTION	PLANT PROP ACCT	QUANTITY	UNIT COST	TOTAL
CONTRACT WORK	Revised design drawings	397	1	$ 36,100.00	$ 36,100
	Field radio path study	397	1	8,000.00	8,000
	Performance and Payment Bond	397	1	4,311.00	4,311
	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					$ 48,411
MATERIALS					
	SERVICE CONNECTIONS: SINGLE-SHORT	345			
	METERS	346			
TOTAL MATERIALS					$ -
LABOR	Project Management and Engineering Design	397	40	$ 75.00	$ 3,000
	TESTING FEE				
	PERMIT FEE				
	SURVEY FEE				
	FIELD INSPECTION	343	20	55.00	1,100
	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					$ 4,100
SUBTOTAL - CONTRACT WORK, MATERIALS, AND LABOR					$ 52,511
OVERHEAD					5,776
TOTAL	REFUNDABLE PORTION ☐	NON-REFUNDABLE PORTION ☐		**COST ESTIMATE**	$ 58,287

AFH

ARIZONA WATER COMPANY

3805 N. BLACK CANYON HIGHWAY, PHOENIX, ARIZONA 85015-5351 • P.O. BOX 29006, PHOENIX, AZ 85038-9006
PHONE: (602) 240-6860 • FAX: (602) 240-6874 • TOLL FREE: (800) 533-6023 • www.azwater.com

March 4, 2014

Mr. Joseph Miller
Ludvik Electric
1020 E. University Drive
Phoenix, AZ 85034

Re: 1-5032 White Tank SCADA

PROJECT: White Tank SCADA	
SYSTEM: White Tank	
CONTRACT NO.:	
P.E. NO.:	W.A. NO.: 1-5032

Dear Mr. Miller:

Enclosed is your copy of the Proposal/Contract for the above-referenced project, which has been accepted by Arizona Water Company (the "Company"). The project shall be constructed in accordance with the Company's *General Conditions of Contract, the Specifications and the Drawings* which were included with the Company's previously provided Proposal/Contract, copies of which are being provided again and attached herewith.

Also enclosed are two copies of the Commencement Notice for the above-referenced project. Please sign one of the copies and return it to my attention retaining the other for your records.

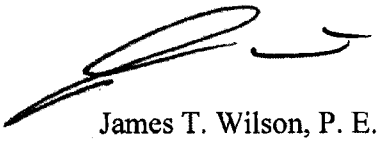
As provided in paragraph 4 of the Company's Proposal/Contract executed by the Company on March 13, 2014, Ludvik Electric acknowledged that one hundred percent (100%) Performance and Payment Bonds are required and must be provided to the Company prior to the commencement of work. In addition, as provided in paragraph 44 of the Company's General Conditions of Contract, the 100% Performance and Payment Bonds must be provided within ten (10) calendar days of the date of the Commencement Notice. Failure to provide an acceptable 100% Performance and Payment Bond does not limit the Company's ability to

terminate the Proposal/Contract or seek restitution for damages that the Company may have or will incur.

Prior to the start of construction, please call Ray Murrieta, Division Manager at 520-836-8785 to schedule a pre-construction meeting. In addition, please provide the required Performance and Payment Bonds to the Company promptly so that the contracted work can be completed within the contract's timeline.

If you have any questions, please call me at this office.

Very truly yours,



James T. Wilson, P. E.
Senior Engineer
engineering@azwater.com

afh
Enclosure

ARIZONA WATER COMPANY

White Tank
1549 N. Perryville Road
Goodyear, AZ 85326 PH: 623-853-9302

PROPOSAL/CONTRACT

CONTRACTOR: LUDVIK ELECTRIC	SYSTEM: WHITE TANK
ADDRESS: 1020 E. UNIVERSITY DRIVE	W.A. No(s): 1-5032
CITY ST ZIP: PHOENIX, AZ 85034	BID DUE DATE: November 12, 2013

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.

1. Contractor certifies that it has a complete copy of, and has read, understands 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.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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 Statues ("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. §42-5061 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.

7. 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 thereof. 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.

8. 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.

9. 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.

10. Contractor will not commence work on the Project until the Company gives Contractor a written Commencement Notice. Contractor will complete the Project within 180 calendar days after the Commencement Notice is issued.

11. 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.

12. 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:

There will be six progress payments and one final payment based on project deliverables described in attached Special Conditions

See attached Special Conditions dated October 29, 2013 and attached drawings E001 through E013, Beautiful Arizona Estates, EC1 through EC15, Well No. 7, EC1 through EC15, Monte Vista, EC1 through EC15, Well No. 8, EC1 through EC15

See attached Ludvik Electric Clarifications dated November 12, 2013.

CONTRACTOR	PROPOSAL/CONTRACT ACCEPTED:
LUDVIK ELECTRIC	*ARIZONA WATER COMPANY*
By: Joseph F. Miller	By: Fredrick K. Schneider
Print Name: JOSEPH F. MILLER	Print Name: Fredrick K. Schneider, PE
Title: V.P. OF PHOENIX OPERATIONS	Title: Vice President - Engineering
Date: NOVEMBER 12, 2013	Date: 3-13-2014

AFH

ARIZONA WATER COMPANY

White Tank
1549 N. Perryville Road
Goodyear, AZ 85326 PH: 623-853-9302

PROPOSAL/CONTRACT

CONTRACTOR: LUDVIK ELECTRIC	SYSTEM: WHITE TANK
AZ CONTRACTOR LICENSE NO: 170920 / 088575 CLASSIFICATION: A / L-11	W.A. No(s): 1-5032
ADDRESS: 1020 E. UNIVERSITY DRIVE	BID DUE DATE: November 12, 2013
CITY ST ZIP PHOENIX, AZ 85034	BID BOND REQUIRED ☑ Yes ☐ No

DESCRIPTION OF PROJECT: White Tank SCADA Project - Design, update drawings, provide control strategy, programming and SCADA equipment to control operation of Beautiful Arizona Tank, Monte Vista Plant Site, Golightly Plant Site and Well No. 8.

1-2. MATERIALS EXEMPT FROM CONTRACTING TAX (per Paragraph 6)	QUANTITY	UNIT PRICE LABOR	UNIT PRICE MATERIALS	TOTAL COST LABOR	TOTAL COST MATERIALS
				1	2
3. Total Labor to Install Exempt Materials (add the amounts in column 1)				3	
4. Total Exempt Materials (add the amounts in column 2)					4

5-6. NON-EXEMPT MATERIALS	QUANTITY	LABOR	MATERIALS	LABOR	MATERIALS
Revised design drawings	1 LOT			$36,100	
Programming and control strategy	1 LOT			$63,700	
Field path radio study	1 LOT			$ 8,000	
RTU equipment and panels	1 LOT				$132,000
Instrumentation equipment	1 LOT				$ 16,100
Factory acceptance test	1 LOT			$ 4,000	
RTU panels, instrumentation, wiring install	1 LOT			$45,000	$53,000
Startup and loop check	1 LOT			$18,300	
Training	1 LOT			$ 5,900	
O & M Manuals and As-Built Drawings	1 LOT			$17,200	
7. Total Labor to Install Non-Exempt Materials (add the amounts in column 5)				7 $198,200	
8. Total Non-Exempt Materials (add the amounts in column 6)					8 $201,100
9. Subtotal A (add lines 3, 7 and 8)					9 $399,300
10. Contracting Tax Base (multiply the amount on line 9 by 0.65)				10 $259,545	
11. Applicable Contracting Tax Rate				11 9.3%	
12. Contracting Tax (multiply the amount on line 10 by line 11)					12 $24,138
13. Subtotal B (add lines 4, 9 and 12)					13 $423,438
14. 100% Performance and Payment Bonds Cost					14 $ 4,311
15. Estimated Total Cost (add lines 13 and 14)					15 $427,749

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. Joseph Miller
Ludvik Electric
1020 E. University Drive
Phoenix, AZ 85034

DATE: 3/13/14
DIVISION: CASA GRANDE
SYSTEM: WHITE TANK
W.A.: 1-5032

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

DESCRIPTION OF WORK:

White Tank SCADA Project - Provide Revised Design Drawings and perform Field Path Radio Study. No other work is authorized by this Commencement Notice.

PERFORMANCE AND PAYMENT BONDS REQUIRED: [X] Yes [ ] No

TOTAL DAYS ALLOWED: 190

COMPLETION DATE: 9/19/14

Prior to the start of construction, please call Ray Murrieta, Division Manager at 520-836-8785 to schedule a pre-construction meeting.

ARIZONA WATER COMPANY	**LUDVICK ELECTRIC**
Company	Contractor *(type name)*
By Andrew J. Hall	By
Title ~~Vice President - Engineering~~ Chief Engineer	Title

AFH

November 12, 2013 Page 1 of 1

Reference: Arizona Water Co. – White Tanks SCADA Project 1-5032

Subject: **BID CLARIFICATIONS**

The following are Clarifications which we believe match the intent of the Bid:

1. We acknowledge Addendum 1.
2. Conduit is included as GRS exposed, tape wrapped GRS stub ups and PVC40 direct buried with native backfill. Concrete encasement per Detail 105 on Drawing E013 is included under vehicle areas.
3. Enclosures are included as NEMA-12, NEMA-3R or NEMA -4 as applicable.
4. Supports, anchors and hardware are included as galvanized.
5. The Flow Switches on the Drawings were advised to be deleted at the prebid meeting and are not listed in the Addendum 1 Scope of Work, so we have not included any of the work associated with them.
6. The intrusion switch signals are deleted in the Addendum 1 Scope of Work, so we have not included any of the work associated with them.
7. The project duration stated on the bid form is approximate and may vary depending on the time needed by Delta Systems for Design and Programming. We will be flexible to work with Delta and AZ Water for a timely completion.
8. NETA Testing does not appear applicable to this project, is not called for in the scope of work and is not included. Testing will be performed by Ludvik Electric and Vendors as applicable.
9. Power studies do not appear applicable to this project, are not called for in the scope of work and are not included.

We request that you contact the undersigned at 602-777-5000 for any questions.

Sincerely,
LUDVIK ELECTRIC CO.

Thomas E. Spackman
Chief Estimator

LUDVIK ELECTRIC

1020 E. University Drive, Phoenix, AZ 85034 • Telephone (602) 777-5000 • Fax (602) 258-0782
AZ Licenses: 088575 (L-11); 127121 (A-17)

ARIZONA WATER COMPANY

SPECIFICATIONS

GENERAL CONDITIONS OF CONTRACT: E-4-1

CONSTRUCTION SPECIFICATIONS: E-8-1

STANDARD SPECIFICATION DRAWINGS: E-9-1

gw 3/12/14

2007 EDITION WITH **2010** REVISIONS;
2012 GENERAL CONDITIONS OF CONTRACT

A copy of this entire Spec Book was sent out with Ludvik Electric Proposal package for 1-5032 WTSCADA on 3/13/14@4

ARIZONA WATER COMPANY

3805 N. BLACK CANYON HIGHWAY, PHOENIX, ARIZONA 85015-5351 • P.O. BOX 29006, PHOENIX, AZ 85038-9006
PHONE: (602) 240-6860 • FAX: (602) 240-6874 • TOLL FREE: (800) 533-6023 • www.azwater.com

October 30, 2013

Mr. Joseph Miller
Ludvik Electric
1020 E. University Drive
Phoenix, AZ 85034-6512

Re: Addendum No. 1 to Proposal/Contract for White Tank SCADA Project

Mr. Eslick:

This letter shall serve as Addendum No. 1 to Proposal/Contract for White Tank SCADA Project.

Request for Proposal

1. Bid due date change: "Proposals must be delivered to the Company's Phoenix office (address provided below) before 4:00 p.m., Mountain Standard Time, on November 12, 2012. Late proposals will not be accepted."

White Tank SCADA Special Conditions

1. Special Conditions, replace with revised Special Conditions and Appendix A, attached to this addendum.

This Addendum No. 1 shall become part of the Proposal/Contract for White Tank SCADA Project.

Bidders shall acknowledge receipt of all Addenda in their transmittal cover and proposal packages to Arizona Water Company.

Very truly yours,

Ed Radwanski, P. E.
Engineer
engineering@azwater.com

afh

ARIZONA WATER COMPANY

White Tank
1549 N. Perryville Road
Goodyear, AZ 85326 PH: 623-853-9302

PROPOSAL/CONTRACT

CONTRACTOR: LUDVIK ELECTRIC	SYSTEM: WHITE TANK
ADDRESS: 1020 E. UNIVERSITY DRIVE	W A No(s): 1-5032
CITY ST ZIP: PHOENIX, AZ 85034	BID DUE DATE: November 12, 2013

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.

1. Contractor certifies that it has a complete copy of, and has read, understands 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.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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 Statues ("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. §42-5061 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.

7. 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 thereof. 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.

8. 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.

9. 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.

10. Contractor will not commence work on the Project until the Company gives Contractor a written Commencement Notice. Contractor will complete the Project within _____ calendar days after the Commencement Notice is issued.

11. 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.

12. 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:

There will be six progress payments and one final payment based on project deliverables described in attached Special Conditions.
See attached Special Conditions dated October 29, 2013 and attached drawings E001 through E013, Beautiful Arizona Estates, EC1 through EC15, Well No. 7, EC1 through EC15, Monte Vista, EC1 through EC15, Well No. 8, EC1 through EC15

CONTRACTOR	PROPOSAL/CONTRACT ACCEPTED:
LUDVIK ELECTRIC	*ARIZONA WATER COMPANY*
By:	By:
Print Name:	Print Name: Fredrick K. Schneider, PE
Title:	Title: Vice President - Engineering
Date:	Date:

AFH

ARIZONA WATER COMPANY

White Tank
1549 N. Perryville Road
Goodyear, AZ 85326 PH: 623-853-9302

PROPOSAL/CONTRACT

CONTRACTOR: LUDVIK ELECTRIC	SYSTEM: WHITE TANK
AZ CONTRACTOR LICENSE NO: CLASSIFICATION:	W.A. No(s): 1-5032
ADDRESS: 1020 E. UNIVERSITY DRIVE	BID DUE DATE: November 12, 2013
CITY ST ZIP PHOENIX, AZ 85034	BID BOND REQUIRED ☑ Yes ☐ No

DESCRIPTION OF PROJECT: White Tank SCADA Project - Design, update drawings, provide control strategy, programming and SCADA equipment to control operation of Beautiful Arizona Tank, Monte Vista Plant Site, Golightly Plant Site and Well No. 8.

1-2. MATERIALS EXEMPT FROM CONTRACTING TAX (per Paragraph 6)	QUANTITY	UNIT PRICE LABOR	UNIT PRICE MATERIALS	TOTAL COST LABOR	TOTAL COST MATERIALS
				1	2
3. Total Labor to Install Exempt Materials (add the amounts in column 1)				3	
4. Total Exempt Materials (add the amounts in column 2)					4

5-6. NON-EXEMPT MATERIALS	QUANTITY	UNIT PRICE LABOR	UNIT PRICE MATERIALS	TOTAL COST LABOR	TOTAL COST MATERIALS
Revised design drawings					
Programming and control strategy					
Field path radio study					
RTU equipment and panels					
Instrumentation equipment					
Factory acceptance test					
RTU panels, instrumentation, wiring install				5	6
Startup and loop check					
Training					
O & M Manuals and As-Built Drawings					
7. Total Labor to Install Non-Exempt Materials (add the amounts in column 5)				7	
8. Total Non-Exempt Materials (add the amounts in column 6)					8
9. Subtotal A (add lines 3, 7 and 8)					9
10. Contracting Tax Base (multiply the amount on line 9 by 0.65)				10	
11. Applicable Contracting Tax Rate				11	
12. Contracting Tax (multiply the amount on line 10 by line 11)					12
13. Subtotal B (add lines 4, 9 and 12)					13
14. 100% Performance and Payment Bonds Cost					14
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

White Tank
1549 N. Perryville Road
Goodyear, AZ 85326 PH: 623-853-9302

PROPOSAL/CONTRACT

CONTRACTOR: LUDVIK ELECTRIC	SYSTEM: WHITE TANK
ADDRESS: 1020 E. UNIVERSITY DRIVE	W.A. No(s): 1-5032
CITY ST ZIP: PHOENIX, AZ 85034	BID DUE DATE: November 12, 2013

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.

1. Contractor certifies that it has a complete copy of, and has read, understands 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.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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 Statues ("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. §42-5061 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.

7. 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 thereof. 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.

8. 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.

9. 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.

10. Contractor will not commence work on the Project until the Company gives Contractor a written Commencement Notice. Contractor will complete the Project within _____ calendar days after the Commencement Notice is issued.

11. 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.

12. 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:

There will be six progress payments and one final payment based on project deliverables described in attached Special Conditions.
See attached Special Conditions dated October 29, 2013 and attached drawings E001 through E013, Beautiful Arizona Estates, EC1 through EC15, Well No. 7, EC1 through EC15, Monte Vista, EC1 through EC15, Well No. 8, EC1 through EC15

CONTRACTOR	PROPOSAL/CONTRACT ACCEPTED:
LUDVIK ELECTRIC	*ARIZONA WATER COMPANY*
By:	By:
Print Name:	Print Name: Fredrick K. Schneider, PE
Title:	Title: Vice President - Engineering
Date:	Date:

AFH

ARIZONA WATER COMPANY

White Tank
1549 N. Perryville Road
Goodyear, AZ 85326 PH: 623-853-9302

PROPOSAL/CONTRACT

CONTRACTOR: LUDVIK ELECTRIC	SYSTEM: WHITE TANK
AZ CONTRACTOR LICENSE NO: CLASSIFICATION:	W A No(s): 1-5032
ADDRESS: 1020 E. UNIVERSITY DRIVE	BID DUE DATE: November 12, 2013
CITY ST ZIP PHOENIX, AZ 85034	BID BOND REQUIRED ☑ Yes ☐ No

DESCRIPTION OF PROJECT: White Tank SCADA Project - Design, update drawings, provide control strategy, programming and SCADA equipment to control operation of Beautiful Arizona Tank, Monte Vista Plant Site, Golightly Plant Site and Well No. 8.

1-2. MATERIALS EXEMPT FROM CONTRACTING TAX (per Paragraph 6)	QUANTITY	UNIT PRICE LABOR	UNIT PRICE MATERIALS	TOTAL COST LABOR	TOTAL COST MATERIALS
				1	2
3. Total Labor to Install Exempt Materials (add the amounts in column 1)				3	
4. Total Exempt Materials (add the amounts in column 2)					4

5-6. NON-EXEMPT MATERIALS	QUANTITY	UNIT PRICE LABOR	UNIT PRICE MATERIALS	TOTAL COST LABOR	TOTAL COST MATERIALS
Revised design drawings					
Programming and control strategy					
Field path radio study					
RTU equipment and panels					
Instrumentation equipment					
Factory acceptance test					
RTU panels, instrumentation, wiring install				5	6
Startup and loop check					
Training					
O & M Manuals and As-Built Drawings					
7. Total Labor to Install Non-Exempt Materials (add the amounts in column 5)				7	
8. Total Non-Exempt Materials (add the amounts in column 6)					8
9. Subtotal A (add lines 3, 7 and 8)					9
10. Contracting Tax Base (multiply the amount on line 9 by 0.65)				10	
11. Applicable Contracting Tax Rate				11	
12. Contracting Tax (multiply the amount on line 10 by line 11)					12
13. Subtotal B (add lines 4, 9 and 12)					13
14. 100% Performance and Payment Bonds Cost					14
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

Pinal Valley – White Tanks

White Tanks SCADA Design-Build Project

~~**October 7, 2013**~~

Revised October 29, 2013

Special Conditions

1. **Mandatory Pre-Bid Meeting** will be held on **October 23, 2013 at 8:00** a.m. at Arizona Water Company's Go Lightly Warehouse, 1549 N. Perryville Road, Goodyear, Arizona 85326. All the other sites where work will take place will be visited after this site has been inspected and the scope has been reviewed.
2. Any requests for information must be received no later than November 1, 2013.
3. **Bids** are **due ~~November 6, 2013~~** November 12, 2013, **at 2:00** p.m. at the following address:
   Arizona Water Company
   Attention: Ed Radwanski
   3805 North Black Canyon Highway
   Phoenix, AZ 85015
4. Although bid separately for accounting purposes, it is Arizona Water Company's intention to award the Ajo SCADA Design-Build Project with the White Tanks SCADA Design-Build Project.
5. See the attached White Tank-SCADA Scope Description with Appendices A, B and C.
6. See attached supplemental electrical specifications.
7. See attached drawings E001 through E013, Beautiful Arizona Estates Tank Drawings EC1 through EC15, Well #7 Drawings EC1 through EC15, Monte Vista Drawings EC1 through EC15 and Well #8 Drawings EC1 through EC15. (One 11 x 17 set and one CD ROM with sets in pdf format are included.)
8. Progress payments will be made on the following deliverables:
   a. Progress Payment #1 - After Company's receipt of Field Path Radio Study
   b. Progress Payment #2 – After Company's receipt of 90% Design Drawings
   c. Progress Payment #3 – After Company receipt of 90% Design Concept
   d. Progress Payment #4 – After successful completion of Factory Acceptance Test
   e. Progress Payment #5 – After installation of RTU Panels on all sites
   f. Progress Payment #6 - After completion of successful loop check and startup of all sites
   g. Final Payment – After completion of training, receipt of O&M Manuals, demolitionof old equipment and receipt of all release of liens.

~~7.~~

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Arizona Water Company
White Tanks –SCADA October 7, 2013
Design Build Project **Revised October 29, 2013**

A. Design
   1. Project Description
      a. The project will consist of developing programming associated with Appendix A, Design Build Project Scope Description for Beautiful Arizona Tank, Monte Vista, Go Lightly/Well 7, Pasqautte Well 8 and Blue Horizon Plant (Well #9 and #10) and Appendix B, Graphic Display Samples. The design will incorporate a PC based monitoring station at Go Lightly Warehouse; this PC will communicate with the Casa Grande Master Station via new DSL connection or T-1 phone line provided by Arizona water Company.
      b. The project scope will also consist of providing a Field Path Radio Survey to establish feasibility of communications among the sites. See attached Appendix C for Casa Grande Division SCADA Communications Schematic.
      c. Programming services will consist of PLC/RTU programming, operator interface terminal (OIT) programming, SCADA HMI programming and assisting the electrical contractor during startup testing of the control system for the project site.
      d. Prior to shipping the RTU Panels from the RTU Panel Supplier's site, a programmer will assist with the Factory acceptance test for the RTU Panel. Following the FAT tests, a report will be made available for the tested RTU. Non-acceptance of the FAT test will result in additional FAT tests until acceptance.
      e. Programming services will include attendance of the programmer of two meetings with Arizona Water Company and up to eighty (80) hours of assistance to the electrical contractor during loop checks and startup demonstration by Arizona Water Company.
      f. The programmer will provide up to 8 hours of PLC training based over a two non consecutive day period.
      g. The existing design drawings shall be revised to show the latest upgrades and revisions and shall be in conformance with the Company's current specifications.
      h. All the design drawings will be prepared on 11" x 17" bond paper, and will be scaled drawings with bill of materials and wire numbers, suitable for constructing the equipment at the site.
   2. Project Deliverables
      a. Upon completion of the programming, the programmer will provide three hardcopy sets of the programming print outs in electronic form on CD ROM, three copies of PLC programming files also on CD ROM and programming software with license in Company's name. A flash drive with the original program at each site.
      b. Three copies of documentation including the O&M will be provided.
      c. The designer will provide Arizona Water Company with one set of review documents in reproducible form for a 90% submittal. Upon review of comprehensive submittal comments from Arizona Water Company, the designer will produce a submittal comment review log and address each comment and revise the design accordingly.
      d. Upon completion of design and incorporating 90% design review comments, the electrical engineer will provide the Company with one set of final sealed documents bearing the signature of a registered electrical engineer. These documents shall include the plans, I/O List and Control Descriptions.
      e. Provide three copies of the plans in pdf format on CD ROM and two copies in electronic AutoCad on CD ROM.

B. Construction

1. Furnish and Install RTU Panels, instrumentation, radios, electrical equipment and install complete working system in conformance with Company's specifications.
2. Provide Factory Acceptance Test to check functionality of the RTU and to make minor changes in screen views at the Company's discretion.
3. Provide loop checks and startup services
4. Provide Training including training materials and three bound copies of O&M Manuals with identification of the equipment on the manufacturer's information and three copies in pdf format on CD ROM. Provide the preliminary O&M Manuals and training materials two weeks before startup and the final O&M Manuals two weeks after startup.
5. Provide three copies of record drawings in pdf format on CD ROM and two copies in electronic AutoCad on CD ROM.
6. Arizona Water Company will provide flow meter transmitters, DSL Modems, Ethernet switches, desktop computers, keyboards, mouse, 20-inch colored monitors and colored printer.

APPENDIX A

Arizona Water Company
White Tanks – SCADA
Design-Build Project Scope Description

October 7, 2013
Revised October 29, 2013

General Notes:

1. Alarms – All alarms will be annunciated through WIN 911, at the location where they are generated and at Go Lightly (Well #7) Warehouse. The Arizona Water Company will provide new regular telephone line for WIN 911 annunciation. Existing Sensaphones at Monte Vista, Beautiful Arizona and Go Lightly will remain in service and act as backup for WIN 911 alarms. In addition to those alarms listed below all PLC units shall have alarms for UPS Power failure, PLC High temperature, 120 volt power failure, 24 volt DC power failure and radio communication failure.
2. Trending – At Go Lightly Warehouse all new analog values will be capable of being trended. The historian at the Casa Grande Warehouse Control Room will be capable of storing up to one year's worth of data.
3. Go Lightly Warehouse – The Company will provide redundant desktop computers, monitors (20"), keyboard, mouse and one color printer.
4. Design and Programming – Design and Programming will be performed by Delta Engineering Services, except for that at the Blue Horizon PLC. Contractor will employee ZAK Controls to make all the programming changes to the PLC at Blue Horizon. AZ Water will provide Wonderware Software and WIN 911 Software (Municipal Level)
5. RTU Panel – All RTU panels with OIT shall be mounted on interior door of a double door panel. Provide air conditioning for each in conformance with Company's specifications. The panel shall include all finger safe electrical covers on all exposed electrical components. RTU processor platform shall be designed to allow 20% spare I/O space.
6. Provide a list of recommended spare parts that maybe required including access point radio and spare radios.
7. Set points for controls and alarms will be password protected.
8. Graphic displays – must conform to the conventions of the samples attached in Appendix B.
9. Materials of Construction – Equipment and materials are to match that shown on the White Tanks Water System Design Plans and in conformance with the Company's specifications.
10. Processor System – Processor and system platform shall be Modicon M340.
11. Controls – In all cases local control will override remote control.
12. ~~Motor Savers – Remote displays will be required to be mounted on the exterior panel with sunshade or on the interior door panel~~.

Control Strategy

A. **Beautiful Arizona Tank** – This location is controlled from an RTU at the site, from Casa Grande Warehouse Control Room Computer (CG), Monte Vista (MV) and the PC at Go Lightly Warehouse. Indications, set points and trending will be capable at all four locations. Alarms will be annunciated locally and Go Lightly Warehouse

   1. Controls

      Booster Pumps #1 and 2 – These pumps will be controlled from screen push buttons in either local/remote, auto/manual, manual-of/on and reset

      Booster Pumps #1 and 2 -There are two variable frequency drive booster pumps on site. (These pumps will work in a lead/lag fashion based on 24 –hour cycle. In the automatic

mode the active pump motor (operator selectable) will energize when it receives a signal indicating that the system pressure has dropped to an operator adjustable preset low pressure level. The pump will continue to discharge water to the system until after the motor receives a signal that an operator adjustable preset high pressure level has been obtained. If the pump fails to start a fail to run alarm will be generated and annunciated at CG, MV and laptop. The pump motor will also turn off if the water level in the tank drops to an operator adjustable set point in feet.

Tanks –Alarms will be generated from operator adjustable High-High, High, Low-Low and Low tank level adjustable set points. Indication

2. Indication

   Booster Pump #1 and 2 – Run Status – On/Off
   Booster Pump #1, and 2 – Reset Fail to Run (FTR)
   Booster Pump # 1and 2– Run Times Today in hours
   Booster Pump #1 and 2 – Run Times Yesterday in Hours
   Booster Pump #1 and 2 – Run Time Total in Hours
   Booster Pump #1 and 2 – Run Time Reset
   ~~Booster #1 and 2 – Speed in Hertz~~
   Booster Discharge Pressure – Pressure in psi – (one common for both)
   Booster Pump - Flow in gpm (one common for both)
   Reservoir Level

3. Alarms

   Booster Pump #1and 2 – fault
   Booster Pump - Low pressure
   Power Failure -120 volts
   Power Failure – 24 volt DC
   RTU High Temperature – (above 105F)
   UPS Failure
   Reservoir – High-high, High, Low and Low-low
   Radio Communications Failure

4. Setpoints

   ~~Lead pump start and stop pressure high and low set points -psi~~
   ~~Lag Pump start and stop pressure high and low set points -psi~~
   ~~Stop/start pressure dead band -psi~~
   ~~Pump Selection – Lead and Lag – Booster Pump #1 or #2~~
   Tank Level – High-High, High, Low and Low-Low - feet
   Booster #1 and 2 – Low tank Level Shut Down - feet

5. Communications -A new iNET2 radio will be installed to replace the existing MOSCAD light unit. Signals will be transmitted via a new antenna mounted to the largest of the two water reservoirs. Signals will pass from the new radio to new radio at MV.
6. Instrumentation – Contractor will provide and install an insertion type Flow Meter with associated piping on discharge. ~~(Size and type)~~
7. PLC/RTU - Modicon M340 with 12" OIT will be required at this site.

B. Monte Vista - This site is controlled from Casa Grande Warehouse Control Room Computer Monte Vista local RTUand the computer at Go Lightly Warehouse. Indications, alarms, set points and trending will be capable at all three locations.

1. Controls

Wells #2 and #4 – These pumps will be controlled from screen push buttons in either local/remote, auto/manual, manual-of/on and reset.

Wells #2 and #4 - In the automatic mode Well Pump #2 and Well Pump #4 will stop and start based on an operator adjustable site tank level. ~~They will also stop based on a stop command from the arsenic plant controls (this does not currently work.)~~ If Well #2 and #4 stop, a command will be required to be sent to Well #7 to stop it to prevent high nitrate laden water from filling Monte Vista Tank and an alarm will be annunciated.

Wells #7 and #8 - These pumps will be controlled from screen push buttons in manual-of/on and reset.

Tanks – Alarms will be generated for operator adjustable High-High, High, Low-Low and Low tank level adjustable set points.

Booster Pumps – For Booster Pump #1, #2 and #3 in the automatic mode the active pump motor will energize when it receives a signal indicating that the Beautiful Arizona tank level has dropped to an operator adjustable low level tank set points for three pumps. The pump will continue to discharge water to the system until after the motor receives a signal that a preset BA tank high level has been obtained. If the pump fails to start a fail to run an alarm will be generated and annunciated at CG and MV. The motor will also turn off if the water level in the MV tank drops to an operator adjustable set point in feet and a low tank alarm will be generated.

Arsenic Treatment – Using Ethernet transfer data to CG and Go Lightly (See attached screen shot in Appendix B for sample of items requested to be shown.)

Low Zone Control Valve –In automatic mode this valve will either be open or closed based on Monte Vista Tank Level that is operator adjustable.

2. Indication

Turbidity – NTU

pH Analyzer

Nitrate Analyzer

Booster Pump #1, 2 and 3 – Run Status – On/Off

Booster Pump #1, 2 and 3 – Reset FTR

Booster Pump #1, 2 and 3 – Run Times Today in hours

Booster Pump #1, 2 and 3 – Run Times Yesterday in Hours

Booster Pump #1, 2 and 3 – Run Time Total in Hours

Booster Pump #1, 2 and 3 – Run Time Reset

Booster Discharge Pressure – Pressure in psi – (common for all)

~~Booster Suction Pressure – Pressure in psi – (common for all)~~

Booster Pump - Totalized Flow in gpm (common for all)

MV Tank Level – Feet

APPENDIX A

Beautiful Arizona Tank Level - Feet
POE #1 Nitrate Analyzer – Level in ppm
Chlorine Analyzer – Level in ppm
~~Booster Station – Incoming Flow -gpm~~
Booster Station – Outgoing Flow -gpm
Low zone control Valve – ~~percent open~~ open/close.
Well #2 and 4 - Run Status – On/Off
Well #2 and 4 - Reset FTR
Well #2 and #4 – Flow – gpm (Arizona Water will provide and install heads for existing meters)

3. Alarms
   Booster Pump #1, 2 and 3 – Fault (Motor Saver)
   Well #2 and 4 – Fault (Motor Saver)
   Power Failure -120 volts
   Power Failure – 24 volt DC
   RTU High Temperature – (above 105F)
   UPS Failure
   Monte Vista and Beautiful Arizona Reservoirs – High-high, High, Low and Low-low
   Radio Communications Failure
   Arsenic Plant – General Fault and other Layne Alarms similar to other sites
   ~~Eyewash Station – On~~
4. Setpoints
   Low zone control valve – MV Tank Level – feet
   Booster Pump #1, 2 and 3 start/stop – Beautiful Arizona Tank Levels – low and high – feet
   Tank Level – High-High, High, Low and Low-Low - feet
   Well #2 and #4 – Stop/Start – MV Tank Levels – High/Low tank levels in feet
5. Communication - A new iNET2 radio will be installed to replace the existing MOSCAD light unit. Signals will be transmitted via a new omni antenna mounted to the tallest of the two water reservoirs. Signals will pass from the new radio to new radio at Well 7, Well 8 and Blue Horizon. Communication to CG will be via T1 telephone line or through Well 7 to CG.
6. Instrumentation/Electrical – Low zone control valve modifications are required to show it opened or closed. Configure Well #2 and #4 flow meter heads to provide automatic reads. Arizona Water Company will furnish and install flow meter on booster pump discharge header. Contractor to furnish and install high pressure switches on each well pump discharge.
7. PLC/RTU -A Modicon M340 PLC with 15" OIT will be required at this site. Provide 6" reinforced concrete pad for new RTU/PLC panel. Contractor will provide Prosoft Module that will be installed by others.

C. **Golightly Well No. 7** - This site is controlled from Casa Grande Warehouse Control Room Computer, Monte Vista local OIT and the computer at the Go Lightly Warehouse. Indications, alarms, set points and trending will be capable at all three locations.

1. Controls – Well #7 will be controlled from screen push buttons in either local/remote, ~~auto/manual, manual-of/on~~ and reset.
   ~~In automatic mode (which is password protected) Well #7 will stop and start based on an operator adjustable Monte Vista tank level. Also in automatic mode, it cannot start unless Well #2, #4 and #8 are in operation and it will stop if Well #2, #4 and #8 are stopped. An operator can readjust the nitrate treatment for Well #7 which would allow Well #7 to run under certain circumstances. In these instances the operator would run Well #7 in manual mode. Well #7 will also stop in manual or automatic modes based on a stop command from the nitrate plant controls. On start command Well #7 will flush to waste for a time that is adjustable by the operator. After this time is attained, the flush valve will gradually close while the inline valve opens. If signals from the valves show that either the waste valve or the inlet valve do not open and close as required, a failed valve sequence alarm will be generated and Well #7 will be shut down. Upon a stop command, the valves will work in reverse.~~ Arizona Water Company will use existing hardware to control Well #7 operation with Well Nos. 2, 4 and 8.
   Nitrate Plant – Using Ethernet transfer data, shown on Nitrate Plant OIT.

2. Indication
   Bag pressure
   Well #7 Statuses – On/off/Running
   Well #7 – reset
   Plant flow – gpm
   Nitrate Plant – Data
   Nitrate analyzer – ppm
   Inline Valve – open/close
   Waste Valve – open/close
   Differential Pressure – Across nitrate plant inlet and out let.
   Blue Horizon – Show all information currently on Blue Horizon

3. Alarms
   Bag filter – differential high pressure alarm
   Well #7 – Failure to Run (and reason Wells, 2, 4 or 8 not running or MV Tank Level too high)
   Waste Valve – incomplete sequence
   Inline valve – incomplete sequence
   Nitrate analyzer – high level
   Nitrate Plant - Critical Alarm – Any individual alarm that is a critical alarm will be shown
   Nitrate Plant – General Alarm – Any individual alarm that is a general alarm will be shown.
   ~~Office door intrusion – open~~

~~Office Rollup Door open~~
~~Eye Wash – in use~~
120 volt power failure
UPS power failure
24 volt DC power failure –supply #1
24 volt DC power failure – supply #2
RTU – high temp alarm (105-F)
Radio Communications
Blue Horizon Alarms - ~~25 individual~~ all alarms

4. Setpoints
   Well #7 Stop/start – Monte Vista Tank Level high/low
   Bag Filter – High differential pressure - psi
   Nitrate analyzer – high level
5. Communications - A new iNET2 radio will be installed to replace the existing ~~MOSCAD light unit~~ telephone line. Signals will be transmitted via a new omni antenna mounted to the warehouse. Signals will pass from the new radio to new radio at MV.
6. Instrumentation – Well #7 Waste Valve and Inlet Valve open and closed indication required. Contractor to provide and install dual switches. Contractor will furnish and install differential pressure indication between and nitrate inlet and outlet piping including saddles and taps. Contractor will furnish and install high pressure switch on Well #7 discharge pipe.
7. PLC/RTU - RTU panel will be located in Go Lightly Office on north wall. Contractor will furnish Prosoft Module for communication between nitrate plant and new PLC. This will be installed by others.

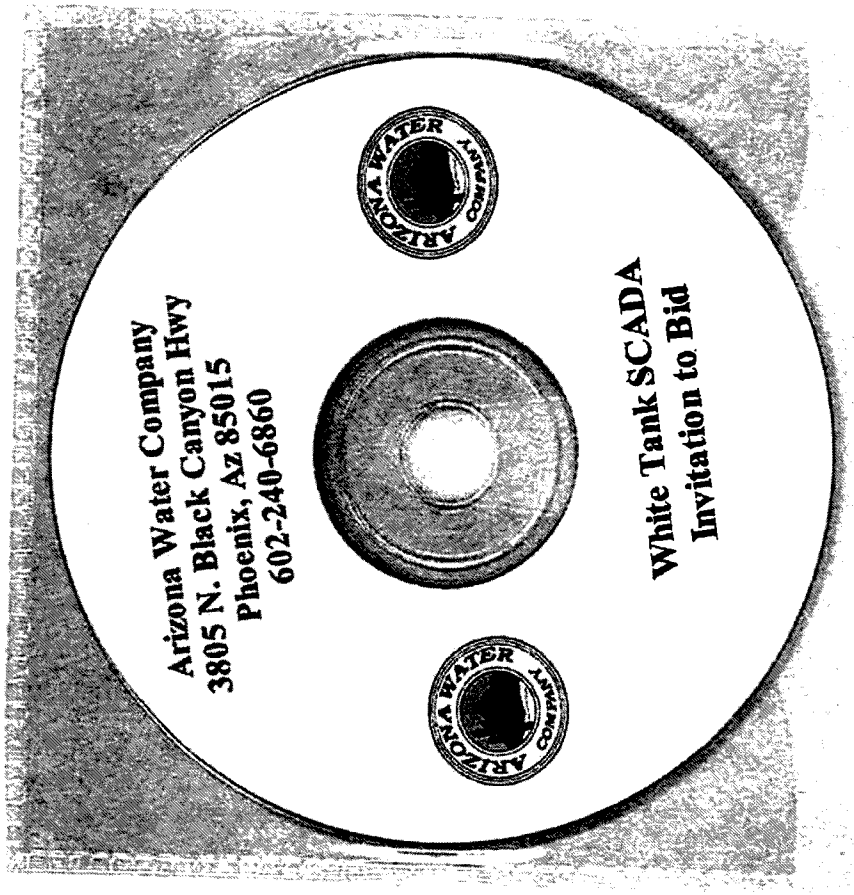
D. **Pasqauetti Well No. 8** - This site is controlled from Casa Grande Warehouse Control Room Computer, Monte Vista local OIT and the ~~laptop~~ desktop computer at the Go Lightly office. Indications, alarms, set points and trending will be capable at all three locations.
   1. Controls - Well #8 will be controlled from screen push buttons in either local/remote, auto/manual, manual-of/on and reset. In automatic mode Well #8 will stop and start based on an operator adjustable Monte Vista tank level
   2. Indication
      Bag differential pressure
      Monte Vista Tank Levels - feet
      Well #8 Statuses – On/off/Running
      Well #8 – reset
      Well #8 flow – gpm
      ~~Well #8 – pump pressure - psi~~
      ~~Inline Valve – open/close~~
      Waste Valve – open/close
      Well Run Time - hours
   3. Alarms

Well #8 – Fault ~~–from high pressure~~ switch
Waste Valve - incomplete sequence
Inline Valve – incomplete sequence
120 volt power failure
UPS power failure
24 volt DC power failure ~~–~~supply #1
24 volt DC power failure – supply #2
RTU – high temp alarm (105-F)
Radio Communications
Bag Filter – high DP pressure

4. Setpoints
   Well #8 – start/stop – Monte Vista Tank Level – feet
   Well #8 – pump pressure high
   Bag Filter – DP set point - psi
5. Communications - A new iNET2 radio will be installed to replace the existing MOSCAD light unit. Signals will be transmitted via a new omni antenna mounted to existing pole. Signals will pass from the new radio to new radio at MV. (~~Note: All sites verify antenna locations~~)
6. Instrumentation - ~~Pressure indicating transmitter~~ Pressure switch is required to be furnished and installed on Well discharge pipe to ~~measure discharge pressure~~ shut down pump on high pressure and to provide an alarm. Configure Well #8 flow meter head to provide automatic read. Contractor will funish and install dual switch on pump waste valve.
7. PLC/RTU – Provide Modicon M340 with 12" OIT Screen. The RTU panel will be located facing north adjacent to the existing panel.

E. Blue Horizon

1. Controls - none
2. Indication - At Blue Horizons show MV Reservoir Levels and status of Low Zone Control Valve (open and close) on PLC located in control building..
3. Alarms -none
4. Setpoints – none
5. Communications – Provide INET 2 radio for communications between Go Lightly and this site.
6. Instrumentation - None



E\&C CD + Plans sent in package on 10/16/13 GK
CM

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;
2012 GENERAL CONDITIONS OF CONTRACT

A copy of this Spec Book was mailed out with the original invitation to bid

ARIZONA WATER COMPANY

CONTRACT CHANGE ORDER

CONTRACTOR: Ludvik Electric, 1020 E. University Drive, Phoenix, AZ 85034	DATE: June 19, 2014	CONTRACT DATE: March 13, 2014
	W.A. NO.: 1-5032	CHANGE ORDER NO.: 1
DESCRIPTION OF WORK: Four (4) additional radio path surveys for White Tank SCADA communication.	APPLICABLE C. O. COST: $2,416.00	
	ORIGINAL CONTRACT AMOUNT: $127,748.00	
	SUM OF ALL CHANGE ORDERS TO DATE: $2,416.00	
REASON FOR ADDITIONAL WORK: The additional radio path surveys are needed to incorporate the Arroyo Seco water storage reservoir site and well site into the White Tank SCADA system.	APPROVAL LEVEL REQ'D: (CIRCLE ALL THAT APPLY) (BASED ON COST) Mgr & Eng: Up to $10,000 or 10% whichever is less; VP Eng: Up to $100,000 or 20% whichever is less; VP Tres & Pres: greater than $100,000 or 20%	

BASIS OF PAYMENT:

- ☐ In accordance with rates contained in Contractor's Proposal/Contract dated:
- ☒ In accordance with material prices, labor and equipment rates shown on Proposal dated: June 19, 2014
- ☒ Lump Sum Price (including taxes) of: (Include supporting documentation) $ 2,416.00
- ☐ Other:

Contractor is hereby authorized to proceed with the work as described above. The Company will pay for the above-described work as indicated above.

Contractor agrees, as an independent contractor, to perform the above-described work in accordance with the Company's *General Conditions of Contract, and the Company's Construction Specifications and Standard Specification Drawings* ("General Conditions of Contract") and related construction drawings which, were provided with the original Proposal/Contract and supplemented herein, and agrees that all provisions of said General Conditions of Contract dated as of April 2004, including any subsequent amendments thereto, and related construction drawings, apply to work covered under this Contract Change Order.

Work Authorization / Approval for additional funds required — YES (NO) (circle one) If yes, attach applicable form & proof of payment for outside funded work.

Division Superintendent/Manager

Project Engineer/Project Manager

AWC Vice President – Engineering

Contractor: (Name) LUDVIK ELECTRIC

By: *Contractor's Representative Signature* Joseph F. Miller

Name: *(Printed)* Joseph F. Miller

Its: *(Title or Position)* VP of Phoenix Operations

CHANGE ORDER AUTHORIZATION OVER $100,000 OR 20% OF THE CONTRACT NOT VALID WITHOUT SIGNATURES BELOW

AWC Vice President and Treasurer

AWC President

Date Work Started

Date Work Completed

CONTRACTOR'S INVOICE APPROVED BY:

Company's Representative Overseeing the Work (signature)

DISTRIBUTION:
Original to Person Authorizing Work and, when completed, to Accounting Dept. with approved invoice for the work with supporting documentation.
Copy to Contractor. Copy to Project Engineer

Labor and Material Releases Required: 1) Yes 2) No
Releases Received and Approved By:

Company's Authorized Signature

[illegible] | FILE: gh | 6-3-32-8 [illegible]

June 19, 2014 Serial No. 4000.17-003

Mr. John Knobbe
Arizona Water Company
3805 N Black Canyon Hwy.
Phoenix, AZ 85015

Reference: LE Job #4000.17 – White Tanks SCADA

Subject: Ludvik Electric Co. Change Request #001 Rev 1
Additional Radio Path Survey

Dear Mr. Knobbe:

We hereby submit for your consideration our Change Request #001 in the amount of **$2,416.00** as an *add* to our subcontract agreement for the above referenced project. This change request covers the following revisions:

To perform additional radio path survey for the following paths:

1) *Arroyo Seco Well to Arroyo Seco Tank*
2) *Arroyo Seco Tank to Lolighly*
3) *Arroyo Seco Tank to Beautiful Arizona Estates Tank*
4) *Arroyo Seco Tank to Blue Horizon Booster/Tank*

Clarifications:

1. *Testing performed no higher than 30'.*
2. *If testing required for 31' to 40', an addar of $1,610.00 will apply after prior approval from Arizona Water Company.* ($1,610.00/4 = $402.50 each site)

AWC Initials

LE Initials

This change order is based solely on the usual cost elements such as labor, material and normal markups and does not include any amount for additional changes in the sequence of work, delays, disruptions, re-scheduling, extended overhead, overtime, acceleration, and/or impact costs; and the right is expressly reserved to make claim for any and all of these related items prior to the final settlement of this contract.

This proposal is valid for 30 days and is subject to any labor and material modifications occurring after this time period.

If you have any questions, please feel free to contact the undersigned.

Sincerely,

LUDVIK ELECTRIC CO.

Joseph F. Miller
V.P. of Phoenix Operations
F11B/F22 attachments

LUDVIK ELECTRIC

1020 E. University Drive, Phoenix, AZ 85034 • Telephone (602) 777-5000 • Fax (602) 258-0782
AZ Licenses: 088575 (L-11); 127121 (A-17)

ARIZONA WATER COMPANY

CONTRACT CHANGE ORDER

CONTRACTOR:
Ludvik Electric
1020 E. University Drive
Phoenix, AZ 85034

DATE: March 18, 2015
W.A. NO.: 1-5032

CONTRACT DATE: March 13, 2014
CHANGE ORDER NO.: 2

DESCRIPTION OF WORK:
Provide a larger boom truck to perform radio path survey. Provide additional design for the following: heat resistant RTU panels at Monte Vista and Pasquisetti Well No. 8 and ACT-PAK sensors on water meters.

APPLICABLE C. O. COST: $ 9,660.00

ORIGINAL CONTRACT AMOUNT: $ 427,749.00

SUM OF ALL CHANGE ORDERS TO DATE: $ 12,076.00

REASON FOR ADDITIONAL WORK:
A larger boom truck is required to perform radio path survey more than 30 feet above ground. Heat resistant RTU panels allow the option to remove shade canopies from scope of new construction. ACT-PAK sensors were not included in the Contract/Proposal but are required to communicate flow rate data to the SCADA system.

APPROVAL LEVEL REQ'D: (CIRCLE ALL THAT APPLY) (BASED ON THIS)

Mgr & Eng	VP Eng	VP Treas & Pres
Up to $10,000 or 10% whichever is less	Up to $100,000 or 20% whichever is less	greater than $100,000 or 20%

BASIS OF PAYMENT:
- ☐ In accordance with rates contained in Contractor's Proposal/Contract dated:
- ☒ In accordance with material prices, labor and equipment rates shown on Proposal dated: January 26, 2015
- ☐ Lump Sum Price (including taxes) of: (Include supporting documentation) $
- ☐ Other:

Contractor is hereby authorized to proceed with the work as described above. The Company will pay for the above-described work as indicated above.

Contractor agrees, as an independent contractor, to perform the above-described work in accordance with the Company's *General Conditions of Contract, and the Company's Construction Specifications* and *Standard Specification Drawings* ("General Conditions of Contract") and related construction drawings which, were provided with the original Proposal/Contract and supplemented herein, and agrees that all provisions of said General Conditions of Contract dated as of April 2004, including any subsequent amendments thereto, and related construction drawings, apply to work covered under this Contract Change Order.

Work Authorization Approval for additional funds required

YES (NO) (circle one) If yes, attach applicable form & proof of payment for outside funded work.

Division Superintendent/Manager

Project Engineer/Project Manager

AWC Vice President – Engineering

LUDVIK ELECTRIC
Contractor (Name)

By: _____
(Contractor's Representative Signature)

Name: Joseph F. Miller
(Printed)

Title: VP of Phoenix Operations
(Title or Position)

CHANGE ORDER AUTHORIZATION OVER $100,000 OR 20% OF THE CONTRACT NOT VALID WITHOUT SIGNATURES BELOW

AWC Vice President and Treasurer

AWC President

Date Work Started

Date Work Completed

CONTRACTOR'S INVOICE APPROVED BY:

Company's Representative Overseeing the Work (Signature)

DISTRIBUTION:
Original to Person Authorizing Work and, when completed, to Accounting Dept. with approved invoice for the work with supporting documentation.
Copy to Contractor. Copy to Project Engineer.

Labor and Material Releases Required: Yes No
Releases Received and Approved By:

Company's Authorized Signature

W:\PROJECTS\CONTRACTS\WW1-1032 INSTALL SCADA AZ BEAUTIFUL ARIZONA STATES WELL NO#7 SWITCHGEAR\CHANGE ORDER\ATW 1-5032 CHCR [illegible]/13 [FWB.pln] 6-3-03-3 [illegible] APR 3 08 PM 3/26/15

ATW

Reference: AZ Water Co. – White Tanks SCADA

Subject: **FINAL DRAWINGS SCOPE/PROPOSAL CHANGES**

We submit our Proposal for the Changes to the Final Drawings dated December 2014, as further revised in the Meetings on 1-14-15 **and 1-22-15** as follows.

Summary of work previously agreed:

Original Bid/Contract Amount	$ 427,749.
Additional Radio Path Work	$ 2,415.
Lift Rental for Additional Radio Path Work	$ 1,610.
Total To Date	$ 431,774.

Breakdown per Site

Performance & Payment Bonds	$ 4,554.
Design	$ 35,630.
Radio Path Study	$ 11,970.
Monte Vista except for Booster Control Programming (Status Only for Boosters)	**$ 104,830.**
Radio, Antenna and UPS at Well 7	**$ 21,220.**
Balance of Well 7	**$ 74,380.**
Monte Vista Booster Control Programming	**$ 4,280.**
Pasqauletti Well 8	$ 63,520.
Beautiful Arizona Estates	$ 86,020.
Blue Horizons	$ 25,170.
Total To Date	$ 431,774.

NOW 2014 → 2015 → LATER

Summary of Changes Jan 2015:

Design	**Add**	**$ 8,050.**
Monte Vista except for Booster Control Programming (Status Only for Boosters) and Shade Canopy	**Add**	**$ 29,900.**
Radio, Antenna and UPS at Well 7	**Add**	**$ 3,180.**
Option to Add Grounding for M.V. Arsenic	Add	$ 2,360.
Balance of Well 7		**$ 6,590.**
Monte Vista Booster Control Programming and Shade Canopy	**Add**	**$ 19,850.**
Pasqauletti Well 8	Add	$ 12,600.
Beautiful Arizona Estates	Add	$ 24,690.
Blue Horizons	Add	$ 11,090.
Total Add		$ 118,510.

NOW 2014 → 2015 → LATER

LUDVIK ELECTRIC

1020 E. University Drive, Phoenix, AZ 85034-8512 • Telephone (602) 777-5000 • Fax (602) 258-0782

AZ Licenses: 086575 (C-11); 127121 (A-17)

ARIZONA WATER COMPANY

CONTRACT CHANGE ORDER

CONTRACTOR:
Ludvik Electric
1020 E. University Drive
Phoenix, AZ 85034

DATE: March 18, 2015
CONTRACT DATE: March 13, 2014
W.A. NO.: 1-5092
CHANGE ORDER NO.: 9

DESCRIPTION OF WORK:

Reduce the scope of work to exclude constructing and making operational SCADA system at Beautiful Arizona Tank, Pasquisili Well No. 8 and Blue Horizon sites. In addition, modify scope of work at Golightly Well No. 7 site to only include constructing and making operational radio communication equipment and SCADA master computer. Construct heat resistant RTU panel at Monte Vista site in lieu of shade canopy. Extend construction completion date to 6/18/2015.

APPLICABLE C. O. COST: $ -216,285.00
ORIGINAL CONTRACT AMOUNT: $ 427,748.00
SUM OF ALL CHANGE ORDERS TO DATE: $ -204,190.00

REASON FOR ADDITIONAL WORK:

Company engineers split the construction of White Tank SCADA system into phases. Company engineers determined that constructing the master computer and radio equipment at the Golightly Well No. 7 site and constructing and making operational SCADA at the Monte Vista site, which is the central hub of the White Tank water system, is phase 1. Company engineers expect to construct future phases at a later date.

APPROVAL LEVEL REQ'D: (CIRCLE ALL THAT APPLY)
(BASED ON $ON)

Mgr & Eng	VP Eng	VP Tres & Pres
Up to $10,000 or 10% whichever is less	Up to $100,000 or 20% whichever is less	greater than $100,000 or 20%

BASIS OF PAYMENT:

- ☐ In accordance with rates contained in Contractor's Proposal/Contract dated:
- ☐ In accordance with material prices, labor and equipment rates shown on Proposal dated:
- ☒ Lump Sum Price (including taxes) of: (include supporting documentation) $ -216,285.00
- ☐ Other:

Contractor is hereby authorized to proceed with the work as described above. The Company will pay for the above-described work as indicated above.

Contractor agrees, as an independent contractor, to perform the above-described work in accordance with the Company's *General Conditions of Contract*, and the Company's *Construction Specifications* and *Standard Specification Drawings* ("General Conditions of Contract") and related construction drawings which, were provided with the original Proposal/Contract and supplemented herein, and agrees that all provisions of said General Conditions of Contract dated as of April 2004, including any subsequent amendments thereto, and related construction drawings, apply to work covered under this Contract Change Order.

Work Authorization Approval for additional funds required

YES (NO) (circle one) If yes, attach applicable form & proof of payment for outside funded work.

Division Superintendent/Manager

Project Engineer/Project Manager

AWC Vice President – Engineering

LUDVIK ELECTRIC
Contractor: (Name)

By *Joseph F. Miller*
Contractor's Representative Signature

Name: Joseph F. Miller
(Printed)

Its: VP of Phoenix Operations
(Title or Position)

CHANGE ORDER AUTHORIZATION OVER $100,000 OR 20% OF THE CONTRACT NOT VALID WITHOUT SIGNATURES BELOW

AWC Vice President and Treasurer

AWC President

Date Work Started

Date Work Completed

CONTRACTOR'S INVOICE APPROVED BY:

Company's Representative Overseeing the Work (signature)

DISTRIBUTION:
Original to Person Authorizing Work and, when completed, to Accounting Dept. with approved invoice for the work with supporting documentation. Copy to Contractor. Copy to Project Engineer.

Labor and Material Releases Required: Yes No
Releases Received and Approved By:

Company's Authorized Signature

W:\PROJECTS\CHANGE ORDERS\WHITE TANK SCADA INSTALL SCADA AT BEAUTIFUL ARIZONA ESTATES WELL NO. 7 CHANGE ORDER.DOC (3/20/15) | PK/bsh | 5-5-23-5 2015 2015 5 ROW 5 5 5 5 5

ATH

Reference: AZ Water Co. – White Tanks SCADA

Subject: **FINAL DRAWINGS SCOPE/PROPOSAL CHANGES**

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Radio Path Study	$ 11,970.
Monte Vista except for Booster Control Programming (Status Only for Boosters)	**$ 104,830.**
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Monte Vista Booster Control Programming	**$ 4,280.**
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Beautiful Arizona Estates	$ 86,020.
Blue Horizons	$ 25,170.
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NOW 2014 ↓ 2015 ↓ LATER ↓

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Option to Add Grounding for M.V. Arsenic	Add	$ 2,360.
Balance of Well 7		**$ 6,590.**
Monte Vista Booster Control Programming and Shade Canopy	**Add**	**$ 19,850.**
Pasqauletti Well 8	Add	$ 12,600.
Beautiful Arizona Estates	Add	$ 24,890.
Blue Horizons	Add	$ 11,090.
Total Add		**$ 118,510.**

NOW 2014 ↓ 2015 ↓ - ? LATER ↓

LUDVIK ELECTRIC

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AZ Licenses: 088575 (C-11); 127121 (A-17)

ARIZONA WATER COMPANY

CONTRACT CHANGE ORDER

CONTRACTOR: Ludvik Electric 1020 E. University Drive Phoenix, AZ 85034	DATE: April 24, 2015 W.A. NO.: 1-5032	CONTRACT DATE: March 13, 2014 CHANGE ORDER NO.: 4
DESCRIPTION OF WORK: Delete concrete, excavation and underground conduit runs. Delete two (2) Act Paks and five (5) Symcon Ethernet Modules. Add five (5) Cutler Com Modules and one (1) Pressure Indicating Transmitter.	APPLICABLE C. O. COST: $ -9,745.00 ORIGINAL CONTRACT AMOUNT: $ 427,749.00 SUM OF ALL CHANGE ORDERS TO DATE: $ -213,935.00	
REASON FOR ADDITIONAL WORK: The Company completed the concrete, excavation and underground conduit required for SCADA wiring. The construction drawings specified Symcom Ethernet modules instead of Cutler Hammer Ethernet modules. The construction drawings did not specify the installation of a new pressure indicating transmitter.	APPROVAL LEVEL REQ'D: (CIRCLE ALL THAT APPLY) (BASED ON SUM) Mgr & Eng Up to $10,000 or 10% whichever is less VP Eng Up to $100,000 or 20% whichever is less VP Tres & Pres greater than $100,000 or 20%	

BASIS OF PAYMENT:

- [ ] In accordance with rates contained in Contractor's Proposal/Contract dated:
- [X] In accordance with material prices, labor and equipment rates shown on Proposal dated: April 16, 2015
- [ ] Lump Sum Price (including taxes) of: (include supporting documentation) $
- [ ] Other:

Contractor is hereby authorized to proceed with the work as described above. The Company will pay for the above-described work as indicated above.

Contractor agrees, as an independent contractor, to perform the above-described work in accordance with the Company's *General Conditions of Contract, and the Company's Construction Specifications* and *Standard Specification Drawings* ("General Conditions of Contract") and related construction drawings which, were provided with the original Proposal/Contract and supplemented herein, and agrees that all provisions of said General Conditions of Contract dated as of April 2004, including any subsequent amendments thereto, and related construction drawings, apply to work covered under this Contract Change Order.

Work Authorization Approval for additional funds required YES (NO) (circle one) If yes, attach applicable form & proof of payment for outside funded work.

Division Superintendent/Manager

Project Engineer/Project Manager

AWC Vice President – Engineering

LUDVIK ELECTRIC
Contractor: (Name)

By: *Contractor's Representative Signature*

Name: Joseph F. Miller
(Printed)

It's: Vice President of Phoenix Operations
(Title or Position)

CHANGE ORDER AUTHORIZATION OVER $100,000 OR 20% OF THE CONTRACT NOT VALID WITHOUT SIGNATURES BELOW

AWC Vice President and Treasurer

AWC President

Date Work Started

Date Work Completed

CONTRACTOR'S INVOICE APPROVED BY:

Company's Representative Overseeing the Work (signature)

DISTRIBUTION:
Original to Person Authorizing Work and, when completed, to Accounting Dept. with approved invoice for the work with supporting documentation. Copy to Contractor. Copy to Project Engineer.

Labor and Material Releases Required: Yes No
Releases Received and Approved By:

Company's Authorized Signature

PRELIMINARY ☐

ACTUAL ☒

ARIZONA WATER COMPANY
COST ESTIMATE WORKSHEET

DATE PREPARED: 5/11/2015

PREPARED BY: MLM

SYSTEM: White Tank

SHEET 1 OF 1

PROJECT LOCATION: Monte Vista and Golightly Well Sites

DRAWING NO:

PROJECT DESCRIPTION:

Delete concrete, excavation, and underground conduit runs. Delete (2) Act Paks, (5) Symcon Ethernet Modules. Add: five (5) Cutler Com Modules, one (1) Pressure Indicating Transmitter.

	DESCRIPTION	PLANT PROP ACCT	QUANTITY	UNIT COST	TOTAL
CONTRACT WORK	**Deductions:**				
	Concrete	325	(1)	1,600.00	(1,600)
	Excavation	325	(1)	900.00	(900)
	Underground conduit runs, material and labor	325	(1)	3,870.00	(3,870)
	Owner furnished Act-Paks	325	(1)	2,600.00	(2,600)
	Symcom Ethernet & Displays	325	(2)	730.00	(1,460)
	Ethernet Com Modules	325	(3)	340.00	(1,020)
	Deduct price for lift and radio path from change order 3	325	(1)	4,025.00	(4,025)
	Additions:				
	Cutler Com Modules	325	5	596.00	2,980
	Pressure Indicating Transmitter	325	1	1,600.00	1,600
	Nitrate/High Pressure Hardwire Shutdown		1	1,150.00	1,150
	SERVICE CONNECTIONS: DOUBLE-LONG	345			
	SERVICE CONNECTIONS: DOUBLE-SHORT	345			
	TAXABLE SERVICE CONNECTIONS COMPLETE: SINGLE-LONG	345			
	TAXABLE SERVICE CONNECTIONS COMPLETE: SINGLE-SHORT	345			
					$ (9,745)
MATERIALS					
	SERVICE CONNECTIONS: DOUBLE-LONG	345			
	SERVICE CONNECTIONS: DOUBLE-SHORT	345			
	TAXABLE SERVICE CONNECTIONS: SINGLE-LONG	345			
	TAXABLE SERVICE CONNECTIONS: SINGLE-SHORT	345			
	TAXABLE METERS	346			
	METERS	346			
TOTAL MATERIALS					$ -
LABOR					
	TESTING FEE				
	PERMIT FEE				
	SURVEY FEE				
	FIELD INSPECTION				
	INSTALL SERVICE CONNECTIONS: DOUBLE-LONG	345			
	INSTALL SERVICE CONNECTIONS: DOUBLE-SHORT	345			
	INSTALL TAXABLE SERVICE CONNECTIONS: SINGLE-LONG	345			
	INSTALL TAXABLE SERVICE CONNECTIONS: SINGLE-SHORT	345			
TOTAL LABOR					$ -
SUBTOTAL - CONTRACT WORK, MATERIALS, AND LABOR					$ (9,745)
OVERHEAD					
TOTAL	REFUNDABLE PORTION ☐ NON-REFUNDABLE PORTION ☐			COST ESTIMATE	$ (9,745)

SCHEMATIC DIAGRAM SYMBOLS

Symbol	Description
(CR)	CONTROL RELAY
(TD)	TIME DELAY RELAY
(AR)	ALARM RELAY
(ETM)	ELAPSED TIME METER
(M)	MOTOR STARTER OR CONTACTOR COIL
(PC)	PHOTO CELL
(R)	BEACON ALARM LIGHT LETTER INDICATES COLOR R=RED, A=AMBER, B=BLUE, G=GREEN
(R)	PILOT LIGHT LETTER INDICATES COLOR R=RED, A=AMBER, B=BLUE, G=GREEN
	OUTPUT DV/DT FILTER
	HEATING ELEMENT
	TRANSFORMER
CT	CURRENT TRANSFORMER
	GROUND CONNECTION
	GENERATOR
HORN	HORN
5	FULL VOLTAGE NON-REVERSING (FVNR) MOTOR STARTER OR CONTACTOR NUMBER DESIGNATES NEMA SIZE
	NORMALLY OPEN CONTACT
	NORMALLY CLOSED CONTACT
DI DO	RTU OR PLC CONTACT
HAND / AUTO, XO	2 POSITION SELECTOR SWITCH POSITION LEGEND: X=CLOSED O=OPEN
OFF, HAND / AUTO, XOO	3 POSITION SELECTOR SWITCH HAND – OFF – AUTO POSITION LEGEND: X=CLOSED O=OPEN
	NORMALLY CLOSED PUSH BUTTON
	LOCKOUT STOP PUSH BUTTON
	NORMALLY OPEN PUSH BUTTON
	EMERGENCY STOP PUSH BUTTON (MAINTAINED)
AMPS	DISCONNECT SWITCH SHOWN WITH RATING AND NUMBER OF POLES
	LIMIT OR POSITION SWITCH
PSH	PRESSURE SWITCH HIGH
PSL	PRESSURE SWITCH LOW
	FLOW SWITCH
	LEVEL FLOAT SWITCH
T, ICTO	TIMER RELAY CONTACT INSTANTANEOUS CLOSE TIME DELAY OPEN
T, NOTC	TIMER RELAY CONTACT NORMALLY OPEN TIME DELAY CLOSE
	TEMPERATURE SWITCH
	FUSE
AMPS	FUSEHOLDER OR FUSEBLOCK
	THERMAL OVERLOAD RELAY
	TERMINAL BLOCK
	DEVICE LOCATED AT REMOTE LOCATION
	CONDUIT SEALOFF

POWER SINGLE LINE DIAGRAM SYMBOLS

Symbol	Description
	JUNCTION BOX WITH POWER DISTRIBUTION BLOCK OR LUGS
	CONDUIT SEALOFF
	LTC CONNECTION
	MC CONNECTION
	BOND TO METALLIC WATER PIPE
(UM)	UTILITY METER
(HP)	MOTOR, NUMBER DESIGNATES NEMA HORSEPOWER SIZE
	FUSE
AMPS	FUSEHOLDER OR FUSEBLOCK
AMPS, POLES	CIRCUIT BREAKER, SHOWN WITH TRIP RATING AND NUMBER OF POLES
AMPS, MCP, POLES	MOTOR CIRCUIT PROTECTOR WITH TRIP RATING AND NUMBER OF POLES
AMPS, POLES	DISCONNECT SWITCH SHOWN WITH RATING AND NUMBER OF POLES
MMR	MOTOR MANAGEMENT RELAY
SSS	SOLID STATE STARTER
VFD	VARIABLE FREQUENCY DRIVE
HF	HARMONIC FILTER
EOL	ELECTRONIC OVERLOAD RELAY
	GROUND CONNECTION

SITE PLAN SYMBOLS

Symbol	Description
	TELEPHONE OUTLET
$	SINGLE POLE SWITCH
$3	3 WAY SWITCH
$4	4-WAY SWITCH
$M	MANUAL MOTOR STARTER
	SPECIAL PURPOSE OR WELDING OUTLET
(S)	SMOKE DETECTOR
(T)	THERMOSTAT
	FIELD DEVICE
	GROUND ROD
	DUPLEX RECEPTACLE
	ANTENNA MAST
	CONDUIT SEALOFF
	DISCONNECT SWITCH
(M)	MOTOR

CIRCUIT SCHEDULE LEGEND

AAA-DC

- SEQUENCE NUMBER
- TYPE C=CONTROL P=POWER
- DEVICE SERVED

ELECTRICAL ABBREVIATIONS

Abbreviation	Meaning
A	AMPERE
AFD	ADJUSTABLE FREQUENCY DRIVE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AI	ANALOG INPUT
AIC	AMPS INTERRUPTING CAPACITY
AO	ANALOG OUTPUT
AS	AIR SUPPLY
ATS	AUTOMATIC TRANSFER SWITCH
BC	BYPASS CONTACTOR
C	CONDUIT
CB	CIRCUIT BREAKER
CCW	COUNTER CLOCKWISE
CL2	CHLORINE
CON	CONTACTOR
CPB	CONTROL PULLBOX
CU	COPPER, BARE
CV	CONTROL VALVE
CW	CLOCKWISE
DCS	DISTRIBUTED CONTROL SYSTEM
DI	DISCRETE INPUT
DO	DISCRETE OUTPUT
DP	DISTRIBUTION PANEL
DV/DT	DIFFERENTIAL VOLTAGE/TIME
DWG	DRAWING
ETM	ELAPSED TIME METER
EOL	ELECTRONIC OVERLOAD
EXIST	EXISTING
FA	FOUL AIR
FC	FAIL CLOSED
FE	FLOW ELEMENT
FLA	FULL LOAD AMPS
FS	FLOW SWITCH
FVNR	FULL VOLTAGE NON-REVERSING
FW	FINISHED WATER
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFP	GROUND FAULT PROTECTION
GND	GROUND
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GRS	GALVANIZED RIGID STEEL
H, HI	HIGH
H2S	HYDROGEN SULFIDE
HMI	HUMAN MACHINE INTERFACE
HOA	HAND-OFF-AUTO
HOR	HAND-OFF-REMOTE
I	CURRENT
IC	INSTRUMENTATION CABLE
ICR	INTERMITTENT CYCLE REACTOR
IO	INPUT/OUTPUT
ISC	SHORT CIRCUIT CURRENT
JB	JUNCTION BOX
L, LO	LOW
LAN	LOCAL AREA NETWORK
LC	LOOP CONTROLLER
LCL	LEVEL CONTROL, LOW
LCP	LOCAL CONTROL PANEL
LOS	LOCK-OUT-STOP
LOR	LOCAL/OFF/REMOTE
LS	LEVEL (i.e. FLOAT) SWITCH
LTC	LIQUIDTIGHT FLEXIBLE METAL CONDUIT
M	MOTOR
MA	MANUAL/AUTO
mA	MILLIAMP
MAX	MAXIMUM
MC	MANUFACTURER'S CABLE
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MFR(S)	MANUFACTURER(S)
MGD	MILLION GALLONS PER DAY
MGL	MILLIGRAMS PER LITER
MH	MANHOLE
MIN	MINIMUM
MOV	MOTOR OPERATED VALVE
MMR	MOTOR MANAGEMENT RELAY
MTU	MASTER TELEMETRY UNIT
NEC	NATIONAL ELECTRICAL CODE
NECA	NATIONAL ELECTRICAL CONTRACTOR ASSOCIATION
N.C.	NORMALLY CLOSED
N.O.	NORMALLY OPEN
NOTC	NORMALLY OPEN TIMED CLOSED
NPW	NON-POTABLE WATER
NS	NITROGEN SUPPLY
NTS	NOT TO SCALE
NTU	TURBIDITY
OF	OVERFLOW
OIT	OPERATOR INTERFACE TERMINAL
OL	OVERLOAD
OLR	OVERLOAD RELAY
OO	ON/OFF (MAINTAINED)
OR	OFF-REMOTE
OSC	OPEN/STOP/CLOSE
P	PHASE
PB	PULL BOX
PCP	PROCESS CONTROL PANEL
PCV	PRESSURE CONTROL VALVE
PFR	PHASE/POWER FAILURE RELAY
PI	PULSE INPUT
PLC	PROGRAMMABLE LOGIC CONTROLLER
PLI	PLANT INFLUENT
PMP	PUMP
PNL	PANEL
PO	PULSE OUTPUT
PPB	POWER PULLBOX
PPG	POUNDS PER GALLON
PPH	POUNDS PER HOUR
PPM	PARTS PER MILLION
PR	PAIR
PRES	PRESSURE
PS	PRESSURE SWITCH
PSH	PRESSURE SWITCH, HIGH
PSI	POUNDS PER SQUARE INCH
PV	PROCESS VARIABLE
RAS	RETURN ACTIVATED SLUDGE
RW	RAW WATER
RF	RADIO FREQUENCY
RIO	REMOTE INPUT OUTPUT
RS	RAW SEWAGE
RSP	RAW SEWAGE PUMP
RST	RESET
RTD	RESISTANCE TEMPERATURE DETECTOR
RTU	REMOTE TELEMETRY UNIT
RWT	REFLECTED WAVE TRAP
SCA	SHORT CIRCUIT AMPS
SEO	SERVICE ENTRANCE EQUIPMENT
SES	SERVICE ENTRANCE SECTION
SLC	SINGLE LOOP CONTROLLER
SLOS	START-LOCK-OUT-STOP
SMC	SUBMERSIBLE MANUFACTURER CABLE
SO2	SULFUR DIOXIDE
SP	SET POINT
SPC	SPARE CONDUIT
SPR	SPARE
SS	START/STOP
SSS	SOLID STATE STARTER (SOFT START)
ST	SHUNT TRIP
TC	TELEPHONE CABLE
TS	TEMPERATURE SWITCH
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
TYP	TYPICAL
UG	UNDERGROUND
UL	UNDERWRITERS LABORATORIES
UNO	UNLESS NOTED OTHERWISE
V	VOLT
VFD	VARIABLE FREQUENCY DRIVE
W	WATT, WIRE
WAS	WASTE ACTIVATED SLUDGE
WP	WEATHERPROOF
XFMR	TRANSFORMER
XMR	TRANSFORMER
XMTR	TRANSMITTER
ZS	POSITION (i.e., LIMIT) SWITCH

ELECTRICAL LINETYPES

Line	Description
	EXPOSED CONDUIT
	EXISTING EXPOSED CONDUIT
	UNDERGROUND CONDUIT
	EXISTING UNDERGROUND CONDUIT
	BARE COPPER GROUND CONDUCTOR
	EXISTING OR FUTURE
	NEW ELECTRICAL EQUIPMENT
	DEMOLITION
	DETAIL VIEW OR MATCHING
	CAPPED CONDUIT STUB OUT
PXXX CXXX	GROUPED CONDUIT AND CIRCUIT IDENTIFICATION TAGS. REFER TO THE POWER SINGLE-LINE, SCHEMATIC CONNECTION DIAGRAMS AND CIRCUIT SCHEDULE FOR CONDUIT SIZES AND CONTENTS. P=POWER C=CONTROL

GENERAL NOTES

1. THE COMPLETED INSTALLATION SHALL COMPLY WITH LATEST REVISION OF APPLICABLE FEDERAL, STATE, AND LOCAL CODES, ORDINANCES, AND REGULATIONS. THE CONTRACTOR SHALL OBTAIN NECESSARY PERMITS AND INSPECTIONS REQUIRED BY THE AUTHORITIES HAVING JURISDICTION. ALL WORK SHALL BE COMPLETED IN A NEAT, WORKMANLIKE MANNER IN ACCORDANCE WITH THE LATEST NECA STANDARDS OF INSTALLATION UNDER COMPETENT SUPERVISION. INSTALL GROUNDING PER NEC.
2. VISIT THE SITE PRIOR TO BIDDING TO BECOME FAMILIAR WITH EXISTING CONDITIONS AND OTHER FACTORS, WHICH MAY AFFECT THE EXECUTION OF THE WORK. INCLUDE ALL RELATED COSTS IN THE INITIAL BID PROPOSAL.
3. THE CONTRACTOR SHALL COORDINATE WORK WITH THE UTILITIES PROVIDING SERVICES ON THIS PROJECT, AND SHALL COMPLY WITH ALL THEIR INSTALLATION REQUIREMENTS.
4. ALL MATERIALS SHALL BE NEW AND OF THE BEST QUALITY, MANUFACTURED IN ACCORDANCE WITH THE LATEST REVISION OF NEMA, ANSI, UL, OR OTHER APPLICABLE STANDARDS. THE USE OF MANUFACTURERS' NAMES, MODELS, AND NUMBERS IS INTENDED TO ESTABLISH STYLE, QUALITY, APPEARANCE, USEFULNESS, AND BID PRICE.
5. PROTECT ALL ELECTRICAL MATERIAL AND EQUIPMENT INSTALLED AGAINST DAMAGE BY OTHER TRADES, WEATHER CONDITIONS, OR ANY OTHER PREVENTABLE CAUSES. EQUIPMENT DAMAGED DURING SHIPPING OR CONSTRUCTION, PRIOR TO ACCEPTANCE BY THE ENGINEER OR THE OWNER, WILL BE REJECTED AS DEFECTIVE.
6. LEAVE THE SITE CLEAN. REMOVE ALL DEBRIS, EMPTY CARTONS, TOOLS, CONDUIT, WIRE SCRAPS AND ALL MISCELLANEOUS SPARE EQUIPMENT AND MATERIALS USED IN THE WORK DURING CONSTRUCTION. ALL COMPONENTS SHALL BE FREE OF DUST, GRIT AND FOREIGN MATERIALS, LEFT AS NEW BEFORE FINAL ACCEPTANCE OF WORK. DAMAGED PAINT AND FINISHES SHALL BE TOUCHED UP OR REPAINTED WITH MATCHING COLOR PAINT AND FINISH.
7. CIRCUIT CONDUCTORS #6 AWG OR SMALLER SHALL BE THWN STRANDED COPPER. #4 AWG THROUGH #2 AWG SHALL BE XHHW STRANDED COPPER. #1 AWG OR LARGER SHALL BE XHHW-2 STRANDED COPPER. MINIMUM POWER CONDUCTOR SIZE SHALL BE #12 AWG WITH #12 AWG GROUND.
8. UNDERGROUND CONDUITS SHALL BE SCHEDULE 40 PVC. MINIMUM CONDUIT DEPTH SHALL BE 24 INCHES. MINIMUM UNDERGROUND CONDUIT SIZE SHALL BE 1 INCH.
9. CONDUITS SHALL BE MARKED AT EACH END WITH MATCHING NUMBERED BRASS TAGS. SPARE CONDUITS SHALL HAVE A PULL STRING INSTALLED, SECURED, AND CAPPED.
10. EXPOSED CONDUITS SHALL BE GALVANIZED RIGID STEEL (GRS). MINIMUM SIZE 3/4 INCH, UNLESS OTHERWISE NOTED ON THE PLANS.
11. SAFETY SWITCHES, ELECTRICAL DISTRIBUTION EQUIPMENT, CONTROL PANELS, AND OTHER ELECTRICAL DEVICES SHALL BE UL LISTED, AND RATED FOR HEAVY DUTY SERVICE.
12. WIRING DEVICES SHALL BE SPECIFICATION GRADE.
13. THE CONTRACTOR IS RESPONSIBLE FOR MANAGING, SCHEDULING, DOCUMENTING, AND PERFORMING THE WORK SO THAT A COMPLETE ELECTRICAL, INSTRUMENTATION AND CONTROL SYSTEM FOR THE FACILITY IS PROVIDED. ACCURATE SHOP AND RECORD DRAWINGS, AND O&M MANUALS SHALL BE SUBMITTED PRIOR TO FINAL ACCEPTANCE OF THE WORK.
14. TYPICAL DETAILS SHALL APPLY IN ALL CASES, WHETHER SPECIFICALLY REFERRED TO OR NOT.

Rev'd	By	Date

Expires 3/31/11

DLT&V
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AZ WATER WHITE TANK SITES
SCADA DESIGN
ELECTRICAL NOTES,
SYMBOLS AND LEGENDS

Scale	N.T.S., U.O.N.
Job No.	1400.00.100
CADD File No.	
Designed	SB
Drawn	IB
Checked	DN
Date	DECEMBER 2009
Sheet	E001

XREF: 1219_BRDR

DWG FILE: 1400.0.100_E001.dwg 2:48pm PLOTTED: Dec 30, 2009 jahrens

NOTES:

1. REFERENCE CONNECTION DIAGRAM DRAWINGS FOR EACH RESPECTIVE SITE FOR ANTENNA CABLE INFORMATION.

CONDUIT NO.	CONDUIT SIZE	CIRCUIT NO.'s	FROM	TO
C400	2"	ANT100-C1	RTU-400	ANT-400
C401	1"	FE400-C2	RTU-400	PB-400
C401A	3/4"	FE400-C1	FE400-C1	PB-400
C402	1"	RTU400-P1	EXISTING LIGHTING PANEL	RTU-400
C403	1"	CGNS-C1	EXISTING NITRATE PLC	RTU-400
C404	3/4"	ES-C1	ETHERNET SWITCH/ SCADA COMPUTER	ES-C3
C405A	1"	WP7-C1, WP7-C1	WELL STARTER	RTU-400
C405B	1"	WP7-C2	WELL STARTER	RTU-400
C406	1"	PSH400-C1	PB-400	WELL PUMP STARTER
C406A	1"	PSH400-C1	PSH-400	PB-400
C407A	1"	ZS401-C1	ZS-401	RTU-400
C407B	1"	ZS402-C1	ZS-402	RTU-400
C408	1"	FSH401-C1	FSH-401	RTU-400
C410	2"	ANT410-C1	ANT-410	RTU-410
C411	1"	FE410-C2	PB-410	RTU-410
C411A	3/4"	FE410-C1	FE-410	PB-410
C412	1"	FE411-C2	PB-411	RTU-410
C412A	3/4"	FE411-C1	FE-411	PB-411
C413	1"	AIT413-C1, ZS413-C1, FE412-C1, PT413-C1, AIT414-C1	PB-412	RTU-410
C413A	1"	PT413-C1	PT-412	PB-412
C413B	1"	PT413-C1	PT-413	PB-412
C413C	1"	AIT413-C1	AIT-413	PB-412
C413D	1"	AIT414-C1	AIT-414	PB-412
C414	1"	FSH413-C1	FSH-413	RTU-410
C415A	1"	ZS413-C1	ZS-413	PB-412
C416	1"	MVATS-C1	EXISTING ARSENIC TREATMENT PLC	RTU-410
C417	2"	WP2-C2, WP4-C2, MVBP1-C2, MVBP2-C1	EXISTING ARSENIC TREATMENT PLC	RTU-410
C418	1"	PSH410-C1	PB-410	RTU-410
C418A	1"	PSH410-C1	PSH-410	PB-410
C419	1"	PSH411-C1	PB-411	RTU-410
C419A	1"	PSH411-C1	PSH-411	PB-411
C420	2"	ANT420-C1	ANT-420	RTU-420
C421A	3/4"	FE420-C1	FE-420	PB-420
C421	1"	FE420-C2	PB-420	RTU-420
C422	1"	PSH420-C1	PSH-420	RTU-420
C430	2"	ANT430-C1	ANT-430	RTU-430
C432	1"	FSH430-C1	FSH-430	RTU-430
C433	1"	FSH431-C1	FSH-431	RTU-430
C434	1"	RTU430-C1	EXISTING RTU PANEL	RTU-430
C435	1"	BAEBP1-C1, BAEBP1-C3 BAEBP2-C1, BAEBP2-C3	BOOSTER PUMP VFD STARTER CABINET	RTU-430
C436	1"	BAEBP1-C2, BAEBP2-C2	BOOSTER PUMP VFD STARTER CABINET	RTU-430
C437	1"	RTU430-P1, RTU430-P2	EXISTING LIGHTING PANEL	RTU-430
C440	2"	ANT440-C1	ANT-440	RTU-440

A MASTER CONDUIT SCHEDULE

CIRCUIT SCHEDULE	
CIRCUIT NO.	CONDUCTORS
ANT100-C1	NOTE 1
FE400-C1	1 - MC
FE400-C2	3 COND. CABLE W/ SHIELD
RTU400-P1	2 - #12, #12 GND
CGNS-C1	1 - CAT5E ETHERNET CABLE
WP7-C1	8 - #14, #14 GND
WP7-C2	2 - #14, #14 GND
WP7-C3	1 - RS-485 CABLE
ZS401-C2	2 - #14, #14 GND
ZS402-C1	2 - #14, #14 GND
FSH401-C1	2 - #14, #14 GND
ES-C1	1 - CAT5E ETHERNET CABLE
SS-C1	1 - CAT5E ETHERNET CABLE
DS1-C1	1 - CAT5E ETHERNET CABLE
PSH400-C1	2 - #14, #14 GND
ANT410-C1	NOTE 1
FE410-C1	1 - MC
FE410-C2	3 COND. CABLE W/ SHIELD
FE411-C1	1 - MC
FE411-C2	3 COND. CABLE W/ SHIELD
PT412-C1	1 - IC, #14 GND
PT413-C1	1 - IC, #14 GND
FSH413-C1	2 - #14, #14 GND
ZS413-C1	4 - #14, #14 GND
MVATS-C1	1 - CAT5E ETHERNET CABLE
AIT413-C1	1 - IC, #14 GND
RTU410-P1	2 - #12, #12 GND
RTU400-P2	2 - #12, #12 GND
AIT414-C1	1 - IC, #14 GND
WP2-C1	6 - #14, #14 GND
WP2-C2	2 - #14, #14 GND
WP2-C3	1 - RS-485 CABLE
WP4-C1	8 - #14, #14 GND
WP4-C2	2 - #14, #14 GND
WP4-C3	1 - RS-485 CABLE
MVBP1-C1	6 - #14, #14 GND
MVBP1-C2	2 - #14, #14 GND
MVBP1-C3	1 - RS-485 CABLE
MVBP2-C1	6 - #14, #14 GND
MVBP2-C2	2 - #14, #14 GND
MVBP2-C3	1 - RS-485 CABLE
AIT413-C1	1 - IC, #14 GND
PSH410-C1	2 - #14, #14 GND
PSH411-C1	2 - #14, #14 GND
ANT420-C1	NOTE 1
FE420-C1	1 - MC
FE420-C2	1 - IC, #14 GND
RTU420-P1	2 - #12, #12 GND
RTU420-P2	2 - #12, #12 GND
WP8-C1	6 - #14, #14 GND
WP8-C2	2 - #14, #14 GND
WP8-C3	1 - RS-485 CABLE
PSH420-C1	2 - #14, #14 GND
AIT421-C1	1 - IC, #14 GND
ANT430-C1	NOTE 1
RTU430-P1	2 - #12, #12 GND
RTU430-P2	2 - #12, #12 GND
BAEBP1-C1	6 - #14, #14 GND
BAEBP1-C2	2 - #14, #14 GND
BAEBP1-C3	1 - IC, #14 GND
BAEBP2-C1	6 - #14, #14 GND
BAEBP2-C2	2 - #14, #14 GND
BAEBP2-C3	1 - IC, #14 GND
FSH430-C1	2 - #14, #14 GND
FSH431-C1	2 - #14, #14 GND
ANT440-C1	NOTE 1

B MASTER CIRCUIT SCHEDULE

DESCRIPTION	SITE	MANUFACTURER	MODEL NO.
PRESSURE SWITCH	WELL 7	MERCOID	DAW-7033-153-7
FLOW SWITCH	WELL 7 EYEWASH	PER OWNER	-
FLOW SWITCH	WELL 2 EYEWASH	PER OWNER	-
PRESSURE SWITCH	WELL 2	MERCOID	DAW-7033-153-7
PRESSURE SWITCH	WELL 4	MERCOID	DAW-7033-153-7
PRESSURE SWITCH	WELL 6	MERCOID	DAW-7033-153-7
FLOW SWITCH	BAE BOOSTER PUMP 1	PER OWNER	-
FLOW SWITCH	BAE BOOSTER PUMP 2	PER OWNER	-

C INSTRUMENT INDEX

Expires 3/31/11

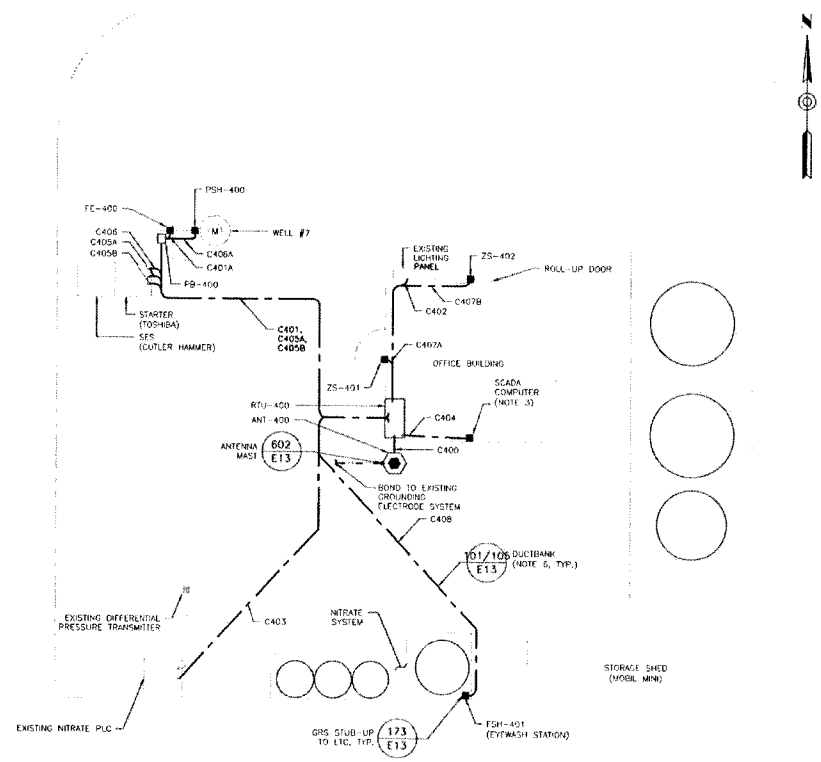
DLT&V SYSTEMS ENGINEERING

AZ WATER WHITE TANK SITES
SCADA DESIGN
CIRCUIT & CONDUIT
SCHEDULES

Scale: N.T.S., U.O.N.
Job No. 1400.00.100
CAD File No.
Designed: SB
Drawn: TB
Checked: DN
Date: DECEMBER 2009
Sheet: E002

XREF: 1210_SHOW

DWG FILE: 1400.0.100_E002.dwg 2:49pm PLOTTED: Dec 30, 2009 jahrens



NOTES:

1. INFORMATION REFLECTED ON THIS DRAWING PERTAINING TO: RELATIVE EQUIPMENT LOCATIONS, ROUTING AND CONNECTIONS OF PROCESS PIPING AND ROUTINGS OF EXISTING CONDUITS IS APPROXIMATE AND SCHEMATIC IN NATURE.
2. CONDUIT #'S AND EQUIPMENT IDENTIFIERS (E.G. FE-101) REFLECTED ON THIS DRAWING HAVE BEEN GENERATED FOR ASSOCIATION PURPOSES WITHIN THIS DESIGN PACKAGE. THEY DO NOT REFLECT ACTUAL #'S OR IDENTIFIERS THAT MAY EXIST IN THE FIELD.
3. LOCATIONS REFLECTED FOR NEW SCADA COMPUTER & RTU ARE APPROXIMATE. ACTUAL LOCATIONS ARE TO BE DETERMINED/CONFIRMED BY OWNER.
4. CONDUIT/DUCTBANK ROUTINGS SHOWN ARE APPROXIMATE, ACTUAL ROUTINGS ARE TO BE FIELD DETERMINED.
5. INSTRUMENT MOUNTING LOCATIONS SHOWN ARE APPROXIMATE, ACTUAL MOUNTING LOCATIONS ARE TO BE VERIFIED/CONFIRMED BY OWNER.
6. DIRECT-BURIED DUCTBANK DETAIL 101 SHALL BE USED IN NON-VEHICULAR TRAFFIC AREAS ONLY. CONCRETE ENCASED DUCTBANK DETAIL 105 SHALL BE USED FOR ALL VEHICULAR TRAFFIC AREAS. AREA CLASSIFICATION TO BE CONFIRMED/VERIFIED BY OWNER.

Rev'd	By	Date

Expires 3/31/11

DLT&V SYSTEMS ENGINEERING
3555 N. CENTRAL AVE, STE. 1900
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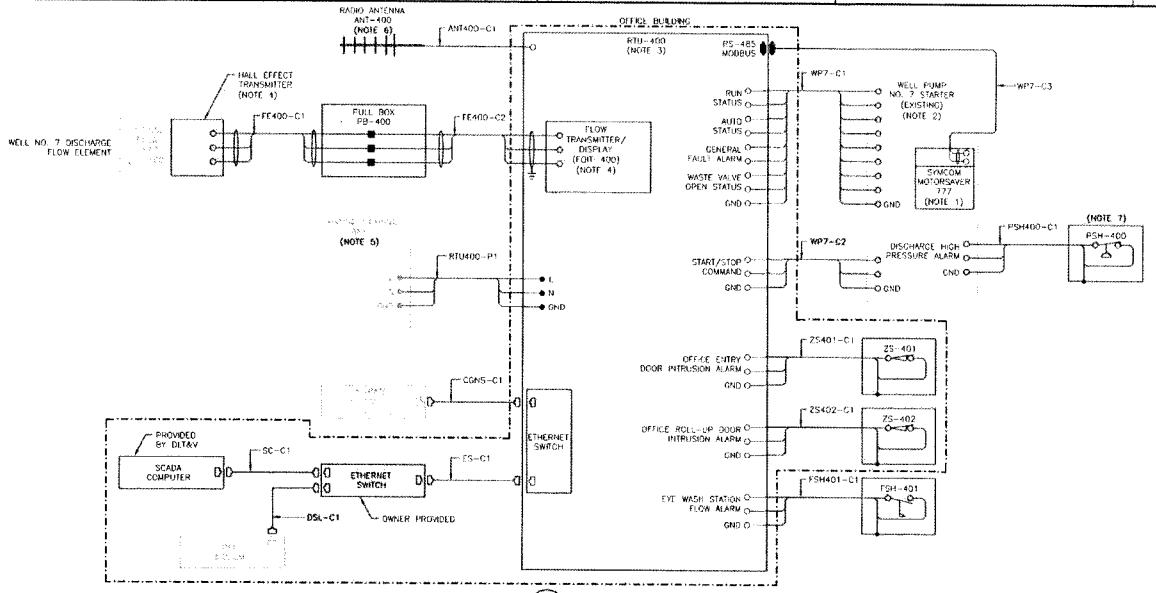
AZ WATER WHITE TANK SITES
SCADA DESIGN
SITE PLAN - WELL #7
(WAREHOUSE)

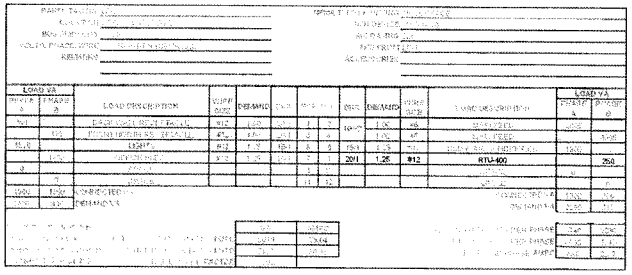
Scale	N.T.S., U.O.N.
Job No.	1400.00.100
CADD File No.	
Designed	SB
Drawn	JB
Checked	DN
Date	DECEMBER 2009
Sheet	E003

XREF: 1219_BRDR

DWG FILE: 1400.0.100_E003.dwg 2:49pm PLOTTED: Dec 30, 2009 johrens



A WAREHOUSE/WELL 7 – CONNECTION DIAGRAM



B WAREHOUSE/WELL 7 – LIGHTING PANEL

NOTES:

1. EXISTING SYMCOM 460 'MOTORSAVER' IS TO BE REPLACED WITH A SYMCOM 777 'MOTORSAVER', WHICH WILL BE UTILIZED TO MONITOR MOTOR CURRENT, VOLTAGE, AND KWH USAGE. PROVIDE & INSTALL RS-485 COMMUNICATION ADAPTER ON 777 (SYMCOM PART NO. RS485MS-2W).
2. PROVIDE MODIFICATIONS INSIDE EXISTING STARTER CABINET TO ALLOW RTU THE ABILITY TO MONITOR STATUSES AND ALARMS INDICATED ON CONNECTION DIAGRAM (E.G. RUN STATUS, AUTO STATUS, FAULT ALARM) VIA A 'SINGLE' N.O. DRY CONTACT FOR EACH POINT BEING MONITORED. PROVIDE MODIFICATIONS INSIDE EXISTING STARTER THAT WILL ALLOW A N.O. DRY CONTACT FROM THE RTU THE ABILITY TO START AND STOP THE PUMP WHEN THE CORRESPONSING STARTER IS IN 'AUTO' MODE. GENERAL FAULT ALARM IS TO BE COMPRISED OF ALL FAULT CONDITIONS THAT WILL SHUT THE PUMP DOWN DURING NORMAL OPERATION.
3. REFERENCE ASSOCIATED DETAILED RTU DRAWINGS FOR INFORMATION PERTAINING TO WIRING AND TERMINATIONS INSIDE RTU CABINET.
4. HALL EFFECT TRANSMITTER IS TO BE INCORPORATED INTO EXISTING PROPELLER FLOWMETER AND BE PROVIDED & INSTALLED BY OWNER (TRANSMITTER COMES WITH A 25' PIGTAIL STYLE SIGNAL CABLE). ASSOCIATED TRANSMITTER/DISPLAY IS TO BE PROVIDED BY OWNER, INSTALLED BY CONTRACTOR.
5. UTILIZE A SPARE 20A, 1P BREAKER INSIDE EXISTING LIGHTING PANEL TO PROVIDE POWER TO RTU CABINET. REFERENCE LIGHTING PANEL SCHEDULE BELOW.
6. ANTENNA 'ANT-400' IS TO BE A 10dB GAIN YAGI STYLE ANTENNA AND MANUFACTURED BY SCALA, MODEL TY-900 OR EQUAL. ASSOCIATED ANTENNA CABLE IS TO HAVE A MAXIMUM 3.9dB LOSS VALUE (@900MHz) PER 100' OF LENGTH AND BE MANUFACTURED BY TIMES MICROWAVE SYSTEMS, MODEL LMR-400 OR EQUAL.
7. REFERENCE INSTRUMENT INDEX ON SHEET E03 FOR MANUFACTURER/MODEL INFORMATION.

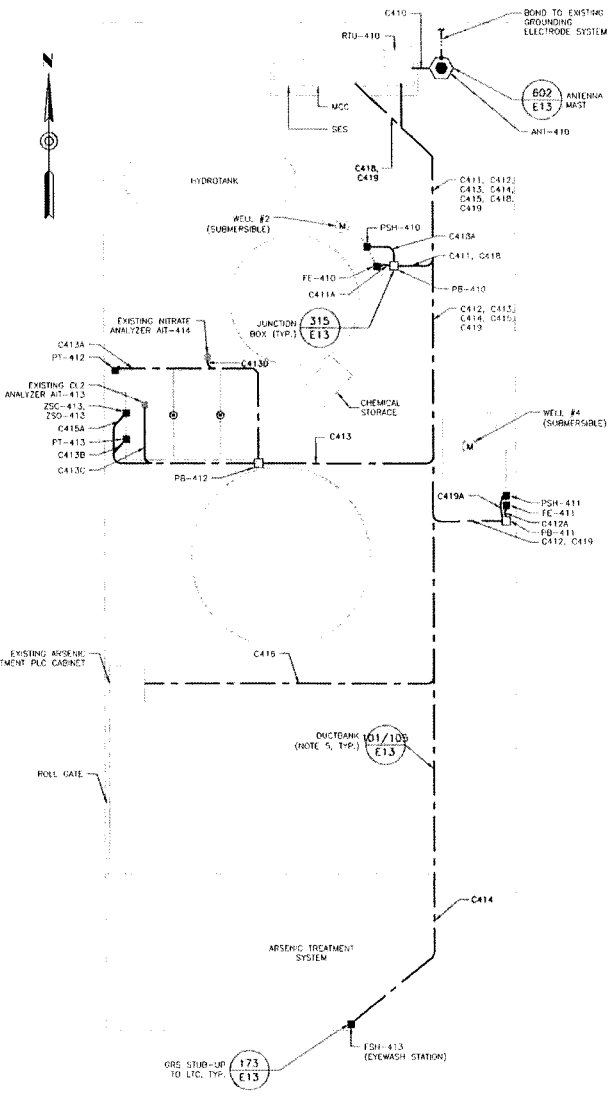
Expires 3/31/11

DLT&V SYSTEMS ENGINEERING

AZ WATER WHITE TANK SITES
SCADA DESIGN
SCHEM./CONN. DIAGRAM & PANEL
SCHEDULE–WAREHOUSE/WELL #7

Scale: N.T.S., U.O.N.
Job No.: 1400.00.100
CADD File No.:
Designed: SB
Drawn: TB
Checked: DN
Date: DECEMBER 2009
Sheet: E004

DWG FILE: 1408.0.100_E004.dwg 2:49pm PLOTTED: Dec 30, 2009 johnens



NOTES:

1. INFORMATION REFLECTED ON THIS DRAWING PERTAINING TO: RELATIVE EQUIPMENT LOCATIONS, ROUTING AND CONNECTIONS OF PROCESS PIPING AND ROUTINGS OF EXISTING CONDUITS IS APPROXIMATE AND SCHEMATIC IN NATURE.
2. CONDUIT #'S AND EQUIPMENT IDENTIFIERS (E.G. FE-101) REFLECTED ON THIS DRAWING HAVE BEEN GENERATED FOR ASSOCIATION PURPOSES WITHIN THIS DESIGN PACKAGE. THEY DO NOT REFLECT ACTUAL #'S OR IDENTIFIERS THAT MAY EXIST IN THE FIELD.
3. CONDUIT/DUCTBANK ROUTINGS SHOWN ARE APPROXIMATE. ACTUAL ROUTINGS ARE TO BE FIELD DETERMINED.
4. INSTRUMENT MOUNTING LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL MOUNTING LOCATIONS ARE TO BE VERIFIED/CONFIRMED BY OWNER.
5. DIRECT-BURIED DUCTBANK DETAIL 101 SHALL BE USED IN NON-VEHICULAR TRAFFIC AREAS ONLY. CONCRETE ENCASED DUCTBANK DETAIL 105 SHALL BE USED FOR ALL VEHICULAR TRAFFIC AREAS. AREA CLASSIFICATION TO BE CONFIRMED/VERIFIED BY OWNER.

Expires 3/31/11

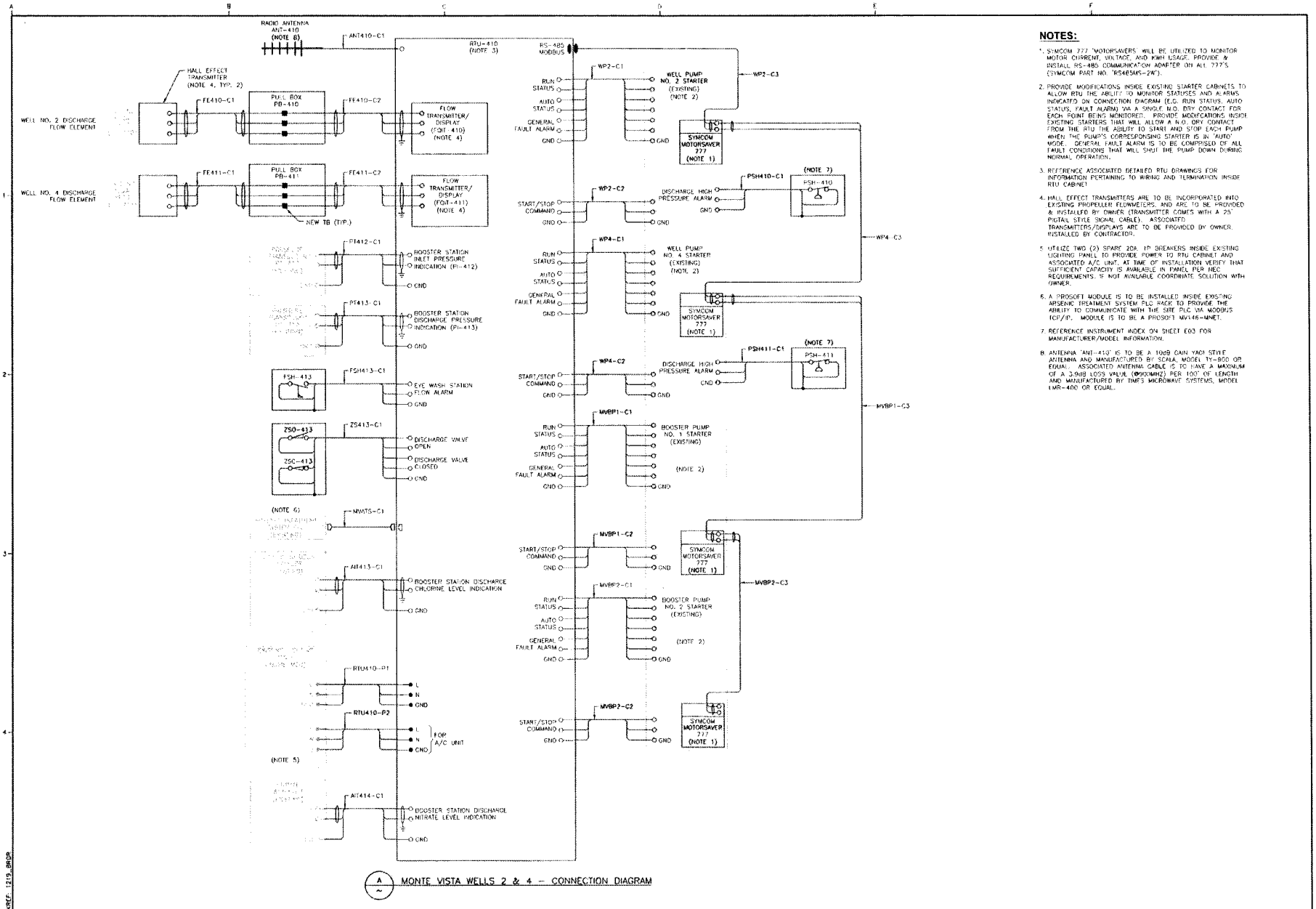
DLT&V SYSTEMS ENGINEERING

AZ WATER WHITE TANK SITES
SCADA DESIGN
SITE PLAN – WELLS 2 & 4
(MONTE VISTA)

Scale	N.T.S., U.O.N.
Job No.	1400.00.100
CADD File No.	
Designed	SB
Drawn	TB
Checked	DN
Date	DECEMBER 2009
Sheet	E005

XREF: 1219_GRDR

DWG FILE: 1400.0.100_E005.dwg 2:49pm PLOTTED: Dec 30, 2009 johnna



A MONTE VISTA WELLS 2 & 4 – CONNECTION DIAGRAM

NOTES:

1. SYMCOM 777 "MOTORSAVERS" WILL BE UTILIZED TO MONITOR MOTOR CURRENT, VOLTAGE, AND KWH USAGE. PROVIDE & INSTALL RS-485 COMMUNICATION ADAPTER ON ALL 777'S (SYMCOM PART NO. "RS485MS-2W").
2. PROVIDE MODIFICATIONS INSIDE EXISTING STARTER CABINETS TO ALLOW RTU THE ABILITY TO MONITOR STATUSES AND ALARMS INDICATED ON CONNECTION DIAGRAM (E.G. RUN STATUS, AUTO STATUS, FAULT ALARM) VIA A SINGLE N.O. DRY CONTACT FOR EACH POINT BEING MONITORED. PROVIDE MODIFICATIONS INSIDE EXISTING STARTERS THAT WILL ALLOW A N.O. DRY CONTACT FROM THE RTU THE ABILITY TO START AND STOP EACH PUMP WHEN THE PUMP'S CORRESPONSING STARTER IS IN 'AUTO' MODE. GENERAL FAULT ALARM IS TO BE COMPRISED OF ALL FAULT CONDITIONS THAT WILL SHUT THE PUMP DOWN DURING NORMAL OPERATION.
3. REFERENCE ASSOCIATED DETAILED RTU DRAWINGS FOR INFORMATION PERTAINING TO WIRING AND TERMINATION INSIDE RTU CABINET.
4. HALL EFFECT TRANSMITTERS ARE TO BE INCORPORATED INTO EXISTING PROPELLER FLOWMETERS, AND ARE TO BE PROVIDED & INSTALLED BY OWNER (TRANSMITTER COMES WITH A 25' PIGTAIL STYLE SIGNAL CABLE). ASSOCIATED TRANSMITTERS/DISPLAYS ARE TO BE PROVIDED BY OWNER, INSTALLED BY CONTRACTOR.
5. UTILIZE TWO (2) SPARE 20A 1P BREAKERS INSIDE EXISTING LIGHTING PANEL TO PROVIDE POWER TO RTU CABINET AND ASSOCIATED A/C UNIT. AT TIME OF INSTALLATION VERIFY THAT SUFFICIENT CAPACITY IS AVAILABLE IN PANEL PER NEC REQUIREMENTS. IF NOT AVAILABLE COORDINATE SOLUTION WITH OWNER.
6. A PROSOFT MODULE IS TO BE INSTALLED INSIDE EXISTING ARSENIC TREATMENT SYSTEM PLC RACK TO PROVIDE THE ABILITY TO COMMUNICATE WITH THE SITE PLC VIA MODBUS TCP/IP. MODULE IS TO BE A PROSOFT MVI46-MNET.
7. REFERENCE INSTRUMENT INDEX ON SHEET E03 FOR MANUFACTURER/MODEL INFORMATION.
8. ANTENNA "ANT-410" IS TO BE A 10dB GAIN YAGI STYLE ANTENNA AND MANUFACTURED BY SCALA, MODEL TY-900 OR EQUAL. ASSOCIATED ANTENNA CABLE IS TO HAVE A MAXIMUM OF A 3.9dB LOSS VALUE (@900MHz) PER 100' OF LENGTH AND MANUFACTURED BY TIMES MICROWAVE SYSTEMS, MODEL LMR-400 OR EQUAL.

DLT&V SYSTEMS ENGINEERING
3550 N. CENTRAL AVE, STE. 1900
PHOENIX, AZ 85012 T: (602) 240-6418

AZ WATER WHITE TANK SITES
SCADA DESIGN
SCHEM./CONN. DIAGRAM &
PANEL SCHEDULE – WELLS 2 & 4

Scale	N.T.S., U.O.N.
Job No.	1400.00.100
CADD File No.	
Designed	SB
Drawn	TB
Checked	DN
Date	DECEMBER 2009
Sheet	E006

Rev'd By Date

Expires 3/31/11

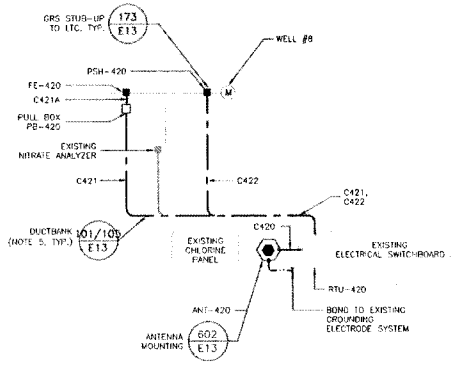
XREF: 1219_BASE

DWG FILE: 1400.0.100_E006.dwg 2:50pm PLOTTED: Dec 30, 2009 jahrens

NOTES:

1. INFORMATION REFLECTED ON THIS DRAWING PERTAINING TO: RELATIVE EQUIPMENT LOCATIONS, ROUTING AND CONNECTIONS OF PROCESS PIPING AND ROUTINGS OF EXISTING CONDUITS IS APPROXIMATE AND SCHEMATIC IN NATURE.
2. CONDUIT #'S AND EQUIPMENT IDENTIFIERS (E.G. FE-101) REFLECTED ON THIS DRAWING HAVE BEEN GENERATED FOR ASSOCIATION PURPOSES WITHIN THIS DESIGN PACKAGE. THEY DO NOT REFLECT ACTUAL #'S OR IDENTIFIERS THAT MAY EXIST IN THE FIELD.
3. CONDUIT/DUCTBANK ROUTINGS SHOWN ARE APPROXIMATE. ACTUAL ROUTINGS ARE TO BE FIELD DETERMINED.
4. INSTRUMENT MOUNTING LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL MOUNTING LOCATIONS ARE TO BE VERIFIED/CONFIRMED BY OWNER.
5. DIRECT-BURIED DUCTBANK DETAIL 101 SHALL BE USED IN NON-VEHICULAR TRAFFIC AREAS ONLY. CONCRETE ENCASED DUCTBANK DETAIL 105 SHALL BE USED FOR ALL VEHICULAR TRAFFIC AREAS. AREA CLASSIFICATION TO BE CONFIRMED/VERIFIED BY OWNER.

XFMR



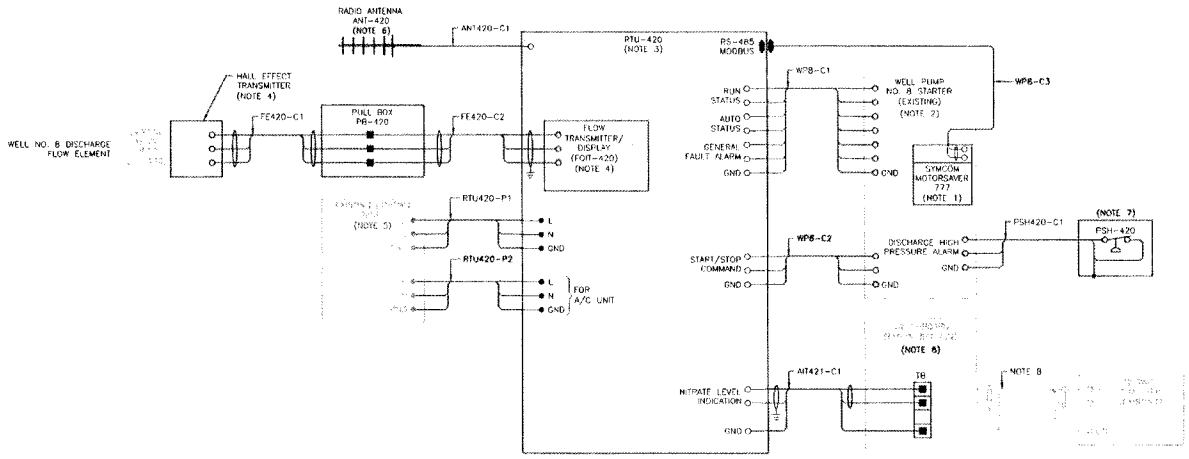
Rev #	By	Date

Expires 3/31/11

DL T&V
SYSTEMS ENGINEERING
3800 N. CENTRAL AVE., STE. 1400
PHOENIX, ARIZONA 85012 (602) 264-6831

AZ WATER WHITE TANK SITES
SCADA DESIGN
SITE PLAN
WELL #8

Scale	N.T.S., U.O.N.
Job No.	1400.00.100
CADD File No.	
Designed	SB
Drawn	TB
Checked	DN
Date	DECEMBER 2009
Sheet	E007



A WELL 8 – CONNECTION DIAGRAM

NOTES:

1. EXISTING SYMCOM 460 'MOTORSAVER' IS TO BE REPLACED WITH A SYMCOM 777 'MOTORSAVER', WHICH WILL BE UTILIZED TO MONITOR MOTOR CURRENT, VOLTAGE, AND KWH USAGE. PROVIDE & INSTALL RS-485 COMMUNICATION ADAPTER ON 777 (SYMCOM PART NO. "RS485MS-2W").
2. PROVIDE MODIFICATIONS INSIDE EXISTING STARTER CABINET TO ALLOW RTU THE ABILITY TO MONITOR STATUSES AND ALARMS INDICATED ON CONNECTION DIAGRAM (E.G. RUN STATUS, AUTO STATUS, FAULT ALARM) VIA A SINGLE N.O. DRY CONTACT FOR EACH POINT BEING MONITORED. PROVIDE MODIFICATIONS INSIDE EXISTING STARTER THAT WILL ALLOW A N.O. DRY CONTACT FROM THE RTU THE ABILITY TO START AND STOP THE PUMP WHEN THE CORRESPONDING STARTER IS IN "AUTO" MODE. GENERAL FAULT ALARM IS TO BE COMPRISED OF ALL FAULT CONDITIONS THAT WILL SHUT THE PUMP DOWN DURING NORMAL OPERATION.
3. REFERENCE ASSOCIATED DETAILED RTU DRAWINGS FOR INFORMATION PERTAINING TO WIRING AND TERMINATIONS INSIDE RTU CABINET.
4. HALL EFFECT TRANSMITTER IS TO BE INCORPORATED INTO EXISTING PROPELLER FLOWMETER, AND PROVIDED & INSTALLED BY OWNER (TRANSMITTER COMES WITH A 25' PIGTAIL STYLE SIGNAL CABLE). ASSOCIATED TRANSMITTER/DISPLAY IS TO BE PROVIDED BY OWNER, INSTALLED BY CONTRACTOR.
5. UTILIZE TWO (2) SPARE 20A, 1P BREAKERS INSIDE EXISTING LIGHTING PANEL TO PROVIDE POWER TO RTU CABINET AND ASSOCIATED A/C UNIT. REFERENCE LIGHTING PANEL SCHEDULE BELOW.
6. ANTENNA "ANT-420" IS TO BE A 10dB OMNI YAGI STYLE ANTENNA AND MANUFACTURED BY SCALA, MODEL TY-900 OR EQUAL. ASSOCIATED ANTENNA CABLE IS TO HAVE A MAXIMUM 3.9dB LOSS VALUE (@900MHz) PER 100' OF LENGTH AND MANUFACTURED BY TIMES MICROWAVE SYSTEMS, MODEL LMR-400 OR EQUAL.
7. REFERENCE INSTRUMENT INDEX ON SHEET E03 FOR MANUFACTURER/MODEL INFORMATION.
8. ADD TERMINAL BLOCK STRIP TO EMPTY SECTION OF EXISTING SWITCHBOARD. TERMINATE EXISTING WIRING FROM NITRATE ANALYZER TO NEW TERMINAL BLOCK STRIP AND PULL NEW WIRING FROM NEW TERMINAL BLOCK STRIP TO RTU-420.

LOADS												LOADS	
A	B	LOAD DESCRIPTION	CKT NO.	BREAKER	AMP	P	S	POLE	DEMAND	WIRE SIZE	LOAD DESCRIPTION	A	B
		SPACE				1					SPACE		
		SPACE				3					SPACE		
		SPACE				5					SPACE		
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
266		RTU-420	#12	1.25		14	201	1.25	#12	#12	RTU-420 A/C	1823	
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
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B WELL 8 – PANEL SCHEDULE

Rev'd	by	Date

DLT&V
SYSTEMS ENGINEERING
2936 N. CENTRAL AVE, STE. 1000
PHOENIX, AZ 85012 (602) 604-0888

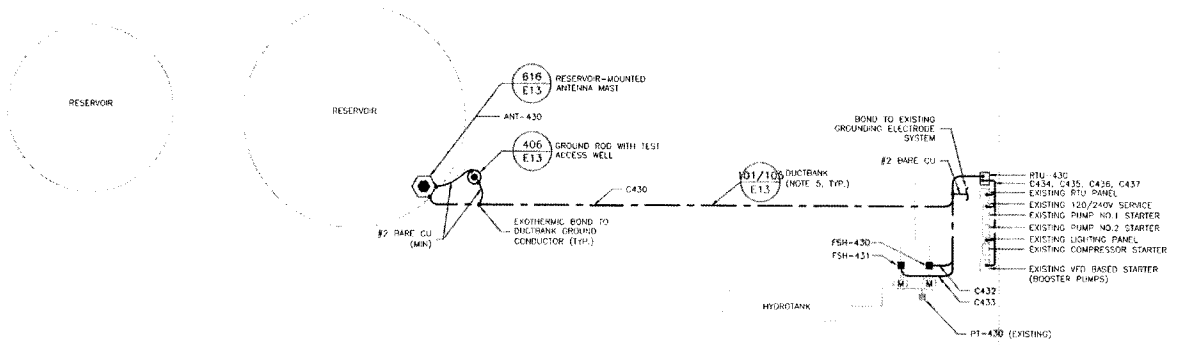
AZ WATER WHITE TANK SITES
SCADA DESIGN
SCHEM./CONN. DIAGRAM &
PANEL SCHEDULE-WELL#8

Scale	N.T.S., U.O.N.
Job No.	1400.00.100
CADD File No.	
Designed	SB
Drawn	TB
Checked	DN
Date	DECEMBER 2009
Sheet	E008

DWG FILE: 1400.0.100_E008.dwg 2:50pm PLOTTED: Dec 30, 2009 johnsrs

NOTES:

1. INFORMATION REFLECTED ON THIS DRAWING PERTAINING TO: RELATIVE EQUIPMENT LOCATIONS, ROUTING AND CONNECTIONS OF PROCESS PIPING AND ROUTINGS OF EXISTING CONDUITS IS APPROXIMATE AND SCHEMATIC IN NATURE.
2. CONDUIT #'S AND EQUIPMENT IDENTIFIERS (E.G. TE-101) REFLECTED ON THIS DRAWING HAVE BEEN GENERATED FOR ASSOCIATION PURPOSES WITHIN THIS DESIGN PACKAGE. THEY DO NOT REFLECT ACTUAL #'S OR IDENTIFIERS THAT MAY EXIST IN THE FIELD.
3. CONDUIT/DUCTBANK ROUTINGS SHOWN ARE APPROXIMATE. ACTUAL ROUTINGS ARE TO BE FIELD DETERMINED.
4. INSTRUMENT MOUNTING LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL MOUNTING LOCATIONS ARE TO BE VERIFIED/CONFIRMED BY OWNER.
5. DIRECT-BURIED DUCTBANK DETAIL 101 SHALL BE USED IN NON-VEHICULAR TRAFFIC AREAS ONLY. CONCRETE ENCASED DUCTBANK DETAIL 105 SHALL BE USED FOR ALL VEHICULAR TRAFFIC AREAS. AREA CLASSIFICATION TO BE CONFIRMED/VERIFIED BY OWNER.



DWG FILE: 1400.0.100_E009.dwg 2:50pm PLOTTED: Dec 30, 2009 jahrens

VREF: 1219_BASE

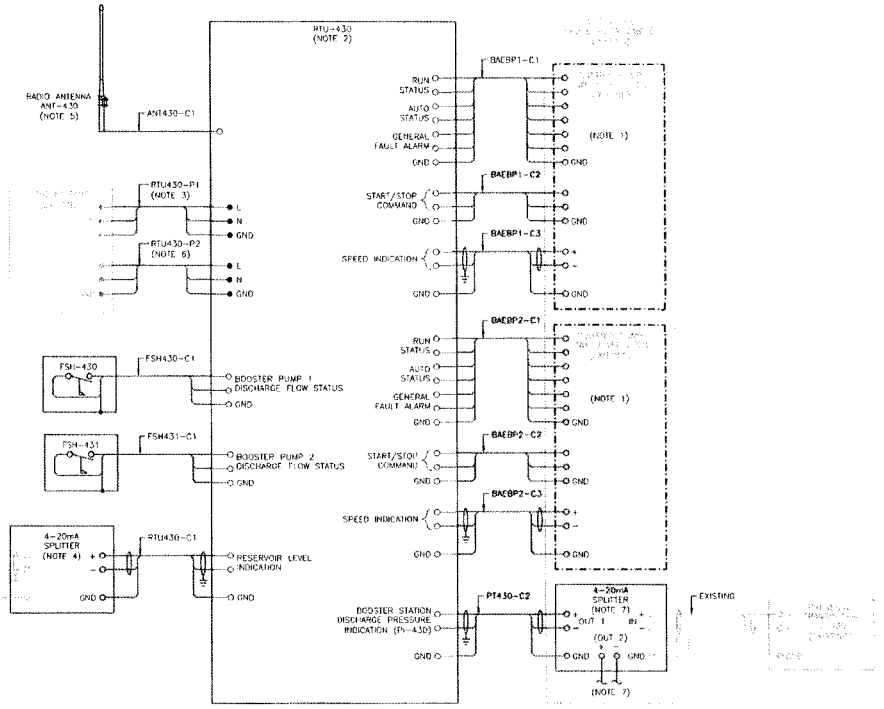
Rev.	By	Date

Expires 3/31/11

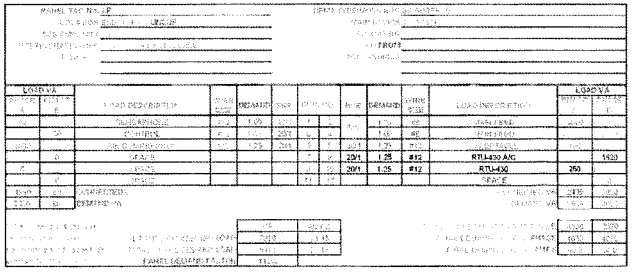
DLT&V SYSTEMS ENGINEERING

AZ WATER WHITE TANK SITES
SCADA DESIGN
SITE PLAN
BEAUTIFUL ARIZONA ESTATES

Scale	N.T.S. U.O.N.
Job No.	1400.00.100
CADD File No.	
Designed	SB
Drawn	TB
Checked	DN
Date	DECEMBER 2009
Sheet	E009



A BEAUTIFUL ARIZONA ESTATES – CONNECTION DIAGRAM



B BEAUTIFUL ARIZONA ESTATES – LIGHTING PANEL

NOTES:

1. PROVIDE MODIFICATIONS INSIDE EXISTING VFD STARTER CABINET TO ALLOW RTU THE ABILITY TO MONITOR STATUSES AND ALARMS INDICATED ON CONNECTION DIAGRAM (E.G. RUN STATUS, AUTO STATUS, FAULT ALARM) VIA A SINGLE N.O. DRY CONTACT FOR EACH POINT BEING MONITORED. GENERAL FAULT ALARM IS TO BE COMPRISED OF ALL FAULT CONDITIONS THAT WILL SHUT THE PUMP DOWN DURING NORMAL OPERATION.
2. REFERENCE ASSOCIATED DETAILED RTU DRAWINGS FOR INFORMATION PERTAINING TO WIRING AND TERMINATIONS INSIDE NEW RTU CABINET.
3. ADD 20A, 1P BREAKER INSIDE EXISTING LIGHTING PANEL, CKT. 10 TO PROVIDE POWER TO RTU CABINET. REFERENCE LIGHTING PANEL SCHEDULE BELOW.
4. PROVIDE ANALOG SPLITTER WITHIN EXISTING RTU PANEL TO COMMUNICATE RESERVOIR LEVEL FROM EXISTING RESERVOIR LEVEL TRANSMITTER TO NEW RTU-430.
5. ANTENNA ANT-430 IS TO BE AN OMNI-DIRECTIONAL STYLE ANTENNA WITH 6dB GAIN AND MANUFACTURED BY SCALA, MODEL OCB6-900 OR EQUAL. ASSOCIATED ANTENNA CABLE IS TO HAVE A MAXIMUM 2.5dB LOSS VALUE (@900MHZ) PER 100' OF LENGTH AND MANUFACTURED BY TIMES MICROWAVE SYSTEMS, MODEL LMR-600 OR EQUAL.
6. ADD 20A, 1P BREAKER INSIDE EXISTING LIGHTING PANEL, CKT. 8 TO PROVIDE POWER TO RTU CABINET A/C UNIT. REFERENCE LIGHTING PANEL SCHEDULE BELOW.
7. ADD 4-20mA SPLITTER TO EXISTING VFD STARTER CABINET. CONNECT EXISTING PRESSURE TRANSMITTER WIRING TO SPLITTER INPUT. CONNECT (1) OUTPUT OF SPLITTER TO TERMINALS IN WHICH ORIGINAL PT WIRING WAS REMOVED FROM. REMAINING OUTPUT IS TO BE WIRED TO NEW RTU (RTU-430) AS SHOWN.

Expires 3/31/11

DL T&V
SYSTEMS ENGINEERING

AZ WATER WHITE TANK SITES
SCADA DESIGN
SCHEM./CONN. DIA. & PANEL
SCHED–BEAUTIFUL AZ ESTATES

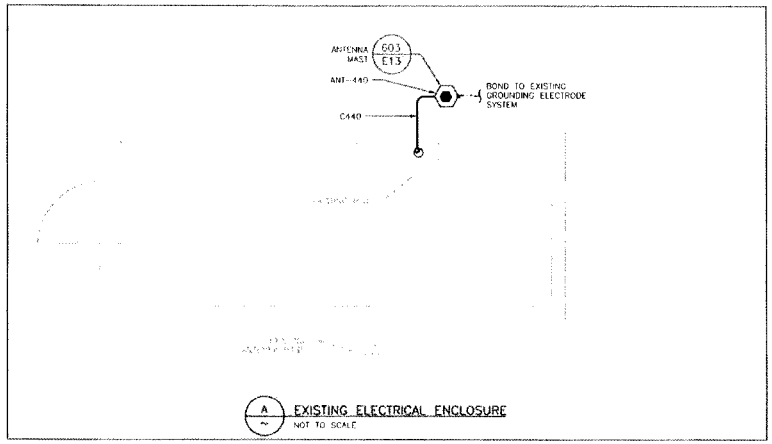
Scale: N.T.S., U.O.N.
Job No. 1400.00.160
CADD File No.
Designed: SB
Drawn: TB
Checked: DN
Date: DECEMBER 2009
Sheet: E010

XREF: '219_BRDR'

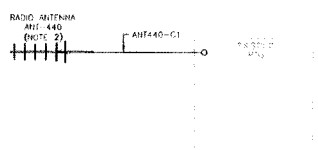
DWG FILE: 1400.0.160_E010.dwg 2:50pm PLOTTED: Dec 30, 2009 jahrens

NOTES:

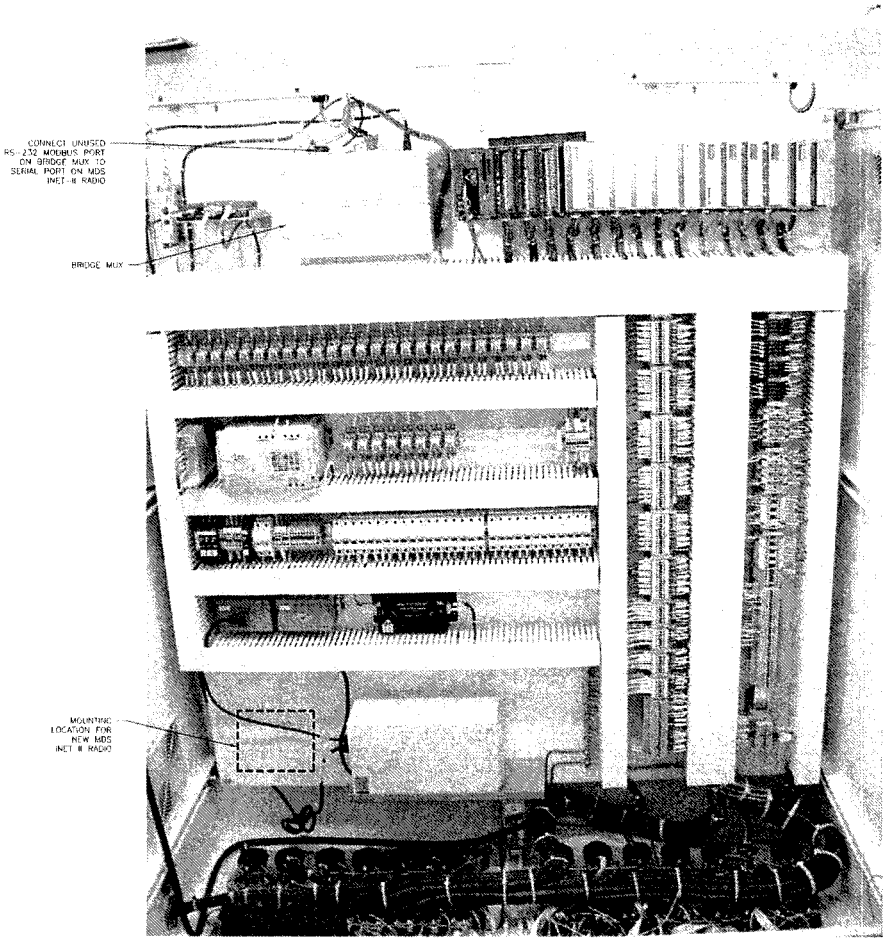
1. SUPPLY POWER TO NEW MDS INET II RADIO FROM EXISTING 24VDC POWER SUPPLY UTILIZING SPARE FUSE. INSTALL MDS INET II RADIO ACCORDING TO MANUFACTURER'S INSTRUCTIONS USING SURGE SUPPRESSOR. SURGE SUPPRESSOR MANUFACTURER AND MODEL NUMBER SHALL BE POLYPHASER IS-50NX-C2 BROADBAND COAXIAL SURGE PROTECTOR, FLANGE MOUNT, 125-1000MHZ OR EQUAL.
2. ANTENNA 'ANT-440' IS TO BE A 10dB GAIN YAGI STYLE ANTENNA AND IS TO BE AS MANUFACTURED BY SCALA, MODEL TY-900 OR EQUAL. ASSOCIATED ANTENNA CABLE IS TO HAVE A MAXIMUM OF A 3.9dB LOSS VALUE (@900MHZ) PER 100' OF LENGTH AND IS TO BE AS MANUFACTURED BY TIMES MICROWAVE SYSTEMS, MODEL LMR-400 OR EQUAL.



A EXISTING ELECTRICAL ENCLOSURE
NOT TO SCALE



B BLUE HORIZONS - CONNECTION DIAGRAM



C EXISTING RTU CABINET - NEW ADDITIONS
NOT TO SCALE

Rev'd	By	Date

Expires 3/31/11

DLT&V SYSTEMS ENGINEERING
3550 N. CENTRAL AVE. STE. 1900
PHOENIX, AZ 85012 (602) 266-4666

AZ WATER WHITE TANK SITES
SCADA DESIGN
PANEL LAYOUT & SITE
MODIFICATIONS - BLUE HORIZONS

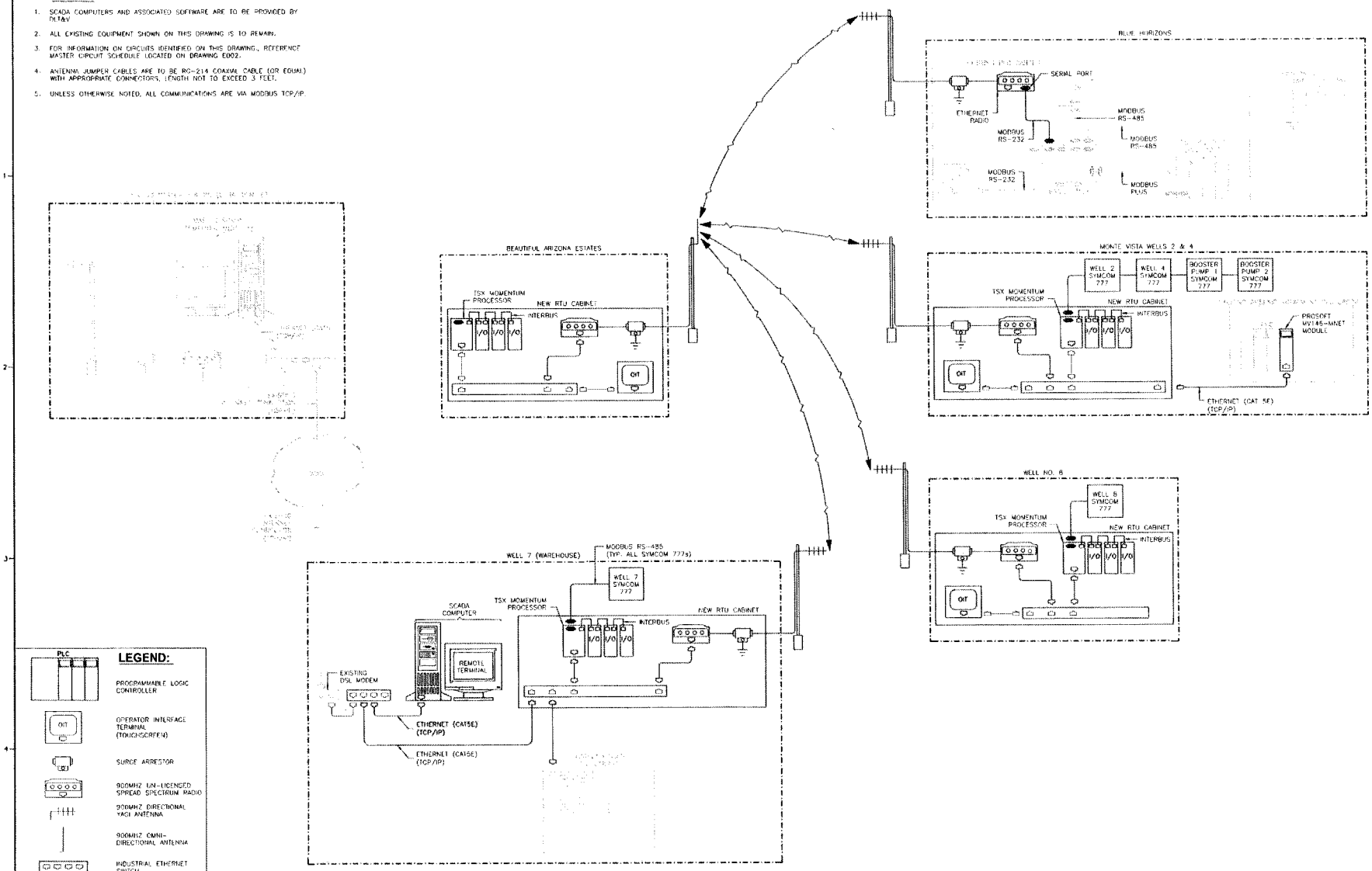
Scale	N.T.S., U.O.N.
Job No.	1400.00.100
CADD File No.	
Designed	SB
Drawn	TB
Checked	DN
Date	DECEMBER 2009
Sheet	E011

XREF: 1219_BRGR

DWG FILE: 1400.0.100_E011.dwg 2:51pm PLOTTED: Dec 30, 2009 johrens

NOTES:

1. SCADA COMPUTERS AND ASSOCIATED SOFTWARE ARE TO BE PROVIDED BY DLT&V
2. ALL EXISTING EQUIPMENT SHOWN ON THIS DRAWING IS TO REMAIN.
3. FOR INFORMATION ON CIRCUITS IDENTIFIED ON THIS DRAWING, REFERENCE MASTER CIRCUIT SCHEDULE LOCATED ON DRAWING E002.
4. ANTENNA JUMPER CABLES ARE TO BE RG-214 COAXIAL CABLE (OR EQUAL) WITH APPROPRIATE CONNECTORS, LENGTH NOT TO EXCEED 3 FEET.
5. UNLESS OTHERWISE NOTED, ALL COMMUNICATIONS ARE VIA MODBUS TCP/IP.



LEGEND:

- PLC — PROGRAMMABLE LOGIC CONTROLLER
- OIT — OPERATOR INTERFACE TERMINAL (TOUCHSCREEN)
- SURGE ARRESTOR
- 900MHZ UN-LICENSED SPREAD SPECTRUM RADIO
- 900MHZ DIRECTIONAL YAGI ANTENNA
- 900MHZ OMNI-DIRECTIONAL ANTENNA
- INDUSTRIAL ETHERNET SWITCH
- 900 MHZ RADIO LINK
- EXISTING
- NEW

XREF: 1219_BRDR

DWG FILE: 1400.0.100_E012.dwg 2:51pm PLOTTED: Dec 30, 2009 johrens

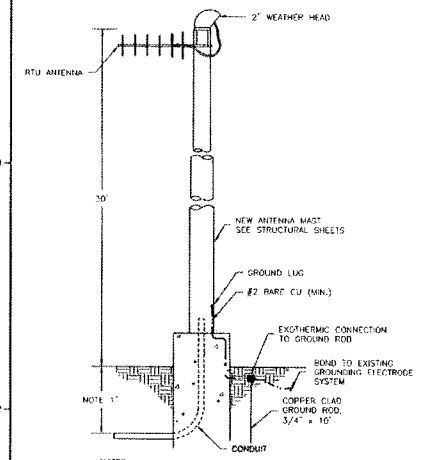
Rev'd	By	Date

Expires 3/31/11

DLT&V SYSTEMS ENGINEERING
3550 N. CENTRAL AVE., STE. 1900
PHOENIX, AZ 85012 (602) 266-4658

AZ WATER WHITE TANK SITES SCADA DESIGN SYSTEM COMMUNICATIONS DIAGRAM

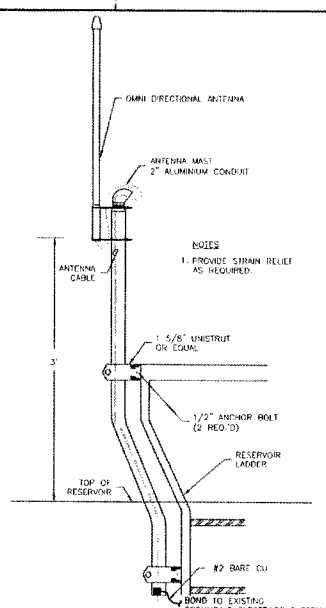
Scale	N.T.S., U.O.N.
Job No.	1400.00.100
CADD File No.	
Designed	SB
Drawn	TB
Checked	DN
Date	DECEMBER 2009
Sheet	E012



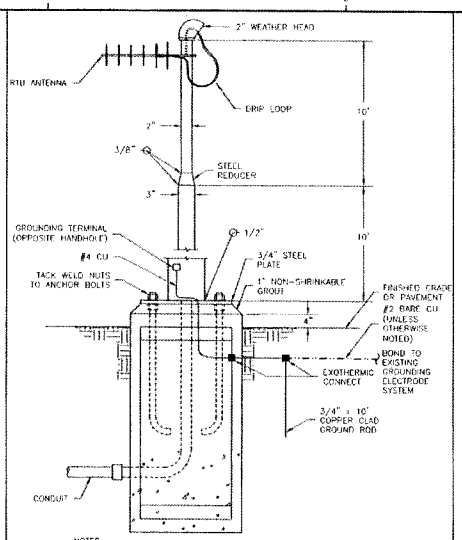
NOTES:

1. CONTRACTOR SHALL SUBMIT FINAL ANTENNA MAST AND CONCRETE BASE DRAWINGS SEALED BY STRUCTURAL ENGINEER.

603 TYP — ANTENNA MAST ELEVATION
NOT TO SCALE



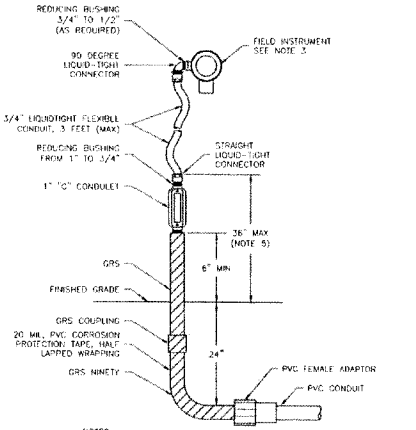
616 TYP — RESERVOIR MOUNTED ANTENNA MAST
NOT TO SCALE



NOTES:

1. CONTRACTOR SHALL SUBMIT FINAL ANTENNA MAST AND CONCRETE BASE DRAWINGS SEALED BY STRUCTURAL ENGINEER.
2. STEEL PIPE TO BE PRIMED AND PAINTED TO THE OWNERS SPECIFICATION.
3. J-BOLTS, NUTS, AND WASHERS SHALL BE STAINLESS STEEL.

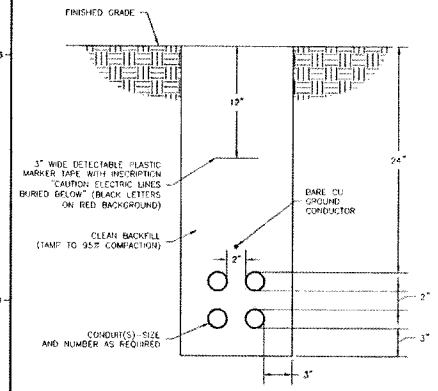
602 TYP — ANTENNA POLE MOUNTING SHORT BASE
NOT TO SCALE



NOTES:

1. WHERE CONDUITS ARE INSTALLED IN A CONCRETE SLAB, THE 24" DIMENSION DOES NOT APPLY. CONDUITS SHALL BE INSTALLED BETWEEN REBAR MATS OR UNDER A SINGLE REBAR MAT.
2. IN CORROSIVE AREAS, PVC COATED GRS SHALL BE USED.
3. MOUNT INSTRUMENT AS PER MANUFACTURERS' RECOMMENDATIONS.
4. INSULATE WATER LINES AND TRANSMITTER TO PREVENT FREEZING.
5. SUPPORT AS REQUIRED FOR DISTANCES GREATER THAN 36".

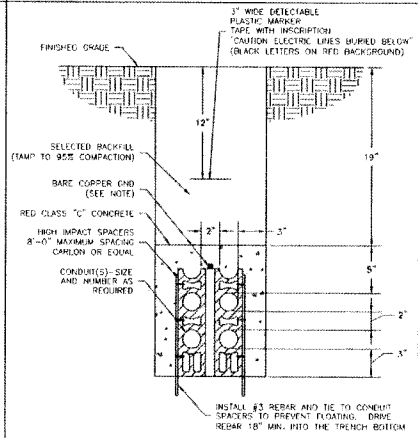
173 TYP — GRS STUB-UP TO LTC DETAIL
NOT TO SCALE



NOTES:

1. GROUND CONDUCTOR SHALL RUN CONTINUOUSLY THROUGH MANHOLES AND SHALL CONTINUE FROM DUCTBANK INTO SWITCHGEAR OR BUILDING GROUNDING SYSTEM AND SHALL BE BONDED TO EACH RIGID METAL CONDUIT. SIZE TO BE #4/0 UNLESS OTHERWISE INDICATED ON PLANS.
2. ALL DIMENSIONS ARE MINIMUM.

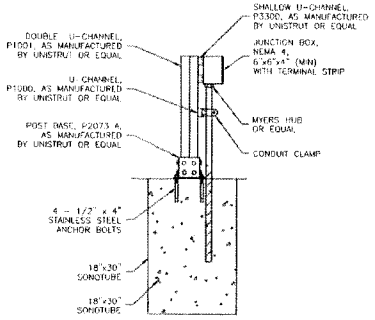
101 TYP — DUCTBANK - DIRECT BURIED
NOT TO SCALE
UTILIZE IN NON-VEHICULAR AREAS



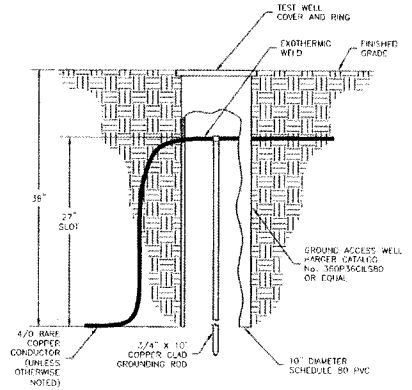
NOTES:

1. GROUND CONDUCTOR SHALL RUN CONTINUOUSLY THROUGH MANHOLES AND SHALL CONTINUE FROM DUCTBANK INTO SWITCHGEAR OR BUILDING GROUNDING SYSTEM AND SHALL BE BONDED TO EACH RIGID METAL CONDUIT. SIZE TO BE #4/0 UNLESS OTHERWISE INDICATED ON PLANS.
2. ALL DIMENSIONS ARE MINIMUM.

105 TYP — DUCTBANK - CONCRETE ENCASED
NOT TO SCALE
UTILIZE IN VEHICULAR AREAS



315 TYP — JUNCTION BOX MOUNTING DETAIL
NOT TO SCALE



406 TYP — GROUND ROD WITH TEST ACCESS WELL
NOT TO SCALE

DWG FILE: 1400.0.100_E013.dwg 2:51pm PLOTTED: Dec 30, 2009 johnens
XREF: 1219_BROP

Rev'd By: TGM

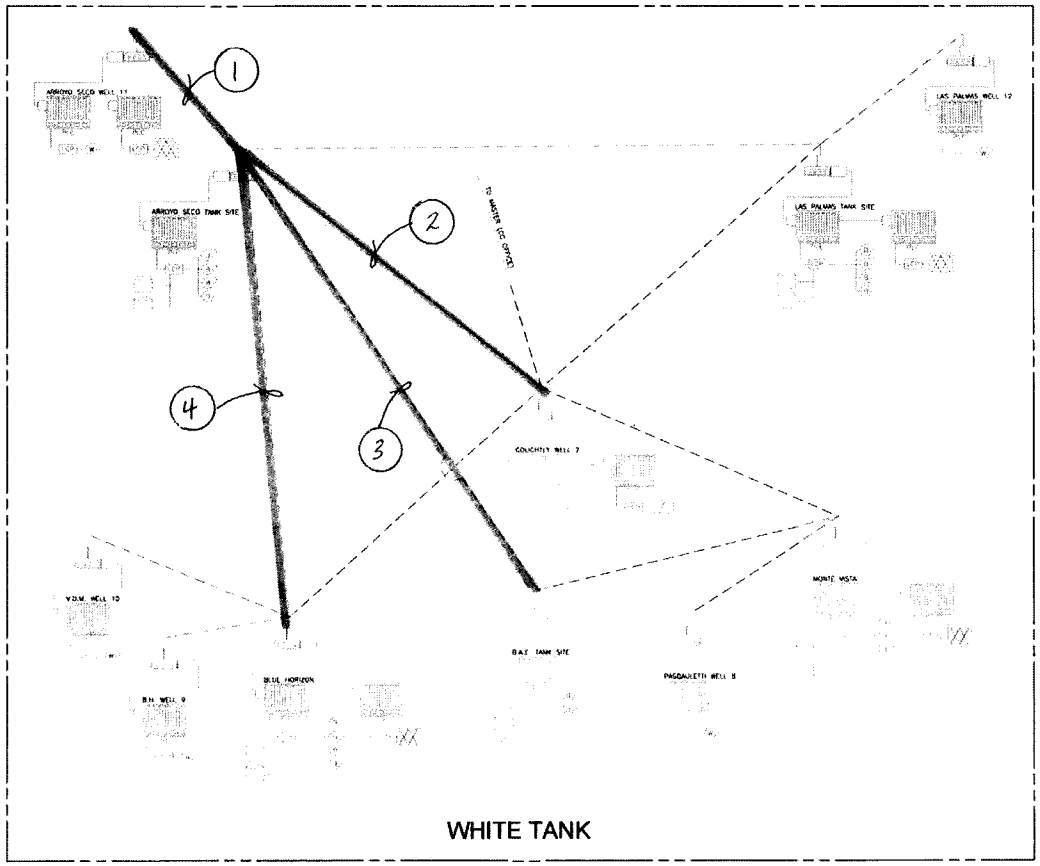
Expires 3/31/11

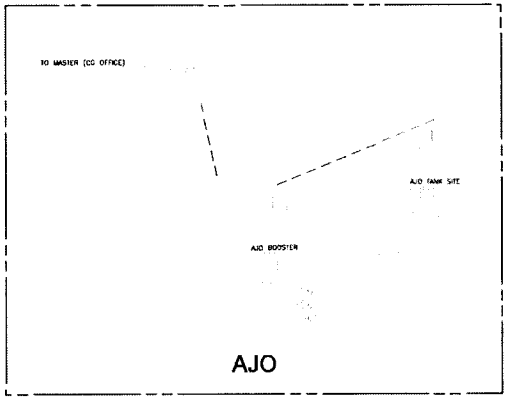
DLT&V
SYSTEMS ENGINEERING
3383 N. CENTRAL AVE., STE. 1400
PHOENIX, AZ 85012 (602) 433-0333

AZ WATER WHITE TANK SITES
SCADA DESIGN
INSTALLATION DETAILS

Scale	N.T.S., U.O.N.
Job No.	1400.00.100
CADD File No.	
Designed	SB
Drawn	TB
Checked	DN
Date	DECEMBER 2009
Sheet	E013

ARIZONA WATER COMPANY
CASA GRANDE DIVISION SCADA COMMUNICATIONS SCHEMATIC
SHEET 1 OF 1





LEGEND:

- RADIO COMMUNICATION PATH
- SCADA COMPUTER
- 900 MHz RADIO
- CELLULAR MODEM
- OMNI DIRECTIONAL ANTENNA
- YAGI DIRECTIONAL ANTENNA
- WELL PUMP
- BOOSTER PUMP
- WATER STORAGE TANK
- ARSENIC REMOVAL FACILITY
- ARSENIC/NITRATE REMOVAL FACILITY
- NITRATE REMOVAL FACILITY
- EX. SCADA COMMUNICATION
- NEW SCADA COMMUNICATION (2013)
- FUTURE SCADA COMMUNICATION
- FUTURE FACILITY

ABREVIATIONS:

PLC - PROGRAMMABLE LOGIC CONTROLLER
HMI - HUMAN MACHINE INTERFACE

REVISIONS: LATEST REVISION: 10-11-2013

The installation shown is to be installed in accordance with the Arizona Water Company standard specifications on file with the Arizona Department of Environmental Quality

263-1100
1-800-STAKE-IT

DATE	3-6-2013
SCALE	N.T.S.
DRAWN BY	JPK
CHECKED BY	
SEC.	-T. R.

ARIZONA WATER COMPANY
3805 N. BLACK CANYON HWY. POST OFFICE BOX 29006
PHOENIX, ARIZONA 85038-9006
(602) 240-6860

PROJECT DESC: CASA GRANDE DIVISION SCADA SCHEMATIC
PROJECT SHEET DESC: WHITE TANK, AJO

DWG No

SHEET 1 OF 1

ARIZONA WATER COMPANY

WHITE TANK SCADA

PROJECT NO. 1-5032

SUBMITTAL

FINAL RTU DRAWINGS

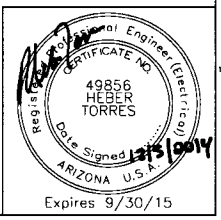
LECO JOB NO. 4000.17
JANUARY 2015

Submittal #001B

LUDVIK ELECTRIC

1020 E. University Drive, Phoenix, AZ 85034 • Telephone (602) 777-5000 • Fax (602) 602-258-0782
AZ Licenses: 088575 (L-11); 127121 (A-17)

ARIZONA WATER COMPANY
WHITE TANKS WATER SYSTEM SCADA DESIGN
BEAUTIFUL ARIZONA ESTATES



DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE. SUITE 915
PHOENIX, AZ 85012 p. 602.265-4658

Rev'd	By	Date	Description

AWC WHITE TANKS SCADA PROJECT
BEAUTIFUL ARIZONA ESTATES
COVER SHEET

Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_BAE_EC01.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC01

XREF: DLIV_BORDER_22X34

PLOTTED: 12/7/2014 1:05 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\BEAUTIFUL ARIZONA ESTATES\1834.00.101_BAE_EC01.DWG

DRAWING INDEX

Drawing No.	Drawing Title
EC01	COVER SHEET
EC02	DRAWING INDEX, STANDARD SYMBOLS, LEGENDS, AND ISA TABLE
EC03	BILL OF MATERIALS
EC04	PLC CABINET ENCLOSURE LAYOUT AND NAMEPLATE SCHEDULE
EC05	TERMINAL BLOCK AND DEVICE DETAILS
EC06	COMMUNICATION SYSTEM ARCHITECTURE DIAGRAM
EC07	POWER DISTRIBUTION SCHEMATIC
EC08	WIRING DIAGRAMS DI-1 AND DI-2
EC09	WIRING DIAGRAMS AI-1

SCHEMATIC/WIRING DIAGRAM SYMBOLS

- CIRCUIT BREAKER
- FUSE WITH PULLER *A – AMP RATING
- SWITCH NORMALLY OPEN
- SELECTOR SWITCH 2 POSITION, NORMALLY OPEN
- SELECTOR SWITCH 3 POSITION, NORMALLY OPEN
- TEMPERATURE SWITCH NORMALLY OPEN
- SINGLE LEVEL TERMINAL BLOCK * – TB IDENTIFICATION
- DOUBLE LEVEL TERMINAL BLOCK * – TB IDENTIFICATION
- TERMINAL BLOCK W/ FUSE PLUG AND FUSE * – TB IDENTIFICATION ** – FUSE AMPS
- TERMINAL BLOCK W/ DISCONNECT KNIFE * – TB IDENTIFICATION
- SURGE SUPPRESSOR FOR FLOATING SIGNAL CIRCUITS * – SS NUMBER IDENTIFICATION
- SURGE SUPPRESSOR FOR POWER SUPPLY * – SS NUMBER IDENTIFICATION
- CONTROL RELAY * – CR NUMBER IDENTIFICATION # – TERMINAL NUMBER
- EARTH GROUND
- DUPLEX RECEPTACLE
- SINGLE RECEPTACLE
- DC POWER SUPPLY * – DC VOLTAGE RATING

COLOR CODE CHART FOR 18 AWG BELDEN CABLES 12 COND. NO. 8466 AND 19 COND. NO. 8619

BLACK	BLK	1st
WHITE	WHT	2nd
RED	RED	3rd
GREEN	GRN	4th
ORANGE	ORN	5th
BLUE	BLU	6th
WHITE/BLACK	WHT/BLK	7th
RED/BLACK	RED/BLK	8th
GREEN/BLACK	GRN/BLK	9th
ORANGE/BLACK	ORN/BLK	10th
BLUE/BLACK	BLU/BLK	11th
BLACK/WHITE	BLK/WHT	12th
RED/WHITE	RED/WHT	13th
GREEN/WHITE	GRN/WHT	14th
BLUE/WHITE	BLU/WHT	15th
BLACK/RED	BLK/RED	16th
WHITE/RED	WHT/RED	17th
ORANGE/RED	ORN/RED	18th
BLUE/RED	BLU/RED	19th

WIRE SIZES

(CIRCUIT WIRING SHALL BE RATED IN ACCORDANCE WITH THE MAXIMUM PERMITTED AMPERE RATING/SETTING OF THE OVERCURRENT PROTECTION DEVICE. N.E.C. 210-3)

120VAC / 20A POWER CIRCUIT – MIN. #12 AWG.
120VAC / 15A AND BELOW – MIN. #14 AWG.

24VDC / 20A POWER CIRCUIT – MIN. #12 AWG.
24VDC / 15A AND BELOW – MIN. #16 AWG.
24VDC I/O & SIGNAL CIRCUIT – MIN. #18 AWG.

4-20mADC I/O SIGNAL CIRCUIT – MIN. #18 AWG.

ABBREVIATIONS

A/R	AS REQUIRED
AC COM	NEUTRAL
AFF	ABOVE FINISHED FLOOR
AI	ANALOG INPUT
ANL COM	ANALOG COMMON
AO	ANALOG OUTPUT
AWG	AMERICAN WIRE GAUGE
BLK	BLACK
BLU	BLUE
CAP	CENTRAL ARIZONA PROJECT
CLR	CLEAR
CR	CONTROL RELAY
DC COM	DC COMMON
DC+	DC POSITIVE POTENTIAL
DI	DISCRETE INPUT
DO	DISCRETE OUTPUT
DS	DOOR SWITCH
FOM	FIBER OPTIC MODEM
FOT	FIBER OPTIC TRANSCEIVER
GND	GROUND
GRN	GREEN
I/O	INPUT/OUTPUT
L	LINE
N	NEUTRAL
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NP	NAMEPLATE
OIT	OPERATOR INTERFACE TERMINAL
ORN	ORANGE
PDB	POWER DISTRIBUTION BLOCK
PLC	PROGRAMMABLE LOGIC CONTROLLER
PP	FIBER OPTIC PATCH PANEL
PS	POWER SUPPLY
REC	RECEPTACLE
RES	RESERVOIR
RIO	REMOTE INPUT/OUTPUT
RTU	REMOTE TELEMETRY UNIT
SLC	SMALL LOGIC CONTROLLER
SP	SPACE
SS	SURGE SUPPRESSOR
TB	TERMINAL BLOCK
UPS	UNINTERRUPTIBLE POWER SUPPLY
WHT	WHITE
WTR	WATER TREATMENT PLANT
WWTP	WASTE WATER TREATMENT PLANT

ISA INSTRUMENT IDENTIFICATION TABLE

FIRST LETTERS			SUCCEEDING LETTERS		
MEASURED OR INITIATING VARIABLE		MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYZER		ALARM		AUTO
B	BURNER, COMBUSTION				
C	CONDUCTIVITY			CONTROL	CLOSED
D	DENSITY	DIFFERENTIAL			
E	VOLTAGE		ELEMENT		
F	FLOW	RATIO			
G	GAUGE		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHED.	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MOTION				MIDDLE
N	INTRUSION				NORMAL
O	TORQUE		ORIFICE, RESTRICTION		OPEN
P	PRESSURE		POINT CONNECTION		STOP
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD, OR PRINT		REMOTE
S	SPEED, FREQUENCY	SAFETY		SWITCH	START
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION			VALVE, LOUVER	
W	WEIGHT		WELL		
X	MOTOR	X-AXIS	UNCLASSIFIED	UNCLASSIFED	UNCLASSIFED
Y	EVENT, STATE, OR PRESENCE	Y-AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION	Z-AXIS		DRIVER, ACTUATOR, FINAL CONTROL ELEMENT	

COLOR CODE CHART FOR 22 AWG BELDEN PAIRED CABLE NO. 8761

BLACK	BLK	1st
CLEAR	CLR	2nd

DRAWING REFERENCES

#####A – WIRE NUMBER
(0321) – RUNG NUMBER

LINETYPE LEGEND

- FIELD WIRING
- INTERNAL PANEL WIRING
- RADIO COMMUNICATION LINK
- FO FO – FIBER OPTIC CABLE
- FOP FOP – FIBER OPTIC PATCH CABLE
- EN EN – ETHERNET CAT5 CABLE
- DH+ DH+ – DATA HIGHWAY PLUS
- RIO RIO – REMOTE INPUT OUTPUT
- AREA DIVIDER
- EQUIPMENT
- PATCH PANEL

RUNG NUMBERING

0321 – RUNG NUMBER; DRAWING NUMBER (E.G. EC##)

WIRE NUMBERING

0321A – RUNG NUMBER; WIRE LETTER

PANEL WIRING IDENTIFICATION

BLACK – 120VAC LINE
WHITE – 120VAC NEUTRAL
GREEN – GROUND
BLUE – DC POSITIVE
BLUE W/WHITE STRIPE – DC COMMON

PANEL I/O WIRES TAG LEGEND

O:#.#.2 – CHANNEL #; SLOT #; RACK #; O=OUTPUT I=INPUT

Registered Professional Engineer (Electrical) CERTIFICATE NO. 49856 HEBER TORRES Date Signed 12/5/2014 ARIZONA U.S.A.
Expires 9/30/15

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE. SUITE 915
PHOENIX, AZ 85012 (602) 266-4698

AWC WHITE TANKS SCADA PROJECT
BEAUTIFUL ARIZONA ESTATES
DRAWING INDEX, STANDARD SYMBOLS, LEGENDS, AND ISA TABLE

Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_BAE_EC02.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC02

Rev'd	By	Date	Description

XREF: D_IV_BORDER_22X34

PLOTTED: 12/7/2014 1:05 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\BEAUTIFUL ARIZONA ESTATES\1834.00.101_BAE_EC02.DWG

QTY	ITEMS	MFG	CATALOG	DESC
1	102	MODICON	BMX CPS 2000	M340 POWER SUPPLY MODULE - 20W
1	105	MODICON	BMX P34 1000	M340 STANDARD PROCESSOR MODULE
2	106	MODICON	BMX DDI 1602	M340 DISCRETE INPUT MODULE
1	108	MODICON	BMXAMI0810	M340 8 CHANNEL ISOLATED ANALOG INPUT
1	110	MODICON	BMXNOE0100	M340 ETHERNET MODULE - 1 x RJ45 10/100
1	115	MODICON	BMX XBP 0800	M340 RACK
3	116	MODICON	BMXXEM010	UNUSED SLOT CONNECTOR PROTECTIVE COVER
2	196	GE MDS	INETII-DGSN	INDUSTRIAL SPREAD SPECTRUM RADIO, DUAL GATEWAY, W/ ETHERNET AND RS-232 CONNECTIONS, 902 - 928 MHz
1	197	SQUARE D	HMIGTO5310	MAGELIS OPERATOR INTERFACE TERMINAL, 24VDC, 10.4" VGA-TFT
1	198	SQUARE D	HMIZSD4G	4GB MEMORY SG CARD
A/R	201	AB	199-DR1	ZINC/STEEL DIN RAIL EN 50022 (35mm x 7.5mm x 1m)
19	202	AB	1492-EA35	END ANCHOR
6	210	AB	1492-GM35	TERMINAL BLOCK, GROUP MARKING CARRIER
12	215	AB	1492-J4	SCREW CONNECTION TERMINAL BLOCK; SINGLE CIRCUIT, 600V, GRAY, FEED-THROUGH
3	216	AB	1492-EBJ3	END BARRIER; 1492-J
56	219	AB	1492-JD3P	SCREW CONNECTION TERMINAL BLOCK; DOUBLE LEVEL,W/ PLUGGABLE TOP LEVEL
4	220	AB	1492-EBJD3P	END BARRIER; 1492-J
8	221	AB	1492-JG4	SCREW CONNECTION TERMINAL BLOCK; GROUNDING
16	223	AB	1492-FPK224	FUSE PLUG INSERT W/ BFI, 10-36VAC/DC WORKING VOLTAGE, 10A MAX @ 250V.
40	225	AB	1492-DPL	DISCONNECT PLUG FOR 1492-JD3 P AND 1492-JD3
1	230	AB	1492-SP1C005	CIRCUIT BREAKER, MINIATURE, ONE POLE, 0.5A
2	231	AB	1492-SP1C010	CIRCUIT BREAKER, MINIATURE, ONE POLE, 1A
1	232	AB	1492-SP1C020	CIRCUIT BREAKER, MINIATURE, ONE POLE, 2A
2	233	AB	1492-SP1C050	CIRCUIT BREAKER, MINIATURE, ONE POLE, 5A
3	234	AB	1492-SP1C100	CIRCUIT BREAKER, MINIATURE, ONE POLE, 10A
1	235	AB	1489-M1C200	CIRCUIT BREAKER, ONE POLE, 20A, UL 489 COMPLIANT
1	236	AB	1489-M1C150	CIRCUIT BREAKER, ONE POLE, 15A, UL 489 COMPLIANT
8	282	BUSSMANN	GMA-125MA	250V, 125mA, 5mmX20mm, FAST ACTING GLASS FUSE
3	284	BUSSMANN	GMA-500MA	250V, 500mA, 5mmX20mm, FAST ACTING GLASS FUSE
1	285	BUSSMANN	GMA-1A	250V, 1A, 5mmX20mm, FAST ACTING GLASS FUSE
4	286	BUSSMANN	GMA-2A	250V, 2A, 5mmX20mm, FAST ACTING GLASS FUSE
1	301	HOFFMAN	A72H3724FSPT	FREE-STANDING TYPE 4 SINGLE-DOOR ENCLOSURES WITH 3-POINT LATCH
1	303	HOFFMAN	A72P36F1	SUB PANEL, 60" TALL, 32" WIDE
1	310	HOFFMAN	G280416G100	SPECTRACOOL AIR CONDITIONER, 115VAC, 4000 BTU/HR, OUTDOOR, NO HEAT
1	311	HOFFMAN	A72SP36F3	SWING-OUT PANEL, FULL PANEL, 60" X 30.81"
1	313	HOFFMAN	LF120V18	18" FLUORESCENT LIGHT PACKAGE, 115VAC
1	316	HOFFMAN	ATEMNO	TEMPERATURE CONTROL SWITCH (THERMOSTAT), N.O. CONTACTS
1	351	HOFFMAN	ALFSWD	DOOR SWITCH FOR LIGHT PACKAGE
1	352	ANY	F8T5	FLUORESCENT LIGHT
4	357	BELDEN	7929A	CABLE, ETHERNET, 4 PR, 24AWG, CAT 5E (LENGTH AS REQUIRED)
2	358	BELDEN	8267	CABLE, COAXIAL, RG-213 (OR EQUAL) WITH APPROPRIATE CONNECTORS, (LENGTH AS REQUIRED)
1	377	SQUARE D	PK15GTA	GROUNDING BAR, 24 CIRCUITS
A/R	380	PANDUIT	F2X4LG6 C2LG6	WIRE DUCT, 2"X4" TALL, LIGHT GRAY, SLOTTED WITH COVER
A/R	381	PANDUIT	F3X4LG6 C3LG6	WIRE DUCT, 3"X4" TALL, LIGHT GRAY, SLOTTED WITH COVER
1	390	PHOENIX CONTACT	5604775	DUAL OUTLET FOR 120VAC, 15A SERVICE, GFCI, DIN-RAIL MOUNTED
2	391	PHOENIX CONTACT	2963860	SINGLE OUTLET FOR 120VAC, 15A SERVICE, DIN-RAIL MOUNTED
1	400	PULS	YRM2.DIODE	DIODE REDUNDANCY MODULE, 10A PER INPUT, 24-48VDC
2	405	PULS	CS10.241	POWER SUPPLY, 10A, 24-28VDC OUTPUT, 100-120V/200-240V INPUT
1	414	PHOENIX CONTACT	2900310	TERMINAL BLOCK WITH PLUG IN MINIATURE RELAY, 1PDT, 120VAC
8	423	WEIDMULLER	8448920000	SURGE SUPPRESSOR, 24VDC, 2 WIRE LOOP PROTECTION (MCZ OVP)
1	424	WEIDMULLER	8389030000	END CAP FOR SURGE SUPPRESSOR (MCZ OVP)
1	425	WEIDMULLER	8829430000	INDUSTRIAL ETHERNET SWITCH, 8-PORT
1	450	COOPER BUSSMAN	BSPM1120S2GR	120VAC, 40kA MAX DISCHARGE CURRENT, SURGE PROTECTIVE DEVICE WITH REMOTE SIGNALING
1	703	APC	SMT750	750VA SMART UPS
1	704	APC	AP9613	DRY CONTACT I/O SMARTSLOT CARD
2	811	POLYPHASER	IS-50NX-C2	BROADBAND COAXIAL SURGE PROTECTOR, BULKHEAD MOUNT OPTION, 125-1000MHZ
4	853	TIMES MICROWAVE SYSTEMS	EZ-600-NMC	N-MALE CONNECTOR

A BILL OF MATERIALS

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER TORRES
Date Signed 12/5/2014
ARIZONA U.S.A.
Expires 9/30/15

Rev'd	By	Date	Description

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.265.4939

AWC WHITE TANKS SCADA PROJECT
BEAUTIFUL ARIZONA ESTATES
BILL OF MATERIALS

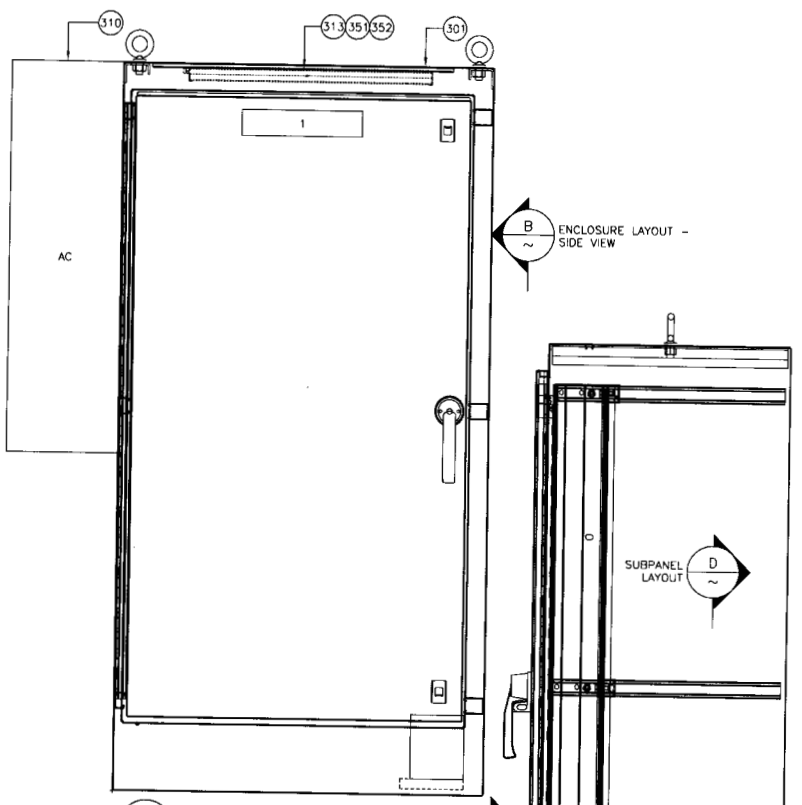
Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_BAE_EC03.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC03

XREF: DLN_BORDER_22X34

PLOTTED: 12/7/2014 1:05 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\BEAUTIFUL ARIZONA ESTATES\1834.00.101_BAE_EC03.DWG

NOTES:

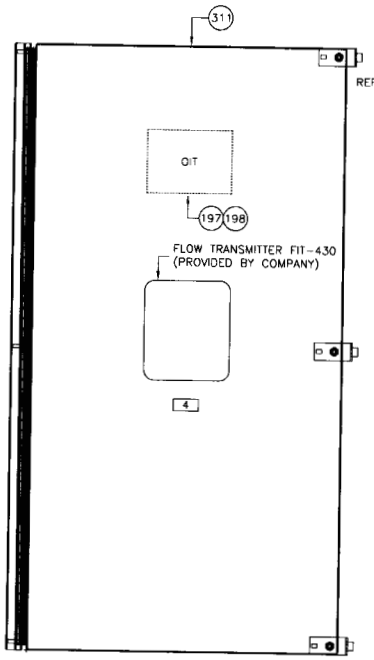
1. REFER TO BILL OF MATERIALS ON DRAWING EC03.
2. NAMEPLATES SHALL BE 3/32" THICK LAMINATED PHENOLIC TYPE WHITE WITH BLACK LETTERS. SEE NAMEPLATE SCHEDULE (DETAIL D) ON THIS SHEET FOR ADDITIONAL INFORMATION.
3. FURNISH ADDITIONAL NAMEPLATES AS REQUIRED BY UL OR BY OTHER APPLICABLE CODES.
4. REFER TO SHEET EC06 FOR COMMUNICATION SYSTEM ARCHITECTURE AND ADDITIONAL EQUIPMENT AND WIRING INFORMATION.
5. UPS IS TO BE MOUNTED ON A SHELF ATTACHED TO SIDE PANEL. SHELF IS TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.
6. MOUNT RADIOS ON CUSTOM SHELVES. SHELVES TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.
7. ALL 120VAC COMPONENTS MOUNTED ON SUBPANEL AND SWING-OUT PANEL SHALL BE FINGER SAFE. IF A COMPONENT IS NOT FINGER SAFE BY DESIGN, IT SHALL BE PROVIDED WITH A PROTECTIVE COVER SO AS TO MINIMIZE POTENTIAL OF ACCIDENTAL CONTACT.



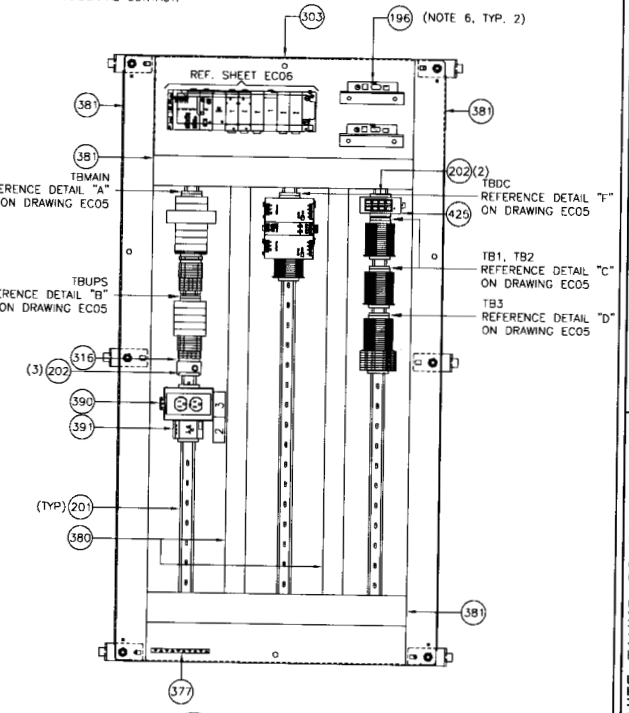
NAMEPLATE SCHEDULE				
NP.	HxWxLTR	FIRST LINE	SECOND LINE	LOCATION
1	2" x 13" x 1/2"	BEAUTIFUL ARIZONA	RTU	CENTERED 3" FROM TOP OF ENCLOSURE DOOR
2	1" x 3" x 1/4"	UPS RECEPTACLE	ONLY	CENTERED TO THE RIGHT OF UPS RECEPTACLE
3	1" x 3" x 1/4"	SERVICE RECEPTACLE	ONLY	CENTERED TO THE RIGHT OF SERVICE RECEPTACLE
4	1" x 3" x 1/4"	BOOSTER STATION	DISCHARGE FLOW	CENTERED BELOW FLOW TRANSMITTER

D NAMEPLATE SCHEDULE (NOTE 2)

B ENCLOSURE LAYOUT - SIDE VIEW
SCALE: 1" = 1'-0"



C SWING-OUT PANEL LAYOUT
SCALE: 1" = 1'-0"



D SUBPANEL LAYOUT
SCALE: 1" = 1'-0"

Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER
TORRES
Date Signed 12/5/2014
ARIZONA U.S.A.
Expires 9/30/15

Rev'd	By	Date	Description

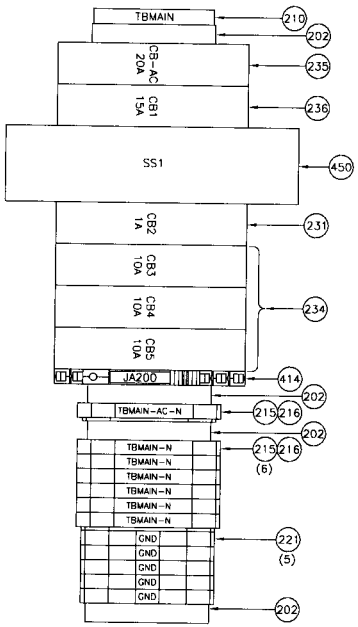
DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4998

AWC WHITE TANKS SCADA PROJECT
BEAUTIFUL ARIZONA ESTATES
PLC CABINET ENCLOSURE LAYOUT
AND NAMEPLATE SCHEDULE

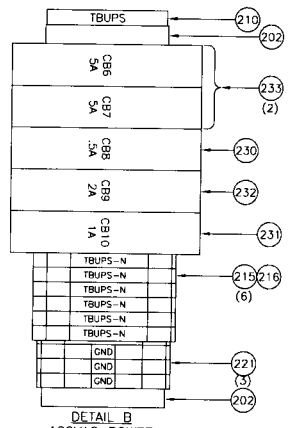
Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_BAE_EC04.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC04

XREF: DLTV_BORDER_22X34; 1823.00.101_EC05; 1823.00.101_EC04; 1834.00.101_BAE_EC05

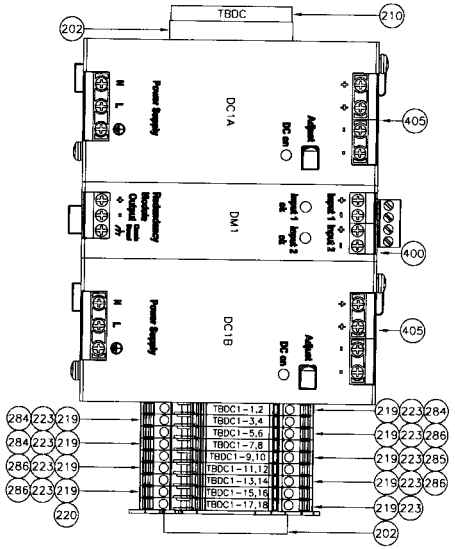
PLOTTED: 12/7/2014 1:05 PM 6:51 AM BY: johrens DWG FILE: x:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\BEAUTIFUL ARIZONA ESTATES\1834.00.101_BAE_EC04.DWG



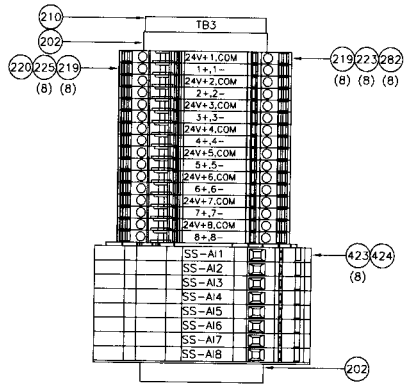
DETAIL A
120VAC POWER
DISTRIBUTION
TBMAIN



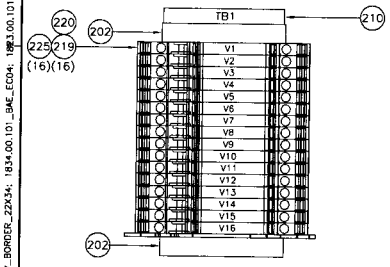
DETAIL B
120VAC POWER
DISTRIBUTION
TBUPS



DETAIL F
24VDC POWER DISTRIBUTION
TBDC



DETAIL D
ANALOG INPUT
TB3



DETAIL C
DISCRETE INPUTS
TB1, TB2

NOTES:

1. PROVIDE BUS BAR STYLE OR INSULATED COMB STYLE JUMPERS WHERE 2 OR MORE TERMINALS IN THE SAME TB ARE COMMONED TOGETHER. DO NOT USE DISCRETE WIRE JUMPERS.
2. BILL OF MATERIALS IS ON DRAWING EC03.
3. PANEL BUILDER TO SUPPLY AND INSTALL ALL NECESSARY AND APPROPRIATE ACCESSORIES INCLUDING TERMINAL NUMBERS, JUMPERS AND END BARRIERS.

0 .5" 1" 1.5" 2"
SCALE: 6" = 1'-0"

Registered Professional Engineer (Electrical)
CERTIFICATE NO. 49856
HEBER TORRES
Date Signed 12/5/2014
ARIZONA U.S.A.
Expires 9/30/15

Rev'd	By	Date	Description

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4658

AWC WHITE TANKS SCADA PROJECT
BEAUTIFUL ARIZONA ESTATES
TERMINAL BLOCK
AND DEVICE DETAILS

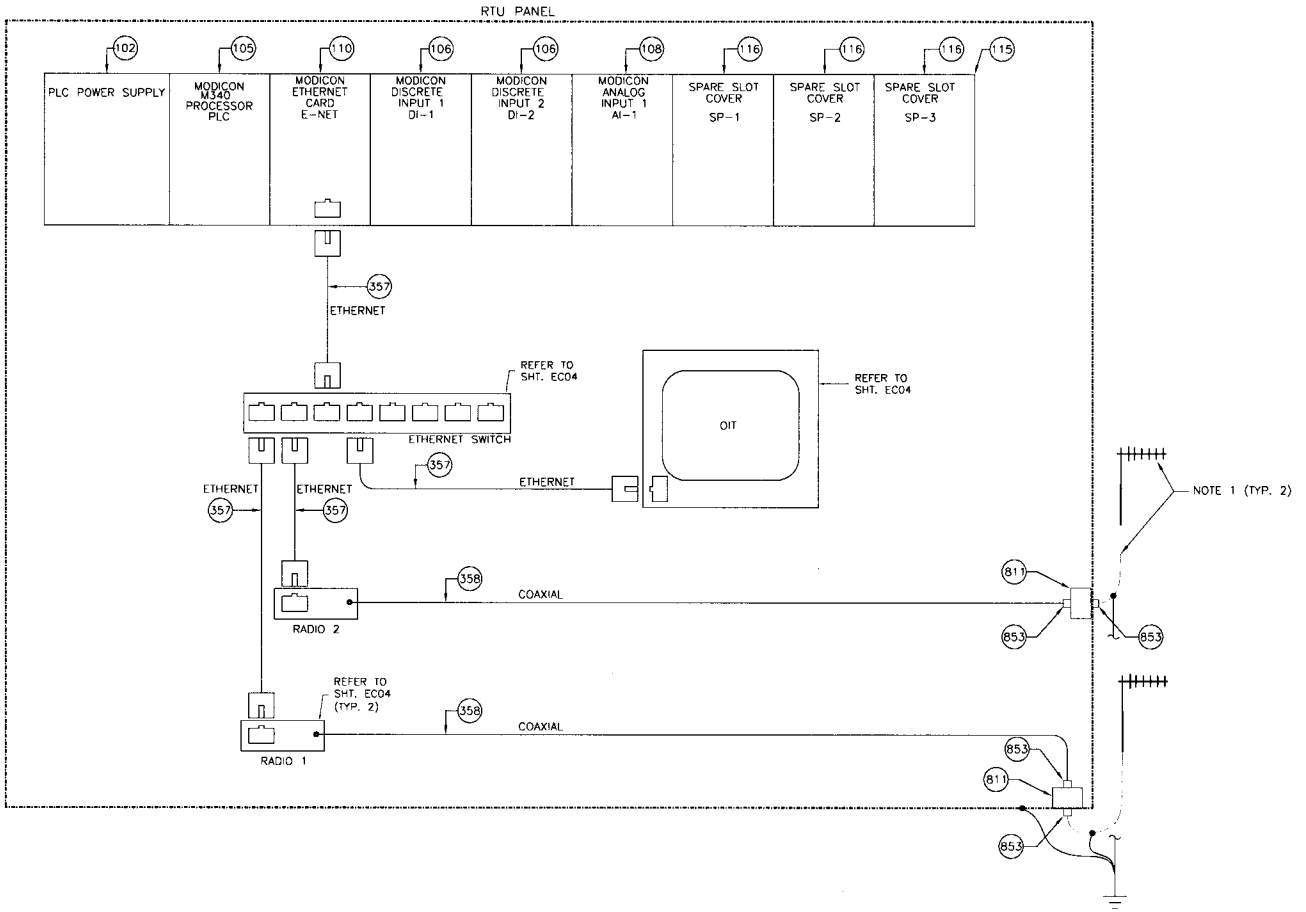
Scale 6" = 1'-0"
Job No. 1834.00.101
CADD File No. 1834.00.101_BAE_EC05.dwg
Designed DLN
Drawn JHA
Checked DLN
Date DEC. 2014
Sheet EC05

XREF: DLTV_BORDER_22X34; 1834.00.101_BAE_EC04; 1834.00.101_EC05

PLOTTED: 12/7/2014 1:06 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\BEAUTIFUL ARIZONA ESTATES\1834.00.101_BAE_EC05.DWG

NOTES:

1. REFERENCE ASSOCIATED ELECTRICAL DESIGN PACKAGE FOR ANTENNAS AND ANTENNA CABLE REQUIREMENTS.



Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER TORRES
Date Signed 12/5/2014
ARIZONA U.S.A.
Expires 9/30/15

Rev'd	By	Date	Description

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE. SUITE 915
PHOENIX, AZ 85012 602.266.4658

AWC WHITE TANKS SCADA PROJECT
BEAUTIFUL ARIZONA ESTATES
COMMUNICATION SYSTEM
ARCHITECTURE DIAGRAM

Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_BAE_EC06.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC06

XREF: DLTV_BORDER_22X34

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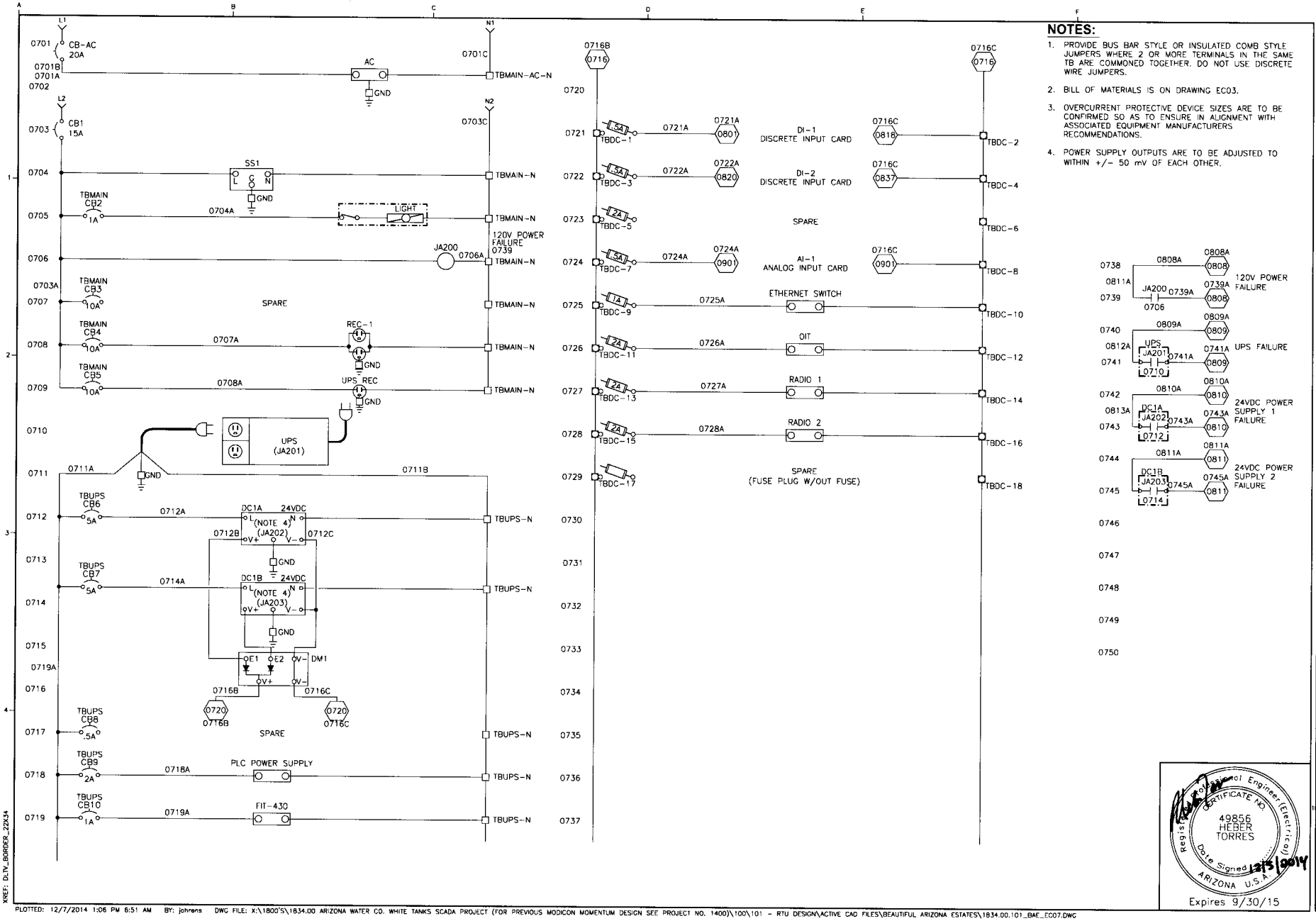


NOTES:

1. PROVIDE BUS BAR STYLE OR INSULATED COMB STYLE JUMPERS WHERE 2 OR MORE TERMINALS IN THE SAME TB ARE COMMONED TOGETHER. DO NOT USE DISCRETE WIRE JUMPERS.
2. BILL OF MATERIALS IS ON DRAWING EC03.
3. OVERCURRENT PROTECTIVE DEVICE SIZES ARE TO BE CONFIRMED SO AS TO ENSURE IN ALIGNMENT WITH ASSOCIATED EQUIPMENT MANUFACTURERS RECOMMENDATIONS.
4. POWER SUPPLY OUTPUTS ARE TO BE ADJUSTED TO WITHIN +/- 50 mV OF EACH OTHER.

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4668

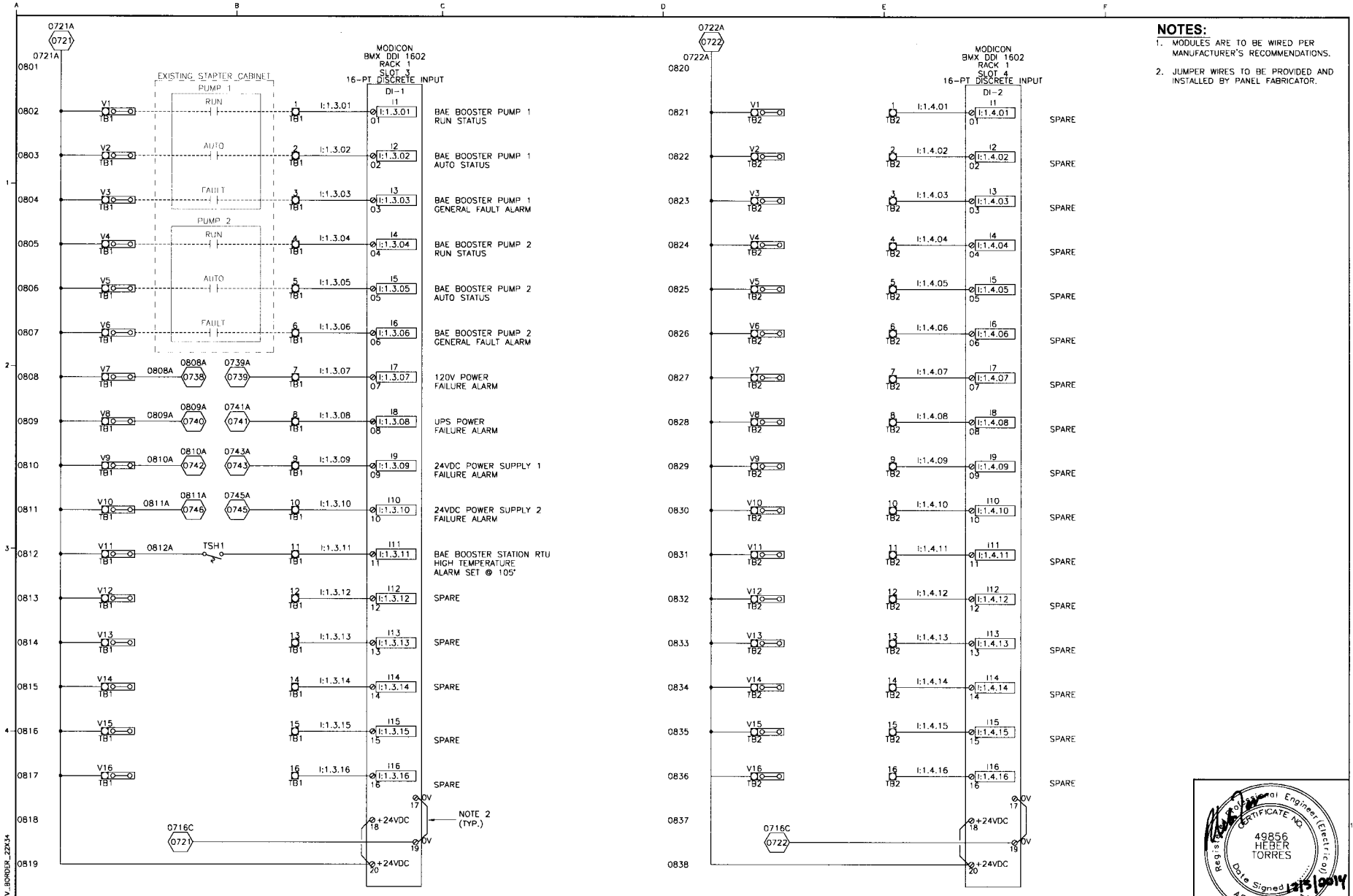
AWC WHITE TANKS SCADA PROJECT
BEAUTIFUL ARIZONA ESTATES
POWER DISTRIBUTION SCHEMATIC

Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_BAE_EC07.DWG
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC07

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER TORRES
Date Signed 12/5/2014
ARIZONA U.S.A.
Expires 9/30/15

XREF: DLTV_BORDER_22X34

PLOTTED: 12/7/2014 1:06 PM 6:51 AM BY: johnsns DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\BEAUTIFUL ARIZONA ESTATES\1834.00.101_BAE_EC07.DWG



NOTES:

1. MODULES ARE TO BE WIRED PER MANUFACTURER'S RECOMMENDATIONS.
2. JUMPER WIRES TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.

Registered Professional Engineer (Electrical) CERTIFICATE NO. 49856 HEBER TORRES Date Signed 12/5/2014 ARIZONA U.S.A.

Expires 9/30/15

Rev'd	By	Date	Description

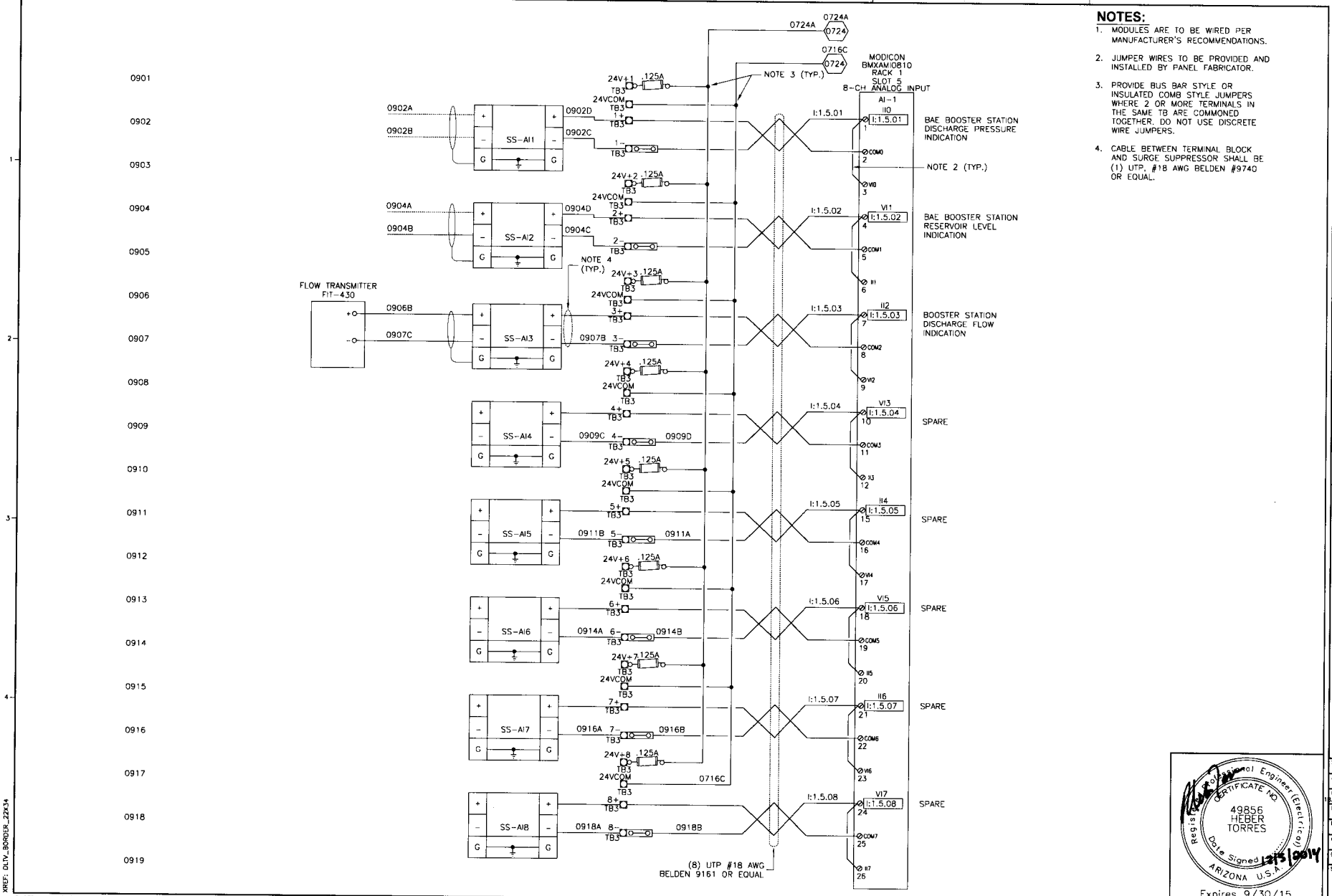
DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE. SUITE 915
PHOENIX, AZ 85012 602.264.4535

AWC WHITE TANKS SCADA PROJECT
BEAUTIFUL ARIZONA ESTATES
WIRING DIAGRAM
DI-1 AND DI-2

Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_BAE_EC08.DWG
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC08

XREF: DLTV_BORDER_22X34

PLOTTED: 12/7/2014 1:06 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\BEAUTIFUL ARIZONA ESTATES\1834.00.101_BAE_EC08.DWG



NOTES:

1. MODULES ARE TO BE WIRED PER MANUFACTURER'S RECOMMENDATIONS.
2. JUMPER WIRES TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.
3. PROVIDE BUS BAR STYLE OR INSULATED COMB STYLE JUMPERS WHERE 2 OR MORE TERMINALS IN THE SAME TB ARE COMMONED TOGETHER. DO NOT USE DISCRETE WIRE JUMPERS.
4. CABLE BETWEEN TERMINAL BLOCK AND SURGE SUPPRESSOR SHALL BE (1) UTP, #18 AWG BELDEN #9740 OR EQUAL.

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER
TORRES
Date Signed 12/5/2014
ARIZONA U.S.A.
Expires 9/30/15

No.	Description	By	Date

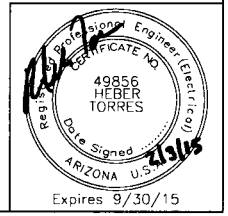
DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4658

AWC WHITE TANKS SCADA PROJECT
BEAUTIFUL ARIZONA ESTATES
WIRING DIAGRAM
AI-1

Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_BAE_EC09.DWG
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC09

XREF: DLV_BORDER_22X34
PLOTTED: 12/7/2014 1:06 PM 6:51 AM BY: jahrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\BEAUTIFUL ARIZONA ESTATES\1834.00.101_BAE_EC09.DWG

ARIZONA WATER COMPANY
WHITE TANKS WATER SYSTEM SCADA DESIGN
MONTE VISTA



Rev'd	By	Date	Description

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4658

AWC WHITE TANKS SCADA PROJECT
MONTE VISTA
COVER SHEET

Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_MONTE VISTA_EC01.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC01

PLOTTED: 2/3/2015 3:58 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\MONTE VISTA\1834.00.101_MONTE VISTA_EC01.DWG

DRAWING INDEX

Drawing No.	Drawing Title
EC01	COVER SHEET
EC02	DRAWING INDEX, STANDARD SYMBOLS, LEGENDS, AND ISA TABLE
EC03	BILL OF MATERIALS
EC04	PLC CABINET ENCLOSURE LAYOUT AND NAMEPLATE SCHEDULE
EC05	TERMINAL BLOCK AND DEVICE DETAILS
EC06	COMMUNICATION SYSTEM ARCHITECTURE DIAGRAM
EC07	POWER DISTRIBUTION SCHEMATIC
EC08	WIRING DIAGRAMS DI-1 AND DI-2
EC09	WIRING DIAGRAMS DO-1
EC10	WIRING DIAGRAMS AI-1
EC11	WIRING DIAGRAMS AI-2

SCHEMATIC/WIRING DIAGRAM SYMBOLS

- CIRCUIT BREAKER
- FUSE WITH PULLER — *A – AMP RATING
- SWITCH NORMALLY OPEN
- SELECTOR SWITCH 2 POSITION, NORMALLY OPEN
- SELECTOR SWITCH 3 POSITION, NORMALLY OPEN
- TEMPERATURE SWITCH NORMALLY OPEN
- SINGLE LEVEL TERMINAL BLOCK * – TB IDENTIFICATION
- DOUBLE LEVEL TERMINAL BLOCK * – TB IDENTIFICATION
- TERMINAL BLOCK W/ FUSE PLUG AND FUSE * – TB IDENTIFICATION ** – FUSE AMPS
- TERMINAL BLOCK W/ DISCONNECT KNIFE * – TB IDENTIFICATION
- SURGE SUPPRESSOR FOR FLOATING SIGNAL CIRCUITS * – SS NUMBER IDENTIFICATION
- SURGE SUPPRESSOR FOR POWER SUPPLY * – SS NUMBER IDENTIFICATION
- CONTROL RELAY * – CR NUMBER IDENTIFICATION # – TERMINAL NUMBER
- EARTH GROUND
- DUPLEX RECEPTACLE
- SINGLE RECEPTACLE
- DC POWER SUPPLY * – DC VOLTAGE RATING

COLOR CODE CHART FOR 18 AWG BELDEN CABLES 12 COND. NO. 8466 AND 19 COND. NO. 8619

BLACK	BLK	1st
WHITE	WHT	2nd
RED	RED	3rd
GREEN	GRN	4th
ORANGE	ORN	5th
BLUE	BLU	6th
WHITE/BLACK	WHT/BLK	7th
RED/BLACK	RED/BLK	8th
GREEN/BLACK	GRN/BLK	9th
ORANGE/BLACK	ORN/BLK	10th
BLUE/BLACK	BLU/BLK	11th
BLACK/WHITE	BLK/WHT	12th
RED/WHITE	RED/WHT	13th
GREEN/WHITE	GRN/WHT	14th
BLUE/WHITE	BLU/WHT	15th
BLACK/RED	BLK/RED	16th
WHITE/RED	WHT/RED	17th
ORANGE/RED	ORN/RED	18th
BLUE/RED	BLU/RED	19th

WIRE SIZES

(CIRCUIT WIRING SHALL BE RATED IN ACCORDANCE WITH THE MAXIMUM PERMITTED AMPERE RATING/SETTING OF THE OVERCURRENT PROTECTION DEVICE. N.E.C. 210-3)

120VAC / 20A POWER CIRCUIT – MIN. #12 AWG.
120VAC / 15A AND BELOW – MIN. #14 AWG.

24VDC / 20A POWER CIRCUIT – MIN. #12 AWG.
24VDC / 15A AND BELOW – MIN. #16 AWG.
24VDC I/O & SIGNAL CIRCUIT – MIN. #18 AWG.

4-20mADC I/O SIGNAL CIRCUIT – MIN. #18 AWG.

ABBREVIATIONS

A/R	AS REQUIRED
AC COM	NEUTRAL
AFF	ABOVE FINISHED FLOOR
AI	ANALOG INPUT
ANL COM	ANALOG COMMON
AO	ANALOG OUTPUT
AWG	AMERICAN WIRE GAUGE
BLK	BLACK
BLU	BLUE
CAP	CENTRAL ARIZONA PROJECT
CLR	CLEAR
CR	CONTROL RELAY
DC COM	DC COMMON
DC+	DC POSITIVE POTENTIAL
DI	DISCRETE INPUT
DO	DISCRETE OUTPUT
DS	DOOR SWITCH
FOM	FIBER OPTIC MODEM
FOT	FIBER OPTIC TRANSCEIVER
GND	GROUND
GRN	GREEN
I/O	INPUT/OUTPUT
L	LINE
N	NEUTRAL
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NP	NAMEPLATE
OIT	OPERATOR INTERFACE TERMINAL
ORN	ORANGE
PDB	POWER DISTRIBUTION BLOCK
PLC	PROGRAMMABLE LOGIC CONTROLLER
PP	FIBER OPTIC PATCH PANEL
PS	POWER SUPPLY
REC	RECEPTACLE
RES	RESERVOIR
RIO	REMOTE INPUT/OUTPUT
RTU	REMOTE TELEMETRY UNIT
SLC	SMALL LOGIC CONTROLLER
SP	SPACE
SS	SURGE SUPPRESSOR
TB	TERMINAL BLOCK
UPS	UNINTERRUPTIBLE POWER SUPPLY
WHT	WHITE
WTR	WATER TREATMENT PLANT
WWTP	WASTE WATER TREATMENT PLANT

ISA INSTRUMENT IDENTIFICATION TABLE

FIRST LETTERS			SUCCEEDING LETTERS		
MEASURED OR INITIATING VARIABLE		MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYZER		ALARM		AUTO
B	BURNER, COMBUSTION				
C	CONDUCTIVITY			CONTROL	CLOSED
D	DENSITY	DIFFERENTIAL			
E	VOLTAGE		ELEMENT		
F	FLOW	RATIO			
G	GAUGE		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHED.	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MOTION				MIDDLE
N	INTRUSION				NORMAL
O	TORQUE		ORIFICE, RESTRICTION		OPEN
P	PRESSURE		POINT CONNECTION		STOP
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD, OR PRINT		REMOTE
S	SPEED, FREQUENCY	SAFETY		SWITCH	START
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION			VALVE, LOUVER	
W	WEIGHT		WELL		
X	MOTOR	X-AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE, OR PRESENCE	Y-AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION	Z-AXIS		DRIVER, ACTUATOR, FINAL CONTROL ELEMENT	

COLOR CODE CHART FOR 22 AWG BELDEN PAIRED CABLE NO. 8761

BLACK	BLK	1st
CLEAR	CLR	2nd

DRAWING REFERENCES

####A – WIRE NUMBER
(032) – RUNG NUMBER

LINETYPE LEGEND

- FIELD WIRING
- INTERNAL PANEL WIRING
- RADIO COMMUNICATION LINK
- FO — FIBER OPTIC CABLE
- FOP — FIBER OPTIC PATCH CABLE
- EN — ETHERNET CAT5 CABLE
- DH+ — DATA HIGHWAY PLUS
- RIO — REMOTE INPUT OUTPUT
- AREA DIVIDER
- EQUIPMENT
- PATCH PANEL

RUNG NUMBERING

0321 – RUNG NUMBER; DRAWING NUMBER (E.G. EC##)

WIRE NUMBERING

0321A – WIRE LETTER; RUNG NUMBER

PANEL WIRING IDENTIFICATION

BLACK – 120VAC LINE
WHITE – 120VAC NEUTRAL
GREEN – GROUND
BLUE – DC POSITIVE
BLUE W/WHITE STRIPE – DC COMMON

PANEL I/O WIRES TAG LEGEND

O:#.#.2
- CHANNEL #
- SLOT #
- RACK #
- O=OUTPUT I=INPUT

Registered Professional Engineer (Electrical) CERTIFICATE NO. 49856 HEBER TORRES Date Signed 2/3/15 ARIZONA U.S.A.
Expires 9/30/15

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE. SUITE 915
PHOENIX, AZ 85012 602.266.4658

AWC WHITE TANKS SCADA PROJECT
MONTE VISTA
DRAWING INDEX, STANDARD SYMBOLS, LEGENDS, AND ISA TABLE

Scale	NTS
Job No.	1834.00.101
CAD File No.	1834.00.101_MONTE VISTA_EC02.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC02

No.	Description	Rev'd By	Date

PLOTTED: 2/3/2015 3:58 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\MONTE VISTA\1834.00.101_MONTE VISTA_EC02.DWG

QTY	ITEMS	MFG	CATALOG	DESC
1	102	MODICON	BMX CPS 2000	M340 POWER SUPPLY MODULE - 20W
1	105	MODICON	BMX P34 1000	M340 STANDARD PROCESSOR MODULE
2	106	MODICON	BMX DDI 1602	M340 DISCRETE INPUT MODULE
1	107	MODICON	BMX DDO 1602	M340 DISCRETE OUTPUT MODULE
2	108	MODICON	BMXAMI0810	M340 8 CHANNEL ISOLATED ANALOG INPUT
1	110	MODICON	BMXNOE0100	M340 ETHERNET MODULE - 1 x RJ45 10/100
1	115	MODICON	BMX XBP 0800	M340 8-SLOT RACK
1	116	MODICON	BMXXEM010	UNUSED SLOT CONNECTOR PROTECTIVE COVER
1	196	GE MDS	INETII-DGSN	INDUSTRIAL SPREAD SPECTRUM RADIO, DUAL GATEWAY, W/ ETHERNET AND RS-232 CONNECTIONS, 902 - 928 MHz
1	197	SQUARE D	HMIGTO5310	MAGELIS OPERATOR INTERFACE TERMINAL, 24VDC, 10.4" VGA-TFT
1	198	SQUARE D	HMIZSD4G	4GB MEMORY SG CARD
1	199	RED LION	CSMSTRLE	MODULAR CONTROLLER MASTER WITH MULTIPLE PROTOCOL CONVERTER, ETHERNET, & EXPANSION SLOT
A/R	201	AB	199-DR1	ZINC/STEEL DIN RAIL EN 50022 (35mm x 7.5mm x 1m)
23	202	AB	1492-EA35	END ANCHOR
8	210	AB	1492-GM35	TERMINAL BLOCK, GROUP MARKING CARRIER
11	215	AB	1492-J4	SCREW CONNECTION TERMINAL BLOCK; SINGLE CIRCUIT, 600V, GRAY, FEED-THROUGH
3	216	AB	1492-EBJ3	END BARRIER; 1492-J
81	219	AB	1492-JD3P	SCREW CONNECTION TERMINAL BLOCK; DOUBLE LEVEL,W/ PLUGGABLE TOP LEVEL
6	220	AB	1492-EBJD3P	END BARRIER; 1492-J
8	221	AB	1492-JG4	SCREW CONNECTION TERMINAL BLOCK; GROUNDING
30	223	AB	1492-FPK224	FUSE PLUG INSERT W/ BFI, 10-36VAC/DC WORKING VOLTAGE, 10A MAX @ 250V.
2	224	AB	1492-FPK2120	FUSE PLUG INSERT W/ BFI, 60-150VAC/DC WORKING VOLTAGE
49	225	AB	1492-DPL	DISCONNECT PLUG FOR 1492-JD3 P AND 1492-JD3
1	231	AB	1492-SP1C010	CIRCUIT BREAKER, MINIATURE, ONE POLE, 1A
2	232	AB	1492-SP1C020	CIRCUIT BREAKER, MINIATURE, ONE POLE, 2A
2	233	AB	1492-SP1C050	CIRCUIT BREAKER, MINIATURE, ONE POLE, 5A
3	234	AB	1492-SP1C100	CIRCUIT BREAKER, MINIATURE, ONE POLE, 10A
1	235	AB	1489-M1C150	CIRCUIT BREAKER, ONE POLE, 15A, UL 489 COMPLIANT
1	236	AB	1489-M1C200	CIRCUIT BREAKER, ONE POLE, 20A, UL 489 COMPLIANT
16	282	BUSSMANN	GMA-125MA	250V, 125mA, 5mmX20mm, FAST ACTING GLASS FUSE
7	283	BUSSMANN	GMA-250MA	250V, 250mA, 5mmX20mm, FAST ACTING GLASS FUSE
5	284	BUSSMANN	GMA-500MA	250V, 500mA, 5mmX20mm, FAST ACTING GLASS FUSE
1	285	BUSSMANN	GMA-1A	250V, 1A, 5mmX20mm, FAST ACTING GLASS FUSE
3	286	BUSSMANN	GMA-2A	250V, 2A, 5mmX20mm, FAST ACTING GLASS FUSE
1	301	HOFFMAN	A72H3724FSPT	FREE-STANDING TYPE 4 SINGLE-DOOR ENCLOSURES WITH 3-POINT LATCH
1	303	HOFFMAN	A72P36F1	SUB PANEL, 60" TALL, 32" WIDE
1	311	HOFFMAN	A72SP36F3	SWING-OUT PANEL, FULL PANEL, 60" X 30.81"
1	313	HOFFMAN	LF120V18	18" FLUORESCENT LIGHT PACKAGE, 115VAC
1	316	HOFFMAN	ATEMNO	TEMPERATURE CONTROL SWITCH (THERMOSTAT), N.O. CONTACTS
1	351	HOFFMAN	ALFSWD	DOOR SWITCH FOR LIGHT PACKAGE
1	352	ANY	F8T5	FLUORESCENT LIGHT
4	357	BELDEN	7929A	CABLE, ETHERNET, 4 PR, 24AWG, CAT 5E (LENGTH AS REQUIRED)
1	358	BELDEN	8267	CABLE, COAXIAL, RG-213 (OR EQUAL) WITH APPROPRIATE CONNECTORS, (LENGTH AS REQUIRED)
1	359	ANY	ANY	CABLE, RS-485 WITH RJ-45 CONNECTORS (LENGTH AS REQUIRED)
1	377	SQUARE D	PK15GTA	GROUNDING BAR, 24 CIRCUITS
A/R	381	PANDUIT	F3X4LG6 C3LG6	WIRE DUCT, 3"X4" TALL, LIGHT GRAY, SLOTTED WITH COVER
1	390	PHOENIX CONTACT	5604775	DUAL OUTLET FOR 120VAC, 15A SERVICE, GFCI, DIN-RAIL MOUNTED
2	391	PHOENIX CONTACT	2963860	SINGLE OUTLET FOR 120VAC, 15A SERVICE, DIN-RAIL MOUNTED
1	400	PULS	YRM2.DIODE	DIODE REDUNDANCY MODULE, 10A PER INPUT, 24-48VDC
2	405	PULS	CS10.241	POWER SUPPLY, 10A, 24-28VDC OUTPUT, 100-120V/200-240V INPUT
16	412	PHOENIX CONTACT	2900299	TERMINAL BLOCK WITH PLUG-IN MINIATURE RELAY, 24VDC, 1PDT
1	414	PHOENIX CONTACT	2900310	TERMINAL BLOCK WITH PLUG IN MINIATURE RELAY, 1PDT, 120VAC
16	423	WEIDMULLER	8448920000	SURGE SUPPRESSOR, 24VDC, 2 WIRE LOOP PROTECTION (MCZ OVP)
2	424	WEIDMULLER	8389030000	END CAP FOR SURGE SUPPRESSOR (MCZ OVP)
1	426	WEIDMULLER	1241000000	INDUSTRIAL ETHERNET SWITCH, 16-PORT, UNMANAGED
1	450	COOPER BUSSMAN	BSPM1120S2GR	120VAC, 40kA MAX DISCHARGE CURRENT, SURGE PROTECTIVE DEVICE WITH REMOTE SIGNALING
1	475	AUTOMATION DIRECT	XTD-0200F-PT1	PROSENSE DIN-RAIL MOUNTED TEMPERATURE TRANSMITTER, 0 TO 200°F RATED, FOR RTD TYPE PT100 3-WIRE
1	476	ANY	ANY	3-WIRE RTD TYPE PT100, COMPATIBLE WITH AUTOMATION DIRECT XTD-0200F-PT1
1	703	FALCON	SSG1.5K-1T	1.5kVA SSG SERIES INDUSTRIAL UPS, RATED FOR 55°C
1	704	FALCON	UA88376-SS-HW	DRY RELAY SIGNAL INTERFACE
2	715	SENSUS	5390653700001	ACT-PAK 100D ELECTRONIC INSTRUMENT, PULSE INPUT, 4-20mA OUTPUT, NEMA 1 ENCLOSURE
2	716	SENSUS	5390633700142	ACT-PAK 100D PANEL MOUNTING OPTION
1	811	POLYPHASER	IS-50NX-C2	BROADBAND COAXIAL SURGE PROTECTOR, BULKHEAD MOUNT OPTION, 125-1000MHZ
2	853	TIMES MICROWAVE SYSTEMS	EZ-600-NMC	N-MALE CONNECTOR

A ~ BILL OF MATERIALS

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER
TORRES
Date Signed 2/3/15
ARIZONA U.S.A.
Expires 9/30/15

No.	Description	By	Date

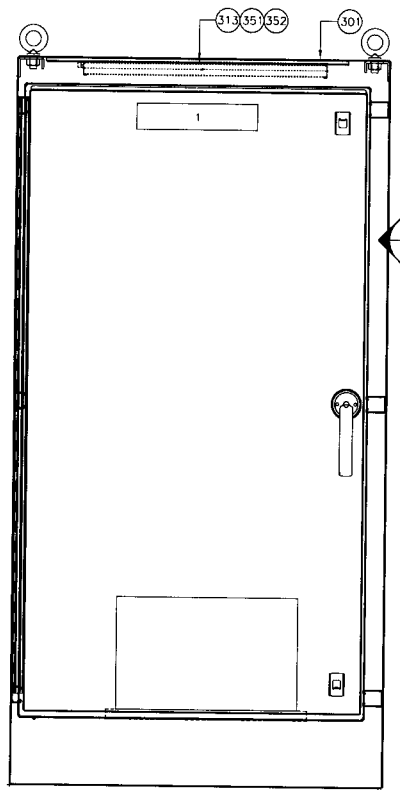
DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE, SUITE 915
PHOENIX, AZ 85012 602.265.4658

AWC WHITE TANKS SCADA PROJECT
MONTE VISTA
BILL OF MATERIALS

Scale	NTS
Job No.	1834.00.101
CAD File No.	1834.00.101_MONTE VISTA_EC03.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC03

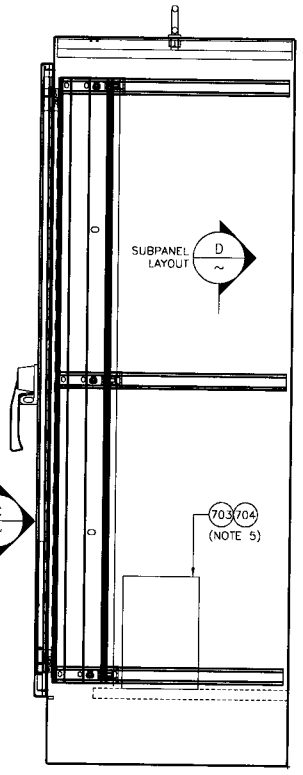
NOTES:

1. REFER TO BILL OF MATERIALS ON DRAWING EC03.
2. NAMEPLATES SHALL BE 3/32" THICK LAMINATED PHENOLIC TYPE WHITE WITH BLACK LETTERS. SEE NAMEPLATE SCHEDULE (DETAIL E) ON THIS SHEET FOR ADDITIONAL INFORMATION.
3. FURNISH ADDITIONAL NAMEPLATES AS REQUIRED BY UL OR BY OTHER APPLICABLE CODES.
4. REFER TO SHEET EC06 FOR COMMUNICATION SYSTEM ARCHITECTURE AND ADDITIONAL EQUIPMENT AND WIRING INFORMATION.
5. UPS IS TO BE MOUNTED ON A REMOVABLE SHELF ATTACHED TO BACK PANEL. SHELF IS TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.
6. MOUNT RADIO ON CUSTOM SHELF. SHELF TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.
7. ALL 120VAC COMPONENTS MOUNTED ON SUBPANEL AND SWING-OUT PANEL SHALL BE FINGER SAFE. IF A COMPONENT IS NOT FINGER SAFE BY DESIGN, IT SHALL BE PROVIDED WITH A PROTECTIVE COVER SO AS TO MINIMIZE POTENTIAL OF ACCIDENTAL CONTACT.

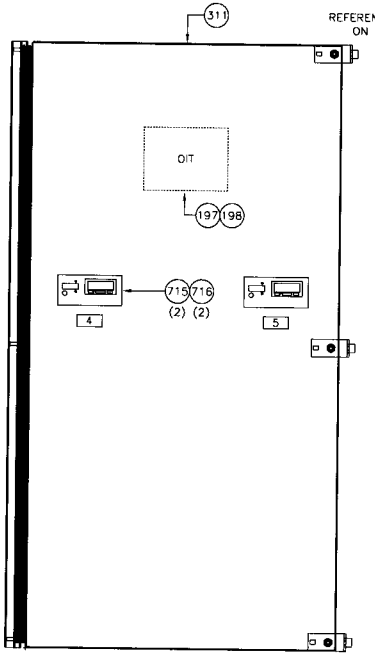


A ENCLOSURE LAYOUT
SCALE: 1" = 1'-0"

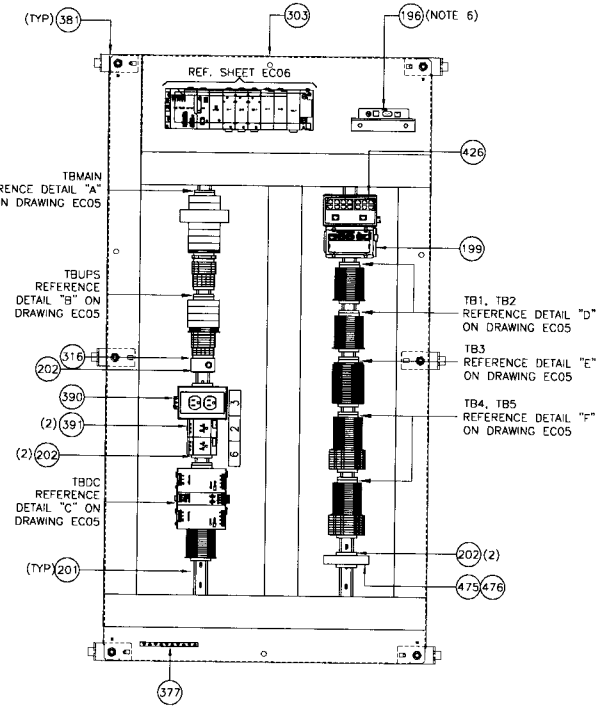
B ENCLOSURE LAYOUT - SIDE VIEW



B ENCLOSURE LAYOUT - SIDE VIEW
SCALE: 1" = 1'-0"



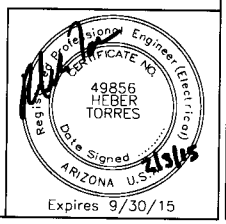
C SWING-OUT PANEL LAYOUT
SCALE: 1" = 1'-0"



D SUBPANEL LAYOUT
SCALE: 1" = 1'-0"

E NAMEPLATE SCHEDULE (NOTE 2)

NP	HxWxLTR	FIRST LINE	SECOND LINE	LOCATION
1	2" x 13" x 1/2"	MONTE VISTA	RTU	CENTERED 3" FROM TOP OF ENCLOSURE DOOR
2	1" x 3" x 1/4"	UPS RECEPTACLE	ONLY	CENTERED TO THE RIGHT OF UPS RECEPTACLE
3	1" x 3" x 1/4"	SERVICE RECEPTACLE	ONLY	CENTERED TO THE RIGHT OF SERVICE RECEPTACLE
4	1" x 3" x 1/4"	WELL 2 DISCHARGE FLOW		CENTERED BELOW ACT-PAK
5	1" x 3" x 1/4"	WELL 4 DISCHARGE FLOW		CENTERED BELOW ACT-PAK
6	1" x 3" x 1/4"	A/C RECEPTACLE	ONLY	CENTERED TO THE RIGHT OF A/C RECEPTACLE



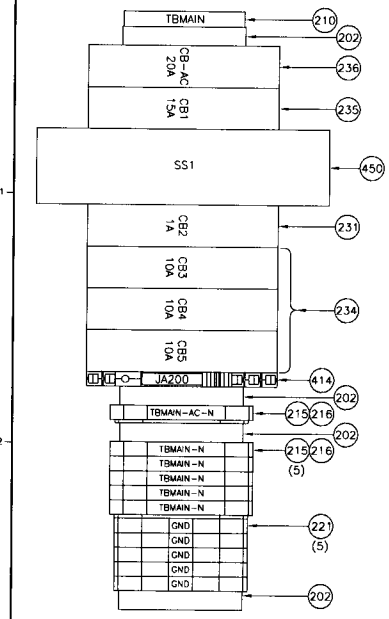
Rev'd	By	Date	Description

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4958

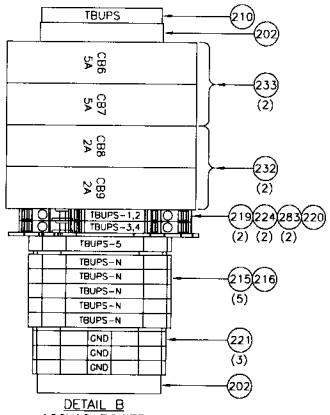
AWC WHITE TANKS SCADA PROJECT
MONTE VISTA
PLC CABINET ENCLOSURE LAYOUT AND NAMEPLATE SCHEDULE

Scale	NTS
Job No.	1834.00.101
CAD File	1834.00.101_MONTE VISTA_EC04.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC04

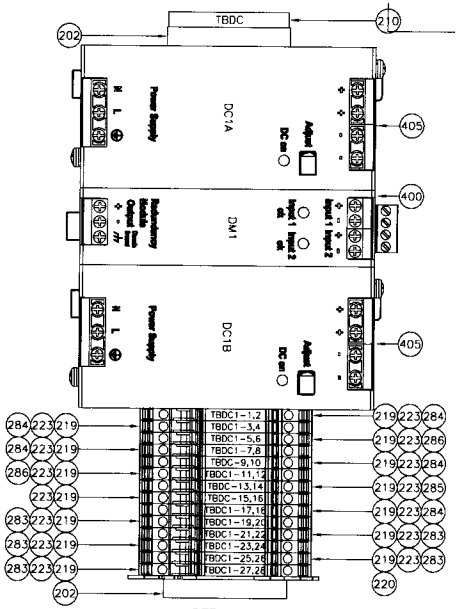
PLOTTED: 2/3/2015 3:58 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\MONTE VISTA\1834.00.101_MONTE VISTA_EC04.DWG



DETAIL A
120VAC POWER
DISTRIBUTION
TBMAIN



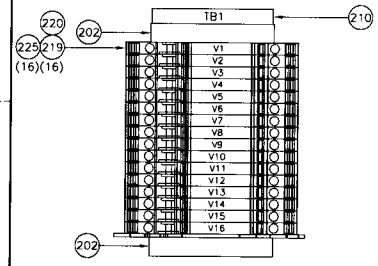
DETAIL B
120VAC POWER
DISTRIBUTION
TBUPS



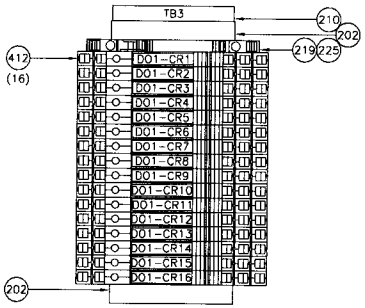
DETAIL C
24VDC POWER DISTRIBUTION
TBDC

NOTES:

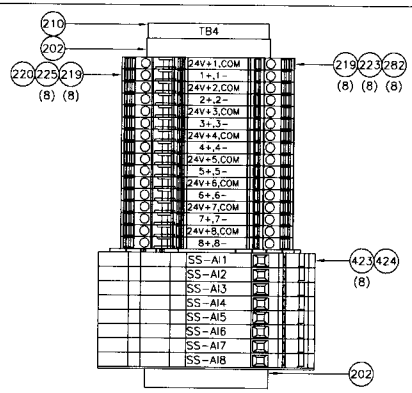
1. PROVIDE BUS BAR STYLE OR INSULATED COMB STYLE JUMPERS WHERE 2 OR MORE TERMINALS IN THE SAME TB ARE COMMONED TOGETHER. DO NOT USE DISCRETE WIRE JUMPERS.
2. BILL OF MATERIALS IS ON DRAWING EC03.
3. PANEL BUILDER TO SUPPLY AND INSTALL ALL NECESSARY AND APPROPRIATE ACCESSORIES INCLUDING TERMINAL NUMBERS, JUMPERS AND END BARRIERS.



DETAIL D
DISCRETE INPUTS
TB1, TB2



DETAIL E
DISCRETE OUTPUT
TB3



DETAIL F
ANALOG INPUT
TB4, TB5

SCALE: 6" = 1'-0"

Expires 9/30/15

Rev'd	By	Date	Description

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4658

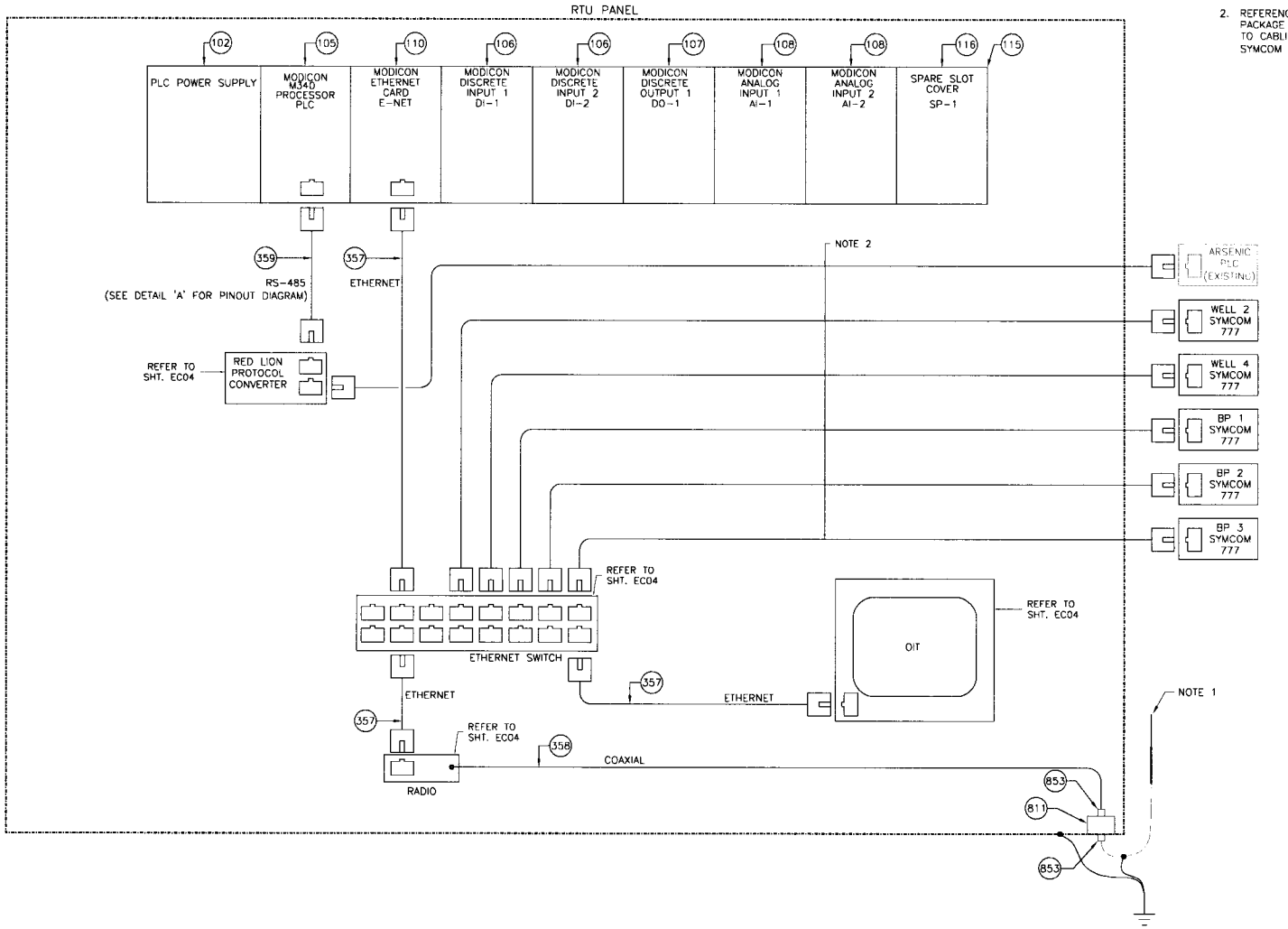
AWC WHITE TANKS SCADA PROJECT
MONTE VISTA
TERMINAL BLOCK
AND DEVICE DETAILS

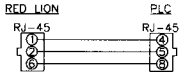
Scale	6" = 1'-0"
Job No.	1834.00.101
CAD File No.	1834.00.101_MONTE VISTA_EC05.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC05

PLOTTED: 2/3/2015 3:58 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\MONTE VISTA\1834.00.101_MONTE VISTA_EC05.DWG

NOTES:

1. REFERENCE ASSOCIATED ELECTRICAL DESIGN PACKAGE FOR ANTENNAS AND ANTENNA CABLE REQUIREMENTS.
2. REFERENCE ASSOCIATED ELECTRICAL DESIGN PACKAGE FOR CIRCUIT INFORMATION PERTAINING TO CABLING TO EXISTING ARSENIC PLC AND SYMCOM 777'S.





DETAIL A
PIN-OUT DIAGRAM

Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER TORRES
Date Signed 2/3/15
ARIZONA U.S.A.
Expires 9/30/15

Rev'd	By	Date	Description

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4658

AWC WHITE TANKS SCADA PROJECT
MONTE VISTA
COMMUNICATION SYSTEM
ARCHITECTURE DIAGRAM

Scale	NTS
Job No.	1834.00.101
CAD File No.	1834.00.101_MONTE VISTA_EC06.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC06

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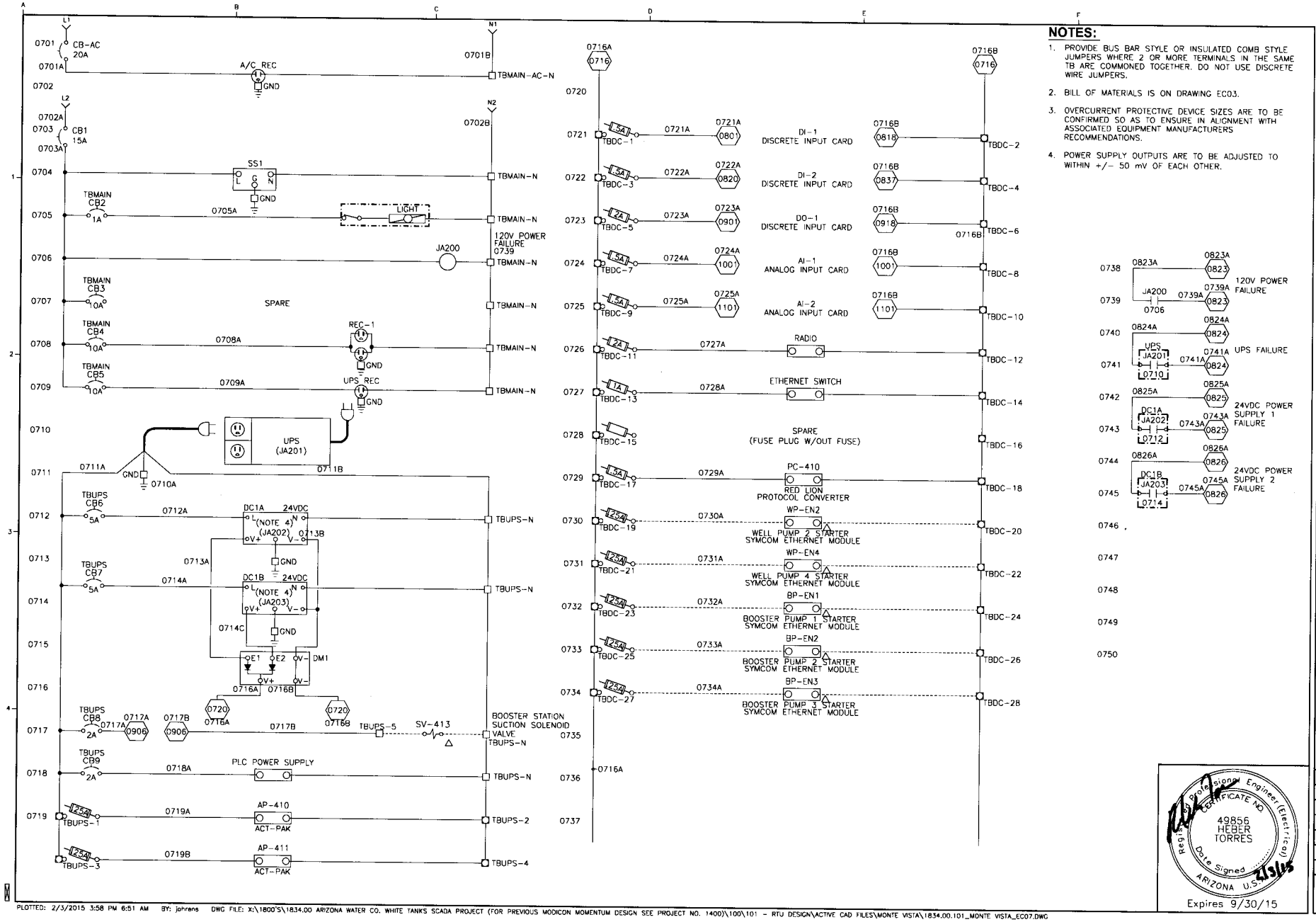


NOTES:

1. PROVIDE BUS BAR STYLE OR INSULATED COMB STYLE JUMPERS WHERE 2 OR MORE TERMINALS IN THE SAME TB ARE COMMONED TOGETHER. DO NOT USE DISCRETE WIRE JUMPERS.
2. BILL OF MATERIALS IS ON DRAWING EC03.
3. OVERCURRENT PROTECTIVE DEVICE SIZES ARE TO BE CONFIRMED SO AS TO ENSURE IN ALIGNMENT WITH ASSOCIATED EQUIPMENT MANUFACTURERS RECOMMENDATIONS.
4. POWER SUPPLY OUTPUTS ARE TO BE ADJUSTED TO WITHIN +/- 50 mV OF EACH OTHER.

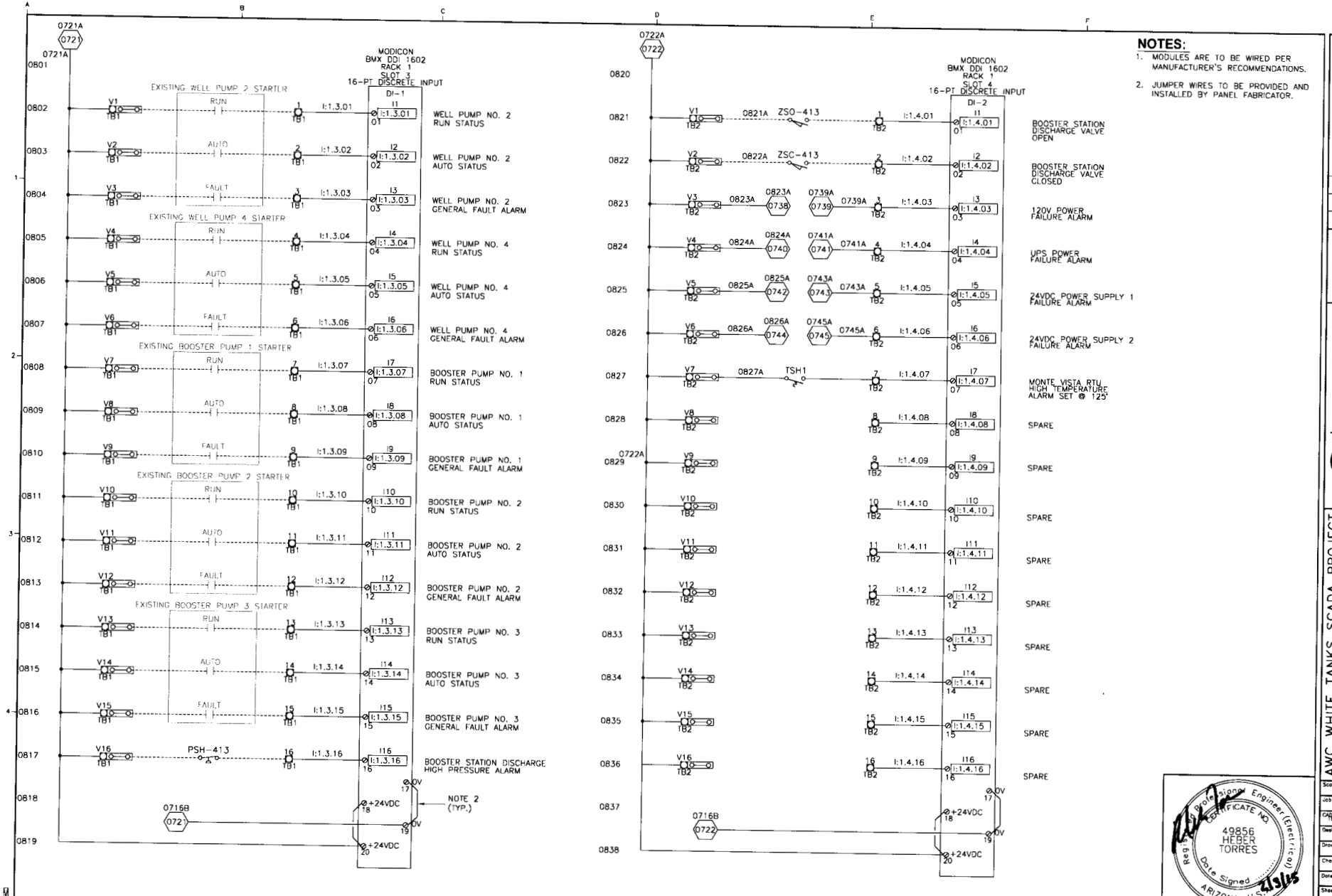
Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER TORRES
Date Signed 2/3/15
ARIZONA U.S.A.
Expires 9/30/15

No.	Description	Date	By

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4688

AWC WHITE TANKS SCADA PROJECT
MONTE VISTA
POWER DISTRIBUTION SCHEMATIC

Scale	NTS
Job No.	1834.00.101
CAD File No.	1834.00.101_MONTE VISTA_EC07.DWG
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC07



NOTES:

1. MODULES ARE TO BE WIRED PER MANUFACTURER'S RECOMMENDATIONS.
2. JUMPER WIRES TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.

Professional Engineer (Electrical) CERTIFICATE NO. 49856 HEBER TORRES Date Signed 2/3/15 ARIZONA U.S.A. Expires 9/30/15

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.265.4939

AWC WHITE TANKS SCADA PROJECT
MONTE VISTA
WIRING DIAGRAM
DI-1 AND DI-2

Scale	NTS
Job No.	1834.00.101
CAD File No.	1834.00.101_MONTE VISTA_EC08.DWG
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC08

Rev'd	By	Date	Description

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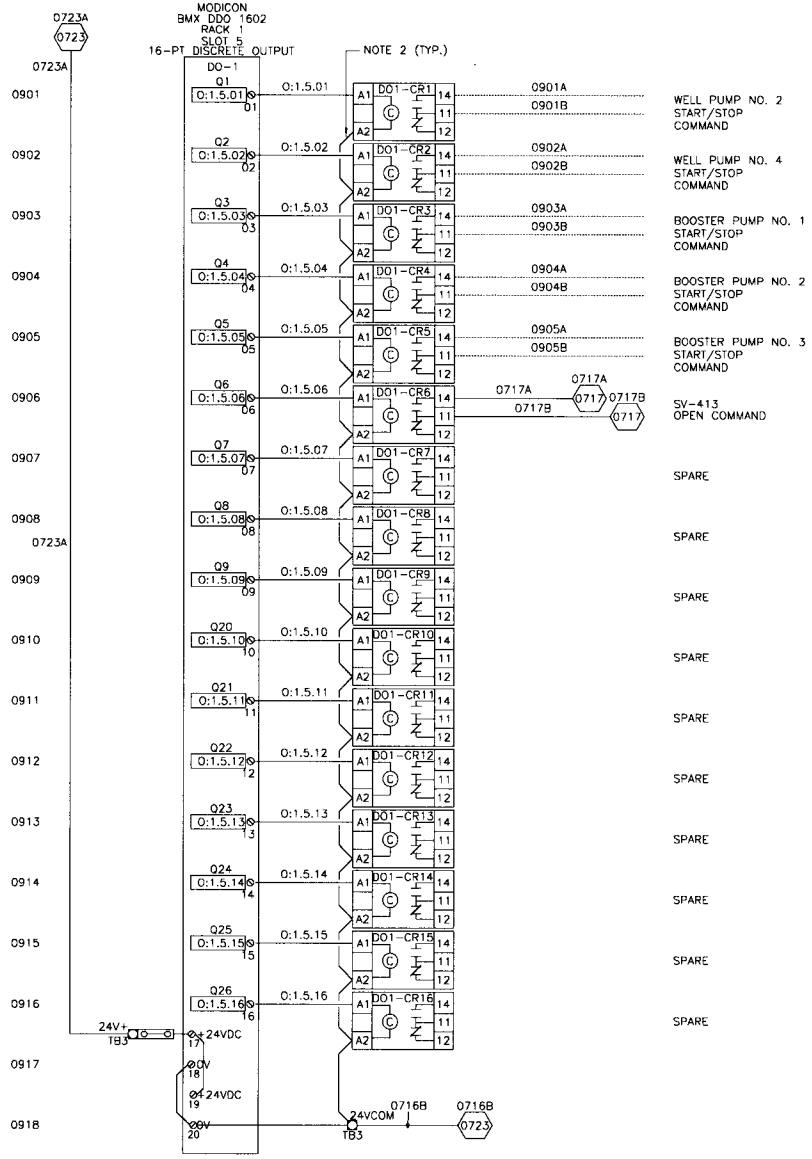


NOTES:

1. MODULES ARE TO BE WIRED PER MANUFACTURER'S RECOMMENDATIONS.
2. JUMPER WIRES TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.

Rev'd | By | Date | Description

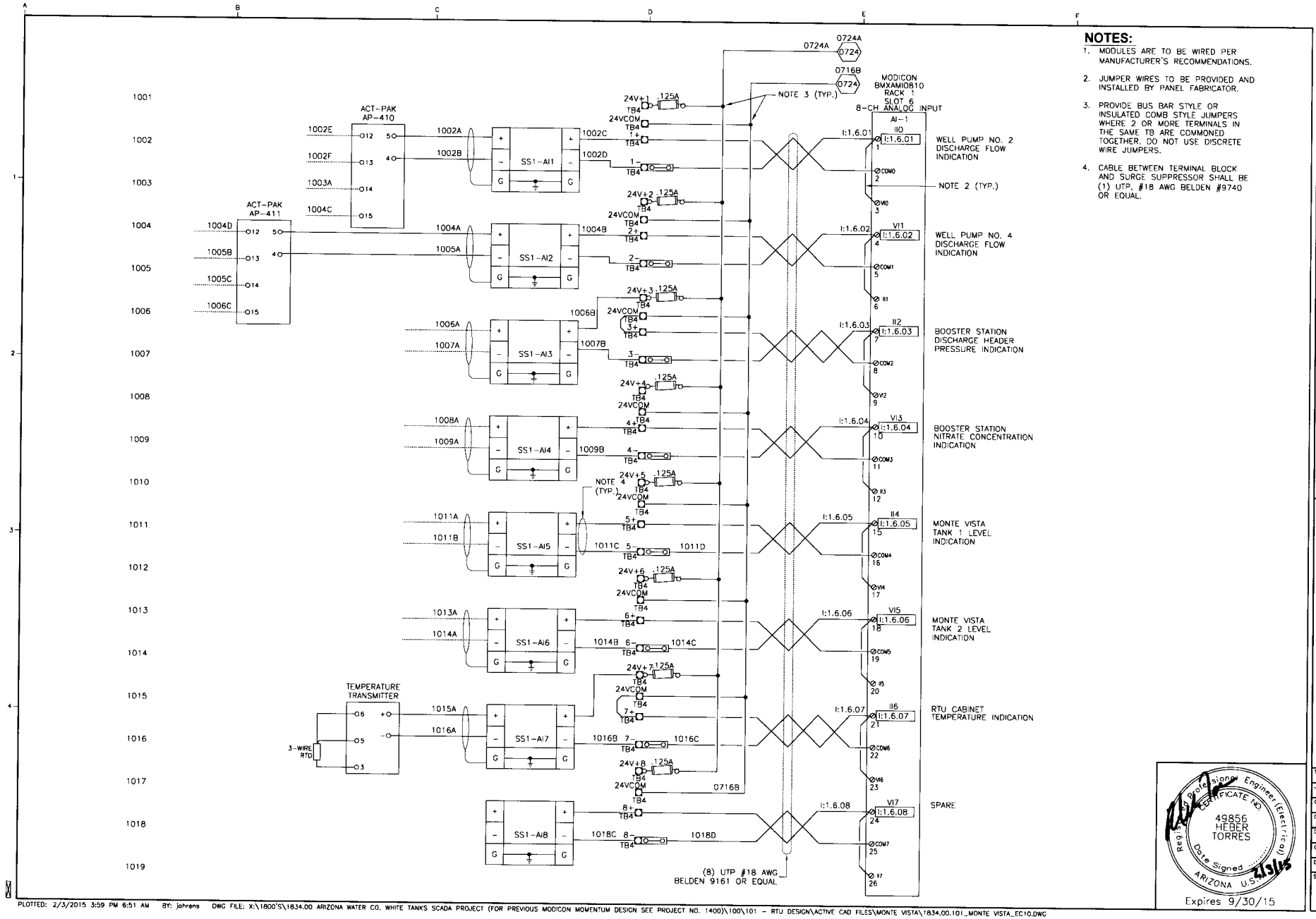
DELTA SYSTEMS ENGINEERING INC
3350 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4658

AWC WHITE TANKS SCADA PROJECT
MONTE VISTA
WIRING DIAGRAM
DO-1

Scale: NTS
Job No.: 1834.00.101
CADD File No.: 1834.00.TD1_MONTE VISTA_EC09.DWG
Designed: DLN
Drawn: JHA
Checked: DLN
Date: JAN. 2015
Sheet: EC09

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER TORRES
Date Signed 2/3/15
ARIZONA U.S.A.
Expires 9/30/15

PLOTTED: 2/3/2015 3:59 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\MONTE VISTA\1834.00.101_MONTE VISTA_EC09.DWG



NOTES:

1. MODULES ARE TO BE WIRED PER MANUFACTURER'S RECOMMENDATIONS.
2. JUMPER WIRES TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.
3. PROVIDE BUS BAR STYLE OR INSULATED COMB STYLE JUMPERS WHERE 2 OR MORE TERMINALS IN THE SAME TB ARE COMMONED TOGETHER. DO NOT USE DISCRETE WIRE JUMPERS.
4. CABLE BETWEEN TERMINAL BLOCK AND SURGE SUPPRESSOR SHALL BE (1) UTP, #18 AWG BELDEN #9740 OR EQUAL.

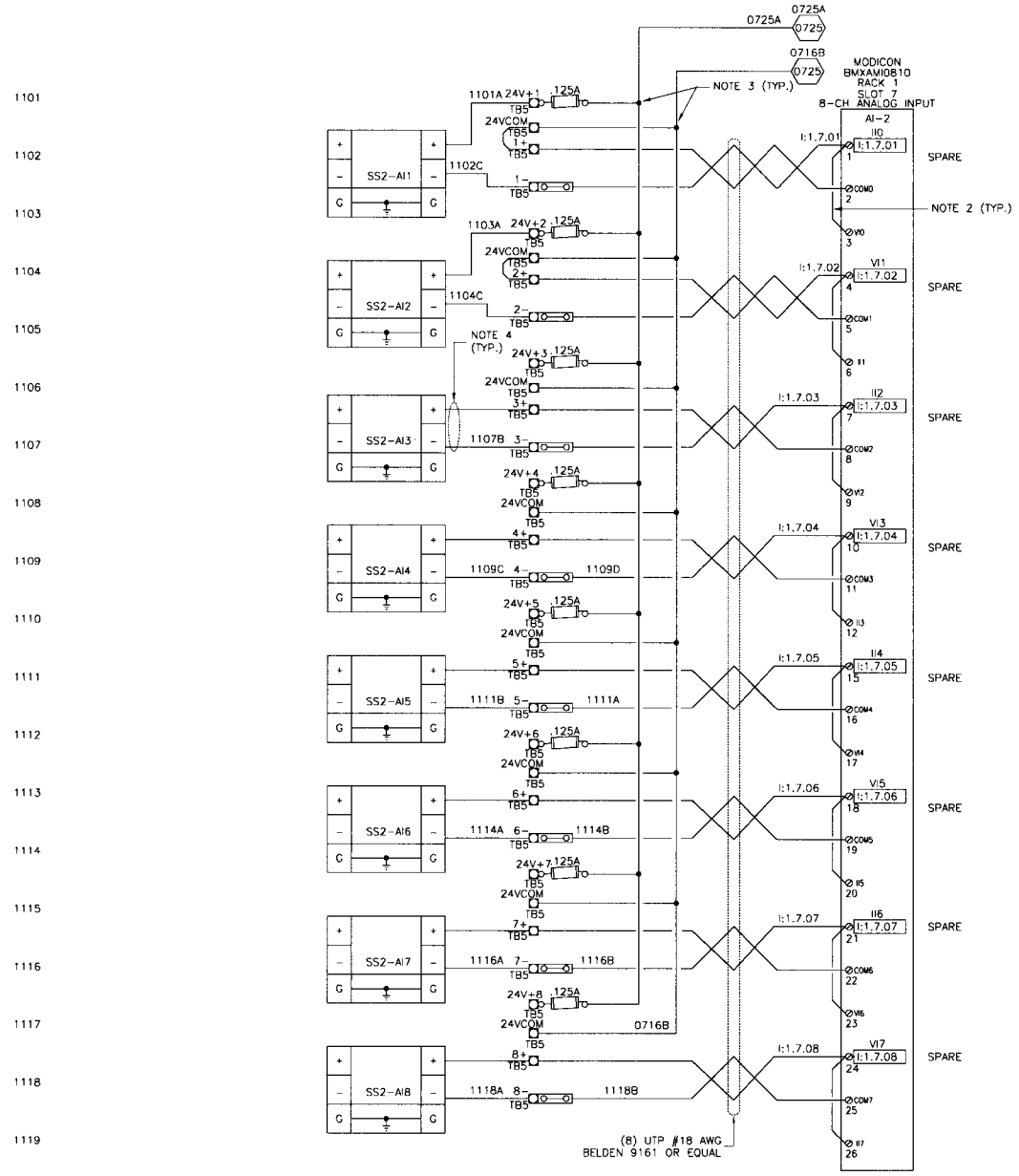
DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4659

AWC WHITE TANKS SCADA PROJECT
MONTE VISTA
WIRING DIAGRAM
AI-1

Scale	NTS
Job No.	1834.00.101
CAD File No.	1834.00.101_MONTE VISTA_EC10.DWG
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC10

Registered Professional Engineer (Electrical) CERTIFICATE NO. 49856 HEBER TORRES Date Signed 2/3/15 ARIZONA U.S.A.
Expires 9/30/15

PLOTTED: 2/3/2015 3:59 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\MONTE VISTA\1834.00.101_MONTE VISTA_EC10.DWG



NOTES:

1. MODULES ARE TO BE WIRED PER MANUFACTURER'S RECOMMENDATIONS.
2. JUMPER WIRES TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.
3. PROVIDE BUS BAR STYLE OR INSULATED COMB STYLE JUMPERS WHERE 2 OR MORE TERMINALS IN THE SAME TB ARE COMMONED TOGETHER. DO NOT USE DISCRETE WIRE JUMPERS.
4. CABLE BETWEEN TERMINAL BLOCK AND SURGE SUPPRESSOR SHALL BE (1) UTP, #18 AWG BELDEN #9740 OR EQUAL.

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER
TORRES
Date Signed 2/3/15
ARIZONA U.S.A.
Expires 9/30/15

Rev'd	By	Date	Description

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE. SUITE 915
PHOENIX, AZ 85012 602.266.4658

AWC WHITE TANKS SCADA PROJECT
MONTE VISTA
WIRING DIAGRAM
AI-2

Scale	NTS
Job No.	1834.00.101
CAD File No.	1834.00.101_MONTE VISTA_EC11.DWG
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC11

PLOTTED: 2/3/2015 3:59 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\MONTE VISTA\1834.00.101_MONTE VISTA_EC11.DWG

ARIZONA WATER COMPANY
WHITE TANKS WATER SYSTEM SCADA DESIGN
WELL NO. 7

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER
TORRES
Date Signed 12/5/2014
ARIZONA U.S.A.
Expires 9/30/15

Rev'd	By	Date	Description

DELTA SYSTEMS ENGINEERING INC
3950 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4658

AWC WHITE TANKS SCADA PROJECT
WELL NO. 7
COVER SHEET

Scale	NTS
Job No.	1834.00.101
CAD File No.	1834.00.101_WELL 7_EC01.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC01

XREF: DLV_BORDER_22X34

PLOTTED: 12/7/2014 1:03 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\WELL 7\1834.00.101_WELL 7_EC01.DWG

DRAWING INDEX

Drawing No.	Drawing Title
EC01	COVER SHEET
EC02	DRAWING INDEX, STANDARD SYMBOLS, LEGENDS, AND ISA TABLE
EC03	BILL OF MATERIALS
EC04	PLC CABINET ENCLOSURE LAYOUT AND NAMEPLATE SCHEDULE
EC05	TERMINAL BLOCK AND DEVICE DETAILS
EC06	COMMUNICATION SYSTEM ARCHITECTURE DIAGRAM
EC07	POWER DISTRIBUTION SCHEMATIC
EC08	WIRING DIAGRAM DI-1
EC09	WIRING DIAGRAM DO-1
EC10	WIRING DIAGRAM AI-1

SCHEMATIC/WIRING DIAGRAM SYMBOLS

- CIRCUIT BREAKER
- FUSE WITH PULLER *A – AMP RATING
- SWITCH NORMALLY OPEN
- SELECTOR SWITCH 2 POSITION, NORMALLY OPEN
- SELECTOR SWITCH 3 POSITION, NORMALLY OPEN
- TEMPERATURE SWITCH NORMALLY OPEN
- SINGLE LEVEL TERMINAL BLOCK * – TB IDENTIFICATION
- DOUBLE LEVEL TERMINAL BLOCK * – TB IDENTIFICATION
- TERMINAL BLOCK W/ FUSE PLUG AND FUSE * – TB IDENTIFICATION ** – FUSE AMPS
- TERMINAL BLOCK W/ DISCONNECT KNIFE * – TB IDENTIFICATION
- SURGE SUPPRESSOR FOR FLOATING SIGNAL CIRCUITS * – SS NUMBER IDENTIFICATION
- SURGE SUPPRESSOR FOR POWER SUPPLY * – SS NUMBER IDENTIFICATION
- CONTROL RELAY * – CR NUMBER IDENTIFICATION # – TERMINAL NUMBER
- EARTH GROUND
- DUPLEX RECEPTACLE
- SINGLE RECEPTACLE
- DC POWER SUPPLY * – DC VOLTAGE RATING

COLOR CODE CHART FOR 18 AWG BELDEN CABLES 12 COND. NO. 8466 AND 19 COND. NO. 8619

BLACK	BLK	1st
WHITE	WHT	2nd
RED	RED	3rd
GREEN	GRN	4th
ORANGE	ORN	5th
BLUE	BLU	6th
WHITE/BLACK	WHT/BLK	7th
RED/BLACK	RED/BLK	8th
GREEN/BLACK	GRN/BLK	9th
ORANGE/BLACK	ORN/BLK	10th
BLUE/BLACK	BLU/BLK	11th
BLACK/WHITE	BLK/WHT	12th
RED/WHITE	RED/WHT	13th
GREEN/WHITE	GRN/WHT	14th
BLUE/WHITE	BLU/WHT	15th
BLACK/RED	BLK/RED	16th
WHITE/RED	WHT/RED	17th
ORANGE/RED	ORN/RED	18th
BLUE/RED	BLU/RED	19th

WIRE SIZES

(CIRCUIT WIRING SHALL BE RATED IN ACCORDANCE WITH THE MAXIMUM PERMITTED AMPERE RATING/SETTING OF THE OVERCURRENT PROTECTION DEVICE. N.E.C. 210-3)

120VAC / 20A POWER CIRCUIT – MIN. #12 AWG.
120VAC / 15A AND BELOW – MIN. #14 AWG.

24VDC / 20A POWER CIRCUIT – MIN. #12 AWG.
24VDC / 15A AND BELOW – MIN. #16 AWG.
24VDC I/O & SIGNAL CIRCUIT – MIN. #18 AWG.

4-20mADC I/O SIGNAL CIRCUIT – MIN. #18 AWG.

ABBREVIATIONS

A/R	AS REQUIRED
AC COM	NEUTRAL
AFF	ABOVE FINISHED FLOOR
AI	ANALOG INPUT
ANL COM	ANALOG COMMON
AO	ANALOG OUTPUT
AWG	AMERICAN WIRE GAUGE
BLK	BLACK
BLU	BLUE
CAP	CENTRAL ARIZONA PROJECT
CLR	CLEAR
CR	CONTROL RELAY
DC COM	DC COMMON
DC+	DC POSITIVE POTENTIAL
DI	DISCRETE INPUT
DO	DISCRETE OUTPUT
DS	DOOR SWITCH
FOM	FIBER OPTIC MODEM
FOT	FIBER OPTIC TRANSCEIVER
GND	GROUND
GRN	GREEN
I/O	INPUT/OUTPUT
L	LINE
N	NEUTRAL
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NP	NAMEPLATE
OIT	OPERATOR INTERFACE TERMINAL
ORN	ORANGE
PDB	POWER DISTRIBUTION BLOCK
PLC	PROGRAMMABLE LOGIC CONTROLLER
PP	FIBER OPTIC PATCH PANEL
PS	POWER SUPPLY
REC	RECEPTACLE
RES	RESERVOIR
RIO	REMOTE INPUT/OUTPUT
RTU	REMOTE TELEMETRY UNIT
SLC	SMALL LOGIC CONTROLLER
SP	SPACE
SS	SURGE SUPPRESSOR
TB	TERMINAL BLOCK
UPS	UNINTERRUPTIBLE POWER SUPPLY
WHT	WHITE
WTR	WATER TREATMENT PLANT
WWTP	WASTE WATER TREATMENT PLANT

ISA INSTRUMENT IDENTIFICATION TABLE

	FIRST LETTERS: MEASURED OR INITIATING VARIABLE	FIRST LETTERS: MODIFIER	SUCCEEDING LETTERS: READOUT OR PASSIVE FUNCTION	SUCCEEDING LETTERS: OUTPUT FUNCTION	SUCCEEDING LETTERS: MODIFIER
A	ANALYZER		ALARM		AUTO
B	BURNER, COMBUSTION				
C	CONDUCTIVITY			CONTROL	CLOSED
D	DENSITY	DIFFERENTIAL			
E	VOLTAGE		ELEMENT		
F	FLOW	RATIO			
G	GAUGE		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHED.	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MOTION				MIDDLE
N	INTRUSION				NORMAL
O	TORQUE		ORIFICE, RESTRICTION		OPEN
P	PRESSURE		POINT CONNECTION		STOP
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD, OR PRINT		REMOTE
S	SPEED, FREQUENCY	SAFETY		SWITCH	START
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION			VALVE, LOUVER	
W	WEIGHT		WELL		
X	MOTOR	X-AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFED
Y	EVENT, STATE, OR PRESENCE	Y-AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION	Z-AXIS		DRIVER, ACTUATOR, FINAL CONTROL ELEMENT	

COLOR CODE CHART FOR 22 AWG BELDEN PAIRED CABLE NO. 8761

BLACK	BLK	1st
CLEAR	CLR	2nd

DRAWING REFERENCES

####A – WIRE NUMBER
(0321)
RUNG NUMBER

LINETYPE LEGEND

- FIELD WIRING
- INTERNAL PANEL WIRING
- RADIO COMMUNICATION LINK
- FO — FIBER OPTIC CABLE
- FOP — FIBER OPTIC PATCH CABLE
- EN — ETHERNET CAT5 CABLE
- DH+ — DATA HIGHWAY PLUS
- RIO — REMOTE INPUT OUTPUT
- AREA DIVIDER
- EQUIPMENT
- PATCH PANEL

RUNG NUMBERING

0321
RUNG NUMBER
DRAWING NUMBER (E.G. EC##)

WIRE NUMBERING

0321A
WIRE LETTER
RUNG NUMBER

PANEL WIRING IDENTIFICATION

BLACK – 120VAC LINE
WHITE – 120VAC NEUTRAL
GREEN – GROUND
BLUE – DC POSITIVE
BLUE W/WHITE STRIPE – DC COMMON

PANEL I/O WIRES TAG LEGEND

0:#.#.2
CHANNEL #
SLOT #
RACK #
0=OUTPUT 1=INPUT

Registered Professional Engineer (Electrical)
CERTIFICATE NO. 49856
HEBER TORRES
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ARIZONA U.S.A.
Expires 9/30/15

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4934

AWC WHITE TANKS SCADA PROJECT
WELL NO. 7
DRAWING INDEX, STANDARD SYMBOLS, LEGENDS, AND ISA TABLE

Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_WELL 7_EC02.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC02

Rev'd	By	Date	Description

XREF: DLN_BORDER_22X34

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QTY	ITEMS	MFG	CATALOG	DESC
1	102	MODICON	BMX CPS 2000	M340 POWER SUPPLY MODULE - 20W
1	105	MODICON	BMX P34 1000	M340 STANDARD PROCESSOR MODULE
1	106	MODICON	BMX DDI 1602	M340 DISCRETE INPUT MODULE
1	107	MODICON	BMX DDO 1602	M340 DISCRETE OUTPUT MODULE
1	108	MODICON	BMXAMI0810	M340 8 CHANNEL ISOLATED ANALOG INPUT
1	110	MODICON	BMXNOE0100	M340 ETHERNET MODULE - 1 x RJ45 10/100
1	115	MODICON	BMX XBP 0800	M340 8-SLOT RACK
3	116	MODICON	BMXXEM010	UNUSED SLOT CONNECTOR PROTECTIVE COVER
1	196	GE MDS	INETII-DGSN	INDUSTRIAL SPREAD SPECTRUM RADIO, DUAL GATEWAY, W/ ETHERNET AND RS-232 CONNECTIONS, 902 - 928 MHz
1	197	SIXNET	SN-6601-VZ-AC	CELLULAR MODEM FOR VERIZON WITH AC ADAPTER & WHIP ANTENNA (PROVIDED BY 'COMPANY')
1	198	RED LION	CSMSTRLE	MODULAR CONTROLLER MASTER WITH MULTIPLE PROTOCOL CONVERTER, ETHERNET, & EXPANSION SLOT
A/R	201	AB	199-DR1	ZINC/STEEL DIN RAIL EN 50022 (35mm x 7.5mm x 1m)
19	202	AB	1492-EA35	END ANCHOR
6	210	AB	1492-GM35	TERMINAL BLOCK, GROUP MARKING CARRIER
11	215	AB	1492-J4	SCREW CONNECTION TERMINAL BLOCK; SINGLE CIRCUIT, 600V, GRAY, FEED-THROUGH
2	216	AB	1492-EBJ3	END BARRIER; 1492-J
44	219	AB	1492-JD3P	SCREW CONNECTION TERMINAL BLOCK; DOUBLE LEVEL,W/ PLUGGABLE TOP LEVEL
5	220	AB	1492-EBJD3P	END BARRIER; 1492-J
8	221	AB	1492-JG4	SCREW CONNECTION TERMINAL BLOCK; GROUNDING
18	223	AB	1492-FPK224	FUSE PLUG INSERT W/ BFI, 10-36VAC/DC WORKING VOLTAGE, 10A MAX @ 250V.
1	224	AB	1492-FPK2120	FUSE PLUG INSERT W/ BFI, 60-150VAC/DC WORKING VOLTAGE
25	225	AB	1492-DPL	DISCONNECT PLUG FOR 1492-JD3 P AND 1492-JD3
1	230	AB	1492-SP1C005	CIRCUIT BREAKER, MINIATURE, ONE POLE, 0.5A
2	231	AB	1492-SP1C010	CIRCUIT BREAKER, MINIATURE, ONE POLE, 1A
1	232	AB	1492-SP1C020	CIRCUIT BREAKER, MINIATURE, ONE POLE, 2A
2	233	AB	1492-SP1C050	CIRCUIT BREAKER, MINIATURE, ONE POLE, 5A
3	234	AB	1492-SP1C100	CIRCUIT BREAKER, MINIATURE, ONE POLE, 10A
1	235	AB	1489-M1C150	CIRCUIT BREAKER, ONE POLE, 15A, UL 489 COMPLIANT
8	282	BUSSMANN	GMA-125MA	250V, 125mA, 5mmX20mm, FAST ACTING GLASS FUSE
2	283	BUSSMANN	GMA-250MA	250V, 250mA, 5mmX20mm, FAST ACTING GLASS FUSE
4	284	BUSSMANN	GMA-500MA	250V, 500mA, 5mmX20mm, FAST ACTING GLASS FUSE
1	285	BUSSMANN	GMA-1A	250V, 1A, 5mmX20mm, FAST ACTING GLASS FUSE
3	286	BUSSMANN	GMA-2A	250V, 2A, 5mmX20mm, FAST ACTING GLASS FUSE
1	301	HOFFMAN	A60N3618FSLP	FREE-STANDING TYPE 1 SINGLE-DOOR ENCLOSURE
1	303	HOFFMAN	A49P32N	SUB PANEL, 49" TALL, 32" WIDE
1	313	HOFFMAN	LF120V18	18" FLUORESCENT LIGHT PACKAGE, 115VAC
1	316	HOFFMAN	ATEMNO	TEMPERATURE CONTROL SWITCH (THERMOSTAT), N.O. CONTACTS
1	351	HOFFMAN	ALFSWD	DOOR SWITCH FOR LIGHT PACKAGE
1	352	ANY	F8T5	FLUORESCENT LIGHT
4	357	BELDEN	7929A	CABLE, ETHERNET, 4 PR, 24AWG, CAT 5E (LENGTH AS REQUIRED)
1	358	BELDEN	8267	CABLE, COAXIAL, RG-213 (OR EQUAL) WITH APPROPRIATE CONNECTORS, (LENGTH AS REQUIRED)
1	377	SQUARE D	PK15GTA	GROUNDING BAR, 24 CIRCUITS
A/R	380	PANDUIT	F2X4LG6 C2LG6	WIRE DUCT, 2"X4" TALL, LIGHT GRAY, SLOTTED WITH COVER
A/R	381	PANDUIT	F3X4LG6 C3LG6	WIRE DUCT, 3"X4" TALL, LIGHT GRAY, SLOTTED WITH COVER
1	390	PHOENIX CONTACT	5604775	DUAL OUTLET FOR 120VAC, 15A SERVICE, GFCI, DIN-RAIL MOUNTED
2	391	PHOENIX CONTACT	2963860	SINGLE OUTLET FOR 120VAC, 15A SERVICE, DIN-RAIL MOUNTED
1	400	PULS	YRM2.DIODE	DIODE REDUNDANCY MODULE, 10A PER INPUT, 24-48VDC
2	405	PULS	CS10.241	POWER SUPPLY, 10A, 24-28VDC OUTPUT, 100-120V/200-240V INPUT
16	412	PHOENIX CONTACT	2900299	TERMINAL BLOCK WITH PLUG-IN MINIATURE RELAY, 24VDC, 1PDT
1	414	PHOENIX CONTACT	2900310	TERMINAL BLOCK WITH PLUG IN MINIATURE RELAY, 1PDT, 120VAC
8	423	WEIDMULLER	8448920000	SURGE SUPPRESSOR, 24VDC, 2 WIRE LOOP PROTECTION (MCZ OVP)
1	424	WEIDMULLER	8389030000	END CAP FOR SURGE SUPPRESSOR (MCZ OVP)
1	425	WEIDMULLER	8829430000	INDUSTRIAL ETHERNET SWITCH, 8-PORT
1	450	COOPER BUSSMAN	BSPM1120S2GR	120VAC, 40kA MAX DISCHARGE CURRENT, SURGE PROTECTIVE DEVICE WITH REMOTE SIGNALING
1	703	APC	SMT750	750VA SMART UPS
1	704	APC	AP9613	DRY CONTACT I/O SMARTSLOT CARD
1	715	SENSUS	5390653700001	ACT-PAK 100D ELECTRONIC INSTRUMENT, PULSE INPUT, 4-20mA OUTPUT, NEMA 1 ENCLOSURE
1	716	SENSUS	5390633700142	ACT-PAK 100D PANEL MOUNTING OPTION
1	811	POLYPHASER	IS-50NX-C2	BROADBAND COAXIAL SURGE PROTECTOR, BULKHEAD MOUNT OPTION, 125-1000MHZ
2	853	TIMES MICROWAVE SYSTEMS	EZ-600-NMC	N-MALE CONNECTOR

A ~ BILL OF MATERIALS

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER
TORRES
Date Signed 12/5/2014
ARIZONA U.S.A.
Expires 9/30/15

No.	Description	Rev'd By	Date

DELTA SYSTEMS ENGINEERING INC
3350 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4858

AWC WHITE TANKS SCADA PROJECT
WELL NO. 7
BILL OF MATERIALS

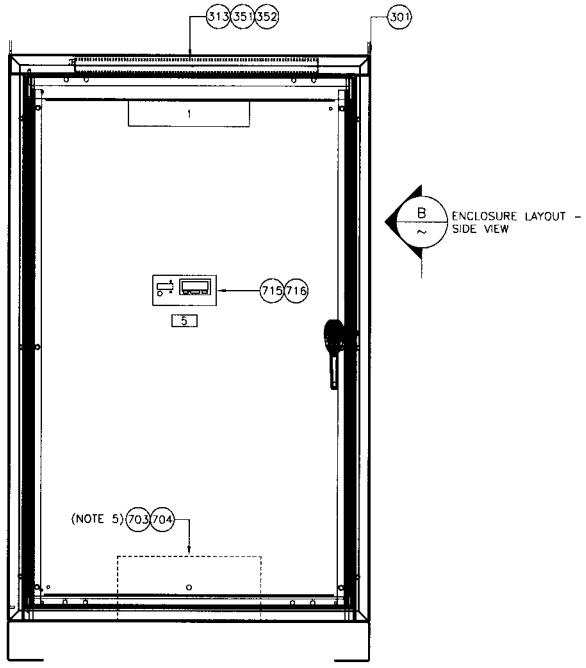
Scale	NTS
Job No.	1834.00.101
CAD File No.	1834.00.101_WELL 7_EC03.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC03

XREF: DLTV_BORDER_22X34

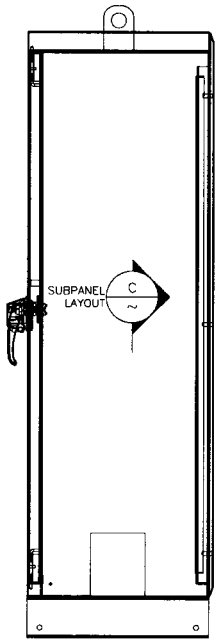
PLOTTED: 12/7/2014 1:03 PM 6:51 AM BY: johrens DWG FILE: x:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\WELL 7\1834.00.101_WELL 7_EC03.DWG

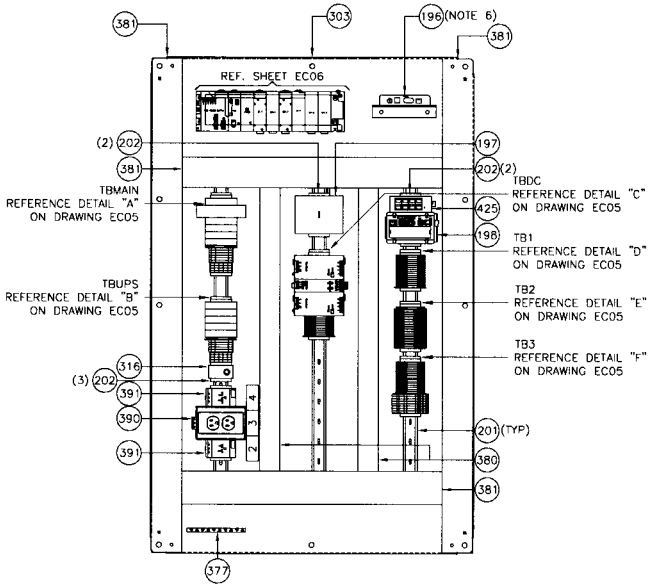
NOTES:

1. REFER TO BILL OF MATERIALS ON DRAWING EC03.
2. NAMEPLATES SHALL BE 3/32" THICK LAMINATED PHENOLIC TYPE WHITE WITH BLACK LETTERS. SEE NAMEPLATE SCHEDULE (DETAIL D) ON THIS SHEET FOR ADDITIONAL INFORMATION.
3. FURNISH ADDITIONAL NAMEPLATES AS REQUIRED BY UL OR BY OTHER APPLICABLE CODES.
4. REFER TO SHEET EC06 FOR COMMUNICATION SYSTEM ARCHITECTURE AND ADDITIONAL EQUIPMENT AND WIRING INFORMATION.
5. UPS IS TO BE SECURELY FASTENED TO BOTTOM OF CABINET.
6. MOUNT RADIO ON CUSTOM SHELF. SHELF TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.
7. ALL 120VAC COMPONENTS MOUNTED ON SUBPANEL AND SWING-OUT PANEL SHALL BE FINGER SAFE. IF A COMPONENT IS NOT FINGER SAFE BY DESIGN, IT SHALL BE PROVIDED WITH A PROTECTIVE COVER SO AS TO MINIMIZE POTENTIAL OF ACCIDENTAL CONTACT.



B ENCLOSURE LAYOUT - SIDE VIEW





A ENCLOSURE LAYOUT
SCALE: 1" = 1'-0"

B ENCLOSURE LAYOUT - SIDE VIEW
SCALE: 1" = 1'-0"

C SUBPANEL LAYOUT
SCALE: 1" = 1'-0"

NAMEPLATE SCHEDULE				
NP	HxWxLTR	FIRST LINE	SECOND LINE	LOCATION
1	2" x 13" x 1/2"	WELL 7	RTU	CENTERED 3" FROM TOP OF ENCLOSURE DOOR
2	1" x 3" x 1/4"	UPS RECEPTACLE	ONLY	CENTERED TO THE RIGHT OF UPS RECEPTACLE
3	1" x 3" x 1/4"	SERVICE RECEPTACLE	ONLY	CENTERED TO THE RIGHT OF SERVICE RECEPTACLE
4	1" x 3" x 1/4"	MODEM RECEPTACLE	ONLY	CENTERED TO THE RIGHT OF MODEM RECEPTACLE
5	1" x 3" x 1/4"	WELL 7 DISCHARGE FLOW		CENTERED BELOW ACT-PAK

D NAMEPLATE SCHEDULE
(NOTE 2)

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
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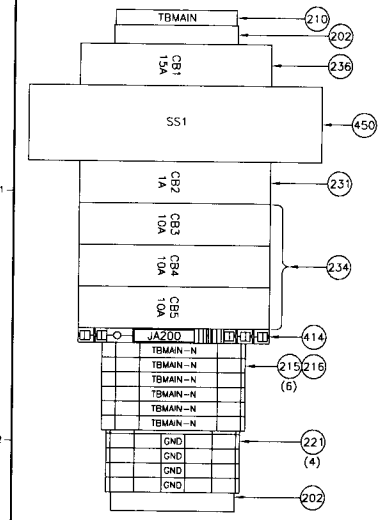
DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4858

AWC WHITE TANKS SCADA PROJECT
WELL NO. 7
PLC CABINET ENCLOSURE LAYOUT
AND NAMEPLATE SCHEDULE

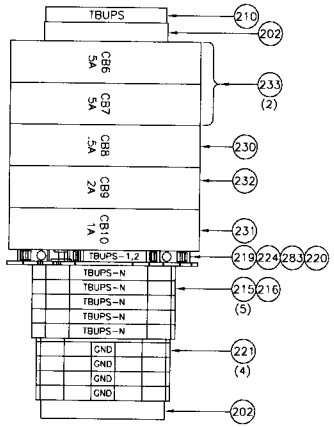
Scale	NTS
Job No.	1834.00.101
CAD File	1834.00.101_WELL 7_EC04.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC04

XREF: DLTV_BORDER_22X34; 1834.00.101_WELL 7_EC05.dwg

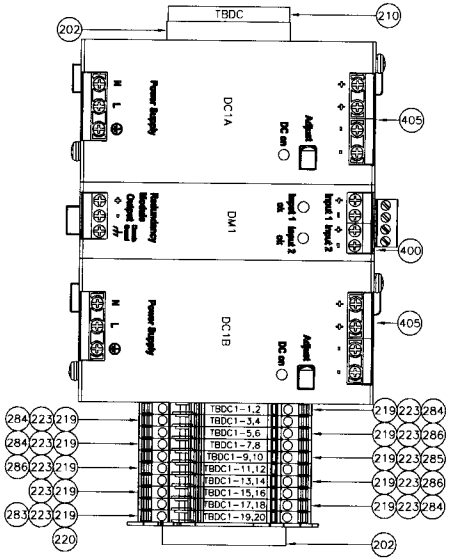
PLOTTED: 12/7/2014 1:04 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\WELL 7\1834.00.101_WELL 7_EC04.DWG



DETAIL A
120VAC POWER
DISTRIBUTION
TBMAIN



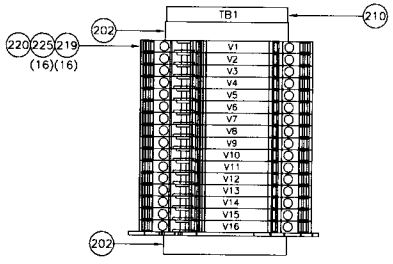
DETAIL B
120VAC POWER
DISTRIBUTION
TBUPS



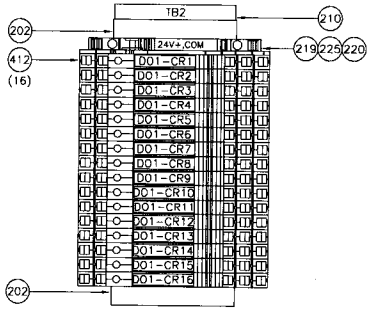
DETAIL C
24VDC POWER DISTRIBUTION
TBDC

NOTES:

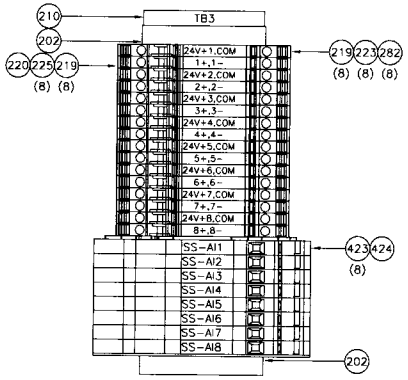
1. PROVIDE BUS BAR STYLE OR INSULATED COMB STYLE JUMPERS WHERE 2 OR MORE TERMINALS IN THE SAME TB ARE COMMONED TOGETHER. DO NOT USE DISCRETE WIRE JUMPERS.
2. BILL OF MATERIALS IS ON DRAWING EC03.
3. PANEL BUILDER TO SUPPLY AND INSTALL ALL NECESSARY AND APPROPRIATE ACCESSORIES INCLUDING TERMINAL NUMBERS, JUMPERS AND END BARRIERS.



DETAIL D
DISCRETE INPUTS
TB1



DETAIL E
DISCRETE OUTPUT
TB2



DETAIL F
ANALOG INPUT
TB3

0 .5" 1" 1.5" 2"
SCALE: 6" = 1'-0"

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER
TORRES
Date Signed 12/5/2014
ARIZONA U.S.A.
Expires 9/30/15

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4658

AWC WHITE TANKS SCADA PROJECT
WELL NO. 7
TERMINAL BLOCK
AND DEVICE DETAILS

Scale	6" = 1'-0"
Job No.	1834.00.101
CAD File No.	1834.00.101_WELL 7_EC05.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC05

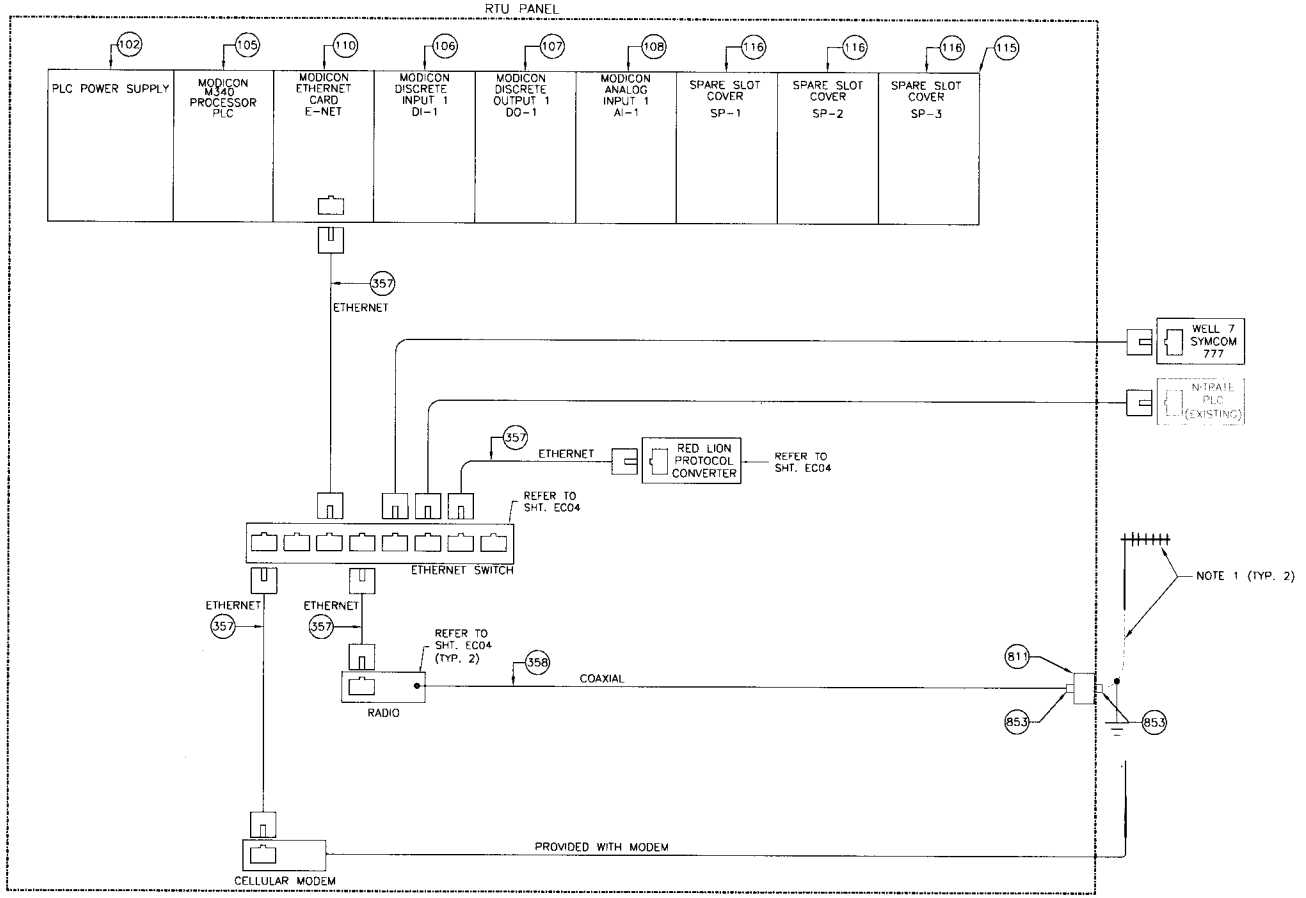
Rev'd	By	Date	Description

XREF: D:\V_BORDER_22X34=_1834.00.101_WELL 7_EC04.dwg

PLOTTED: 12/7/2014 1:04 PM 6:51 AM BY: johrens DWG FILE: x:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\WELL 7\1834.00.101_WELL 7_EC05.DWG

NOTES:

1. REFERENCE ASSOCIATED ELECTRICAL DESIGN PACKAGE FOR ANTENNAS AND ANTENNA CABLE REQUIREMENTS.
2. REFERENCE ASSOCIATED ELECTRICAL DESIGN PACKAGE FOR CIRCUIT INFORMATION PERTAINING TO CAT5E CABLING TO EXISTING NITRATE PLC AND SYMCOM 777.



Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER TORRES
Date Signed 12/15/2014
ARIZONA U.S.A.
Expires 9/30/15

Rev'd	By	Date	Description

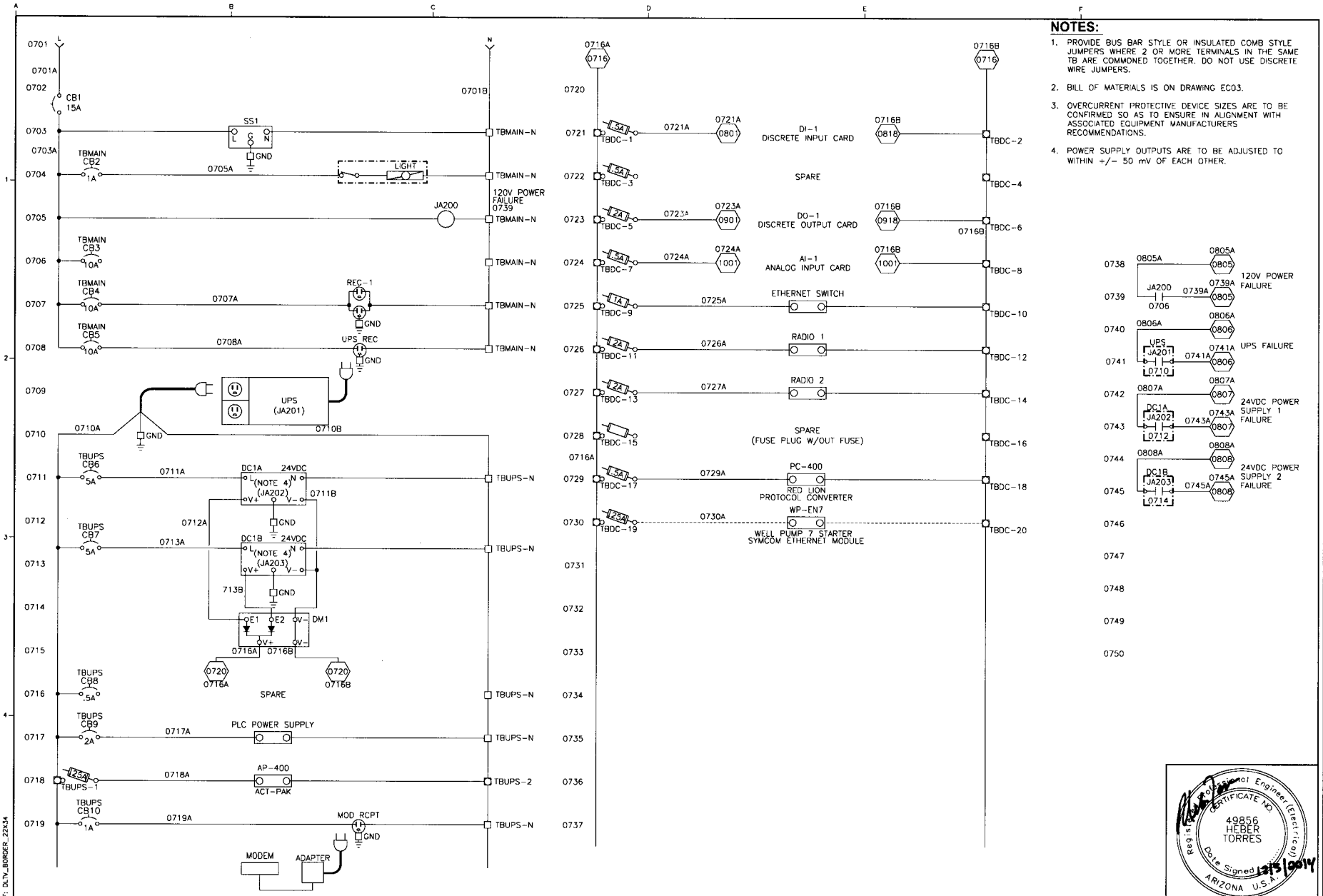
DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4658

AWC WHITE TANKS SCADA PROJECT
WELL NO. 7
COMMUNICATION SYSTEM ARCHITECTURE DIAGRAM

Scale	NTS
Job No.	1834.00.101
CAD File No.	1834.00.101_WELL 7_EC06.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC06

XREF: DLTV_BORDER_22X34

PLOTTED: 12/7/2014 1:04 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\WELL 7\1834.00.101_WELL 7_EC06.DWG



NOTES:

1. PROVIDE BUS BAR STYLE OR INSULATED COMB STYLE JUMPERS WHERE 2 OR MORE TERMINALS IN THE SAME TB ARE COMMONED TOGETHER. DO NOT USE DISCRETE WIRE JUMPERS.
2. BILL OF MATERIALS IS ON DRAWING EC03.
3. OVERCURRENT PROTECTIVE DEVICE SIZES ARE TO BE CONFIRMED SO AS TO ENSURE IN ALIGNMENT WITH ASSOCIATED EQUIPMENT MANUFACTURERS RECOMMENDATIONS.
4. POWER SUPPLY OUTPUTS ARE TO BE ADJUSTED TO WITHIN +/- 50 mV OF EACH OTHER.

DELTA SYSTEMS ENGINEERING INC
3350 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4658

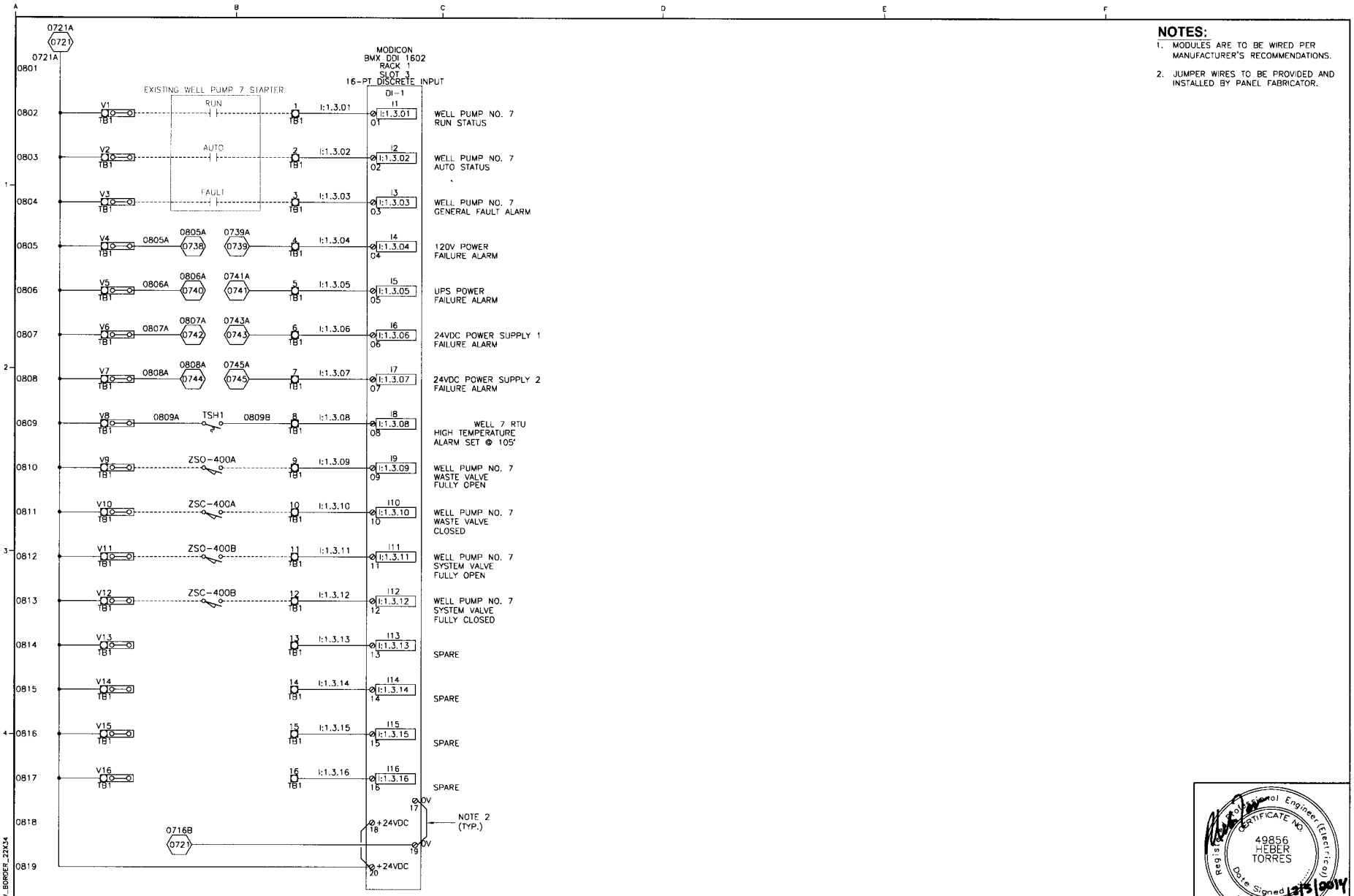
AWC WHITE TANKS SCADA PROJECT
WELL NO. 7
POWER DISTRIBUTION SCHEMATIC

Scale	NTS
Job No.	1834.00.101
CAD File No.	1834.00.101_WELL 7_EC07.DWG
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC07

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER TORRES
Date Signed 12/5/2014
ARIZONA U.S.A.
Expires 9/30/15

XREF: DLTV_BORDER_22X34

PLOTTED: 12/7/2014 1:04 PM 6:51 AM BY: jchrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\WELL 7\1834.00.101_WELL 7_EC07.DWG



NOTES:

1. MODULES ARE TO BE WIRED PER MANUFACTURER'S RECOMMENDATIONS.
2. JUMPER WIRES TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER
TORRES
Date Signed 12/5/2014
ARIZONA U.S.A.
Expires 9/30/15

Rev'd	By	Date	Description

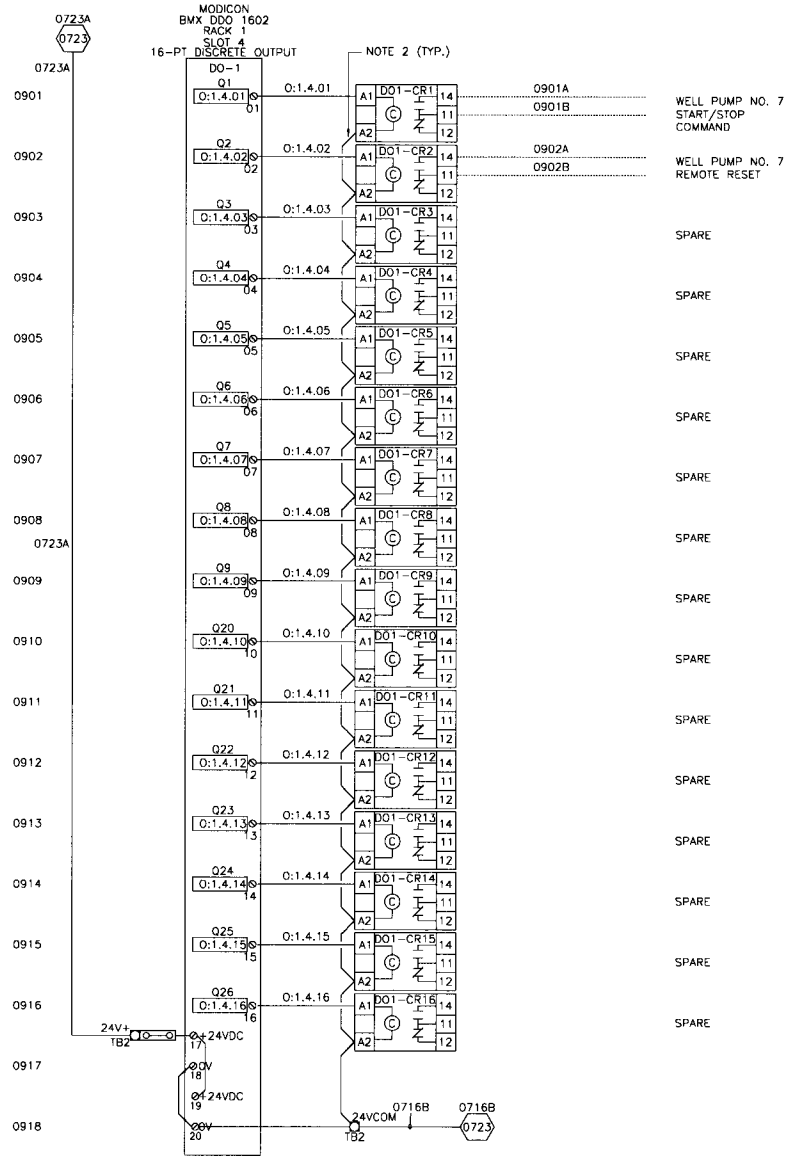
DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4658

AWC WHITE TANKS SCADA PROJECT
WELL NO. 7
WIRING DIAGRAM
DI-1

Scale	NTS
Job No.	1834.00.101
CAD File No.	1834.00.101_WELL 7_EC08.DWG
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC08

XREF: DLTV_BORDER_22X34

PLOTTED: 12/7/2014 1:04 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\WELL 7\1834.00.101_WELL 7_EC08.DWG



NOTES:

1. MODULES ARE TO BE WIRED PER MANUFACTURER'S RECOMMENDATIONS.
2. JUMPER WIRES TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER
TORRES
Date Signed 12/5/2014
ARIZONA U.S.A.
Expires 9/30/15

Rev'd	By	Date	Description

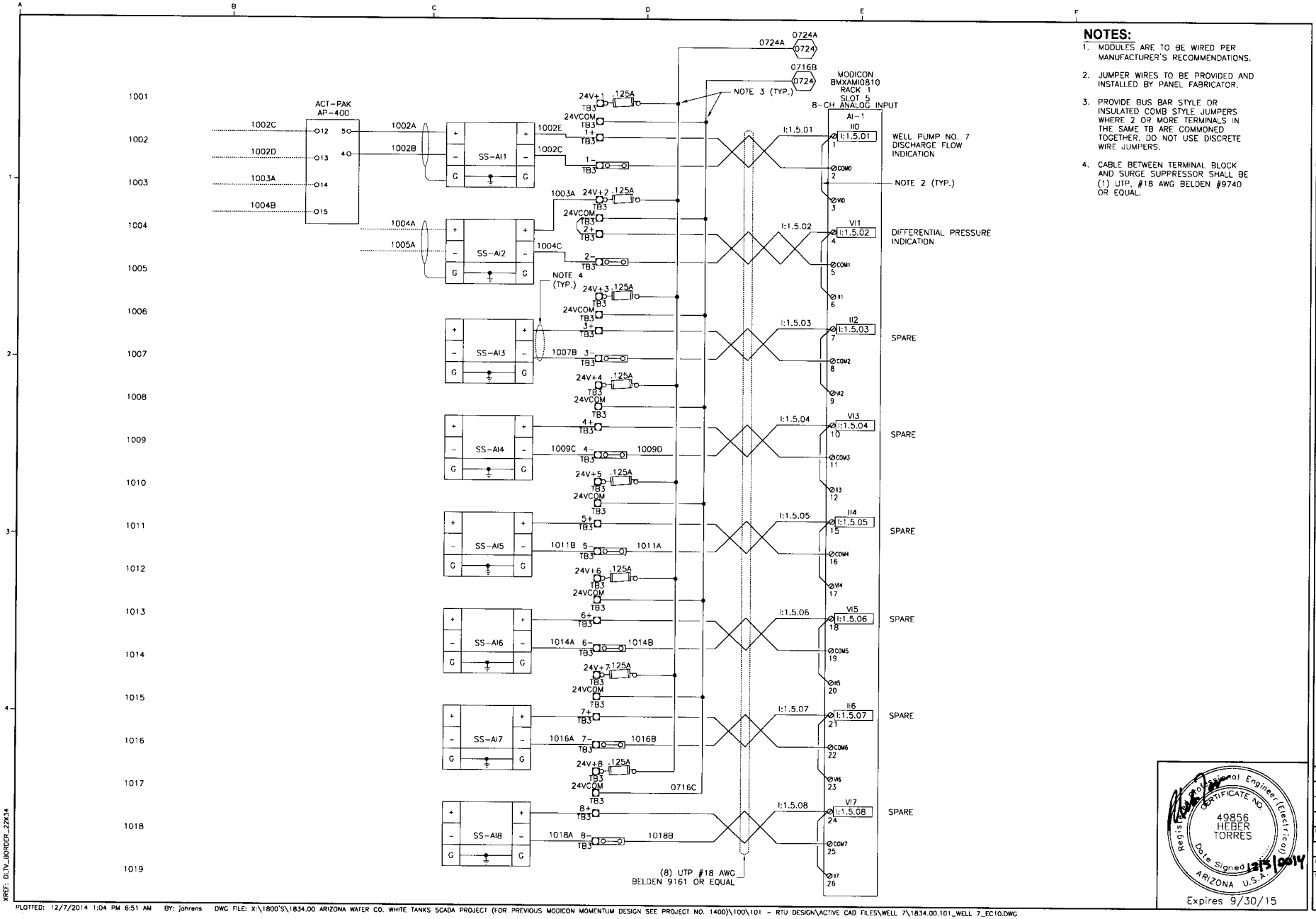
DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4658

AWC WHITE TANKS SCADA PROJECT
WELL NO. 7
WIRING DIAGRAM
DO-1

Scale	NTS
Job No.	1834.00.101
CAD File No.	1834.00.101_WELL 7_EC09.DWG
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC09

XREF: DLTV_BORDER_22X34

PLOTTED: 12/7/2014 1:04 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\WELL 7\1834.00.101_WELL 7_EC09.DWG



NOTES:

1. MODULES ARE TO BE WIRED PER MANUFACTURER'S RECOMMENDATIONS.
2. JUMPER WIRES TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.
3. PROVIDE BUS BAR STYLE OR INSULATED COMB STYLE JUMPERS WHERE 2 OR MORE TERMINALS IN THE SAME TB ARE COMMONED TOGETHER. DO NOT USE DISCRETE WIRE JUMPERS.
4. CABLE BETWEEN TERMINAL BLOCK AND SURGE SUPPRESSOR SHALL BE (1) UTP, #18 AWG BELDEN #9740 OR EQUAL.

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER TORRES
Date Signed 12/5/2014
ARIZONA U.S.A.
Expires 9/30/15

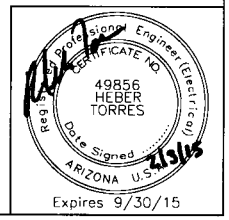
DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4659

AWC WHITE TANKS SCADA PROJECT
WELL NO. 7
WIRING DIAGRAM
AI-1

Scale	NTS
Job No.	1834.00.101
CAD File No.	1834.00.101_WELL 7_EC10.DWG
Designed	DLN
Drawn	JHA
Checked	DLN
Date	DEC. 2014
Sheet	EC10

XREF: D-IV_BORDER_22X34
PLOTTED: 12/7/2014 1:04 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\WELL 7\1834.00.101_WELL 7_EC10.DWG

ARIZONA WATER COMPANY
WHITE TANKS WATER SYSTEM SCADA DESIGN
WELL NO. 8



Rev'd	By	Date	Description

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012. 602.266.4658

AWC WHITE TANKS SCADA PROJECT
WELL NO. 8
COVER SHEET

Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_WELL 8_EC01.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC01

PLOTTED: 2/3/2015 4:09 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\WELL 8\1834.00.101_WELL 8_EC01.DWG

DRAWING INDEX

Drawing No.	Drawing Title
EC01	COVER SHEET
EC02	DRAWING INDEX, STANDARD SYMBOLS, LEGENDS, AND ISA TABLE
EC03	BILL OF MATERIALS
EC04	PLC CABINET ENCLOSURE LAYOUT AND NAMEPLATE SCHEDULE
EC05	TERMINAL BLOCK AND DEVICE DETAILS
EC06	COMMUNICATION SYSTEM ARCHITECTURE DIAGRAM
EC07	POWER DISTRIBUTION SCHEMATIC
EC08	WIRING DIAGRAM DI-1
EC09	WIRING DIAGRAM DO-1
EC10	WIRING DIAGRAM AI-1

SCHEMATIC/WIRING DIAGRAM SYMBOLS

- CIRCUIT BREAKER
- FUSE WITH PULLER *A – AMP RATING
- SWITCH NORMALLY OPEN
- SELECTOR SWITCH 2 POSITION, NORMALLY OPEN
- SELECTOR SWITCH 3 POSITION, NORMALLY OPEN
- TEMPERATURE SWITCH NORMALLY OPEN
- SINGLE LEVEL TERMINAL BLOCK * – TB IDENTIFICATION
- DOUBLE LEVEL TERMINAL BLOCK * – TB IDENTIFICATION
- TERMINAL BLOCK W/ FUSE PLUG AND FUSE * – TB IDENTIFICATION ** – FUSE AMPS
- TERMINAL BLOCK W/ DISCONNECT KNIFE * – TB IDENTIFICATION
- SURGE SUPPRESSOR FOR FLOATING SIGNAL CIRCUITS * – SS NUMBER IDENTIFICATION
- SURGE SUPPRESSOR FOR POWER SUPPLY * – SS NUMBER IDENTIFICATION
- CONTROL RELAY * – CR NUMBER IDENTIFICATION # – TERMINAL NUMBER
- EARTH GROUND
- DUPLEX RECEPTACLE
- SINGLE RECEPTACLE
- DC POWER SUPPLY * – DC VOLTAGE RATING

COLOR CODE CHART FOR 18 AWG BELDEN CABLES 12 COND. NO. 8466 AND 19 COND. NO. 8619

BLACK	BLK	1st
WHITE	WHT	2nd
RED	RED	3rd
GREEN	GRN	4th
ORANGE	ORN	5th
BLUE	BLU	6th
WHITE/BLACK	WHT/BLK	7th
RED/BLACK	RED/BLK	8th
GREEN/BLACK	GRN/BLK	9th
ORANGE/BLACK	ORN/BLK	10th
BLUE/BLACK	BLU/BLK	11th
BLACK/WHITE	BLK/WHT	12th
RED/WHITE	RED/WHT	13th
GREEN/WHITE	GRN/WHT	14th
BLUE/WHITE	BLU/WHT	15th
BLACK/RED	BLK/RED	16th
WHITE/RED	WHT/RED	17th
ORANGE/RED	ORN/RED	18th
BLUE/RED	BLU/RED	19th

WIRE SIZES

(CIRCUIT WIRING SHALL BE RATED IN ACCORDANCE WITH THE MAXIMUM PERMITTED AMPERE RATING/SETTING OF THE OVERCURRENT PROTECTION DEVICE. N.E.C. 210-3)

120VAC / 20A POWER CIRCUIT – MIN. #12 AWG.
120VAC / 15A AND BELOW – MIN. #14 AWG.

24VDC / 20A POWER CIRCUIT – MIN. #12 AWG.
24VDC / 15A AND BELOW – MIN. #16 AWG.
24VDC I/O & SIGNAL CIRCUIT – MIN. #18 AWG.

4-20mADC I/O SIGNAL CIRCUIT – MIN. #18 AWG.

ABBREVIATIONS

A/R	AS REQUIRED
AC COM	NEUTRAL
AFF	ABOVE FINISHED FLOOR
AI	ANALOG INPUT
ANL COM	ANALOG COMMON
AO	ANALOG OUTPUT
AWG	AMERICAN WIRE GAUGE
BLK	BLACK
BLU	BLUE
CAP	CENTRAL ARIZONA PROJECT
CLR	CLEAR
CR	CONTROL RELAY
DC COM	DC COMMON
DC+	DC POSITIVE POTENTIAL
DI	DISCRETE INPUT
DO	DISCRETE OUTPUT
DS	DOOR SWITCH
FOM	FIBER OPTIC MODEM
FOT	FIBER OPTIC TRANSCEIVER
GND	GROUND
GRN	GREEN
I/O	INPUT/OUTPUT
L	LINE
N	NEUTRAL
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NP	NAMEPLATE
OIT	OPERATOR INTERFACE TERMINAL
ORN	ORANGE
PDB	POWER DISTRIBUTION BLOCK
PLC	PROGRAMMABLE LOGIC CONTROLLER
PP	FIBER OPTIC PATCH PANEL
PS	POWER SUPPLY
REC	RECEPTACLE
RES	RESERVOIR
RIO	REMOTE INPUT/OUTPUT
RTU	REMOTE TELEMETRY UNIT
SLC	SMALL LOGIC CONTROLLER
SP	SPACE
SS	SURGE SUPPRESSOR
TB	TERMINAL BLOCK
UPS	UNINTERRUPTIBLE POWER SUPPLY
WHT	WHITE
WTR	WATER TREATMENT PLANT
WWTP	WASTE WATER TREATMENT PLANT

ISA INSTRUMENT IDENTIFICATION TABLE

FIRST LETTERS			SUCCEEDING LETTERS		
MEASURED OR INITIATING VARIABLE		MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYZER		ALARM		AUTO
B	BURNER, COMBUSTION				
C	CONDUCTIVITY			CONTROL	CLOSED
D	DENSITY	DIFFERENTIAL			
E	VOLTAGE		ELEMENT		
F	FLOW	RATIO			
G	GAUGE		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHED.	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MOTION				MIDDLE
N	INTRUSION				NORMAL
O	TORQUE		ORIFICE, RESTRICTION		OPEN
P	PRESSURE		POINT CONNECTION		STOP
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD, OR PRINT		REMOTE
S	SPEED, FREQUENCY	SAFETY		SWITCH	START
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION			VALVE, LOUVER	
W	WEIGHT		WELL		
X	MOTOR	X-AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE, OR PRESENCE	Y-AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION	Z-AXIS		DRIVER, ACTUATOR, FINAL CONTROL ELEMENT	

COLOR CODE CHART FOR 22 AWG BELDEN PAIRED CABLE NO. 8761

BLACK	BLK	1st
CLEAR	CLR	2nd

DRAWING REFERENCES

####A – WIRE NUMBER
0321
RUNG NUMBER

LINETYPE LEGEND

- FIELD WIRING
- INTERNAL PANEL WIRING
- RADIO COMMUNICATION LINK
- FO — FIBER OPTIC CABLE
- FOP — FIBER OPTIC PATCH CABLE
- EN — ETHERNET CAT5 CABLE
- DH+ — DATA HIGHWAY PLUS
- RIO — REMOTE INPUT OUTPUT
- AREA DIVIDER
- EQUIPMENT
- PATCH PANEL

RUNG NUMBERING

0321
RUNG NUMBER
DRAWING NUMBER (E.G. EC##)

WIRE NUMBERING

0321A
WIRE LETTER
RUNG NUMBER

PANEL WIRING IDENTIFICATION

BLACK – 120VAC LINE
WHITE – 120VAC NEUTRAL
GREEN – GROUND
BLUE – DC POSITIVE
BLUE W/WHITE STRIPE – DC COMMON

PANEL I/O WIRES TAG LEGEND

0:#.#.2
CHANNEL #
SLOT #
RACK #
0=OUTPUT 1=INPUT

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER TORRES
Date Signed 2/3/15
ARIZONA U.S.A.
Expires 9/30/15

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE. SUITE 915
PHOENIX, AZ 85012 602.266.4558

No.	Description	Date	By

AWC WHITE TANKS SCADA PROJECT
WELL NO. 8
DRAWING INDEX, STANDARD SYMBOLS, LEGENDS, AND ISA TABLE

Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_WELL 8_EC02.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC02

QTY	ITEMS	MFG	CATALOG	DESC
1	102	MODICON	BMX CPS 2000	M340 POWER SUPPLY MODULE - 20W
1	105	MODICON	BMX P34 1000	M340 STANDARD PROCESSOR MODULE
1	106	MODICON	BMX DDI 1602	M340 DISCRETE INPUT MODULE
1	107	MODICON	BMX DDO 1602	M340 DISCRETE OUTPUT MODULE
1	108	MODICON	BMXAMI0810	M340 8 CHANNEL ISOLATED ANALOG INPUT
1	110	MODICON	BMXNOE0100	M340 ETHERNET MODULE - 1 x RJ45 10/100
1	115	MODICON	BMX XBP 0800	M340 8-SLOT RACK
3	116	MODICON	BMXXEM010	UNUSED SLOT CONNECTOR PROTECTIVE COVER
1	196	GE MDS	INETII-DGSN	INDUSTRIAL SPREAD SPECTRUM RADIO, DUAL GATEWAY, W/ ETHERNET AND RS-232 CONNECTIONS, 902 - 928 MHz
1	197	SQUARE D	HMIGTO5310	MAGELIS OPERATOR INTERFACE TERMINAL, 24VDC, 10.4" VGA-TFT
1	198	SQUARE D	HMIZSD4G	4GB MEMORY SG CARD
A/R	201	AB	199-DR1	ZINC/STEEL DIN RAIL EN 50022 (35mm x 7.5mm x 1m)
19	202	AB	1492-EA35	END ANCHOR
6	210	AB	1492-GM35	TERMINAL BLOCK, GROUP MARKING CARRIER
11	215	AB	1492-J4	SCREW CONNECTION TERMINAL BLOCK; SINGLE CIRCUIT, 600V, GRAY, FEED-THROUGH
3	216	AB	1492-EBJ3	END BARRIER; 1492-J
43	219	AB	1492-JD3P	SCREW CONNECTION TERMINAL BLOCK; DOUBLE LEVEL,W/ PLUGGABLE TOP LEVEL
3	220	AB	1492-EBJD3P	END BARRIER; 1492-J
8	221	AB	1492-JG4	SCREW CONNECTION TERMINAL BLOCK; GROUNDING
17	223	AB	1492-FPK224	FUSE PLUG INSERT W/ BFI, 10-36VAC/DC WORKING VOLTAGE, 10A MAX @ 250V.
1	224	AB	1492-FPK2120	FUSE PLUG INSERT W/ BFI, 60-150VAC/DC WORKING VOLTAGE
25	225	AB	1492-DPL	DISCONNECT PLUG FOR 1492-JD3 P AND 1492-JD3
1	230	AB	1492-SP1C005	CIRCUIT BREAKER, MINIATURE, ONE POLE, 0.5A
1	231	AB	1492-SP1C010	CIRCUIT BREAKER, MINIATURE, ONE POLE, 1A
1	232	AB	1492-SP1C020	CIRCUIT BREAKER, MINIATURE, ONE POLE, 2A
2	233	AB	1492-SP1C050	CIRCUIT BREAKER, MINIATURE, ONE POLE, 5A
3	234	AB	1492-SP1C100	CIRCUIT BREAKER, MINIATURE, ONE POLE, 10A
1	235	AB	1492-M1C200	CIRCUIT BREAKER, ONE POLE, 20A, UL 489 COMPLIANT
1	236	AB	1489-M1C150	CIRCUIT BREAKER, ONE POLE, 15A, UL 489 COMPLIANT
8	282	BUSSMANN	GMA-125MA	250V, 125mA, 5mmX20mm, FAST ACTING GLASS FUSE
2	283	BUSSMANN	GMA-250MA	250V, 250mA, 5mmX20mm, FAST ACTING GLASS FUSE
3	284	BUSSMANN	GMA-500MA	250V, 500mA, 5mmX20mm, FAST ACTING GLASS FUSE
1	285	BUSSMANN	GMA-1A	250V, 1A, 5mmX20mm, FAST ACTING GLASS FUSE
3	286	BUSSMANN	GMA-2A	250V, 2A, 5mmX20mm, FAST ACTING GLASS FUSE
1	301	HOFFMAN	A72H3724FSPT	FREE-STANDING TYPE 4 SINGLE-DOOR ENCLOSURES WITH 3-POINT LATCH
1	303	HOFFMAN	A72P36F1	SUB PANEL, 60" TALL, 32" WIDE
1	311	HOFFMAN	A72SP36F3	SWING-OUT PANEL, FULL PANEL, 60" X 30.81"
1	313	HOFFMAN	LF120V18	18" FLUORESCENT LIGHT PACKAGE, 115VAC
1	316	HOFFMAN	ATEMNO	TEMPERATURE CONTROL SWITCH (THERMOSTAT), N.O. CONTACTS
1	351	HOFFMAN	ALFSWD	DOOR SWITCH FOR LIGHT PACKAGE
1	352	ANY	F8T5	FLUORESCENT LIGHT
3	357	BELDEN	7929A	CABLE, ETHERNET, 4 PR, 24AWG, CAT 5E (LENGTH AS REQUIRED)
1	358	BELDEN	8267	CABLE, COAXIAL, RG-213 (OR EQUAL) WITH APPROPRIATE CONNECTORS, (LENGTH AS REQUIRED)
1	377	SQUARE D	PK15GTA	GROUNDING BAR, 24 CIRCUITS
A/R	380	PANDUIT	F2X4LG6 C2LG6	WIRE DUCT, 2"X4" TALL, LIGHT GRAY, SLOTTED WITH COVER
A/R	381	PANDUIT	F3X4LG6 C3LG6	WIRE DUCT, 3"X4" TALL, LIGHT GRAY, SLOTTED WITH COVER
1	390	PHOENIX CONTACT	5604775	DUAL OUTLET FOR 120VAC, 15A SERVICE, GFCI, DIN-RAIL MOUNTED
1	391	PHOENIX CONTACT	2963860	SINGLE OUTLET FOR 120VAC, 15A SERVICE, DIN-RAIL MOUNTED
1	400	PULS	YRM2.DIODE	DIODE REDUNDANCY MODULE, 10A PER INPUT, 24-48VDC
2	405	PULS	CS10.241	POWER SUPPLY, 10A, 24-28VDC OUTPUT, 100-120V/200-240V INPUT
16	412	PHOENIX CONTACT	2900299	TERMINAL BLOCK WITH PLUG-IN MINIATURE RELAY, 24VDC, 1PDT
1	414	PHOENIX CONTACT	2900310	TERMINAL BLOCK WITH PLUG IN MINIATURE RELAY, 1PDT, 120VAC
8	423	WEIDMULLER	8448920000	SURGE SUPPRESSOR, 24VDC, 2 WIRE LOOP PROTECTION (MCZ OVP)
1	424	WEIDMULLER	8389030000	END CAP FOR SURGE SUPPRESSOR (MCZ OVP)
1	425	WEIDMULLER	8829430000	INDUSTRIAL ETHERNET SWITCH, 8-PORT
1	450	COOPER BUSSMAN	BSPM112052GR	120VAC, 40kA MAX DISCHARGE CURRENT, SURGE PROTECTIVE DEVICE WITH REMOTE SIGNALING
1	475	AUTOMATION DIRECT	XTD-0200F-PT1	PROSENSE DIN-RAIL MOUNTED TEMPERATURE TRANSMITTER, 0 TO 200°F RATED, FOR RTD TYPE PT100 3-WIRE
1	476	ANY	ANY	3-WIRE RTD TYPE PT100, COMPATIBLE WITH AUTOMATION DIRECT XTD-0200F-PT1
1	703	FALCON	SSG1.5K-1T	1.5kVA SSG SERIES INDUSTRIAL UPS, RATED FOR 55°C
1	704	FALCON	UA88376-SS-HW	DRY RELAY SIGNAL INTERFACE
1	715	SENSUS	53906537000001	ACT-PAK 100D ELECTRONIC INSTRUMENT, PULSE INPUT, 4-20mA OUTPUT, NEMA 1 ENCLOSURE
1	716	SENSUS	53906337001142	ACT-PAK 100D PANEL MOUNTING OPTION
1	811	POLYPHASER	IS-50NX-C2	BROADBAND COAXIAL SURGE PROTECTOR, BULKHEAD MOUNT OPTION, 125-1000MHZ
2	853	TIMES MICROWAVE SYSTEMS	EZ-600-NMC	N-MALE CONNECTOR

A ~ BILL OF MATERIALS

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER
TORRES
Date Signed 2/3/15
ARIZONA U.S.A.
Expires 9/30/15

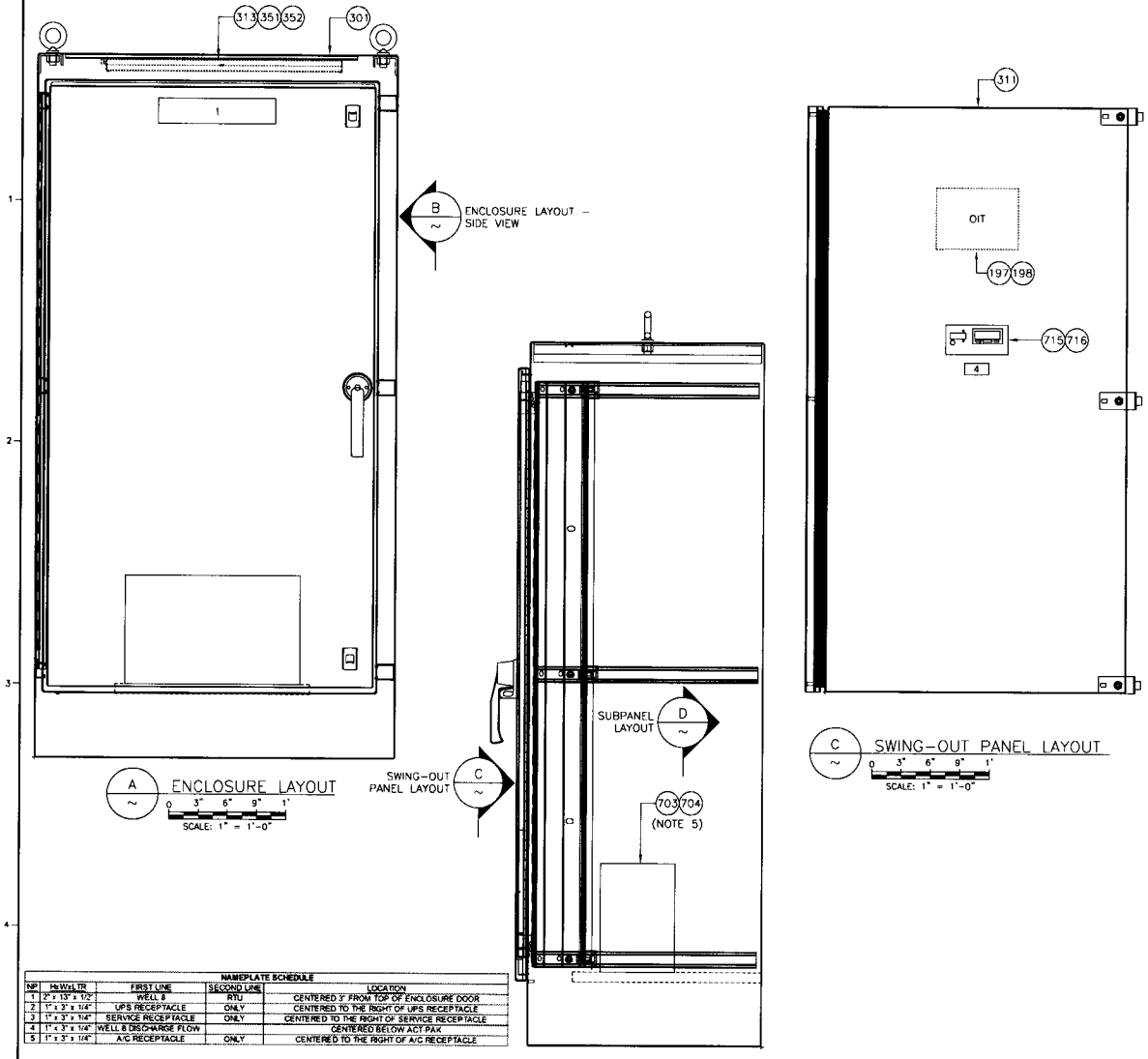
Rev'd	By	Date	Description

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4558

AWC WHITE TANKS SCADA PROJECT
WELL NO. 8
BILL OF MATERIALS

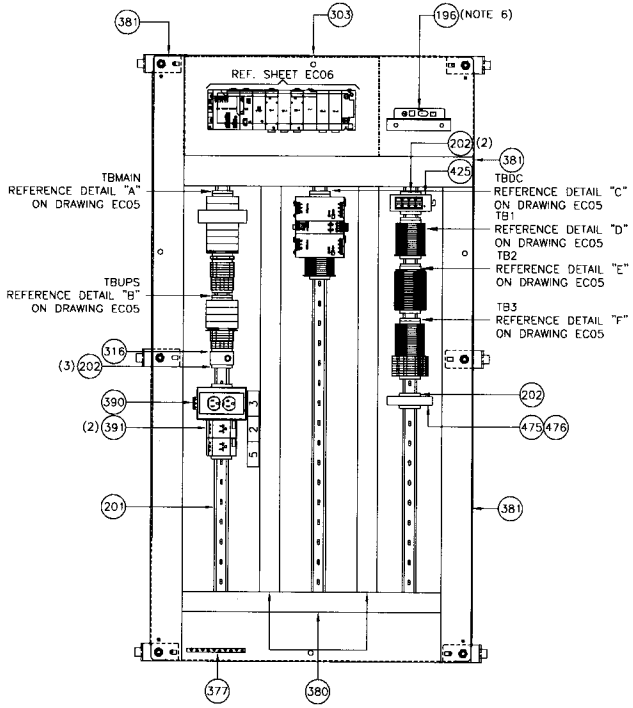
Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_WELL 8_EC03.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC03

PLOTTED: 2/3/2015 4:09 PM 6:51 AM BY: johrens DWG FILE: x:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\WELL 8\1834.00.101_WELL 8_EC03.DWG



NOTES:

1. REFER TO BILL OF MATERIALS ON DRAWING EC03.
2. NAMEPLATES SHALL BE 3/32" THICK LAMINATED PHENOLIC TYPE WHITE WITH BLACK LETTERS. SEE NAMEPLATE SCHEDULE (DETAIL D) ON THIS SHEET FOR ADDITIONAL INFORMATION.
3. FURNISH ADDITIONAL NAMEPLATES AS REQUIRED BY UL OR BY OTHER APPLICABLE CODES.
4. REFER TO SHEET EC06 FOR COMMUNICATION SYSTEM ARCHITECTURE AND ADDITIONAL EQUIPMENT AND WIRING INFORMATION.
5. UPS IS TO BE MOUNTED ON A REMOVABLE SHELF ATTACHED TO BACK PANEL. SHELF IS TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.
6. MOUNT RADIO ON CUSTOM SHELF. SHELF TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.
7. ALL 120VAC COMPONENTS MOUNTED ON SUBPANEL AND SWING-OUT PANEL SHALL BE FINGER SAFE. IF A COMPONENT IS NOT FINGER SAFE BY DESIGN, IT SHALL BE PROVIDED WITH A PROTECTIVE COVER SO AS TO MINIMIZE POTENTIAL OF ACCIDENTAL CONTACT.

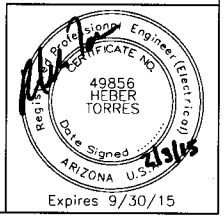


NAMEPLATE SCHEDULE

NP	Ht x Wd x TR	FIRST LINE	SECOND LINE	LOCATION
1	2" x 13" x 1/2"	WELL 8	RTU	CENTERED 3" FROM TOP OF ENCLOSURE DOOR
2	1" x 3" x 1/4"	UPS RECEPTACLE	ONLY	CENTERED TO THE RIGHT OF UPS RECEPTACLE
3	1" x 3" x 1/4"	SERVICE RECEPTACLE	ONLY	CENTERED TO THE RIGHT OF SERVICE RECEPTACLE
4	1" x 3" x 1/4"	WELL 8 DISCHARGE FLOW		CENTERED BELOW ACT PAX
5	1" x 3" x 1/4"	A/C RECEPTACLE	ONLY	CENTERED TO THE RIGHT OF A/C RECEPTACLE

D NAMEPLATE SCHEDULE (NOTE 2)

B ENCLOSURE LAYOUT – SIDE VIEW
SCALE: 1" = 1'-0"



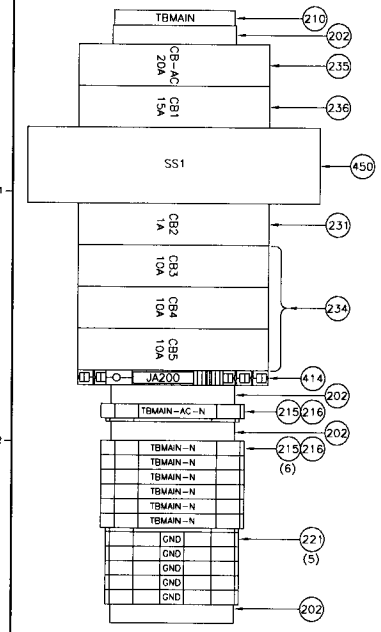
No.	Description	Date	By

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE. SUITE 915
PHOENIX, AZ 85012 602.266.4656

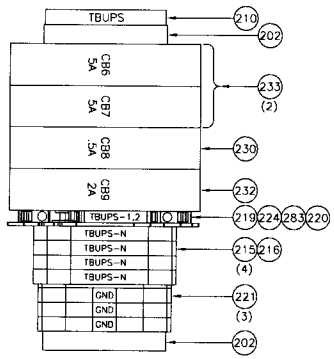
AWC WHITE TANKS SCADA PROJECT
WELL NO. 8
PLC CABINET ENCLOSURE LAYOUT AND NAMEPLATE SCHEDULE

Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_WELL 8_EC04.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC04

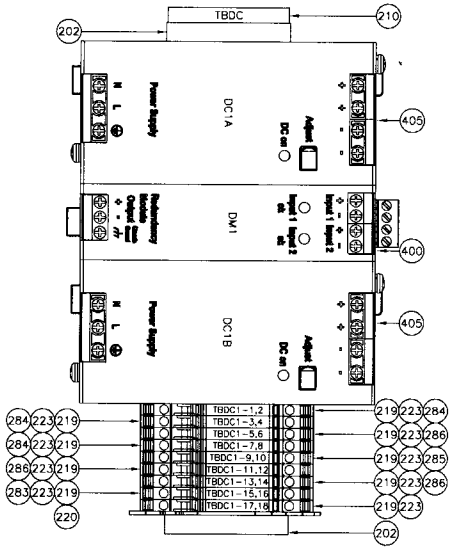
PLOTTED: 2/3/2015 4:09 PM 6:51 AM BY: jahrens DWG FILE: x:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\WELL 8\1834.00.101_WELL 8_EC04.DWG



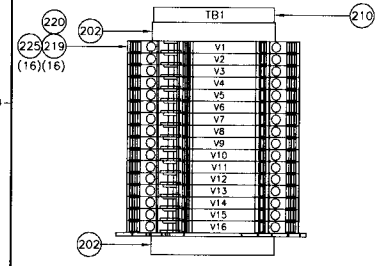
DETAIL A
120VAC POWER
DISTRIBUTION
TBMAIN



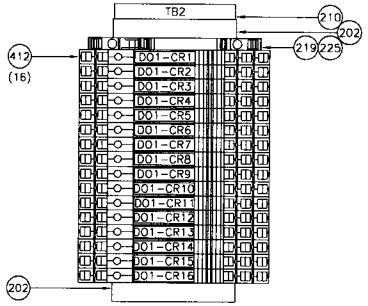
DETAIL B
120VAC POWER
DISTRIBUTION
TBUPS



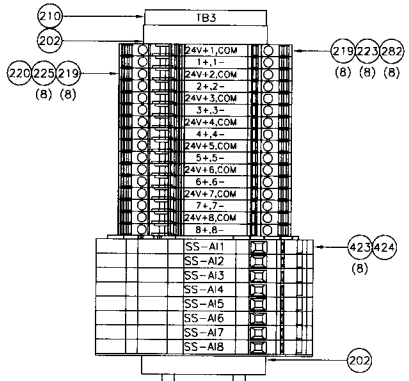
DETAIL C
24VDC POWER DISTRIBUTION
TBDC



DETAIL D
DISCRETE INPUTS
TB1



DETAIL E
DISCRETE OUTPUT
TB2



DETAIL F
ANALOG INPUT
TB3

NOTES:

1. PROVIDE BUS BAR STYLE OR INSULATED COMB STYLE JUMPERS WHERE 2 OR MORE TERMINALS IN THE SAME TB ARE COMMONED TOGETHER. DO NOT USE DISCRETE WIRE JUMPERS.
2. BILL OF MATERIALS IS ON DRAWING EC03.
3. PANEL BUILDER TO SUPPLY AND INSTALL ALL NECESSARY AND APPROPRIATE ACCESSORIES INCLUDING TERMINAL NUMBERS, JUMPERS AND END BARRIERS.

SCALE: 6" = 1'-0"

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER
TORRES
Date Signed 2/3/15
ARIZONA U.S.A.
Expires 9/30/15

Rev'd	By	Date	Description

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE. SUITE 915
PHOENIX, AZ 85012 602.266.4558

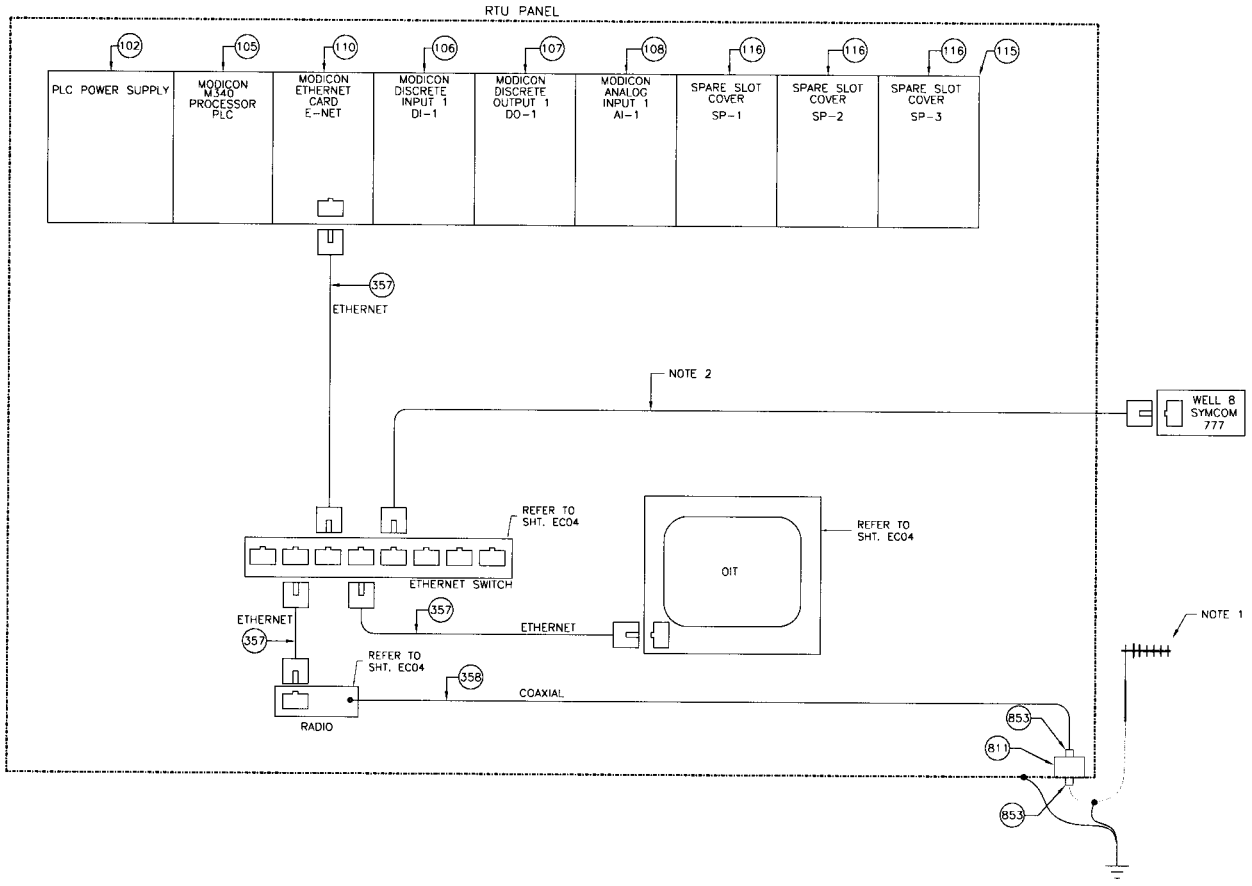
AWC WHITE TANKS SCADA PROJECT
WELL NO. 8
TERMINAL BLOCK AND DEVICE DETAILS

Scale	6" = 1'-0"
Job No.	1834.00.101
CADD File No.	1834.00.101_WELL 8_EC05.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC05

PLOTTED: 2/3/2015 4:09 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\WELL 8\1834.00.101_WELL 8_EC05.DWG

NOTES:

1. REFERENCE ASSOCIATED ELECTRICAL DESIGN PACKAGE FOR ANTENNAS AND ANTENNA CABLE REQUIREMENTS.
2. REFERENCE ASSOCIATED ELECTRICAL DESIGN PACKAGE FOR CIRCUIT INFORMATION PERTAINING TO CAT5E CABLING TO AND SYMCOM 777.



DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4658

AWC WHITE TANKS SCADA PROJECT
WELL NO. 8
COMMUNICATION SYSTEM
ARCHITECTURE DIAGRAM

Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_WELL 8_EC06.dwg
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC06

Rev'd | By | Date | Description

Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER TORRES
Date Signed 2/3/15
ARIZONA U.S.A.
Expires 9/30/15

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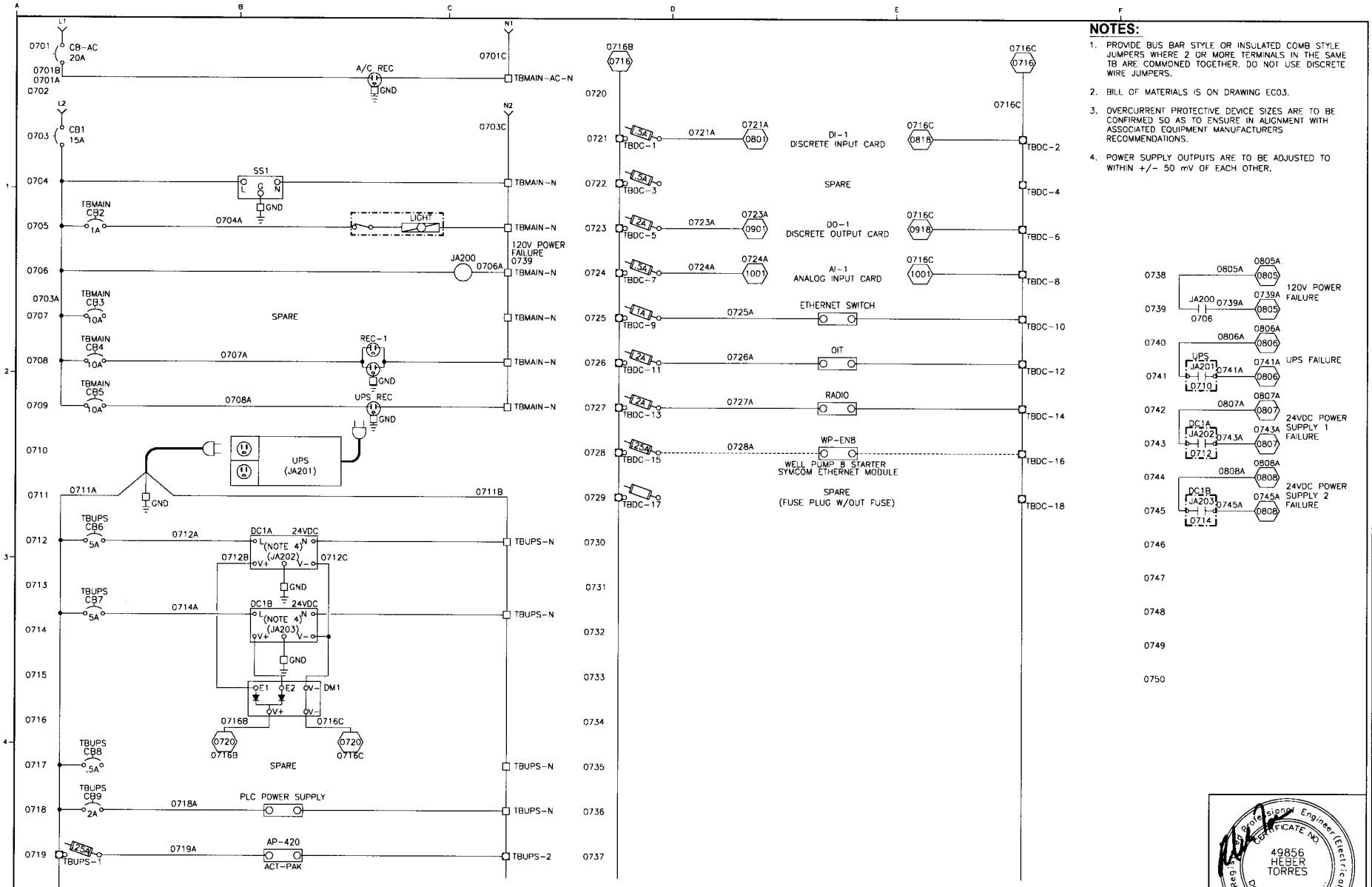


NOTES:

1. PROVIDE BUS BAR STYLE OR INSULATED COMB STYLE JUMPERS WHERE 2 OR MORE TERMINALS IN THE SAME TB ARE COMMONED TOGETHER. DO NOT USE DISCRETE WIRE JUMPERS.
2. BILL OF MATERIALS IS ON DRAWING EC03.
3. OVERCURRENT PROTECTIVE DEVICE SIZES ARE TO BE CONFIRMED SO AS TO ENSURE IN ALIGNMENT WITH ASSOCIATED EQUIPMENT MANUFACTURERS RECOMMENDATIONS.
4. POWER SUPPLY OUTPUTS ARE TO BE ADJUSTED TO WITHIN +/- 50 mV OF EACH OTHER.

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER
TORRES
Date Signed 2/3/15
ARIZONA U.S.A.
Expires 9/30/15

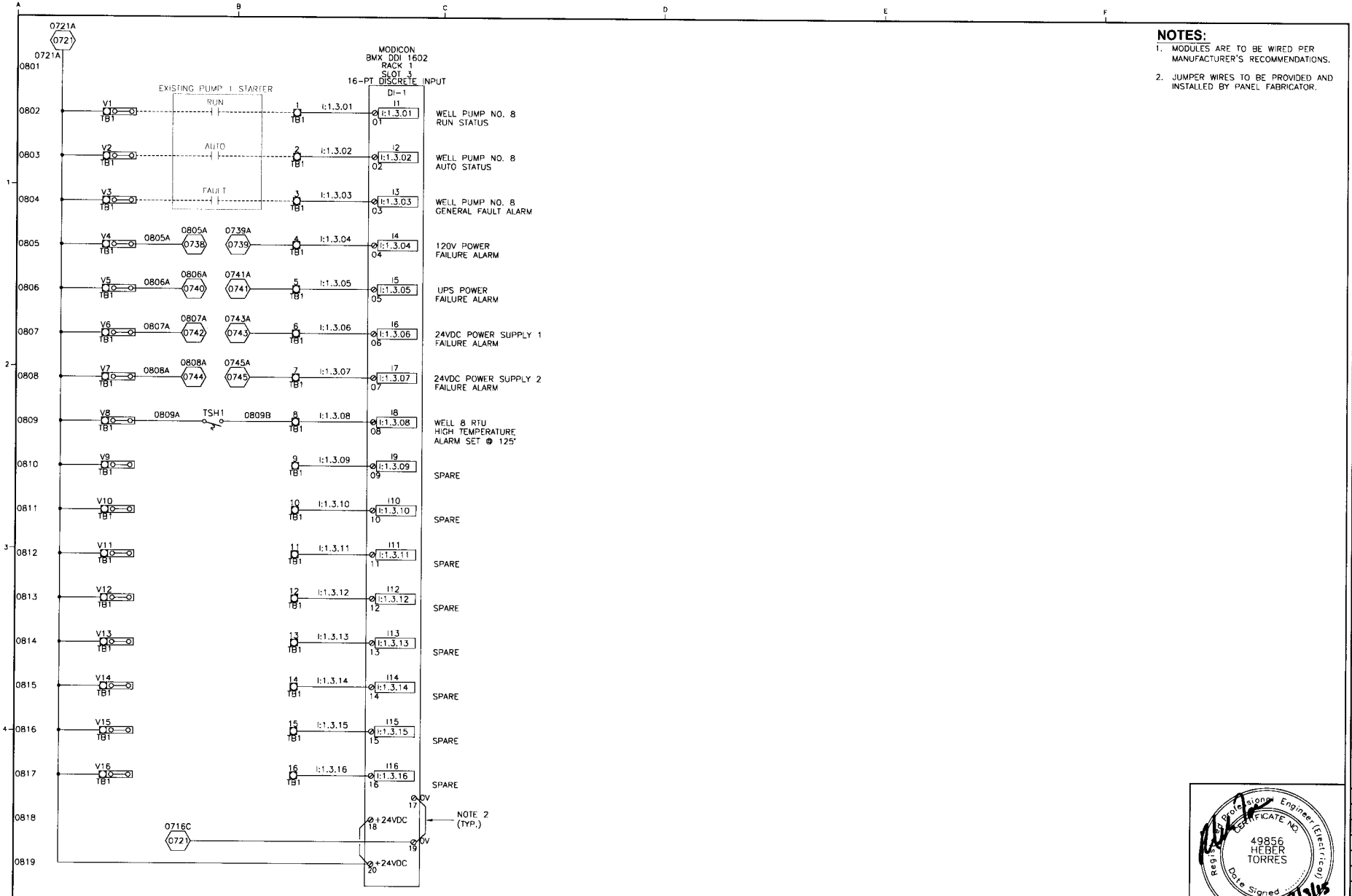
Rev #	By	Date	Description

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4658

AWC WHITE TANKS SCADA PROJECT
WELL NO. 8
POWER DISTRIBUTION
SCHEMATIC

Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_WELL 8_EC07.DWG
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC07

PLOTTED: 2/3/2015 4:09 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\WELL 8\1834.00.101_WELL 8_EC07.DWG



NOTES:

1. MODULES ARE TO BE WIRED PER MANUFACTURER'S RECOMMENDATIONS.
2. JUMPER WIRES TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER TORRES
Date Signed 2/3/15
ARIZONA U.S.A.
Expires 9/30/15

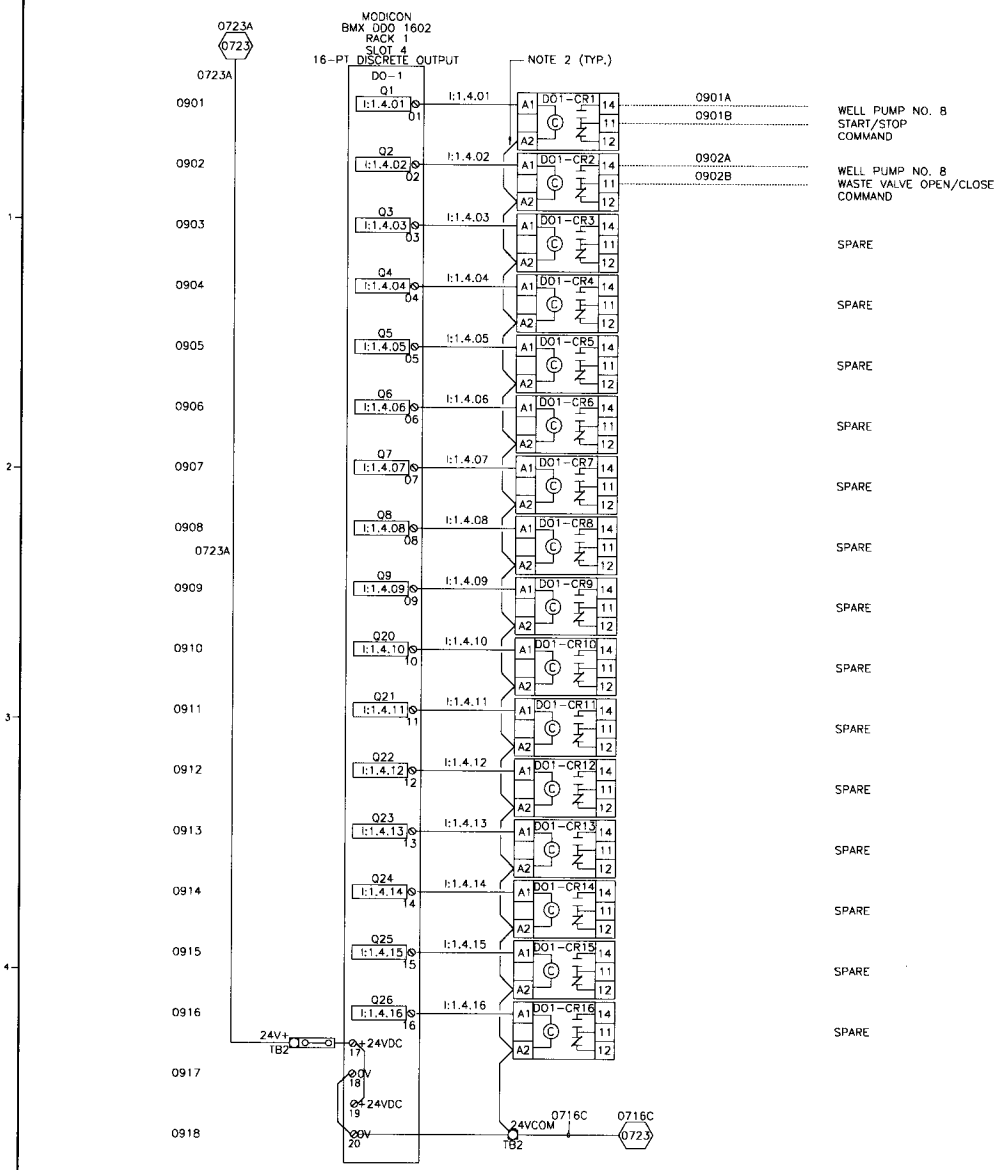
Rev'd	By	Date	Description

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.265.4613

AWC WHITE TANKS SCADA PROJECT
WELL NO. 8
WIRING DIAGRAM
DI-1

Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_WELL 8_EC08.DWG
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC08

PLOTTED: 2/3/2015 4:09 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\WELL 8\1834.00.101_WELL 8_EC08.DWG



NOTES:

1. MODULES ARE TO BE WIRED PER MANUFACTURER'S RECOMMENDATIONS.
2. JUMPER WIRES TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER
TORRES
Date Signed 2/3/15
ARIZONA U.S.A.
Expires 9/30/15

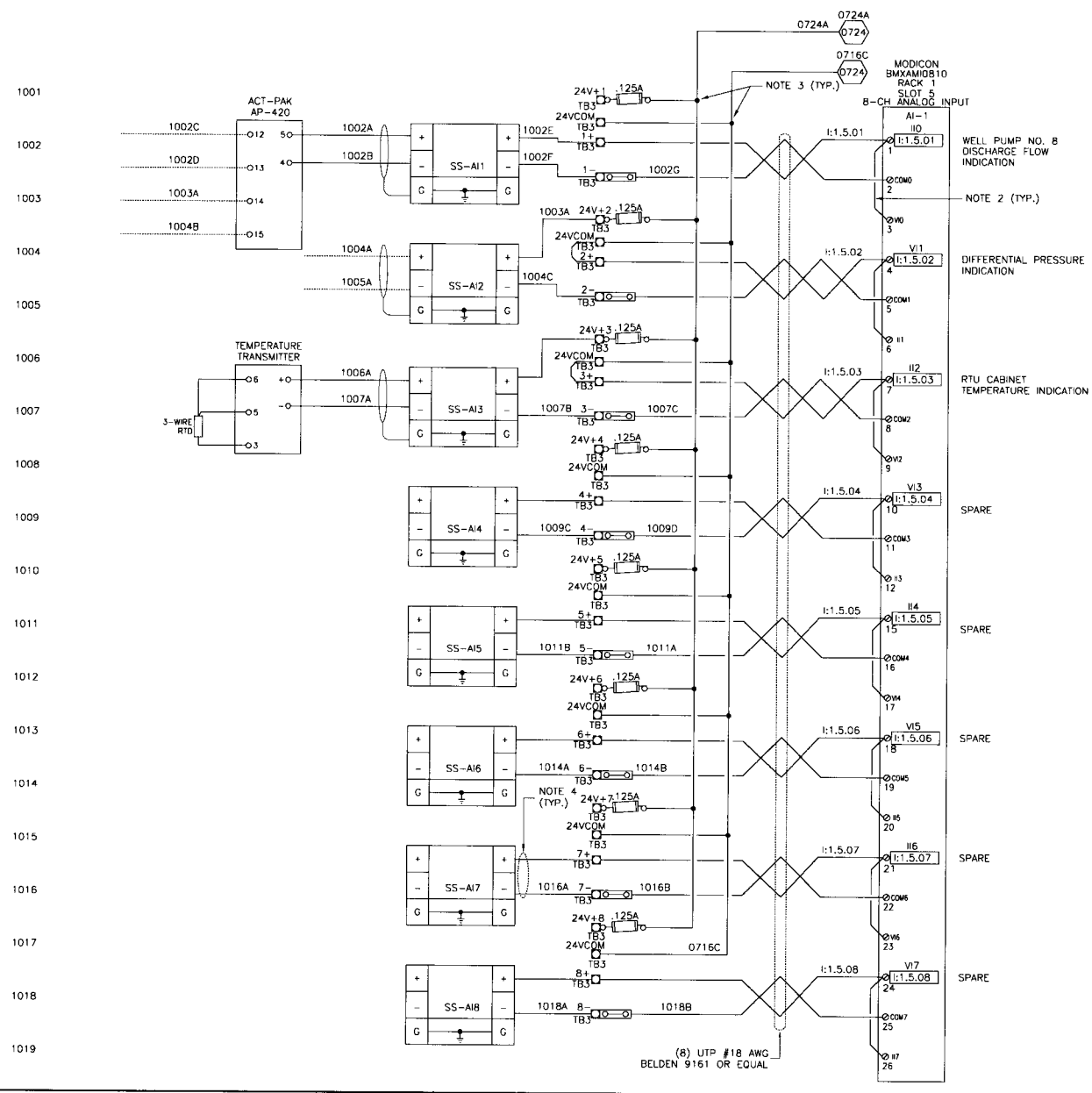
Rev'd	By	Date	Description

DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4698

AWC WHITE TANKS SCADA PROJECT
WELL NO. 8
WIRING DIAGRAM
DO-1

Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_WELL 8_EC09.DWG
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC09

PLOTTED: 2/3/2015 4:09 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\WELL 8\1834.00.101_WELL 8_EC09.DWG



NOTES:

1. MODULES ARE TO BE WIRED PER MANUFACTURER'S RECOMMENDATIONS.
2. JUMPER WIRES TO BE PROVIDED AND INSTALLED BY PANEL FABRICATOR.
3. PROVIDE BUS BAR STYLE OR INSULATED COMB STYLE JUMPERS WHERE 2 OR MORE TERMINALS IN THE SAME TB ARE COMMONED TOGETHER. DO NOT USE DISCRETE WIRE JUMPERS.
4. CABLE BETWEEN TERMINAL BLOCK AND SURGE SUPPRESSOR SHALL BE (1) UTP, #18 AWG BELDEN #9740 OR EQUAL.

Registered Professional Engineer (Electrical)
CERTIFICATE NO.
49856
HEBER
TORRES
Date Signed 2/3/15
ARIZONA U.S.A.
Expires 9/30/15

No.	Description	Date	By

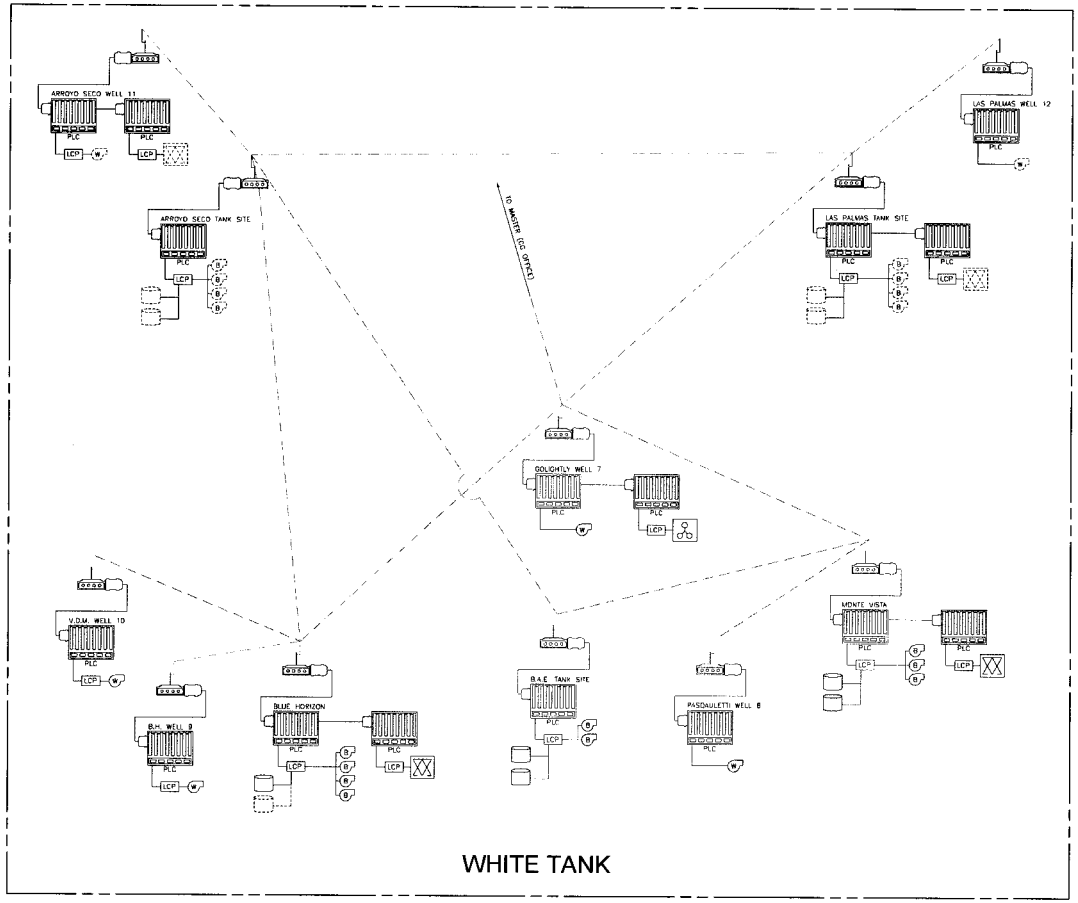
DELTA SYSTEMS ENGINEERING INC
3550 N. CENTRAL AVE., SUITE 915
PHOENIX, AZ 85012 602.266.4658

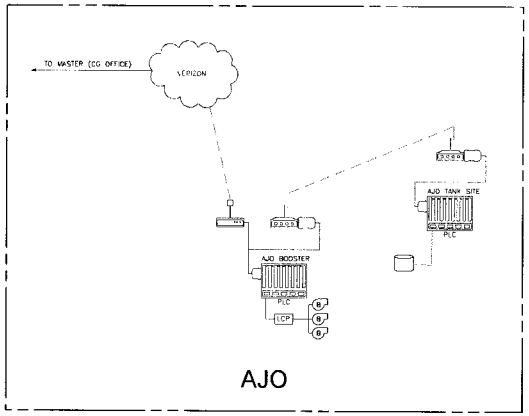
AWC WHITE TANKS SCADA PROJECT
WELL NO. 8
WIRING DIAGRAM
AI-1

Scale	NTS
Job No.	1834.00.101
CADD File No.	1834.00.101_WELL 8_EC10.DWG
Designed	DLN
Drawn	JHA
Checked	DLN
Date	JAN. 2015
Sheet	EC10

PLOTTED: 2/3/2015 4:09 PM 6:51 AM BY: johrens DWG FILE: X:\1800'S\1834.00 ARIZONA WATER CO. WHITE TANKS SCADA PROJECT (FOR PREVIOUS MODICON MOMENTUM DESIGN SEE PROJECT NO. 1400)\100\101 - RTU DESIGN\ACTIVE CAD FILES\WELL 8\1834.00.101_WELL 8_EC10.DWG

ARIZONA WATER COMPANY
CASA GRANDE DIVISION SCADA COMMUNICATIONS SCHEMATIC
SHEET 1 OF 1





LEGEND:

- RADIO COMMUNICATION PATH
- SCADA COMPUTER
- 900 MHz RADIO
- CELLULAR MODEM
- OMNI DIRECTIONAL ANTENNA
- YAGI DIRECTIONAL ANTENNA
- WELL PUMP
- BOOSTER PUMP
- WATER STORAGE TANK
- ARSENIC REMOVAL FACILITY
- ARSENIC/NITRATE REMOVAL FACILITY
- NITRATE REMOVAL FACILITY
- EX. SCADA COMMUNICATION
- NEW SCADA COMMUNICATION (2013)
- FUTURE SCADA COMMUNICATION
- FUTURE FACILITY

ABREVIATIONS:

PLC – PROGRAMMABLE LOGIC CONTROLLER
HMI – HUMAN MACHINE INTERFACE

REVISIONS: LATEST REVISION 10-11-2013

The installation shown is to be installed in accordance with the Arizona Water Company standard specifications on file with the Arizona Department of Environmental Quality

CAL. PROJ. MANAGEMENT REFERENCE NO. 263-1100
1-800-STAKE-II
(OR 1-800-WARNING-ONE-CALL)

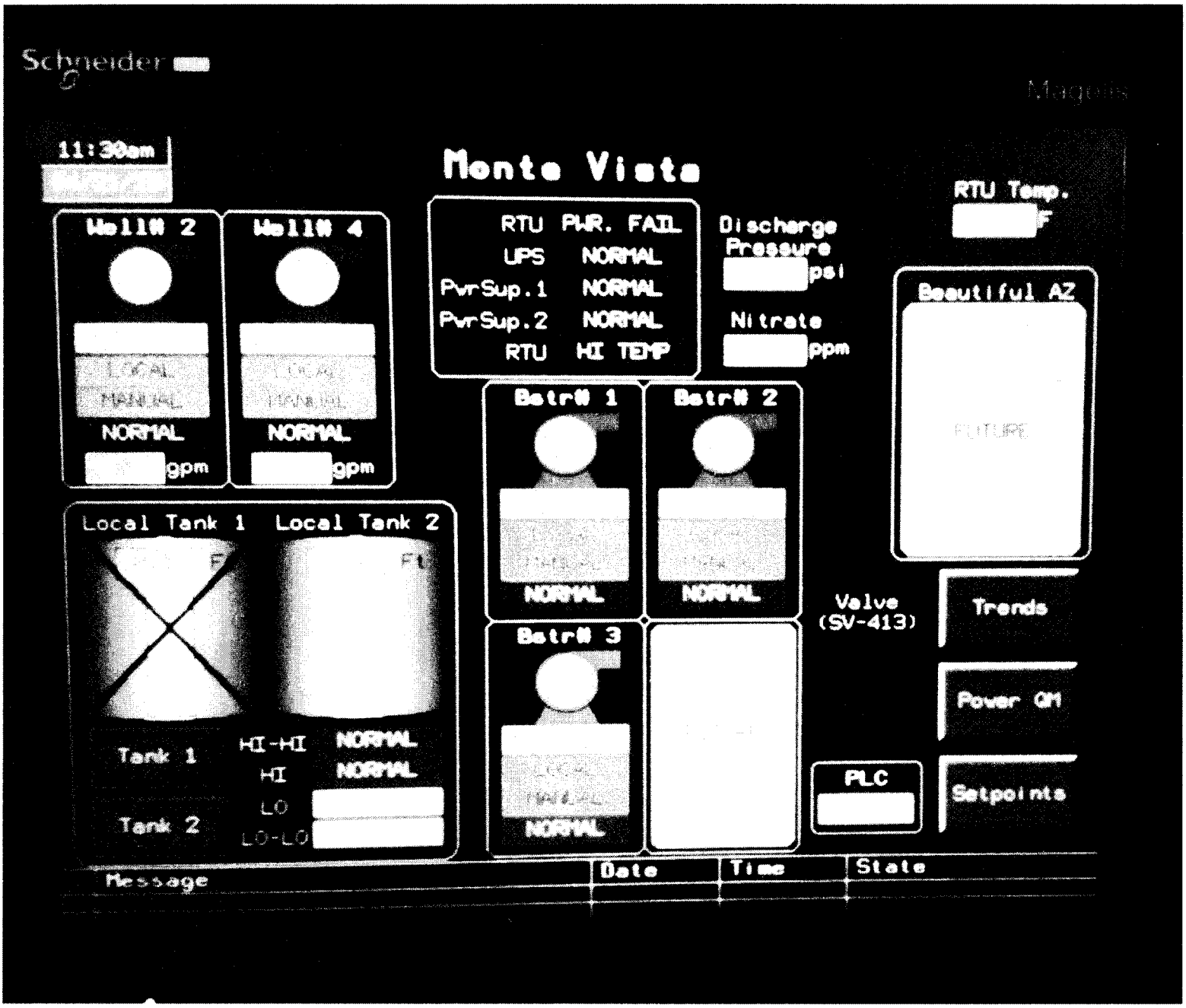
W.A. No.	P.E. No.
SYSTEM:	
LEGAL DESC: SEC. -T. R.	
FAX DIST:	
DATE: 3-6-2013	SCALE: N.T.S.
DRAWN BY: JPK	CHECKED BY:

ARIZONA WATER COMPANY
3805 N. BLACK CANYON HWY POST OFFICE BOX 29006
PHOENIX, ARIZONA 85038-9006
(602) 240-6860

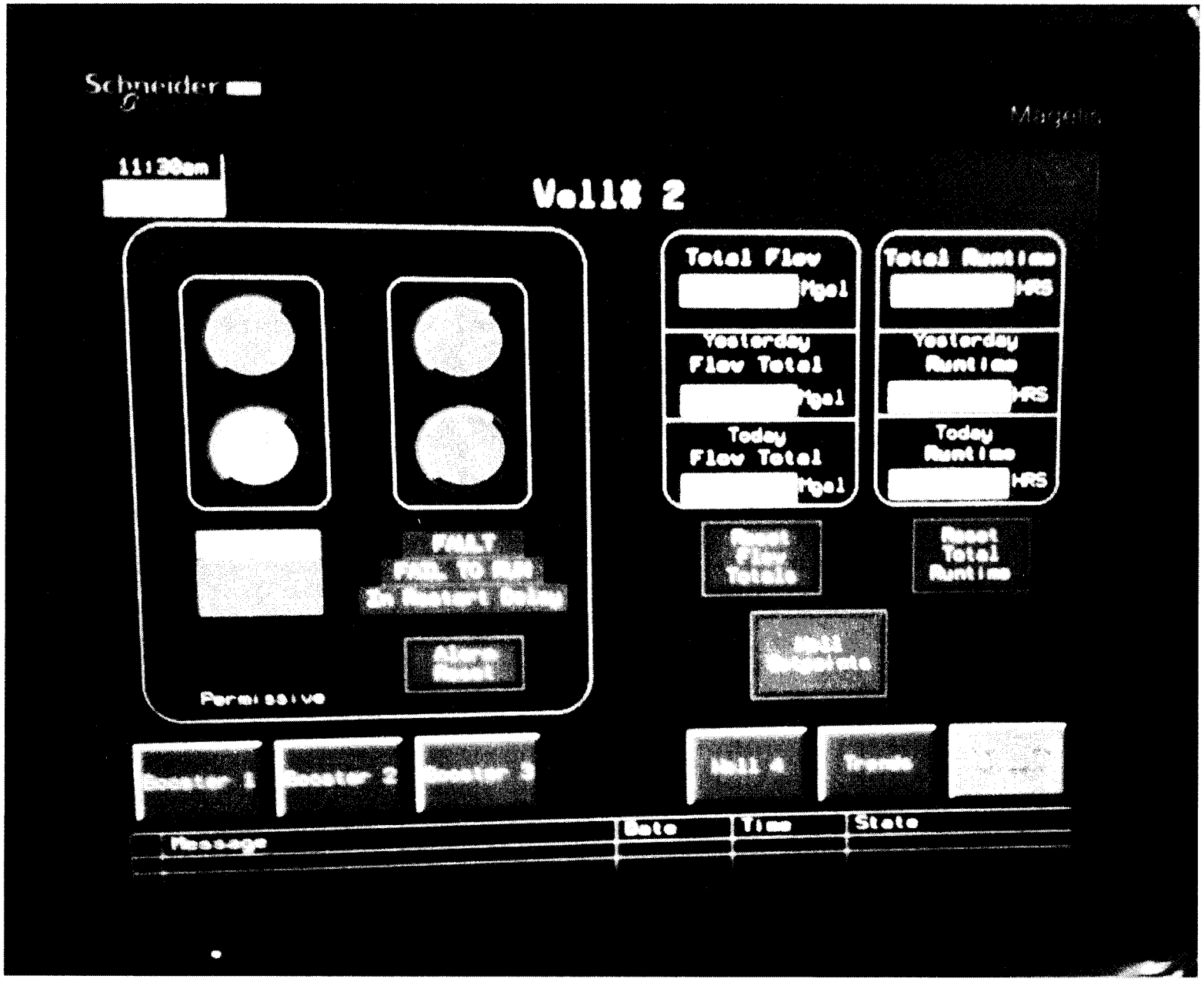
PROJECT DESC: CASA GRANDE DIVISION SCADA SCHEMATIC
PROJECT SHEET DESC: WHITE TANK AJO

DWG No.:

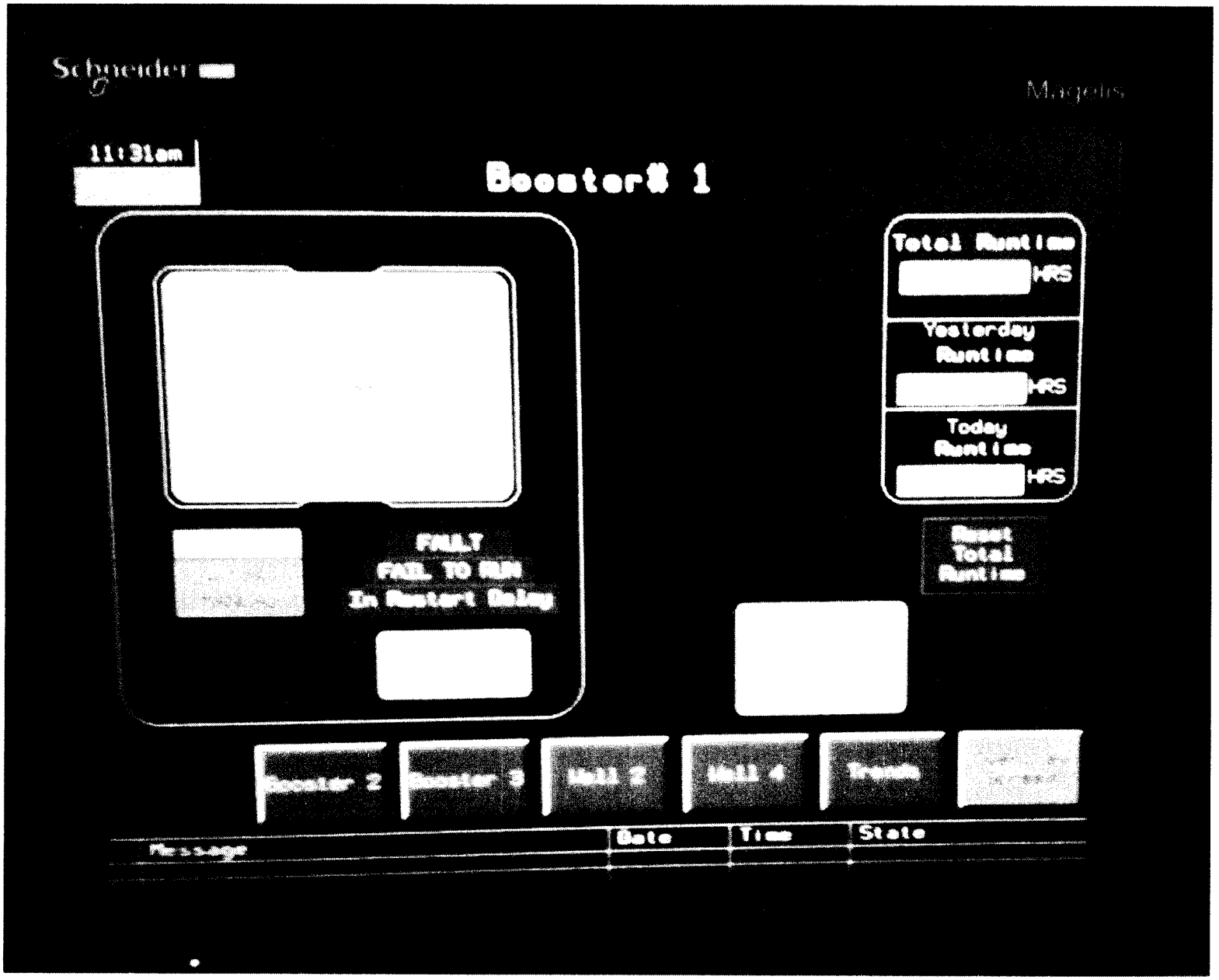
SHEET 1 OF 1



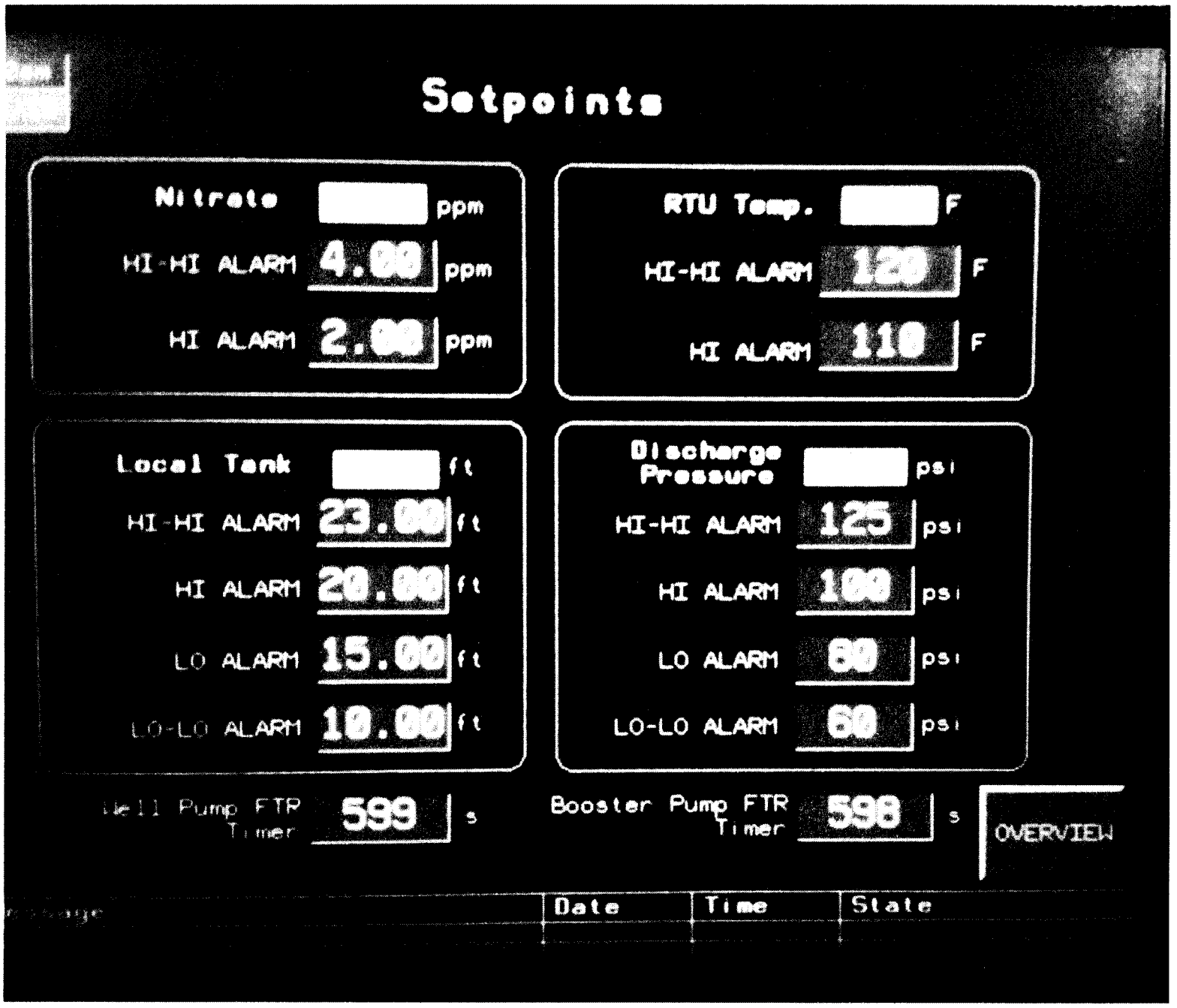
White Tanks SCADA FAT Test 4-21-15
HMI Home Screen



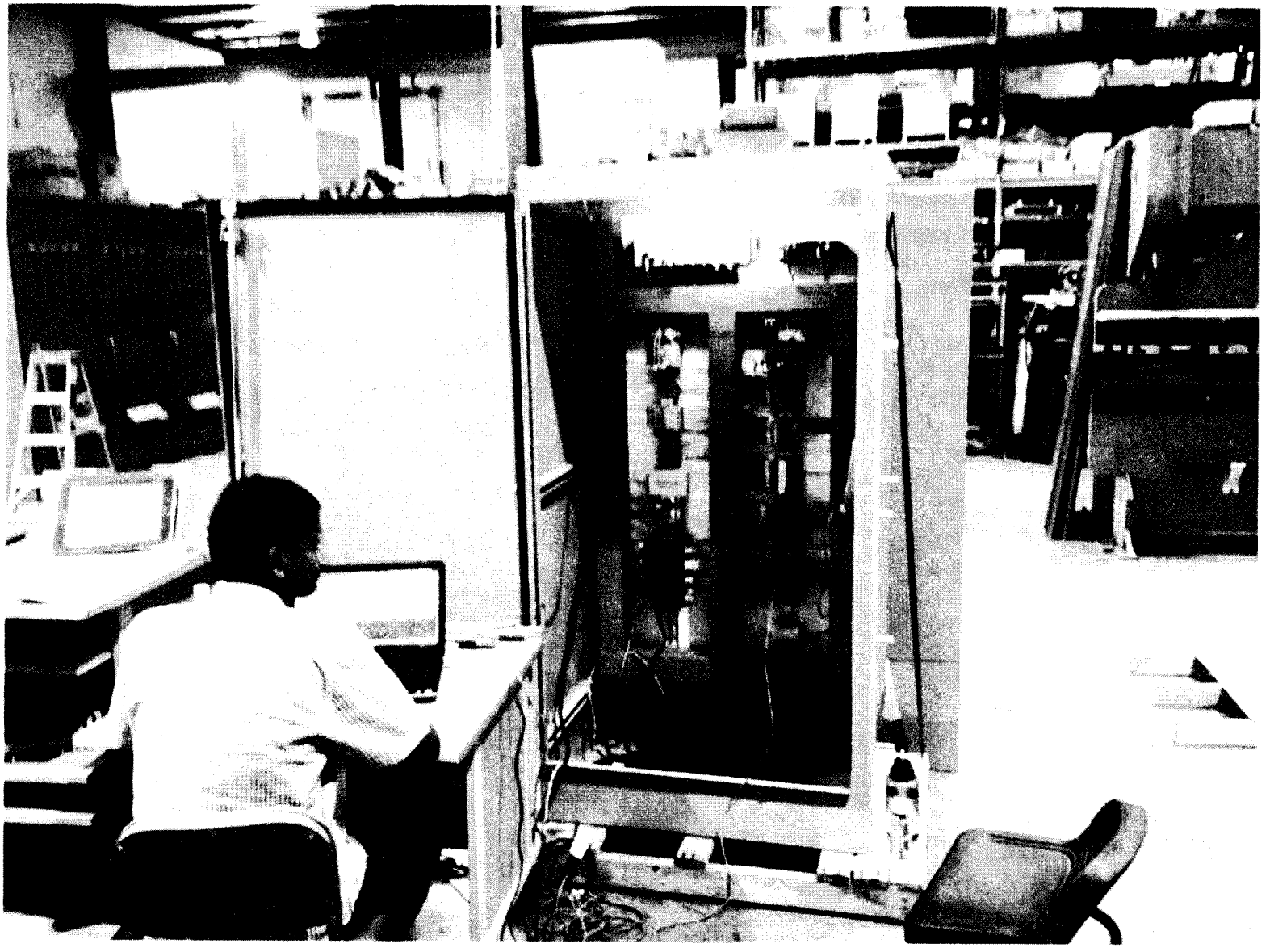
White Tanks SCADA FAT Test 4-21-15
HMI Typical Well Screen



White Tanks SCADA FAT Test 4-21-15
HMI Typical Booster Pump Screen

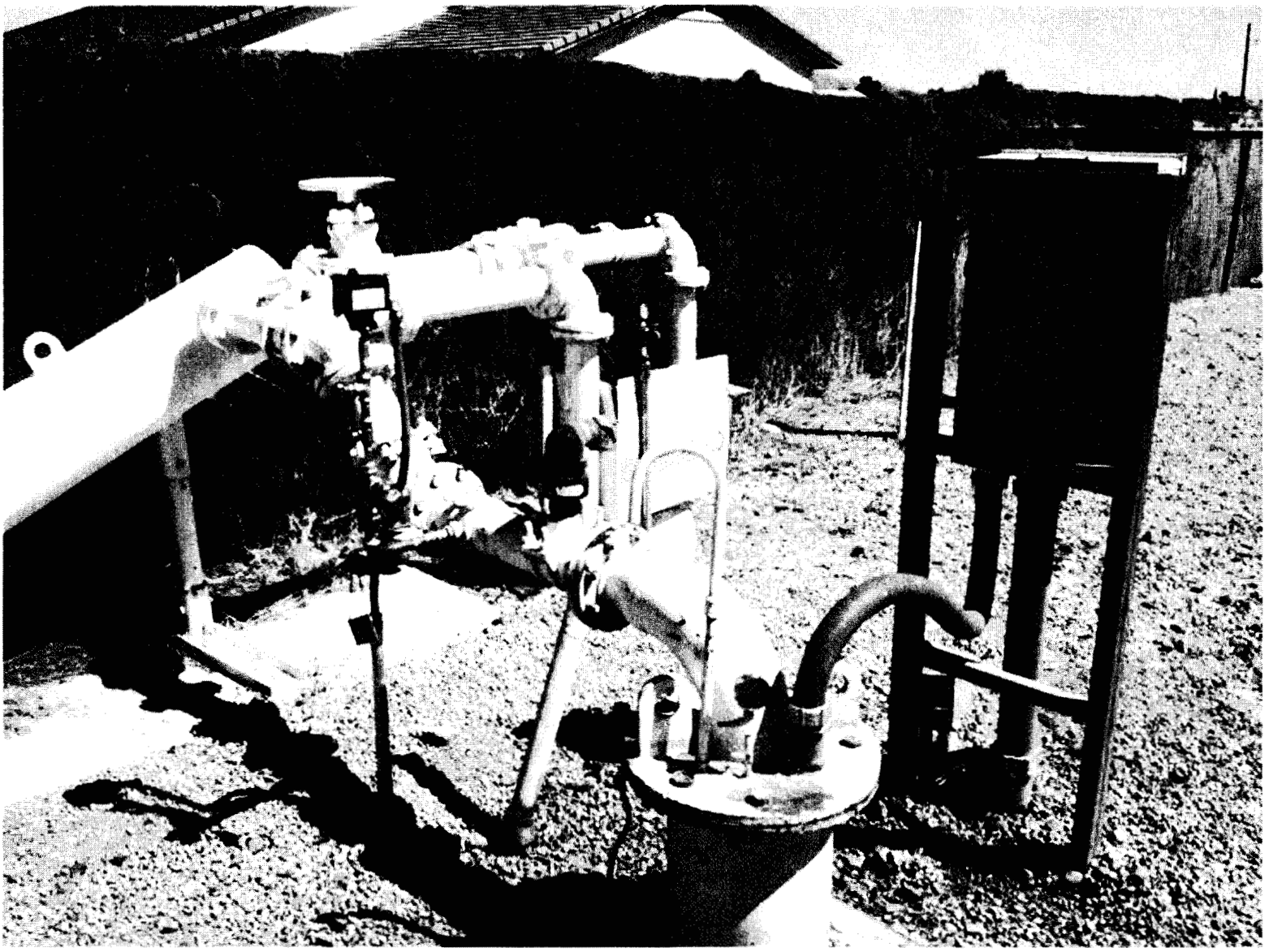


White Tanks SCADA FAT Test 4-21-15
HMI Setpoint Screen

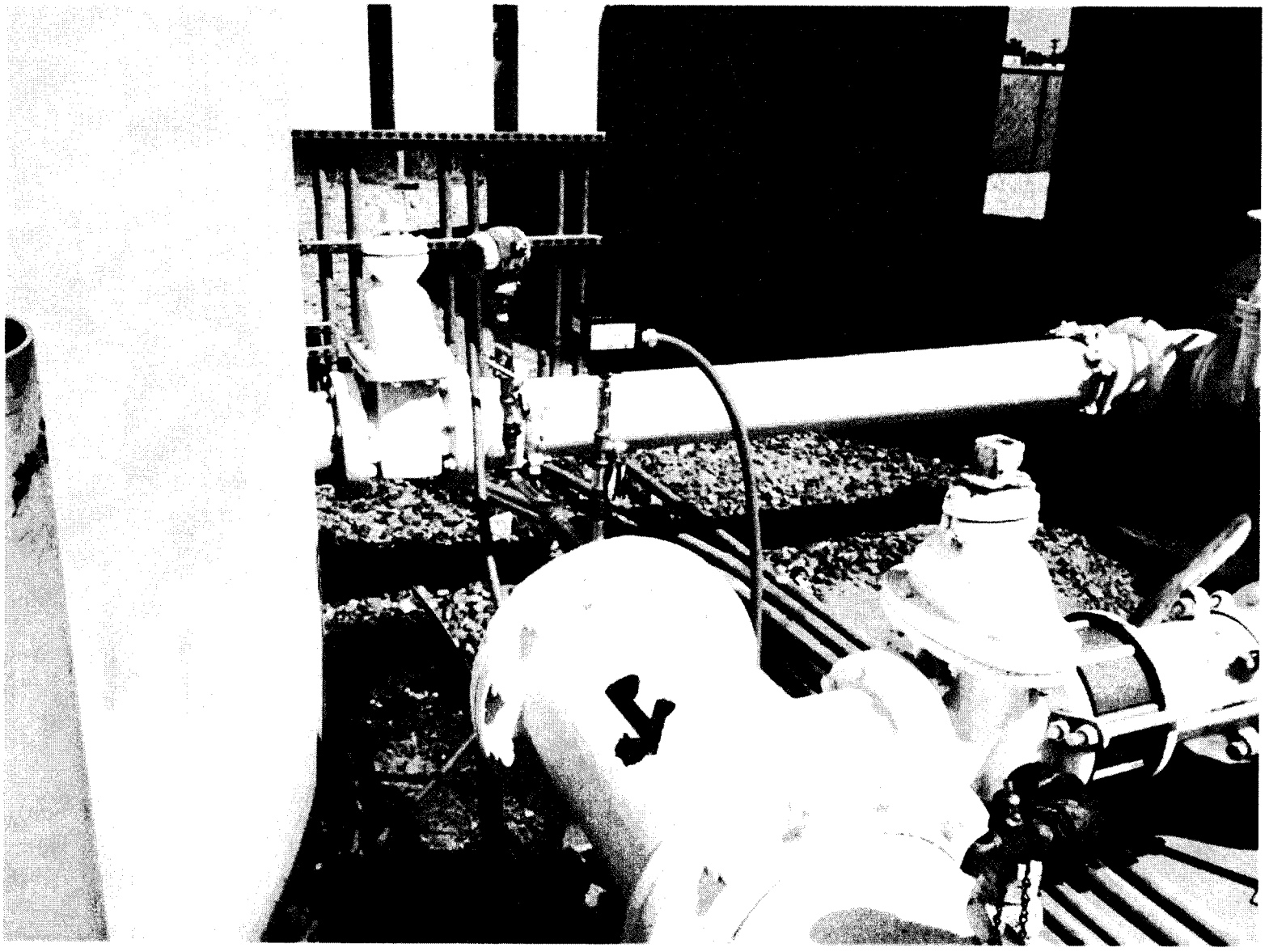


White Tanks SCADA FAT Test 4-21-15
Monte Vista RTU Panel

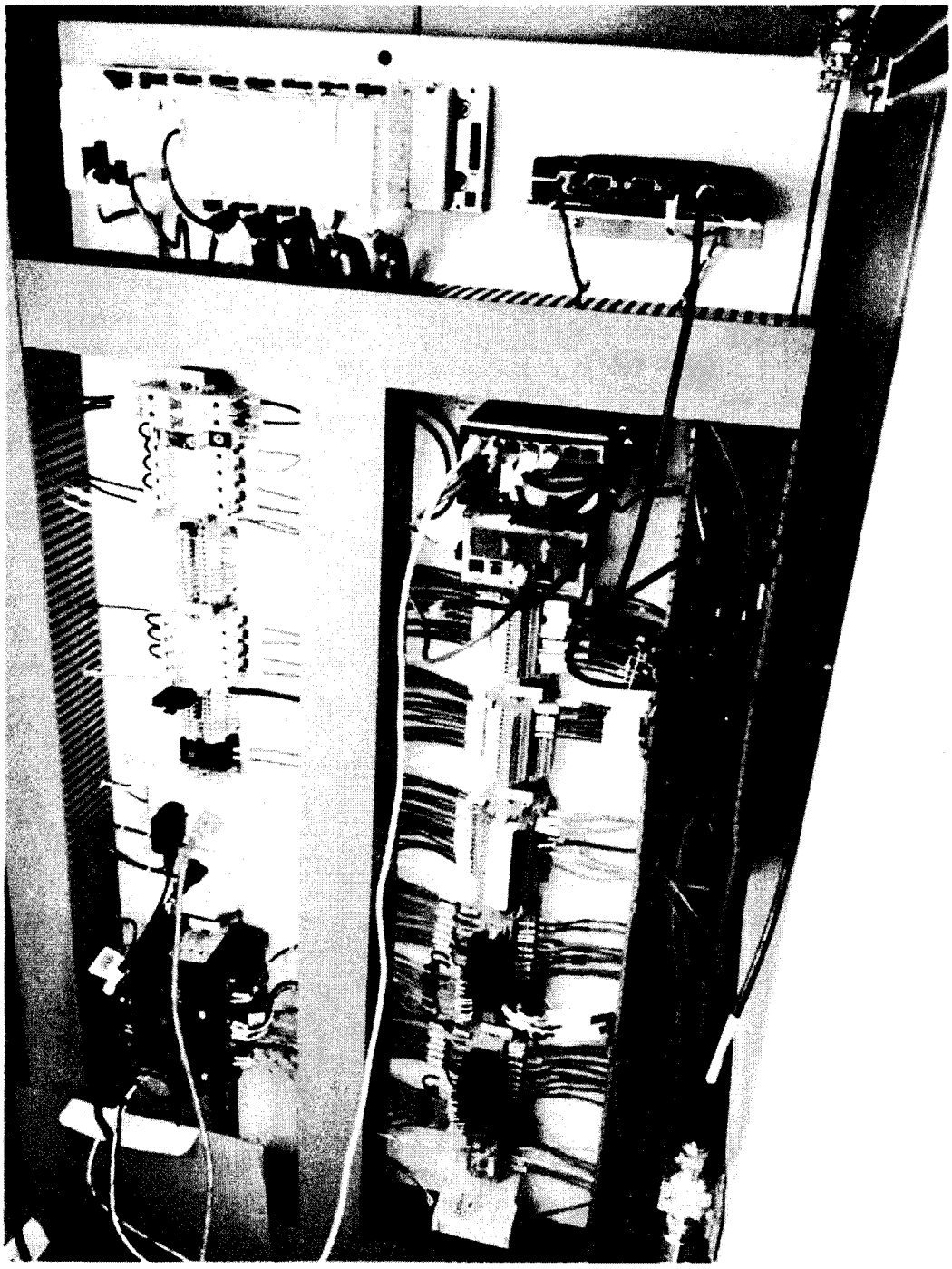
Monte Vista Well #2 on 4-29-15
New Flow Meter and Pressure Switch



Monte Vista 4-29-15
Well #4 New Pressure Switch



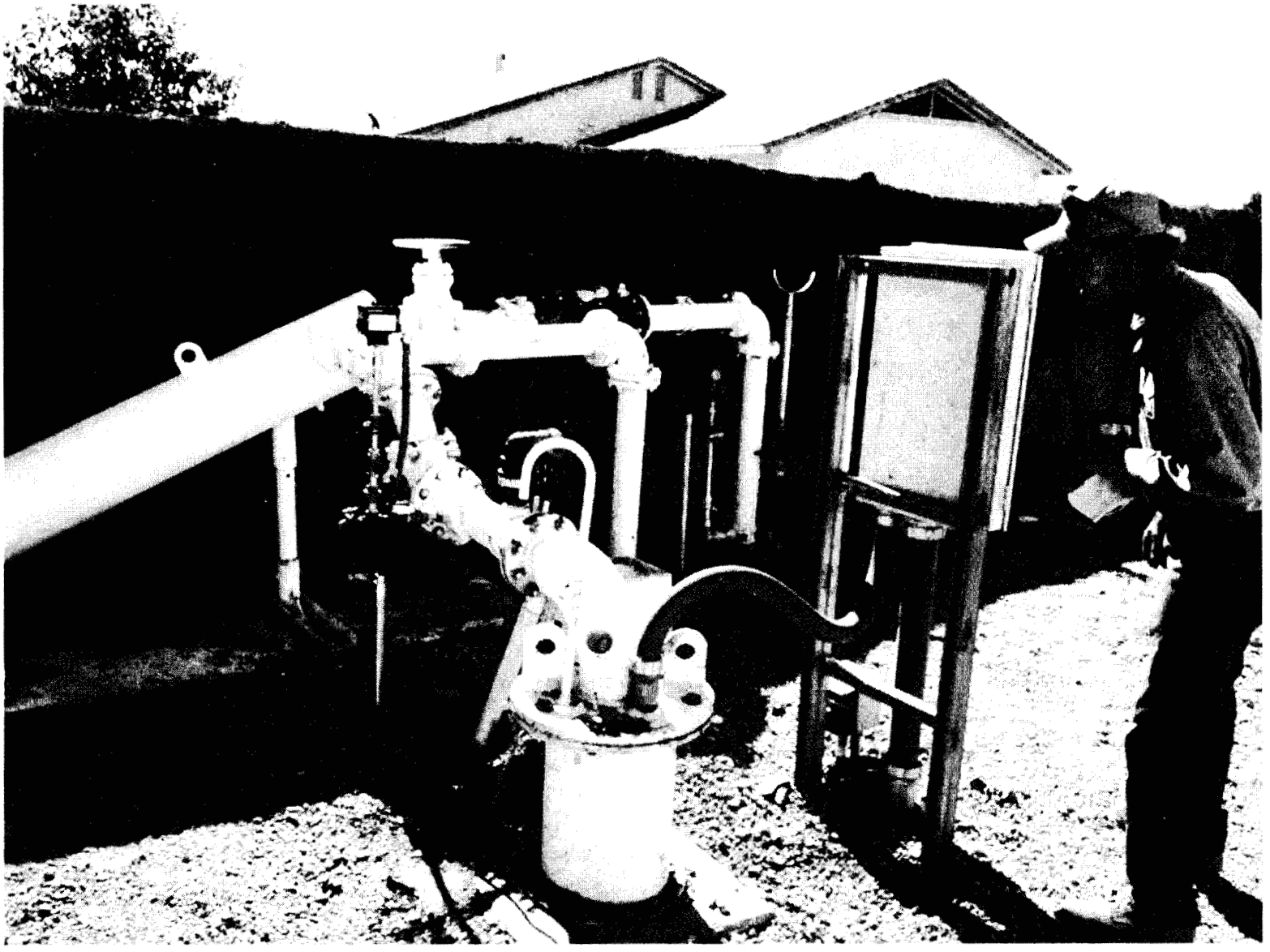
Monte Vista 4-29-15
Booster Pump Discharge Piping
New Pressure Switch and New Pressure Transmitter



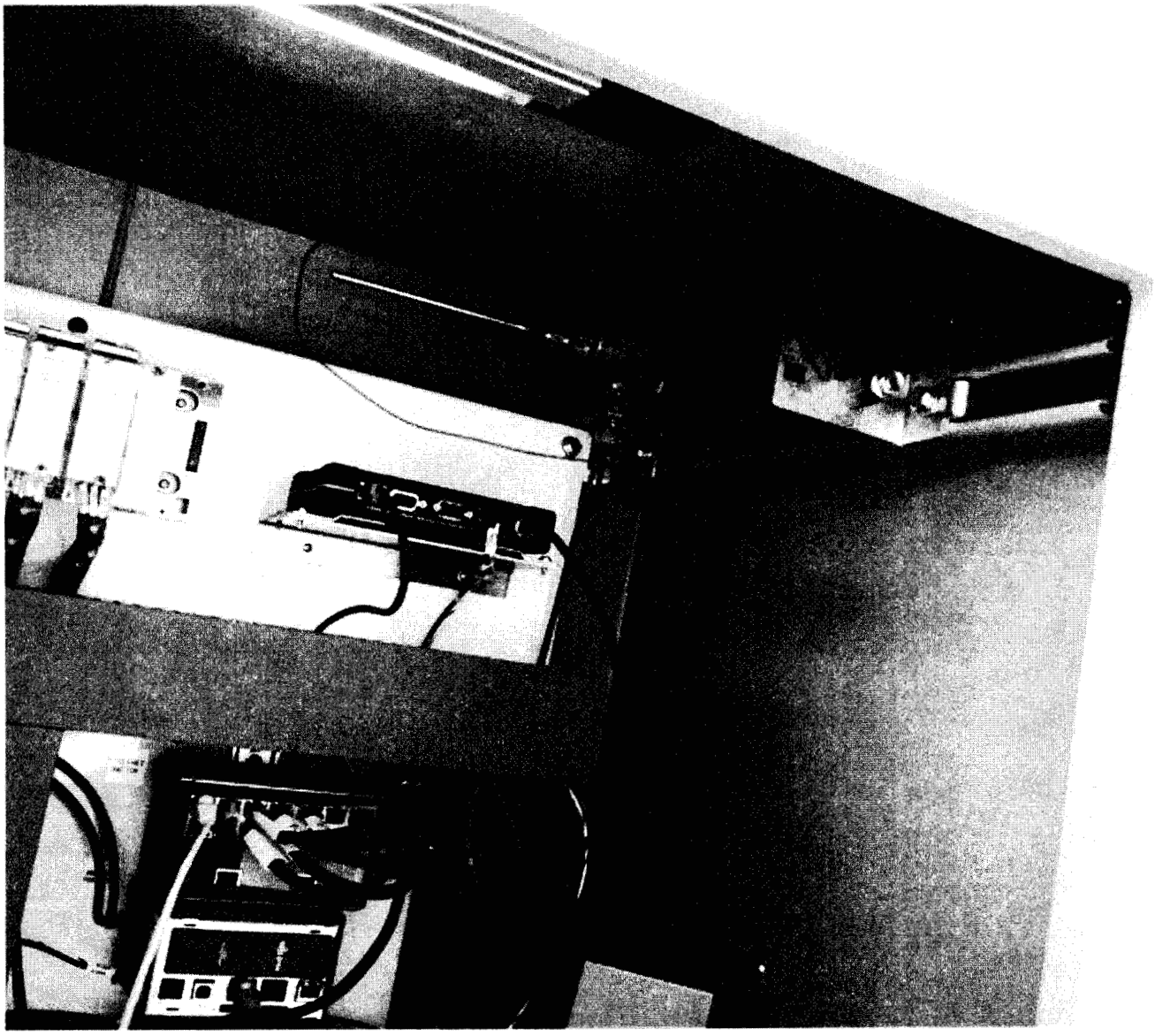
Monte Vista 4-29-15
Interior of RTU Panel

White Tanks SCADA 4-30-15
Go Lightly - new radio panel in storage room

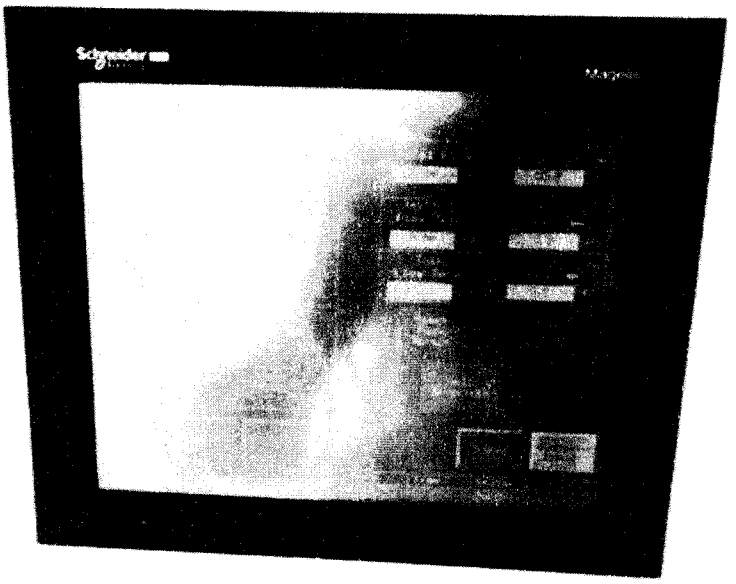
White Tanks SCADA 4-30-15
Go Lightly - new PLCs for SCADA



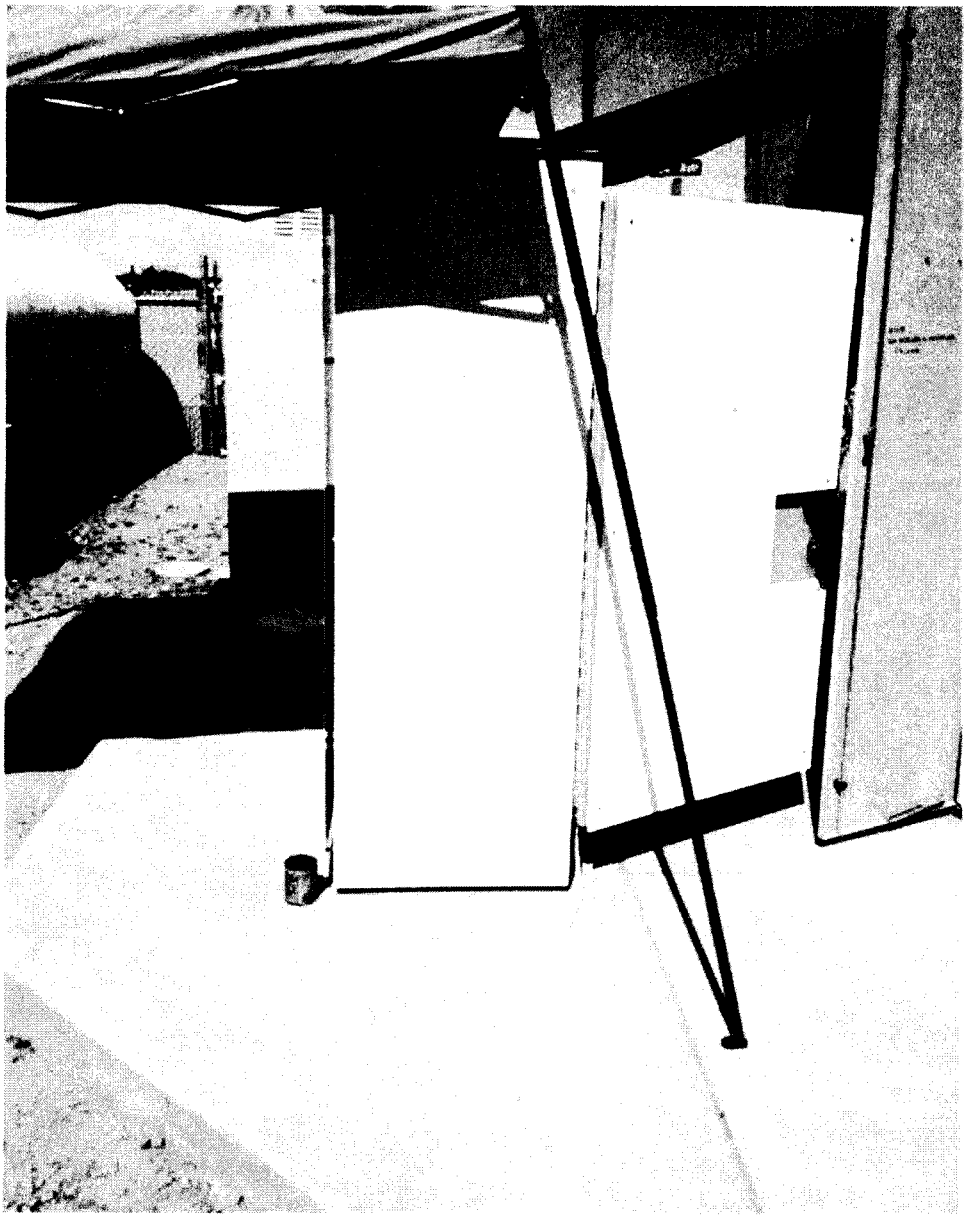
White Tanks SCADA 4-30-15
Monte Vista - well # 4 new pressure transmitter
And flow meter



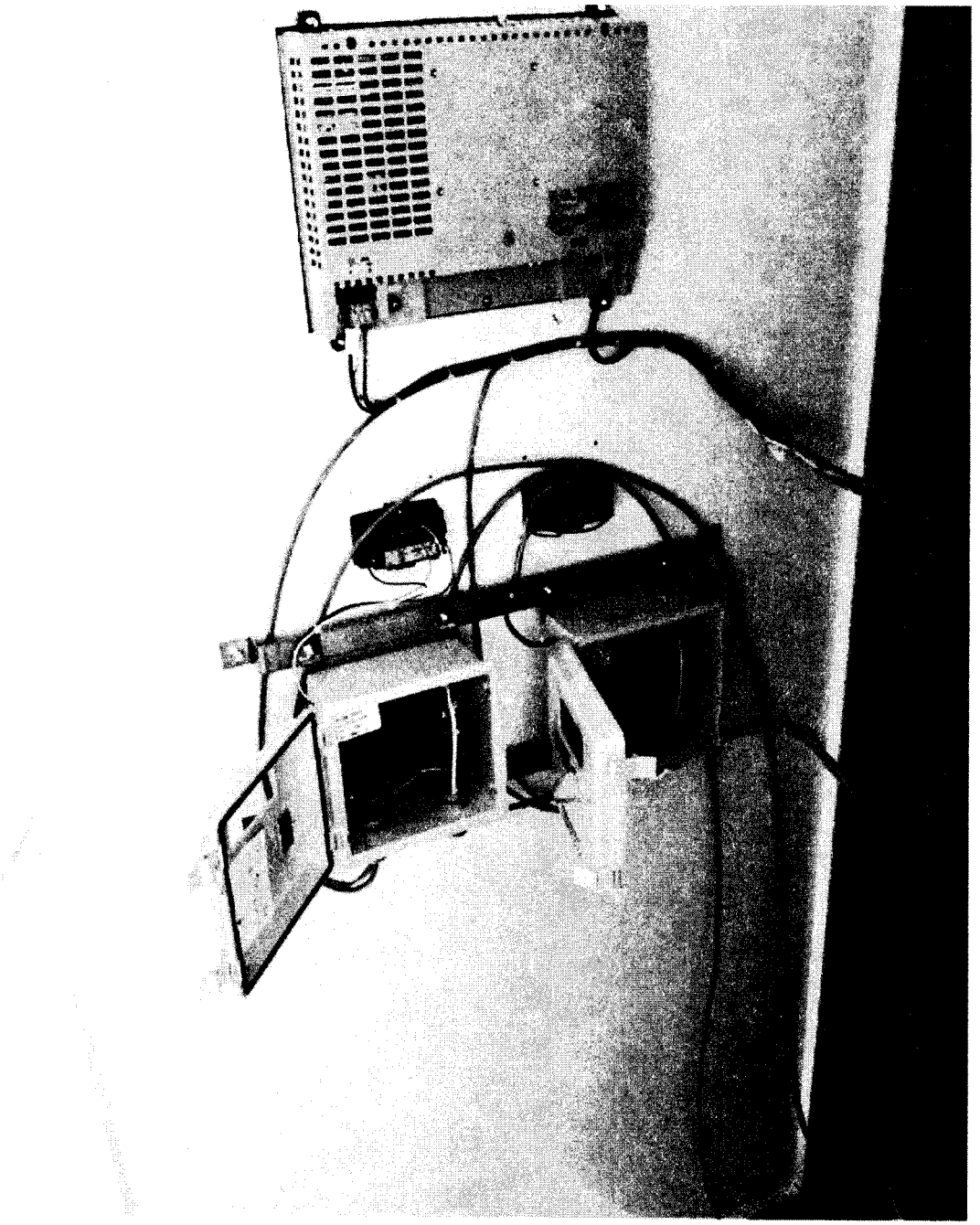
White Tanks SCADA 4-30-15
Monte Vista- temperature probe
In RTU panel



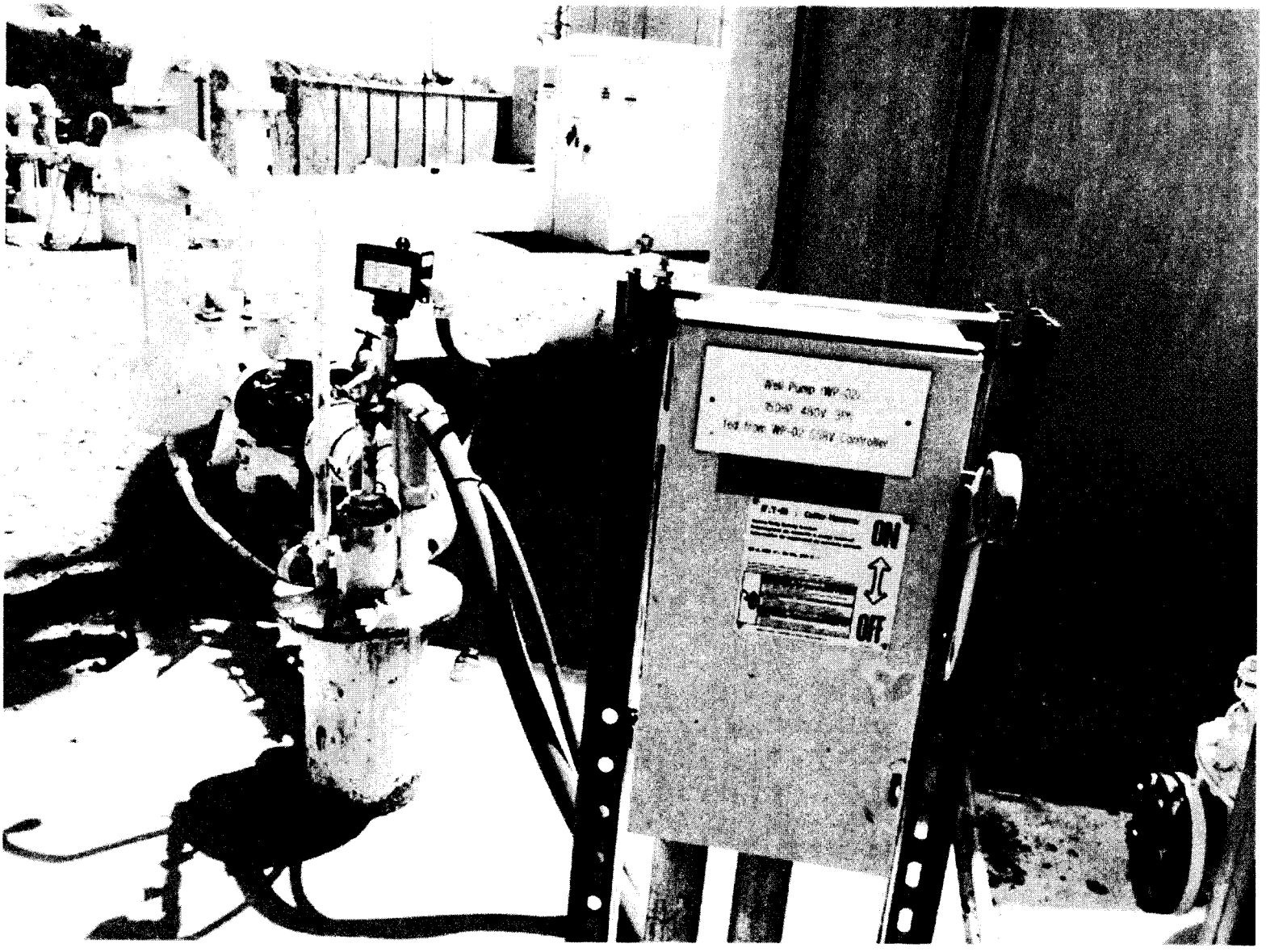
White Tanks SCADA 4-30-15
Monte Vista - RTU inner door panel
With HMI and Actpac well meter read outs



White Tanks SCADA 5-1-15
Monte Vista
New RTU Panel with
White Heat Shields

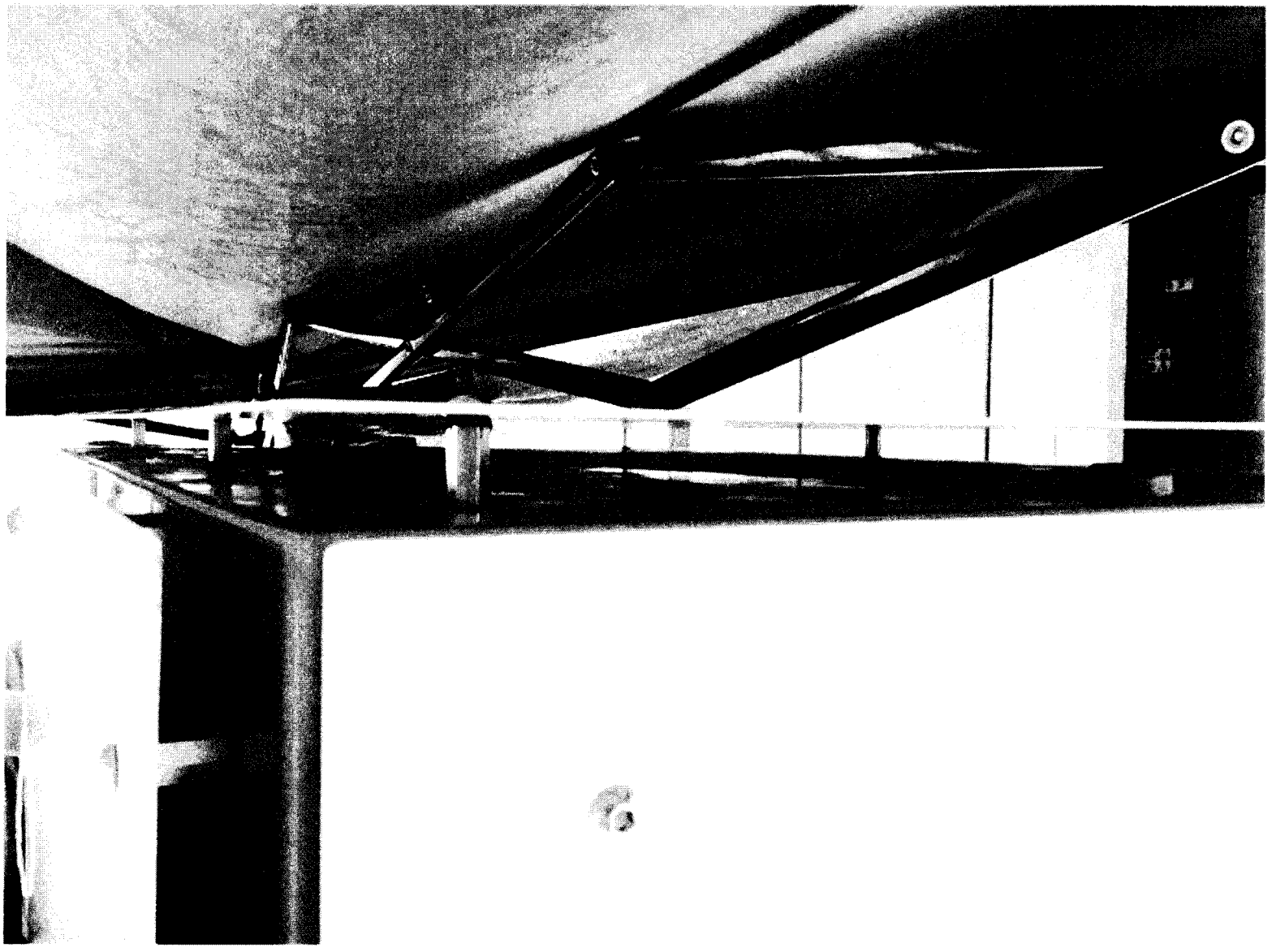


White Tanks SCADA 5-1-15
Monte Vista RTU
Inside view of interior door
Act-Pac read outs removed from small boxes
And mounted on inner panel door

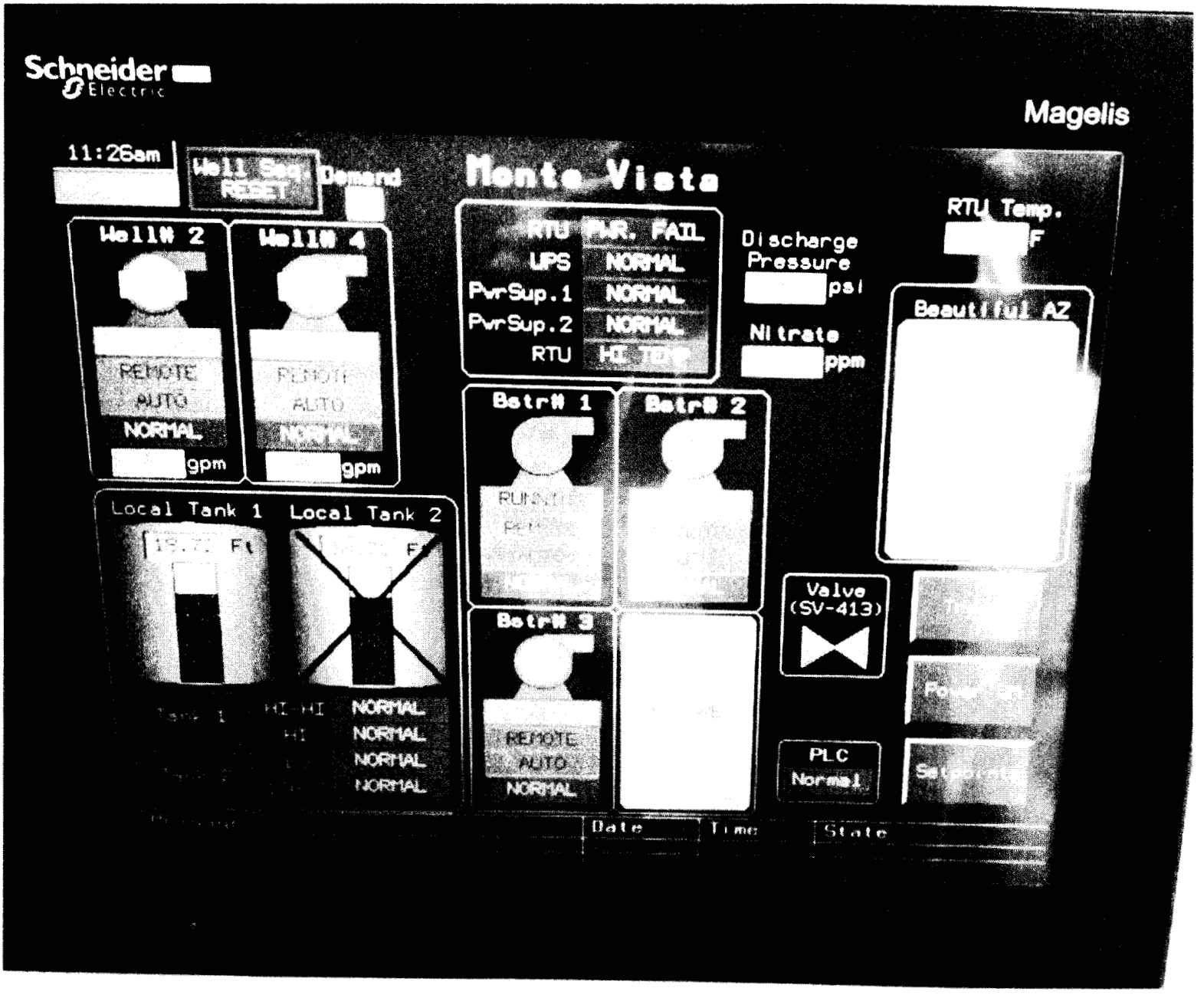


White Tanks SCADA 5-1-15
Monte Vista Well #2
New pressure switch plumbing
Configuration

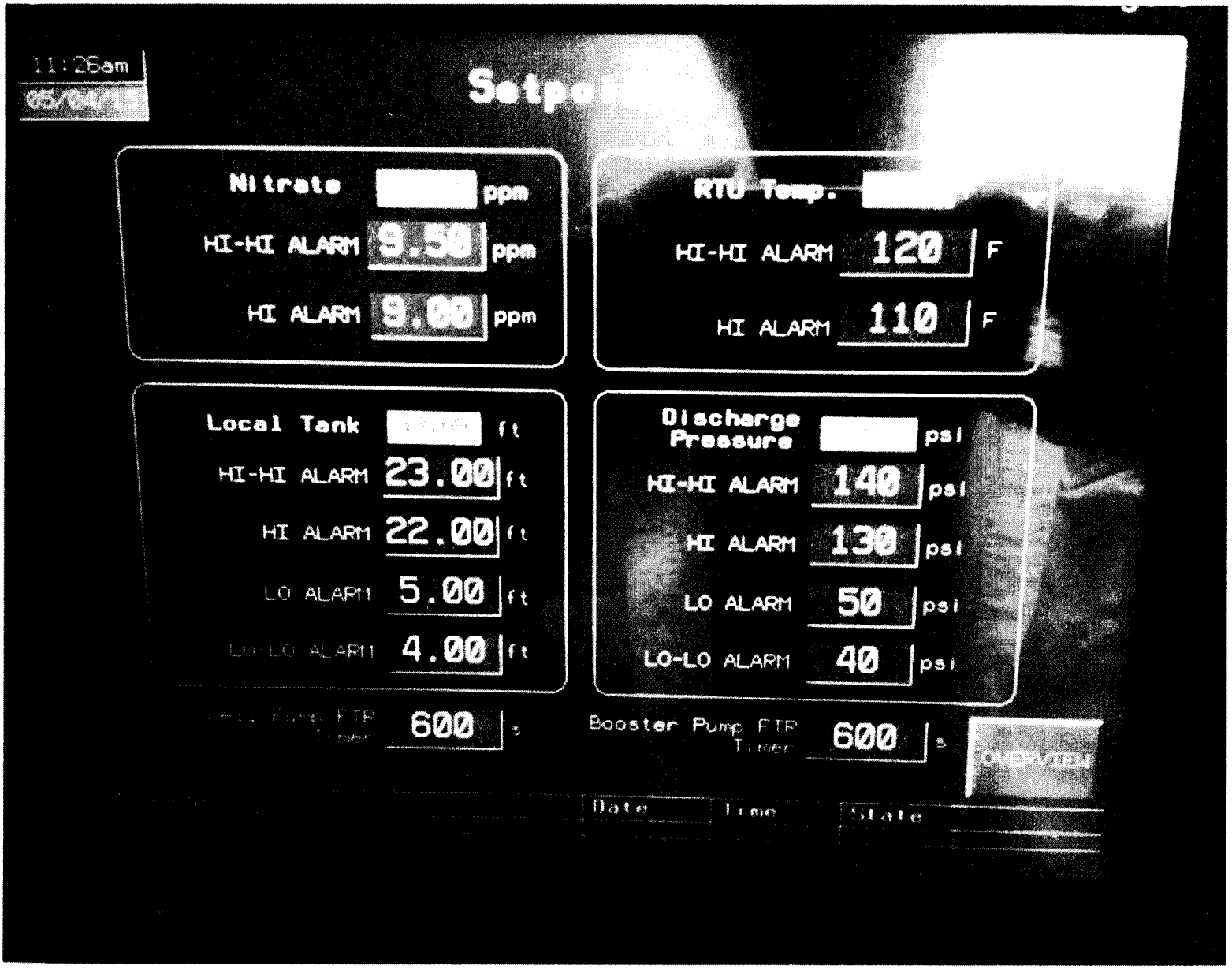
White Tanks SCADA 5-1-15
Monte Vista Well #4
New Flow meter and new pressure switch
Plumbing configuration



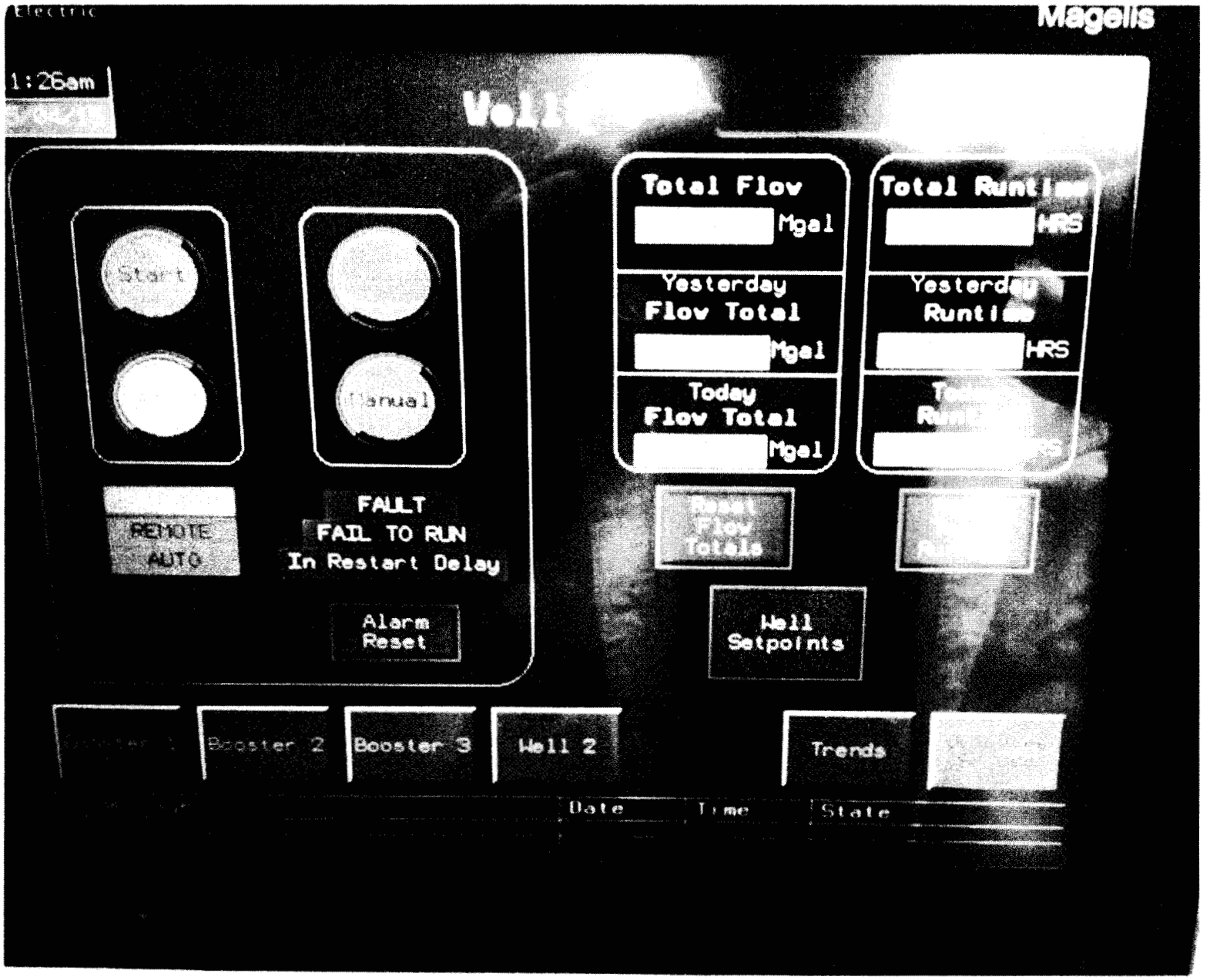
White Tanks SCADA 5-1-15
Monte Vista RTU Panel
Closeup of Heat Shields



White Tanks SCADA 5-4-15
Monte Vista Screen Shots

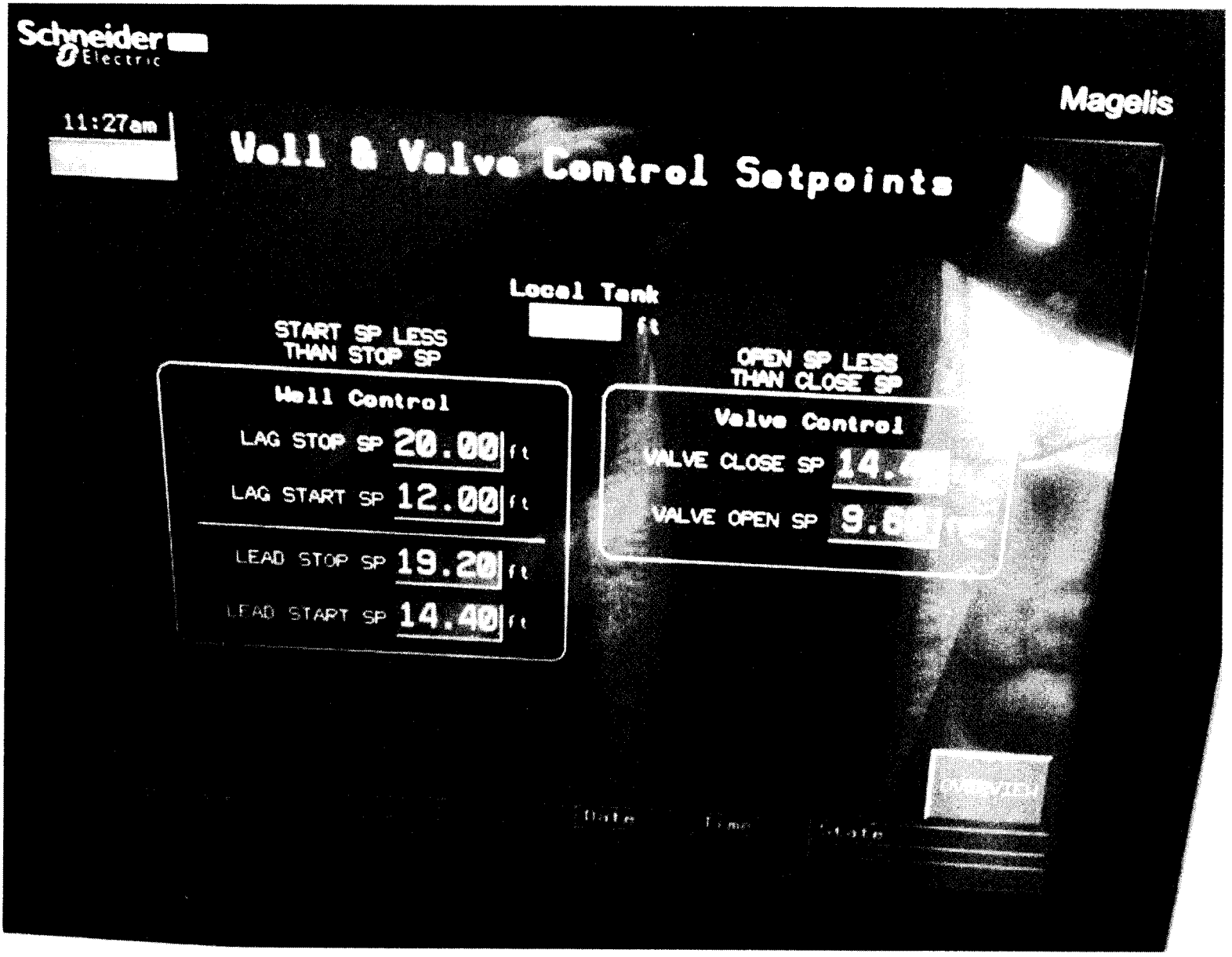


White Tanks SCADA 5-4-15
Monte Vista Screen Shots

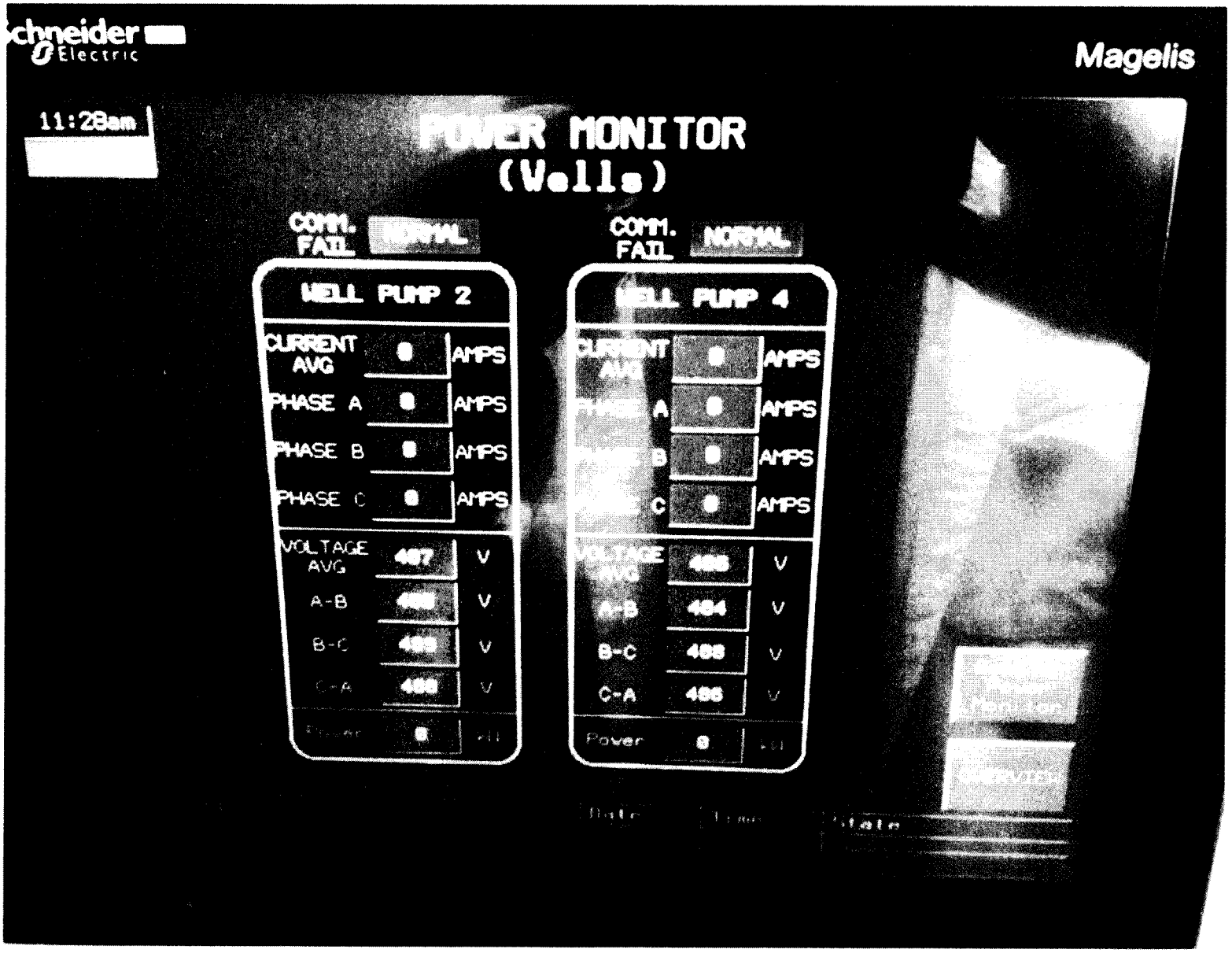


White Tanks SCADA 5-4-15
Monte Vista Screen Shots

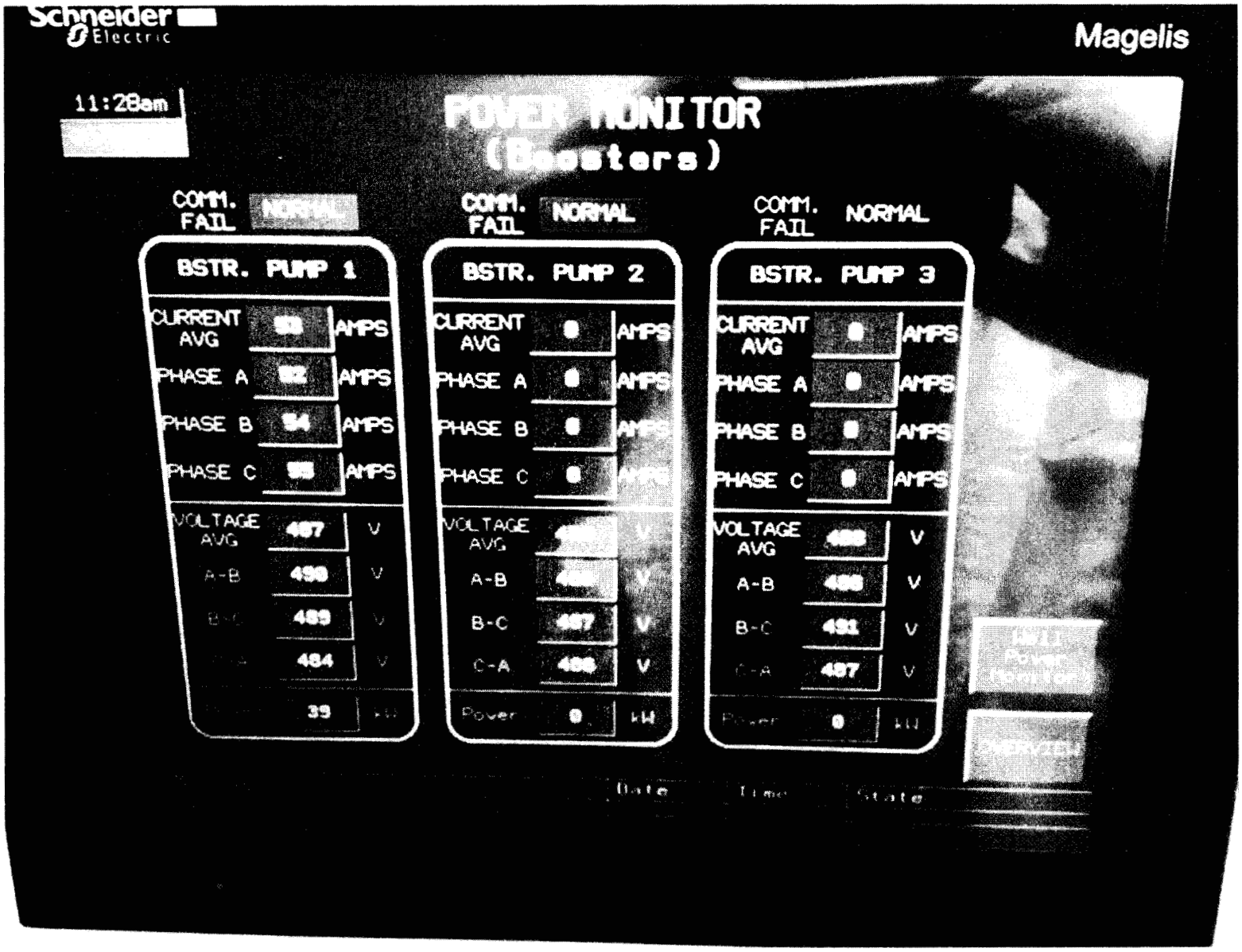
White Tanks 5-4-15
Monte Vista Screen Shots



White Tanks 5-4-15
Screen Shots

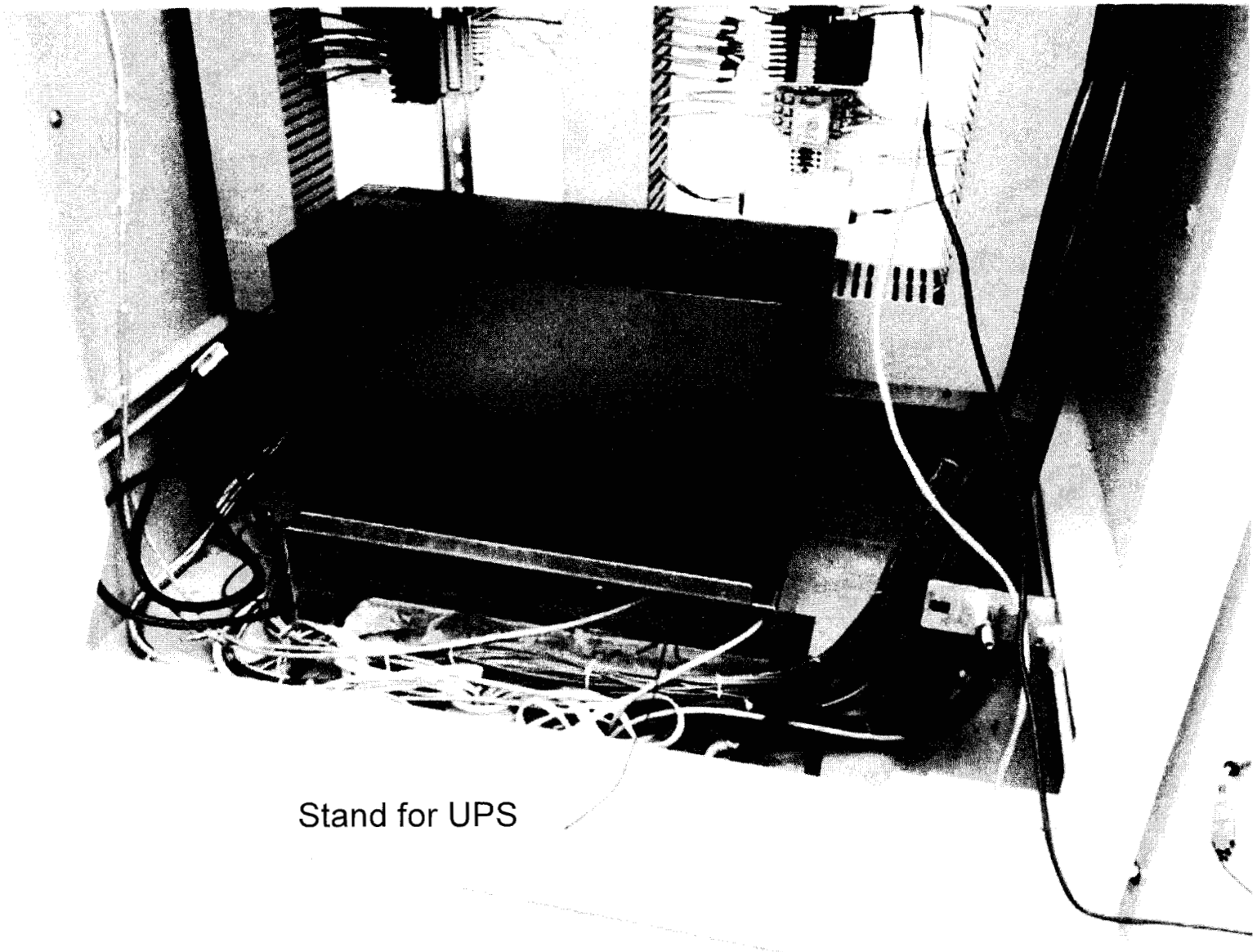


White Tanks SCADA 5-4-15
Monte Vista Screen Shots



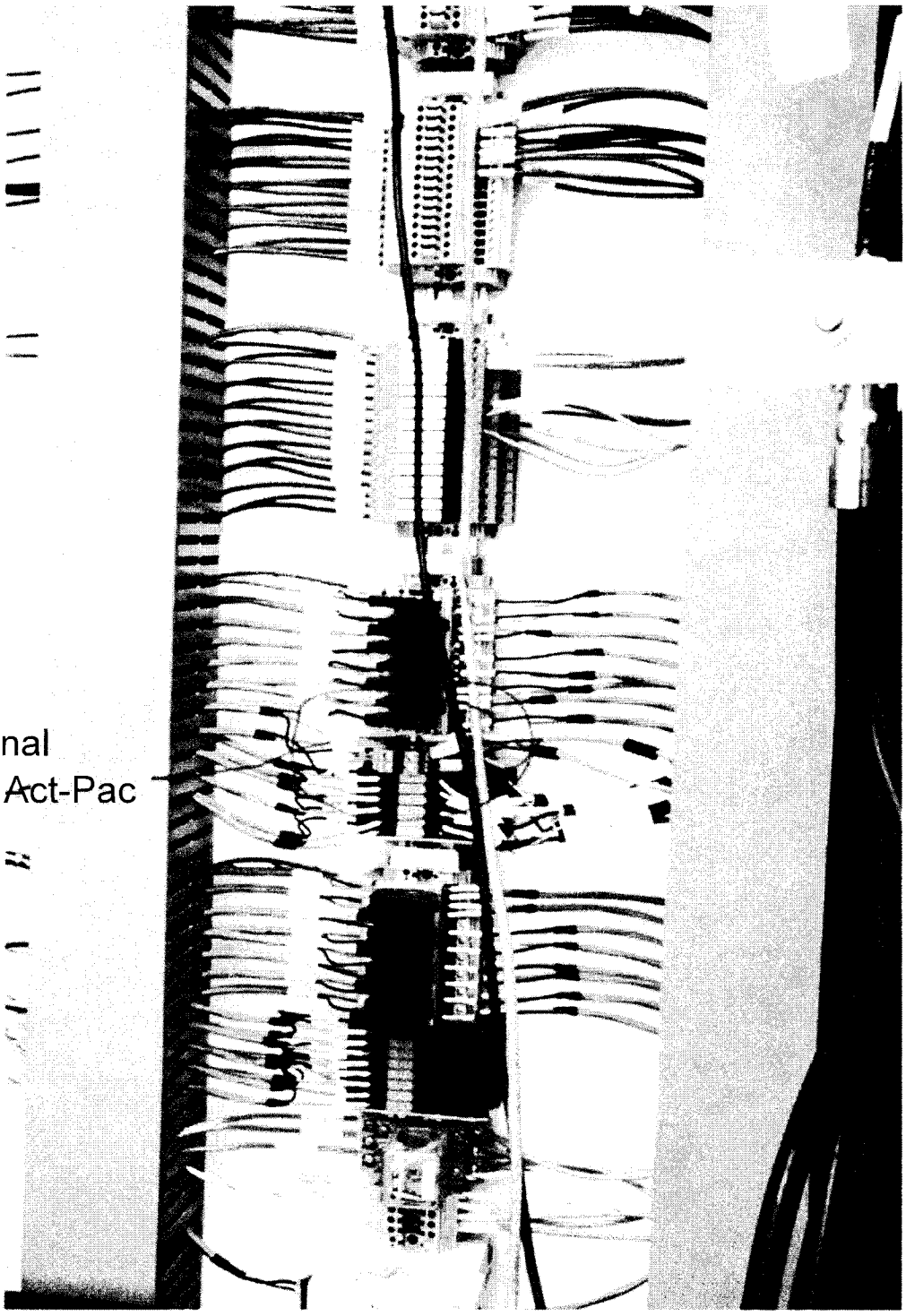
White Tank SCADA 5-4-15
Monte Vista Screen Shots

White Tanks SCADA 5-12-15
Go Lightly Office
New SCADA System



Stand for UPS

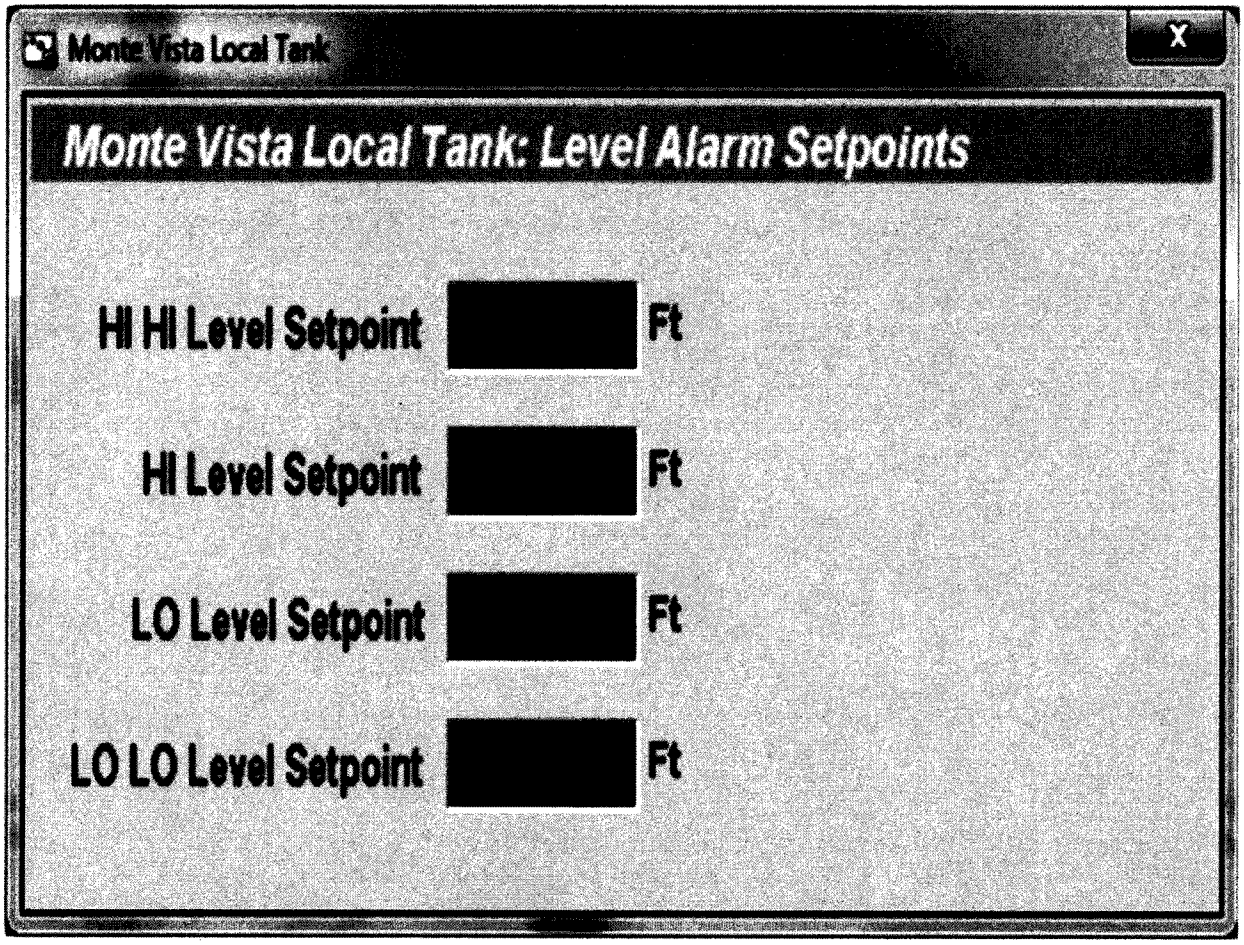
White Tanks SCADA 5-12-15
Monte Vista RTU



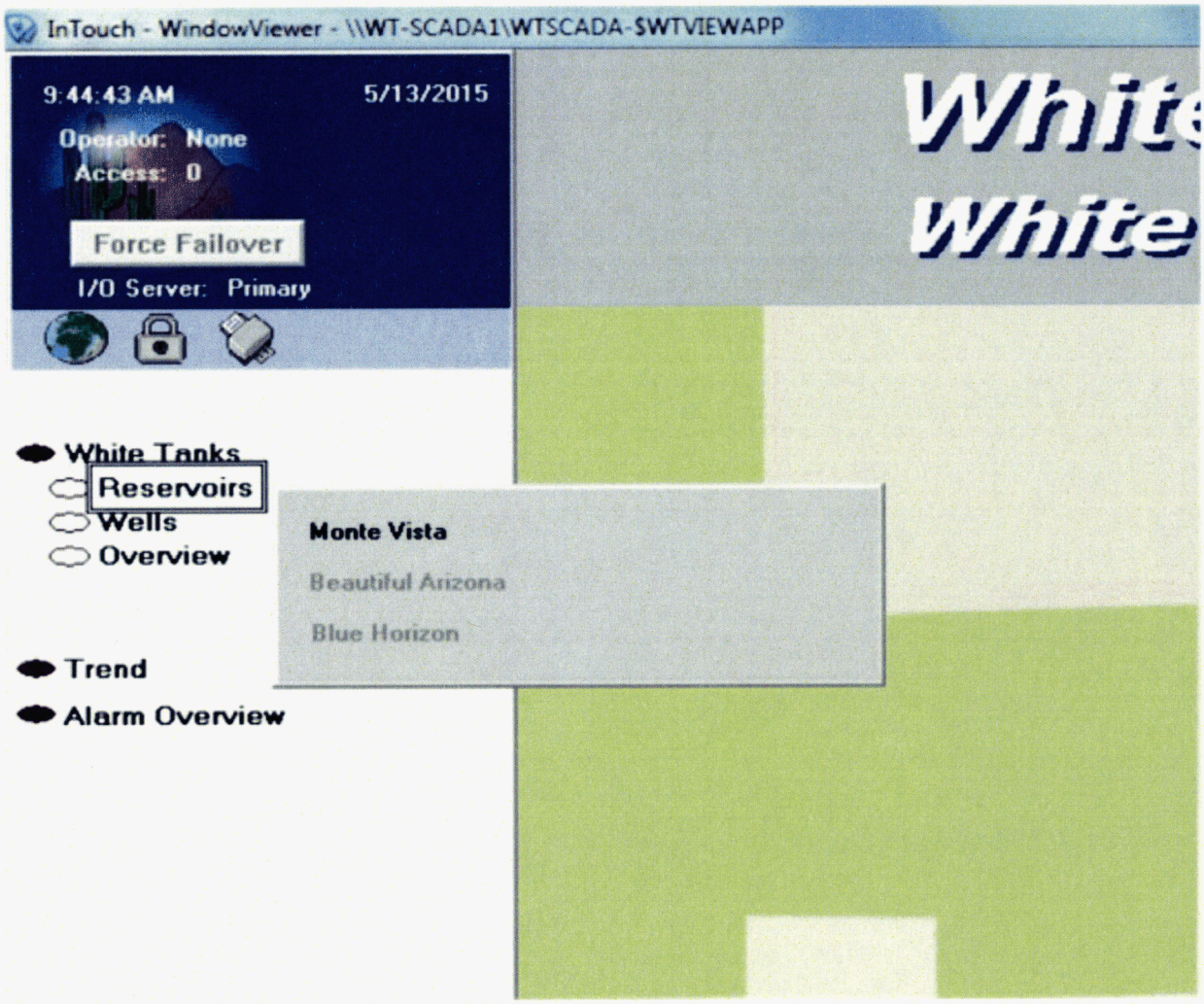
New terminal
Blocks for ~~A~~ct-Pac

White Tanks SCADA 5-12-15
Monte Vista RTU Panel

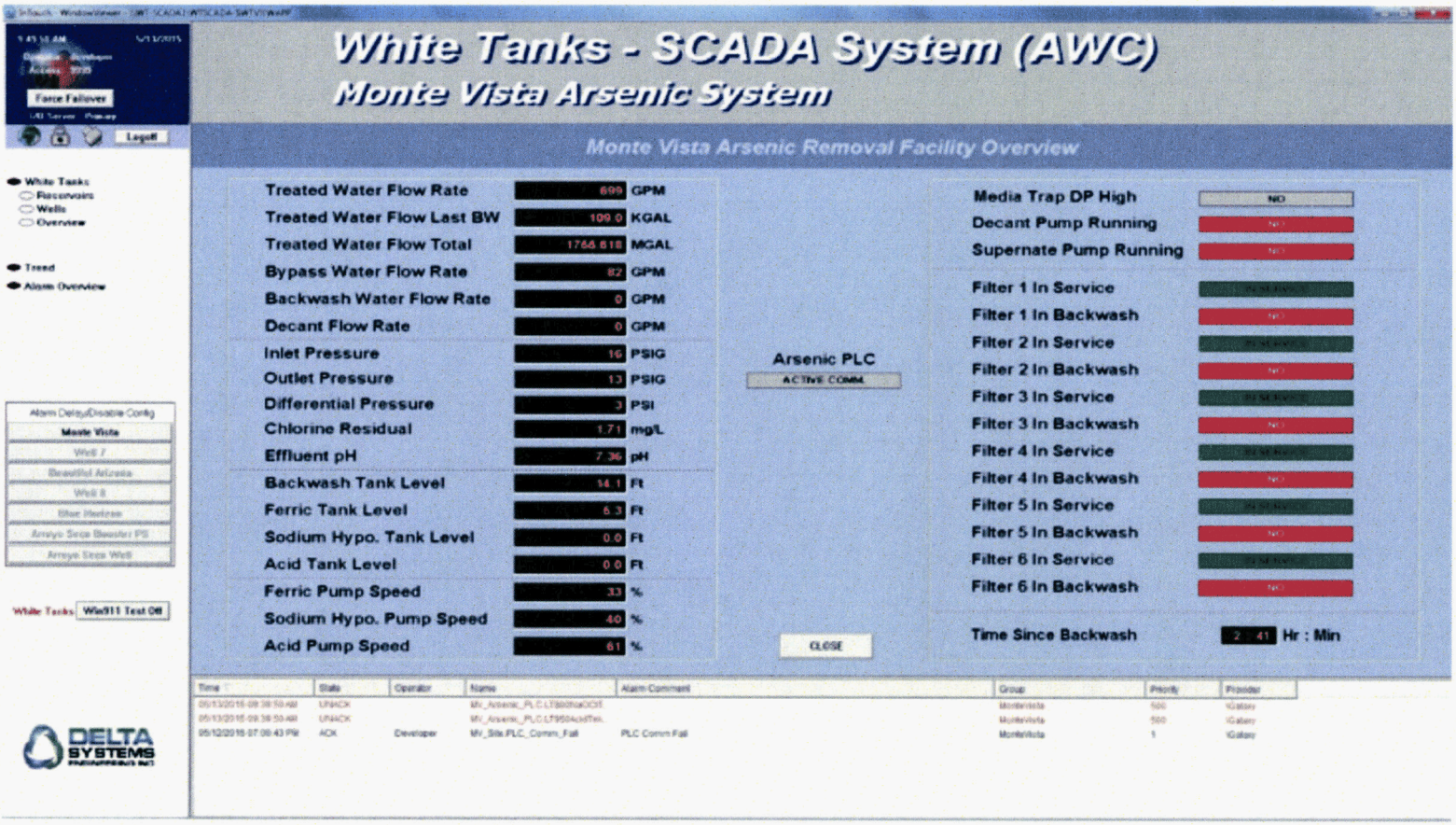
White Tanks SCADA 5-13-15
Screen Shot



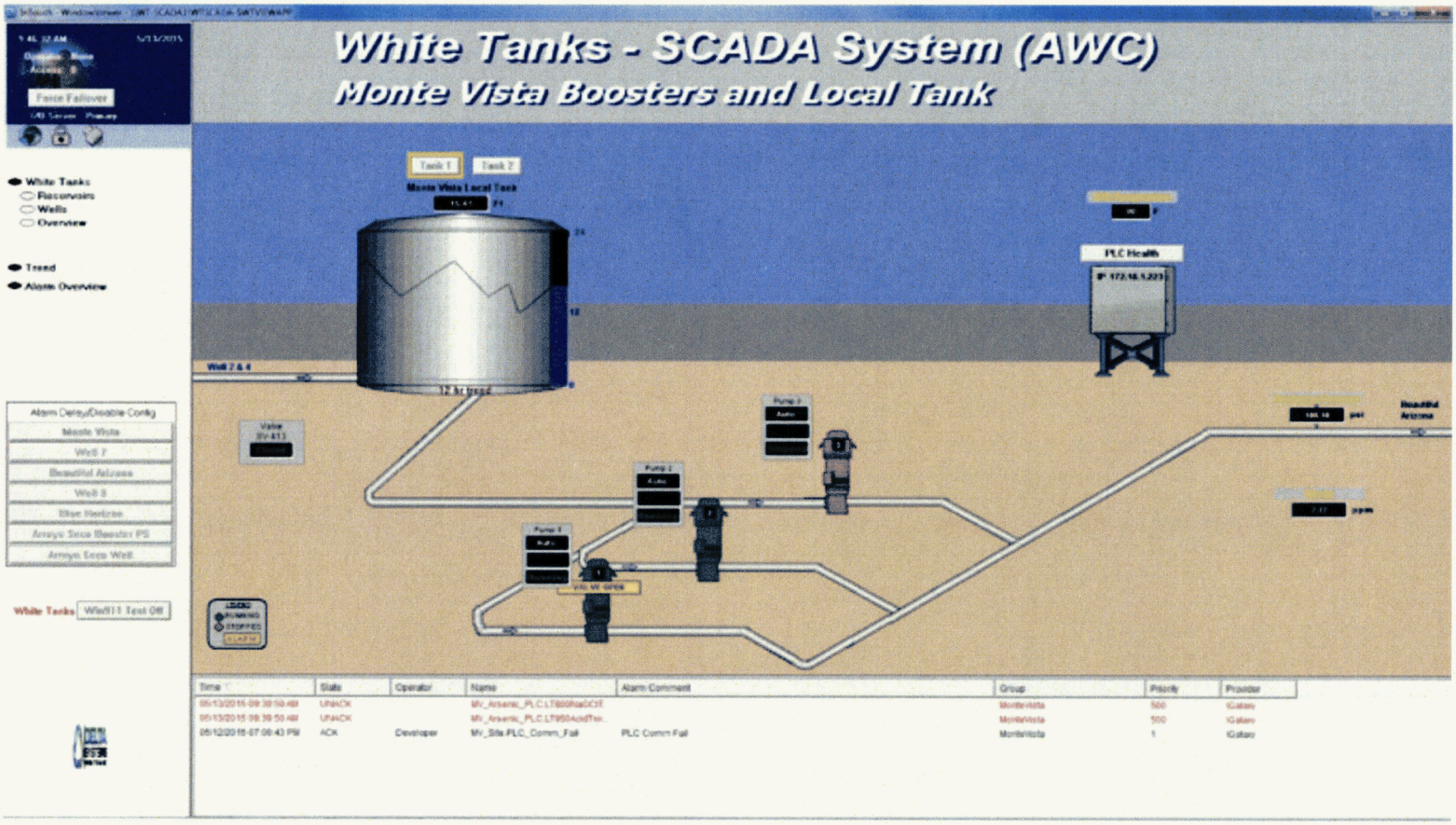
White Tanks SCADA 5-13-15
Screen Shot



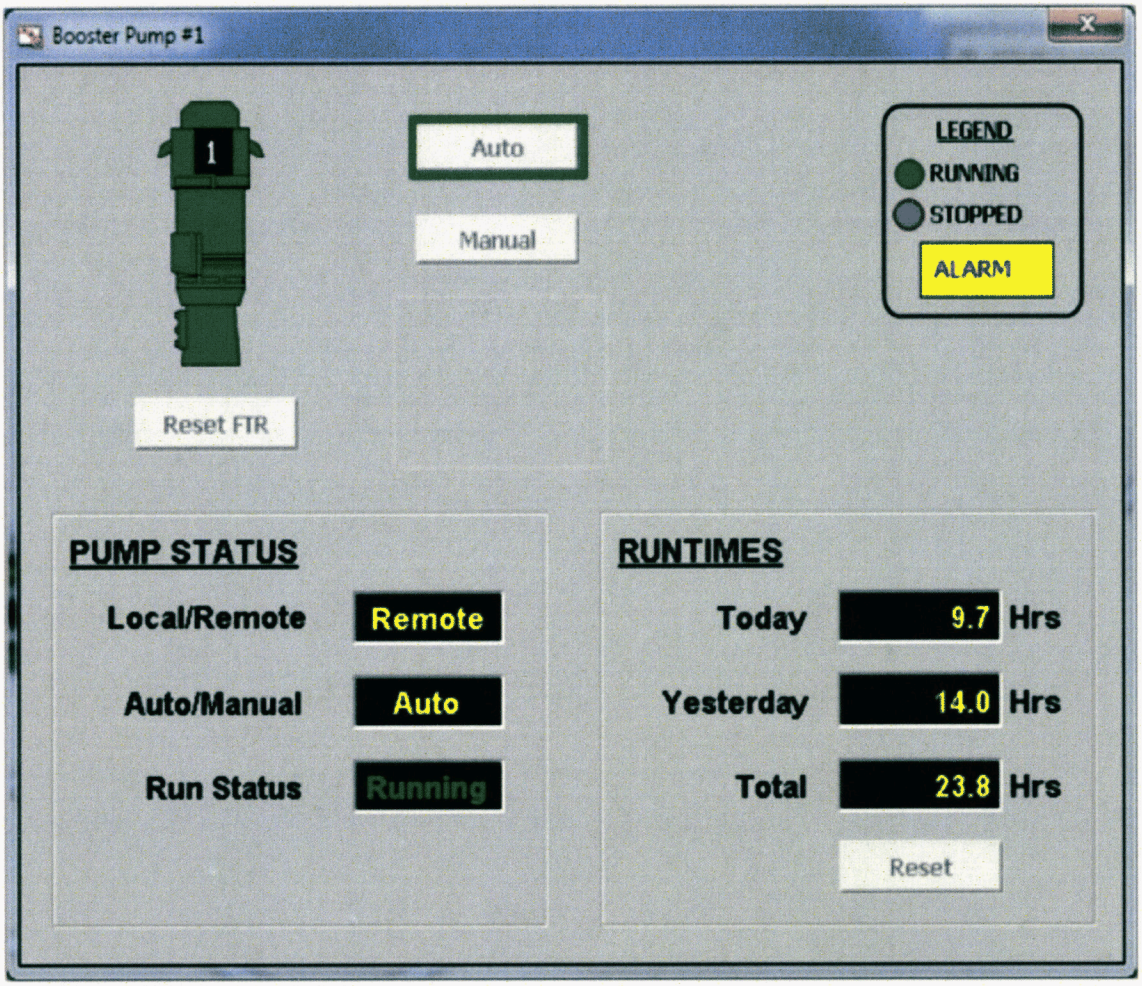
White Tanks SCADA 5-13-15
Screen Shot



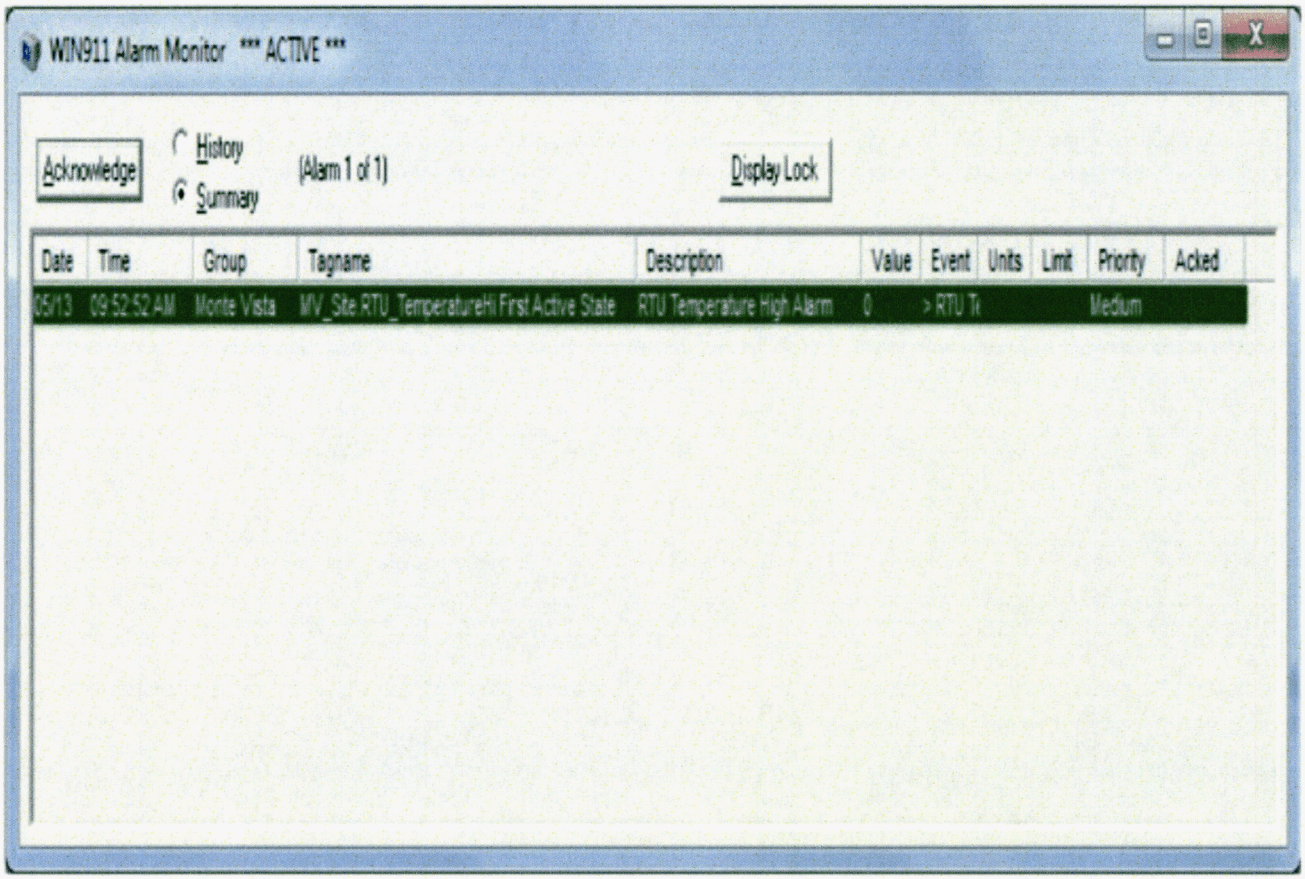
White Tanks SCADA 5-13-15
Screen Shot



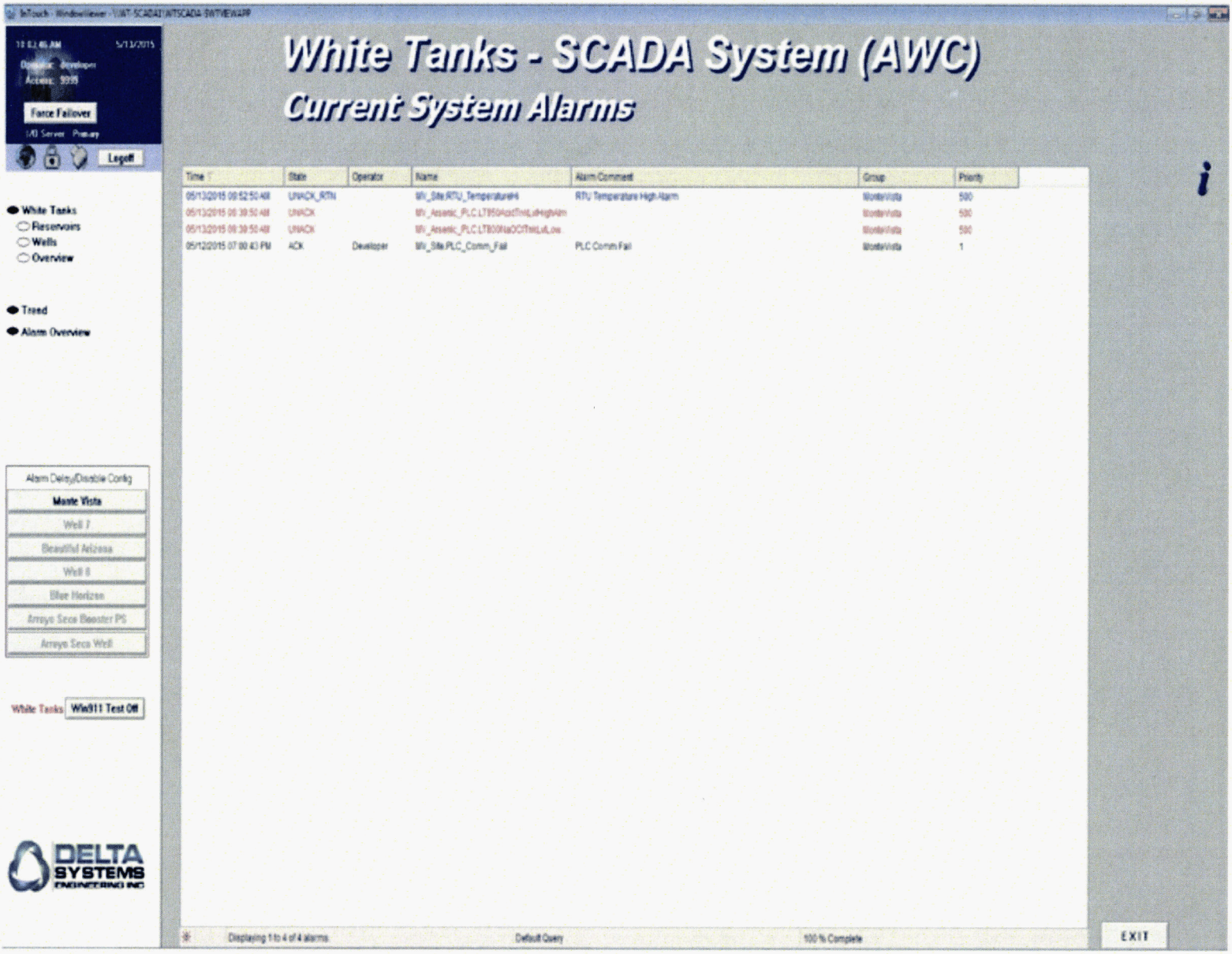
White Tanks 5-13-15
Screen Shot



White Tanks SCADA 5-13-15
Screen Shot

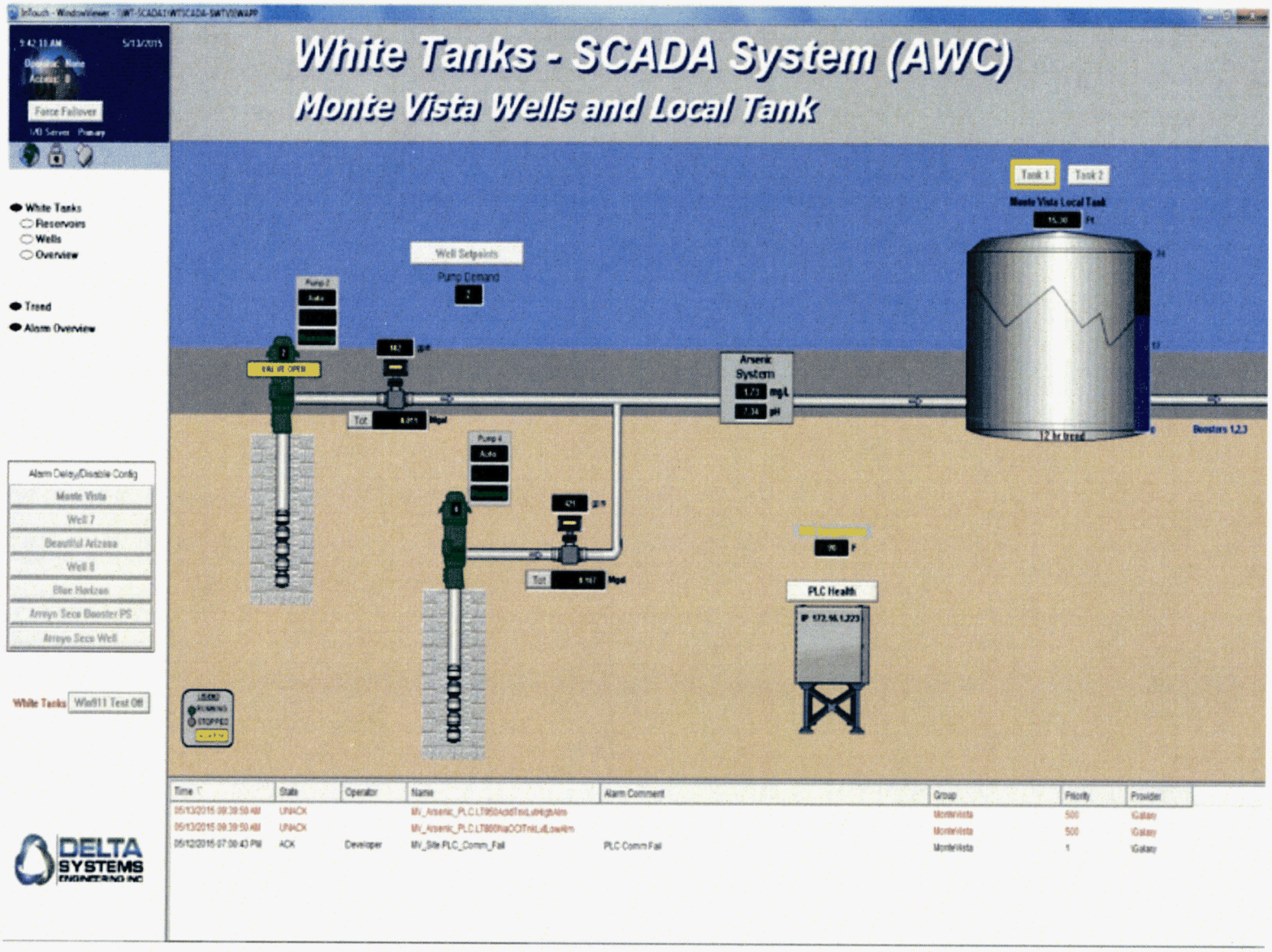


White Tanks SCADA 5-13-15
Screen Shot

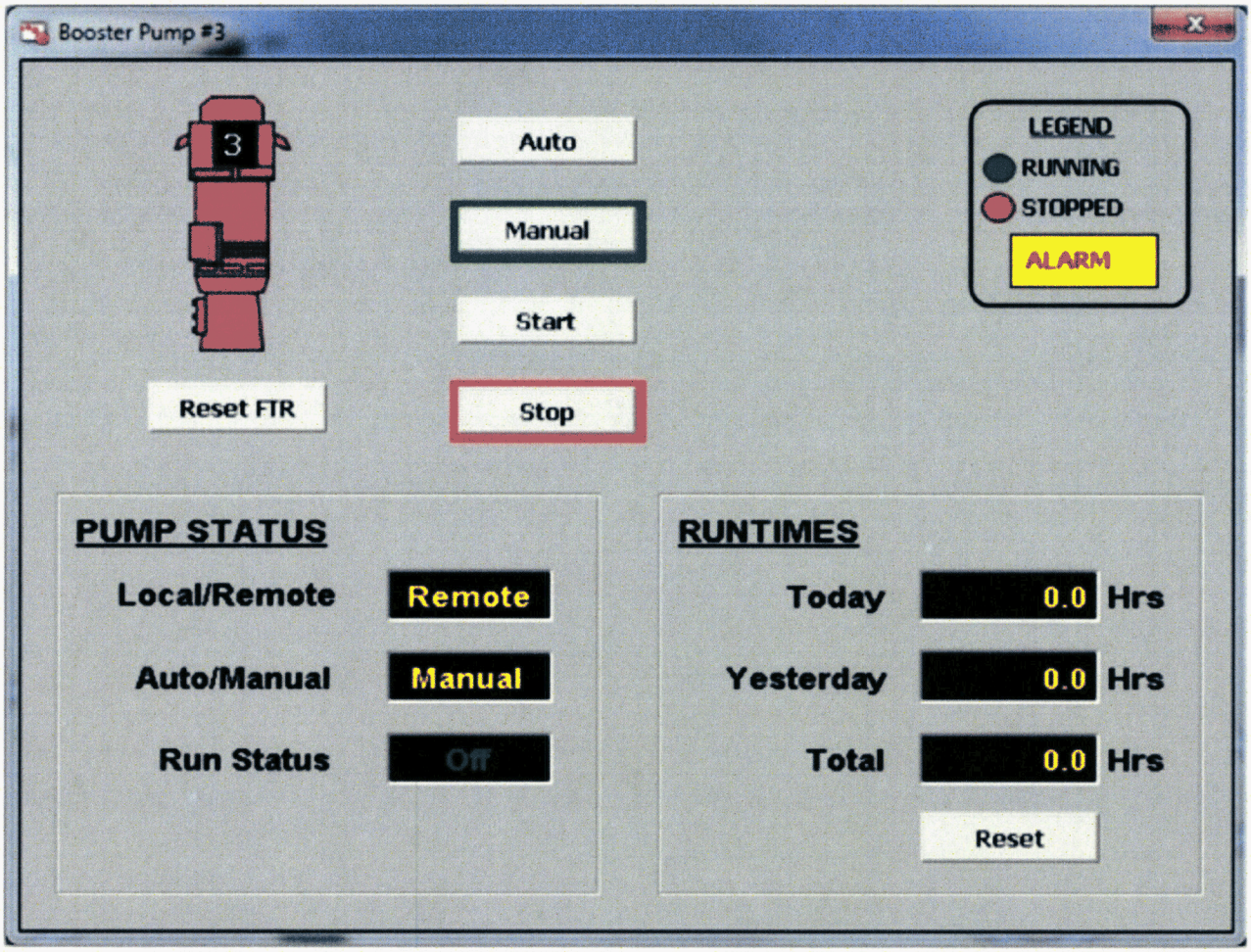


White Tanks SCADA 5-13-15
Screen Shot

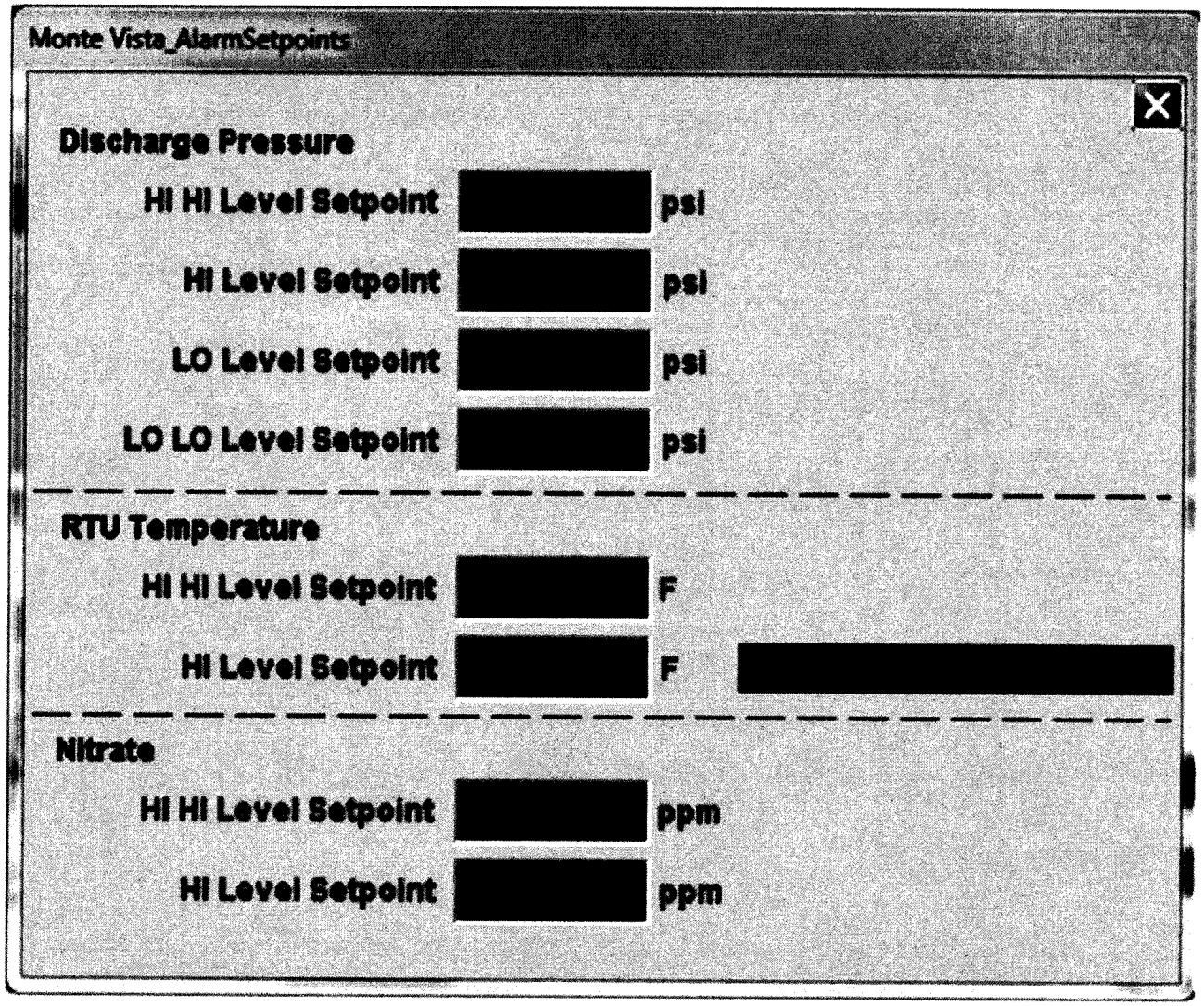
White Tanks SCADA 5-13-15
Screen Shot



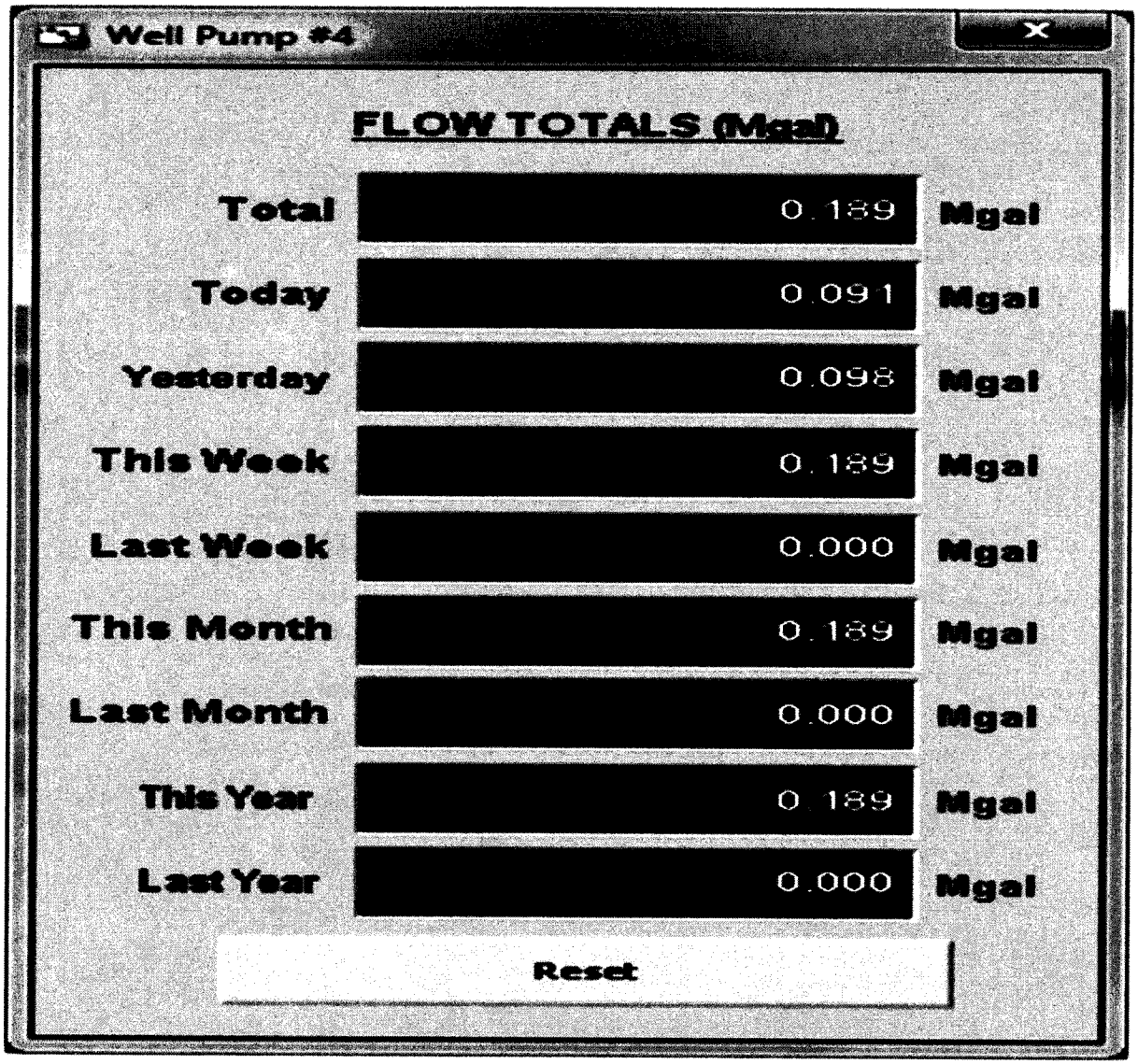
White Tanks SCADA 5-13-15
Screen Shot



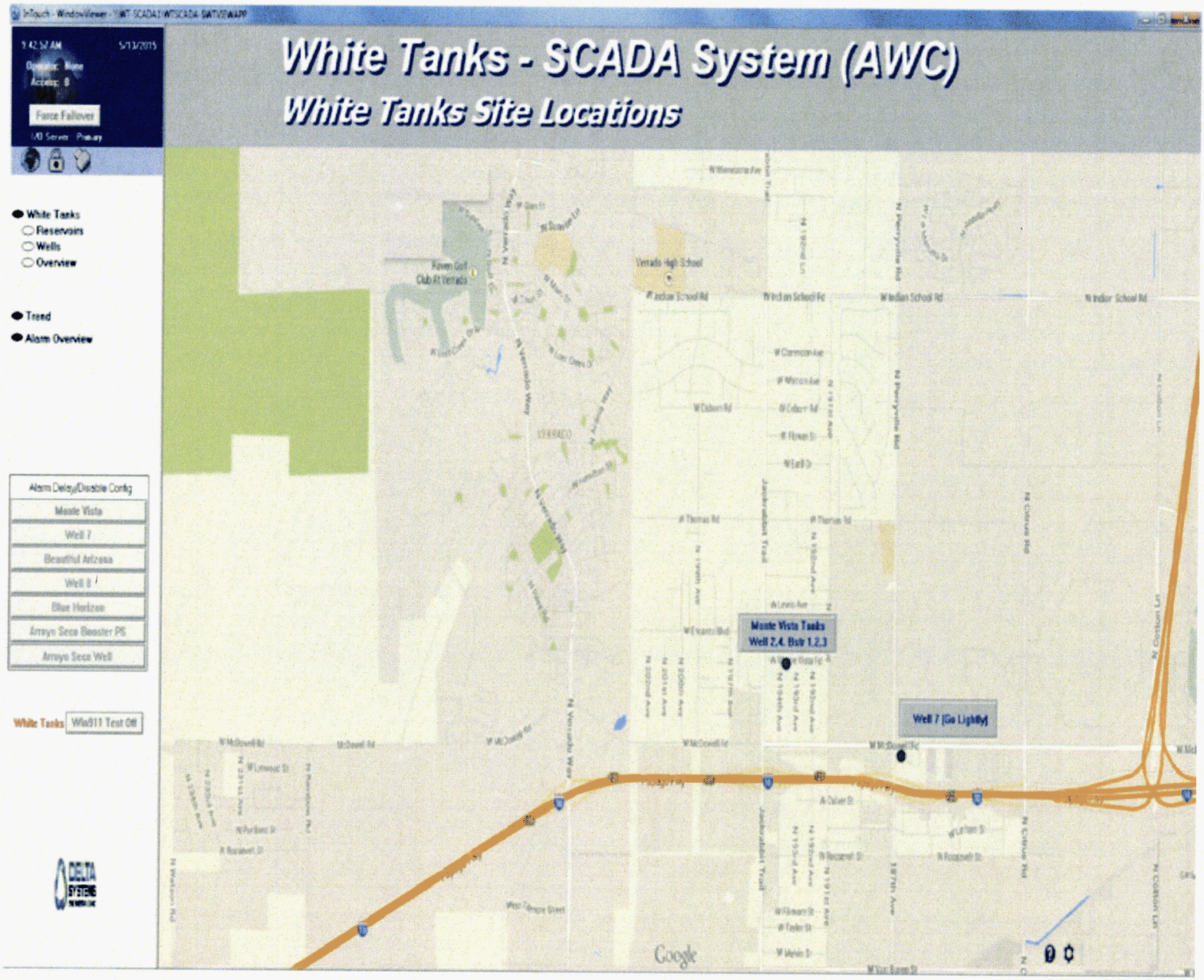
White Tanks SCADA 5-13-15
Screen Shots



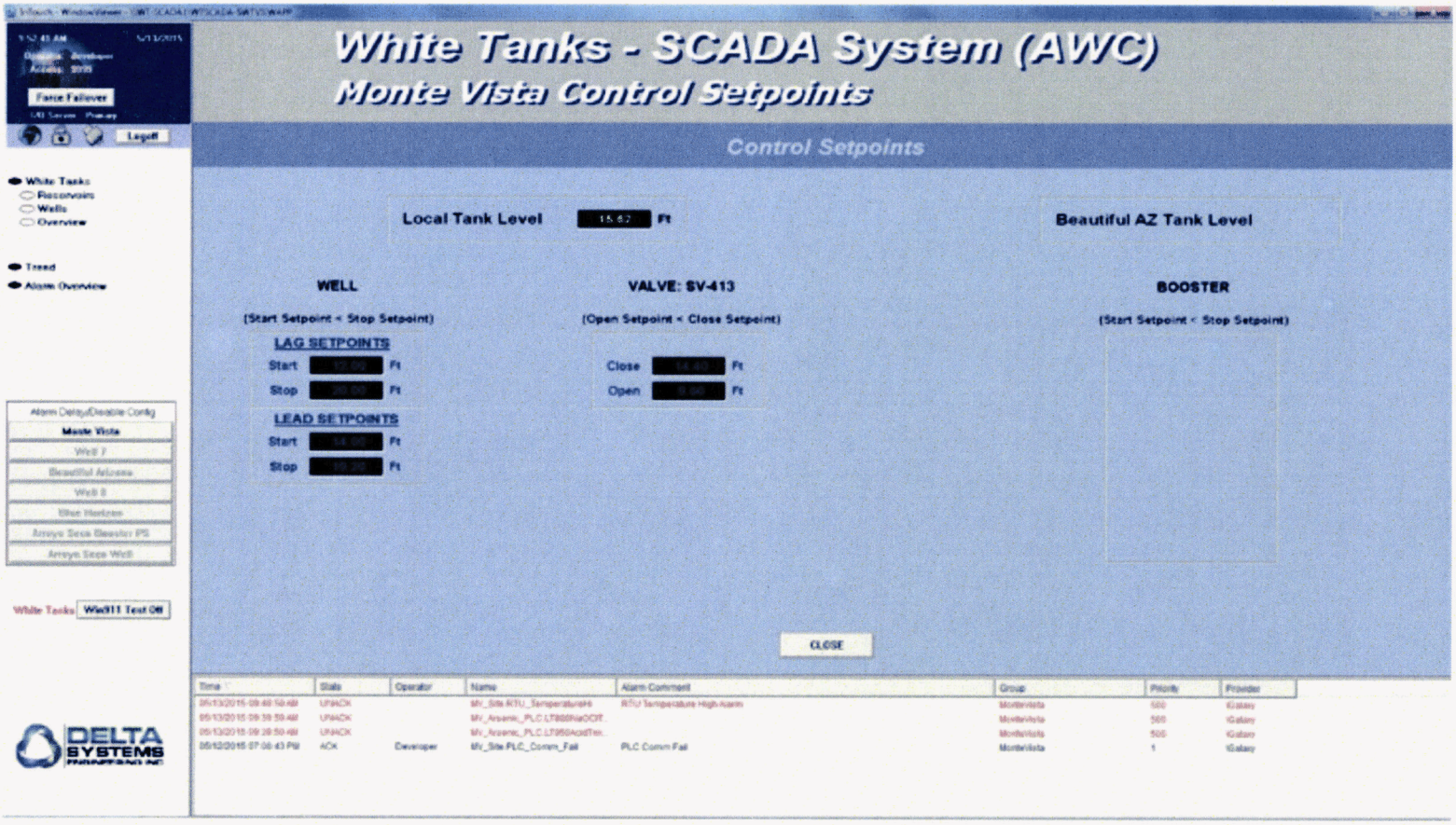
White Tanks SCADA 5-13-15
Screen Shot



White Tanks SCADA 5-13-15
Screen Shot



White Tanks SCADA 5-13-15
Screen Shot



White Tanks SCADA 5-13-15
Screen Shots

ARIZONA WATER COMPANY

CONSTRUCTION PLACED IN SERVICE NOTICE

WORK AUTHORIZATION NO.: 1-5032

DIVISION: PV / CG

DATE PLACED IN SERVICE: 6 | 1 | 2015

CONTRACT NO:

FOR PURPOSES OF *MODIFIED ACCELERATED COST RECOVERY SYSTEM*, AN ASSET IS "PLACED IN SERVICE" WHEN IT IS IN A CONDITION OR STATE OF READINESS AND AVAILABILITY FOR A SPECIFICALLY ASSIGNED FUNCTION, WHETHER IT BE FOR USE IN A TRADE OR BUSINESS, OR FOR THE PRODUCTION OF INCOME.

I CERTIFY THAT THE ASSET(S) CONSTRUCTED PURSUANT TO THE PROVISIONS OF THE ABOVE-REFERENCED WORK AUTHORIZATION ARE READY FOR SERVICE AS OF THE DATE SHOWN ABOVE.

Division Manager or Operations Superintendent
(signature)

6-9-15
Date

A-1-3-1
FKS 11/24/11

ARIZONA WATER COMPANY

PROJECT CLOSE-OUT NOTICE

PROJECT CLOSE-OUT DATE:	6/30/15	DIVISION/ SYSTEM:	CG/WT
		WORK AUTHORIZATION NUMBER:	1-5032

THE FOLLOWING RECORD REQUIREMENTS ARE ATTACHED: PREPARED BY

1. W.A. FINAL COMPLETION CHECKLIST ..... [signature]
2. FINAL AUTHORIZATION TO BILL HAS BEEN SENT TO PHOENIX ON _____ ..... _____
   Date

WA FINAL COMPLETION CHECK LIST

FACILITIES RECORDS
- ☒ Valve Records – Main & Blow-off
- ☐ Fire Hydrant Records – Include Flow Test Data

ABANDONED FACILITIES
- ☐ Property Disposal Report (PDR)
- ☐ Voided Valve Records
- ☐ Voided Fire Hydrant Records

COMPLETION DOCUMENTS
- ☐ Public Fire Hydrants Installation Request (E-3-23)
- ☒ Notice of Fire Hydrant Installation (E-5-5)
- ☐ Permits Acquired By Division Office
- ☐ Bill Of Sale (E-3-36-3)
- ☐ Final Acceptance of Facilities Letter (E-3-36-5)

ON-SITE PHOTOGRAPHS
- ☐ To Show All New Installations At Completion Of W.A.

IF NO ATB IS REQUIRED

- ☐ ADEQ DATA REQUIRED WITH ECC APPLICATION
  NOTE: "Footage Tested" to match total pipe installed ("343" ONLY)

AS-BUILT DRAWING
- ☐ Label Cover Sheet "AS BUILT"
- ☐ Pipe footage and size to be listed on AS-BUILT cover sheet ("343" ONLY)
- ☐ Printed name of AS-BUILT preparer
- ☐ ONLY Changes to original construction drawing to be marked in red on AS-BUILTs,
  NOTE: Include any additional Air Release Valves

FORMS
- ☐ Well Record (E-5-7)
- ☐ Storage Tank Record (E-5-8)
- ☐ Booster Pump Record (E-5-9)
- ☐ Hydropneumatic Tank Record (E-5-10)

OPERATIONS & MAINTENANCE MANUALS
- ☐ Electric S.E.S. & M.C.C.
- ☐ S.C.A.D.A./Controls
- ☐ Treatment Facilities

- ☐ AOC (Approval of Construction)
- ☒ Placed in Service Notice
- ☒ Daily Progress Reports

I certify that construction on the above Work Authorization is complete and for which all materials have been accounted. I further certify that I have inspected the work and determined it is satisfactory and in accordance with Company specifications.

[signature]
Division Manager, Operations Superintendent, or Project Engineer *(signature)*

6-30-15
Date of Notice

ATTACH TO CONSTRUCTION & ENGINEERING FILE COPY OF WORK AUTHORIZATION

TO: ACCOUNTING DEPARTMENT (ACCOUNTANT II)
CC: ENGINEERING DEPARTMENT (ENG. SEC.)

WA 1-5263

Western Group Rate Case

Exhibit FKS-1

5263 Citrus & I-10

ARIZONA WATER COMPANY
WORK AUTHORIZATION

W.A. NUMBER: 1-5263
P.E. NUMBER: 1457
BUDGET ITEM NO.: Special No. 4
SHEET NO.: 1 of 2

SYSTEM:	WHITE TANK	RETENTION REQUIRED:	☑ YES ☐ NO
DIVISION:	CASA GRANDE	WORK TO START BY:	UPON AUTHORIZATION
RESPONSIBLE PERSON:	RAY MURRIETA	WORK TO BE FINISHED BY:	WITHIN 70 DAYS
TAX CODE:	2550		

DESCRIPTION OF WORK:

Install approximately 230 LF of 6-inch DIP with related fittings and 1 air relief valve in an existing company easement along the west side of Citrus Road and south of Interstate 10 in the company's White Tank system.

FACTORS JUSTIFYING WORK:

This installation will eliminate two dead end mains and provide more reliable water service and water pressure in this portion of the company's White Tank water system.

COST ESTIMATE		AUTHORIZATION	DATE
COST OF WORK:		PREPARED BY: Joseph Whelan	12-5-14 1-13-15
MATERIAL	0		
LABOR	7,100	REVIEWED FOR ESMT/ROW VERIFICATION: Charles Briggs CB 01-13-2015	12-09-2014
CONTRACT PORTION	39,100		
OVERHEAD	5,500	REVIEWED BY: Mario Mendez MM 1/14/15	12/11/14
TOTAL AUTHORIZED EXPENDITURES CHARGEABLE TO THIS W.A.	$ 51,700		
FUNDS RECEIVED:		APPROVED BY ENGINEERING: Fredrick Schneider FS 1-14-15	12-5-2014
CONTRIBUTIONS RECEIVED	0		
REFUNDABLE ADVANCES RECEIVED	0	APPROVED BY FINANCE: Joseph Harris	12/5/14
TOTAL CONTRIBUTIONS/ADVANCES	0		
NET COMPANY CASH REQUIRED	$ 51,700	SPECIAL ITEM EXCEEDING $10,000; AUTHORIZED BY PRESIDENT: William Garfield	12-5-2014
		SPECIAL ITEM EXCEEDING $10,000; AUTHORIZED BY CHAIRMAN: M. L. Whitehead	12-5-14

COMMENTS:

Transfer charges from PE 1457 to this WA

CONSTRUCTION RELEASE:

RELEASED TO CONSTRUCTION
Authorized by FRED SCHNEIDER
Date 1/13/15

ARIZONA WATER COMPANY

WORK AUTHORIZATION - DETAIL SHEET

W.A. NUMBER: 1-5263
P.E. NUMBER: 1457
BUDGET ITEM NO.: Special No. 4
SHEET NO.: 2 of 2

RETIREMENT PROPERTY UNITS	PLANT PROPERTY ACCOUNT	UNIT DESCRIPTION	QUANTITY	YEAR INSTALLED AND W.A. NUMBER
	THE REMOVAL ITEMS LISTED BELOW WERE PREVIOUSLY RETIRED AS NON-UTILITY PLANT			

PROJECT DESCRIPTION:

Install approximately 230 LF of 6-inch DIP with related fittings and 1 air relief valve in an existing company easement along the west side of Citrus Road and south of Interstate 10 in the company's White Tank system.

	DESCRIPTION	PLANT PROP ACCT	QUANTITY	UNIT COST	TOTAL
CONTRACT WORK					
	Install 6-inch DIP with polywrap and related fittings	343	230	130.00	29,900
	Install 6-inch gate valve	343	2	1,800.00	3,600
	Performance bond	343	1	400.00	400
	Contracting tax	343	1	2,100.00	2,100
	Install air relief valve	343	1	3,100.00	3,100
	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					$ 39,100
MATERIALS					
	SERVICE CONNECTIONS: DOUBLE-LONG	345			
	SERVICE CONNECTIONS: DOUBLE-SHORT	345			
	SERVICE CONNECTIONS: SINGLE-LONG	345			
	METERS	346			
	METERS	346			
TOTAL MATERIALS					$ -
LABOR	COST OF DESIGN PE 1457	343	1	$ 1,500.00	$ 1,500
	TESTING FEE	343	1	$ 100.00	100
	PERMIT FEE	343	1	500.00	500
	SURVEY FEE	343	1	2,000.00	2,000
	FIELD INSPECTION	343	1	3,000.00	3,000
	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					$ 7,100
SUBTOTAL - CONTRACT WORK, MATERIALS, AND LABOR					$ 46,200
OVERHEAD					5,500
TOTAL	REFUNDABLE PORTION ☐	NON-REFUNDABLE PORTION ☒		**COST ESTIMATE**	$ 51,700

AFH

Maricopa County

Environmental Services Department Water and Waste Management

Subdivision Infrastructure & Planning Program
1001 N. Central Avenue #150
Phoenix, Arizona 85004
Phone: (602) 506-1058
Fax: (602) 506-5813
TDD 602 506 6704

October 22, 2014

Scott Bushman, Project Manager
AMERCO Real Estate
2727 North Central Avenue, Suite 9-N
Phoenix, AZ 85004

RE: Request for Exemption of Plan Review Requirements for the Goodyear U-Haul Storage Facility (#721041) water line. MCESD Project No. DWR-14-00426.

Dear Mr. Bushman:

The Maricopa County Environmental Services Department (MCESD) has reviewed the submitted documents concerning the above referenced request for an exemption from the MCESD plan review requirements. These regulatory requirements are specified in Arizona Revised Statute 49-353.A.2.d and Arizona Department of Environmental Quality regulation R18-4-505 for water systems, and in R18-9-E301 for wastewater systems. Exemptions from the plan review/approval requirement are allowed in both sets of regulations.

The project consists of removing and replacing a water line at an existing U Haul Storage facility located at 1126 N. Citrus Road in Goodyear. Existing water piping and appurtenances will be removed and replaced with 233 LF of 6" DIP water line, new fire hydrants, valves and other appurtenances. Your cost estimates provided indicated the estimated cost of the water line is $49,496 which is below the $50,000 criterion specified in statute.

Based on our review of the submitted documentation, MCESD believes that this project meets the criteria for an Exemption. The water infrastructure has been designed by a registered professional engineer, and the estimated cost should be below $50,000, and is not for a new subdivision currently for a new subdivision requiring plat approval by a city, town or Maricopa County.

After completion of the work, a notice of compliance letter should be submitted to the Subdivision Infrastructure & Planning Program, MCESD in accordance with the requirements of A.A.C. R18-5-505.B.4. The notice of compliance should include the project cost, names of the design and review engineers, if any, project completion date, and the total construction time.

Please contact me at wshonerd@mail.maricopa.gov (602-506-0376) if you have any questions concerning this letter.

Sincerely,

Wesley A. Shonerd, P.E.
Senior Civil Engineer
Subdivision Infrastructure & Planning Program

ARIZONA WATER COMPANY

3805 N. BLACK CANYON HIGHWAY, PHOENIX, ARIZONA 85015-5351 • P.O. BOX 29006, PHOENIX, AZ 85038-9006
PHONE: (602) 240-6860 • FAX: (602) 240-6874 • TOLL FREE: (800) 533-6023 • www.azwater.com

December 9, 2014

Mr. Mike Mills
Ellison-Mills Contracting, Inc.
3152 N. Lear Avenue, Suite 2
Casa Grande, AZ 85122

Re: U-Haul Center – I-10 and Citrus Road

PROJECT: U-Haul Center	
SYSTEM: White Tank	
CONTRACT NO.:	
P.E. NO.:	W.A. NO.: 1-5263

Dear Mr. Mills:

Enclosed is your copy of the Proposal/Contract for the above-referenced project, which has been accepted by Arizona Water Company (the "Company"). The project shall be constructed in accordance with the Company's *General Conditions of Contract, the Specifications and the Drawings* which were included with the Company's previously provided Proposal/Contract, copies of which are being provided again and attached herewith.

Also enclosed are two copies of the Change Order and Commencement Notice for the above-referenced project. Please sign one copy of each and return it to my attention retaining the other for your records.

As provided in paragraph 4 of the Company's Proposal/Contract executed by the Company on December 10, 2014, Ellison-Mills Contracting, Inc. acknowledged that one hundred percent (100%) Performance and Payment Bonds are required and must be provided to the Company prior to the commencement of work. In addition, as provided in paragraph 44 of the Company's General Conditions of Contract, the 100% Performance and Payment Bonds must be provided within ten (10) calendar days of the date of the Commencement Notice. Failure to provide an acceptable 100% Performance and Payment Bond does not limit the Company's

ability to terminate the Proposal/Contract or seek restitution for damages that the Company may have or will incur.

Prior to the start of construction, please call Ray Murrieta, Division Manager at 520-836-8785 to schedule a pre-construction meeting. Prior to the pre-construction meeting, the Contractor must provide proof of insurance of no less than the minimum amounts provided in paragraph 5 of the Company's General Conditions of Contract. Failure to provide acceptable proof of insurance does not limit the Company's ability to terminate the Proposal/Contract or seek restitution for damages that the Company may have or will incur. In addition, please provide the required Performance and Payment Bonds to the Company promptly so that the contracted work can be completed within the contract's timeline.

If you have any questions, please call me at this office.

Very truly yours,

Joseph Whelan
Engineering Development Coordinator
engineering@azwater.com

afh
Enclosure

ARIZONA WATER COMPANY

220 E. 2nd Street
Casa Grande, AZ 85130
520-836-8785

PROPOSAL/CONTRACT

CONTRACTOR: Ellison-Mills Contracting LLC	SYSTEM: WT
ADDRESS: 3152 N Lear Ave Suite #2	W.A. No(s):
CITY ST ZIP: Casa Grande AZ 85122	BID DUE DATE: October 14, 2014

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.

1. Contractor certifies that it has a complete copy of, and has read, understands 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.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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 Statuse ("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. §42-5061 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.

7. 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 thereof. 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.

8. 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.

9. 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.

10. Contractor will not commence work on the Project until the Company gives Contractor a written Commencement Notice. Contractor will complete the Project within 60 calendar days after the Commencement Notice is issued.

11. 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.

12. 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 to obtain traffic control permit if required and SWPPP permit if required; remove and dispose of existing cement asbestos water main in accordance with the EPA Title 40 Part 61 NESHAPS.

CONTRACTOR	PROPOSAL/CONTRACT ACCEPTED:
Ellison-Mills Contracting LLC	ARIZONA WATER COMPANY
By:	By:
Print Name: Mike Mills	Print Name: Fredrick K. Schneider, PE
Title: Owner	Title: Vice President - Engineering
Date: 10/9/14	Date: 12-10-2014

JJW

AJH

ARIZONA WATER COMPANY

220 E. 2nd Street
Casa Grande, AZ 85130
520-836-8785

PROPOSAL/CONTRACT

CONTRACTOR: Ellison-Mills Contracting LLC	SYSTEM: WT
AZ CONTRACTOR LICENSE NO: 241166 CLASSIFICATION: A	W.A. No(s):
ADDRESS: 3152 N Near Ave Suite # 2	BID DUE DATE: October 14, 2014
CITY ST ZIP Casa Grande AZ 85122	BID BOND REQUIRED ☑ Yes ☐ No

DESCRIPTION OF PROJECT: Remove and dispose of approximately 205 of 6-inch cement asbestos pipe and approximately 25 LF of 6-inch ductile iron pipe, remove one existing fire hydrant, two existing service connections and one air relief valve. Replace with approximately 230 LF of 6-inch ducitile iron pipe, one air relief valve, one 1-inch single service and one 2-inch copper service to serve two 1-inch double meters all in an existing 8-wide easment located south of I-10 west of Citrus Rd to serve U-Haul.

1-2. MATERIALS EXEMPT FROM CONTRACTING TAX (per Paragraph 6)	QUANTITY	UNIT PRICE LABOR	UNIT PRICE MATERIALS	TOTAL COST LABOR	TOTAL COST MATERIALS
Remove and dispose of existing 6-inch CA water main	205	29.12		5969.60	
Remove and dispose of existing 6-inch DIP water main	25	14.72		368.00	
Remove existing air relief valve	1	920.04		920.04	
Remove existing fire hydrant	1	920.04		920.04	
Install 6-inch DIP with polywrap and related fittings	230	74.03	27.45	17026.90	6359.50
Install 6-inch gate valve	2	460.02	846.98	920.04	1693.96
	1				
	1				
3. Total Labor to Install Exempt Materials (add the amounts in column 1)				3 26124.62	
4. Total Exempt Materials (add the amounts in column 2)					4 8053.46

5-6. NON-EXEMPT MATERIALS	QUANTITY	UNIT PRICE LABOR	UNIT PRICE MATERIALS	TOTAL COST LABOR	TOTAL COST MATERIALS
Install 1-inch copper service line per AWC Dtl E-9-9-1	1	755.04	741.57	755.04	741.57
Install 2-inch copper service line per AWC Dtl E-9-10-2	1	920.04	1661.31	920.04	1661.31
Install air relief valve	1	755.04	1430.60	755.04	1430.60
7. Total Labor to Install Non-Exempt Materials (add the amounts in column 5)				7 2430.12	
8. Total Non-Exempt Materials (add the amounts in column 6)					8 3933.48
9. Subtotal A (add lines 3, 7 and 8)					9 32388.26
10. Contracting Tax Base (multiply the amount on line 9 by 0.65)				10 21052.37	
11. Applicable Contracting Tax Rate				11 9.8%	
12. Contracting Tax (multiply the amount on line 10 by line 11)					12 2063.13
13. Subtotal B (add lines 4, 9 and 12)					13 42504.87
14. 100% Performance and Payment Bonds Cost					14 400.00
15. Estimated Total Cost (add lines 13 and 14)					15 42964.87

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. Mike Mills
Ellison-Mills Contracting, Inc.
3152 N. Lear Avenue, Suite 2
Casa Grande, AZ 85122

DATE: 12/11/14
DIVISION: CASA GRANDE
SYSTEM: WHITE TANK
W.A.: 1-5263

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

DESCRIPTION OF WORK:

Install approximately 230 LF of 6-inch DIP, and one air relief valve in an existing 8 foot wide easement located south of I-10 west of Citrus to serve U-Haul.

PERFORMANCE AND PAYMENT BONDS REQUIRED: [X] Yes [ ] No

TOTAL DAYS ALLOWED: 70

COMPLETION DATE: 2/19/2015

Prior to the start of construction, please call Ray Murrieta, Division Manager at 520-836-8785 to schedule a pre-construction meeting.

Prior to the pre-construction meeting, the Contractor must provide proof of insurance of no less than the minimum amounts provided in paragraph 5 of the Company's General Conditions of Contract. Failure to provide acceptable proof of insurance does not limit the Company's ability to terminate the Proposal/Contract or seek restitution for damages that the Company may have or will incur

ARIZONA WATER COMPANY	***ELLISON-MILLS CONTRACTING, INC***
Company	Contractor *(type name)*
By [signature]	By
Title Vice President - Engineering	Title

AFH

AFH

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;
2012 GENERAL CONDITIONS OF CONTRACT

12-9-14

A copy of this entire Spec Book was sent out with Ellison Mills Proposal package for 1-5263 U-Haul Center on 12/11/14

ARIZONA WATER COMPANY

CONTRACT CHANGE ORDER

CONTRACTOR: Ellison Mills Contracting LLC 3152 N. Lear Ave. Ste 2 Casa Grande, AZ 85122	DATE: December 9, 2014	CONTRACT DATE: December 9, 2014
	W.A. NO.: 1-5263	CHANGE ORDER NO.: 1
DESCRIPTION OF WORK: The 2-inch service and 1-inch service are removed from the contract.	APPLICABLE C. O. COST: $ -4,077.96	
	ORIGINAL CONTRACT AMOUNT: $ 42,904.81	
	SUM OF ALL CHANGE ORDERS TO DATE: $ -4,077.96	
REASON FOR ADDITIONAL WORK: The 2-inch service and 1-inch service are not necessary at this time.	APPROVAL LEVEL REQ'D: (CIRCLE ALL THAT APPLY) (BASED ON SUM) Mgr & Eng: Up to $10,000 or 10% whichever is less VP Eng: Up to $100,000 or 20% whichever is less VP Tres & Pres: greater than $100,000 or 20%	

BASIS OF PAYMENT:

- [X] In accordance with rates contained in Contractor's Proposal/Contract dated: December 9, 2014
- [ ] In accordance with material prices, labor and equipment rates shown on Proposal dated:
- [ ] Lump Sum Price (including taxes) of: (Include supporting documentation) $
- [ ] Other:

Contractor is hereby authorized to proceed with the work as described above. The Company will pay for the above-described work as indicated above.

Contractor agrees, as an independent contractor, to perform the above-described work in accordance with the Company's *General Conditions of Contract, and the Company's Construction Specifications* and *Standard Specification Drawings* ("General Conditions of Contract") and related construction drawings which, were provided with the original Proposal/Contract and supplemented herein, and agrees that all provisions of said General Conditions of Contract dated as of April 2004, including any subsequent amendments thereto, and related construction drawings, apply to work covered under this Contract Change Order.

Work Authorization Approval for additional funds required YES (NO) (circle one) If yes, attach applicable form & proof of payment for outside funded work.

Division Superintendent/Manager

Project Engineer/Project Manager

AWC Vice President – Engineering

CHANGE ORDER AUTHORIZATION OVER $100,000 OR 20% OF THE CONTRACT NOT VALID WITHOUT SIGNATURES BELOW

AWC Vice President and Treasurer

AWC President

ELLISON MILLS CONTRACTING LLC
Contractor: (Name)

By: _____
Contractor's Representative Signature

Name: Mik Mills
(Printed)

It's: Owner
(Title or Position)

Date Work Started

Date Work Completed

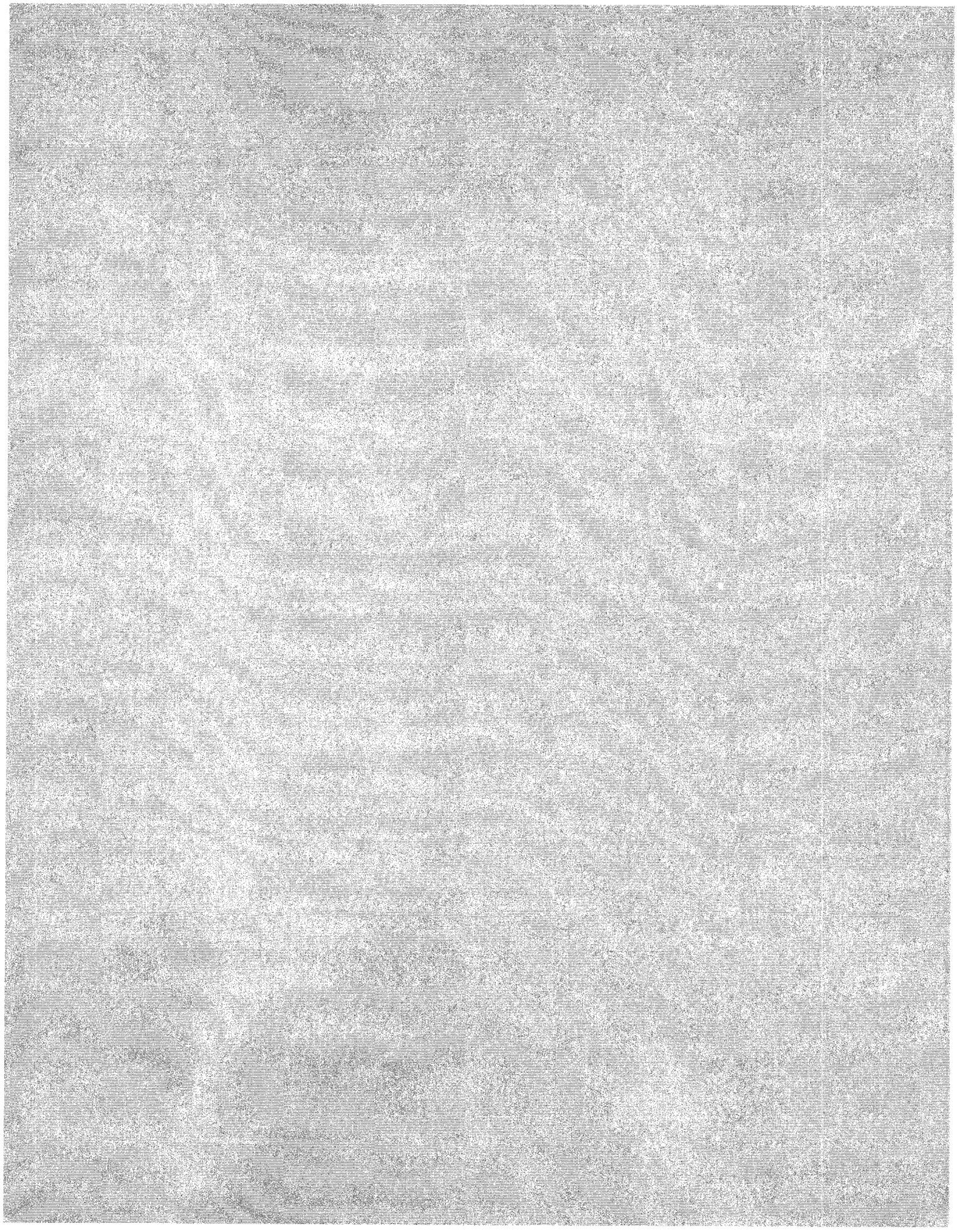
CONTRACTOR'S INVOICE APPROVED BY:

Company's Representative Overseeing the Work (signature)

DISTRIBUTION:
Original to Person Authorizing Work and, when completed, to Accounting Dept. with approved invoice for the work with supporting documentation. Copy to Contractor. Copy to Project Engineer.

Labor and Material Releases Required: ☐ Yes ☐ No
Releases Received and Approved By:

Company's Authorized Signature



CITY OF GOODYEAR, ARIZONA
14455 W VAN BUREN ST. STE D101
GOODYEAR, ARIZONA 85338

ALL PERMITS AND APPROVED PLANS MUST BE KEPT ON SITE

Permit Number . . . . . 13- 960 Date 1/08/15
Application pin number . . . 003840
Property Address . . . . . 1 CITY OF GOODYEAR ROW
Parcel Number: ROW-00-001 /
Tenant nbr, name . . . . . U HAUL
Application type description ENG: COMMERICAL PROJECTS

Application desc
CITY INSPECTOR: ROB GODWIN 623-693-2457

Owner
AMERCO
2727 NORTH CENTRAL AVE
PHOENIX AZ 85004

Contractor 266946 B1
SEA CON LLC
165 NE JUNIPER ST #100
ISSAQUAH WA 98027
(602) 263-6502

Permit . . . . . WATER-PRIVATELY MAINTAINED
Additional desc . . 2013-0960-C4
Phone Access Code . 1014901
Permit Fee . . . . 230.00 Plan Check Fee . . .00
Issue Date . . . . 1/08/15 Valuation 0
Expiration Date . . 7/07/15

Qty	Unit Charge	Per		Extension
			BASE FEE	193.10
30.00	1.2000	LF	C:WATERLINES	36.00
30.00	.0300	LF	C:WTR LN LK DTCTN(ACP,DIP,CIP)	.90

Special Notes and Comments
*PERMIT & APPROVED PLANS to be onsite at all times. CALL LISTED INSPECTOR 24 HOURS BEFORE CONSTRUCTION BEGINS TO SCHEDULE A PRE-CONSTRUCTION MEETING AND IS REQUIRED TO BE ARRANGED BY THE PERMITEE WITH THE CONTRACTOR TO PERFORM THE WORK IN ATTENDANCE AND THE CITY INSPECTOR, ALONG WITH VALID AND COMPLETE BLUE STAKE MARKINGS DOWN PRIOR TO ANY LAND DISTURBANCE ACTIVITIES.
**ALL PERMITS SHALL BE RENEWED AS NECESSARY AND ARE TO REMAIN ACTIVE UNTIL SITE CONSTRUCTION IS ACCEPTED BY THE CITY OF GOODYEAR.
==========
PLAN AMENDED AND APPROVED
*NO DRIVING OR STAGING WORK ON SIDEWALKS without prior authorization by city inspector. A barricade permit is required to close any sidewalk for any length of time.

PLEASE SEE CONSTRUCTION INSPECTOR CONTACT INFORMATION LISTED ABOVE

CITY OF GOODYEAR, ARIZONA
14455 W VAN BUREN ST. STE D101
GOODYEAR, ARIZONA 85338

ALL PERMITS AND APPROVED PLANS MUST BE KEPT ON SITE

Permit Number . . . . . 13- 960 Date 1/08/15
Application pin number . . . 003840

Special Notes and Comments
*All damaged property within and adjacent to the limits of work shall be agreed upon in the pre-construction meeting and marked by the city inspector prior to any land disturbance. Any damage caused by the contractor will be removed and replaced at the request of the city within 72 hours by the contractor at the contractor's expense. The permit holder will be required to provide the city inspector a construction schedule for completion of repairs.
*ANY change to the approved plan REQUIRES a re-submittal with the approved plan for reference.
*ALL ABOVE GROUND electrical transformers, pedestals and utility boxes shall not encroach into city right-of-way and/or city sidewalk area. All concrete pads for the above shall have a designed elevation not to exceed the curb grade on plans. Developers and utility companies will be responsible for any relocation out of right-of-way and or city sidewalk area if there are conflicts with city improvements.
**ALL conduit stub UPS will be terminated in a box with a lid, 1-inch above curb.
* RESTORE landscaping to original state.
*CALL for final inspection when job is complete to close out permit.
*TRAFFIC CONTROL permit required. A uniformed City of Goodyear police officer will be required for any work completed within 300 feet of a signalized intersection.
* A PRE-CONSTRUCTION MEETING SHALL BE HELD PRIOR TO SET-UP. PLEASE CONTACT(INSPECTOR NAME & #)

ASSOCIATED PERMIT NO. 13-960

DURATION: 9-17-14 THRU 9-22-14

DESCRIPTION OF WORK: NORTHBOUND N. CITRUS RD. CURB LANE CURB LAND WILL BE CLOSED NORTH AND SOUTH OF W. ROOSEVELT ST., FLAGGERS WILL MANAGE TRAFFIC.

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1. All set ups shall be maintained daily.
2. For long and intermediate term set-ups, all pavement marking no longer applicable shall be removed or obliterated as soon as practical.
3. When not in use, all traffic control devices shall be removed and stored in a safe manner and not to obstruct motorist or pedestrians.
4. When not in use, all traffic control devices shall be

PLEASE SEE CONSTRUCTION INSPECTOR CONTACT INFORMATION LISTED ABOVE

CITY OF GOODYEAR, ARIZONA
14455 W VAN BUREN ST. STE D101
GOODYEAR, ARIZONA 85338

ALL PERMITS AND APPROVED PLANS MUST BE KEPT ON SITE

Permit Number . . . . . 13- 960 Date 1/08/15
Application pin number . . . 003840

Special Notes and Comments
placed behind sidewalk or behind edge of pavement.
5. Any damaged devices shall be replaced in within a timely manner.
6. Any device moved from its approved location must be immediately reset to its approved location depicted on the traffic control plan.
7. Upon takedown;all devices shall be picked up within 24 hours.
8. Failure to comply with ANY requirements specified on this permit may result in fines and or work suspension as deemed necessary by the inspector.
==========
**CONTACT CITY OF GOODYEAR CONSTRUCTION INSPECTOR@ THE NUMBER LISTED ABOVE AT LEAST 48 HOURS IN ADVANCE OF BARRICADE
PLACEMENT AND 24 HOURS PRIOR TO BARRICADE REMOVAL**
==========
A uniformed City of Goodyear police officer will be required for any work completed within 300 feet of a signalized intersection. Contact Santiago Rodriguez at 623-693-0086 or Tizok Duque, Police Officer at 623-670-1771.
==========
*TRAFFIC CONTROL permit required. When within 300' of a signalized intersection, an off duty City of Goodyear uniformed police officer will be required on site.

Other Fees . . . . . ENG-ENGINEERING PLAN CHCK 5580.00

Fee summary	Charged	Paid	Credited	Due
Permit Fee Total	230.00	230.00	.00	.00
Plan Check Total	.00	.00	.00	.00
Other Fee Total	5580.00	5580.00	.00	.00
Grand Total	5810.00	5810.00	.00	.00

PLEASE SEE CONSTRUCTION INSPECTOR CONTACT INFORMATION LISTED ABOVE

Recording Requested By:
ARIZONA WATER COMPANY

When Recorded, Mail To:
Arizona Water Company
P.O. Box 29006
Phoenix, Arizona 85038-9006

OFFICIAL RECORDS OF
MARICOPA COUNTY RECORDER
HELEN PURCELL
2014-0847250 12/24/14 09:38 AM
PAPER RECORDING

0981275-3-1-1
henrya

WT-2524

ABOVE SPACE RESERVED FOR COUNTY RECORDER

GRANT OF EASEMENT

AMERCO REAL ESTATE COMPANY, a Nevada corporation (hereinafter referred to as "GRANTOR"), for valuable consideration, receipt of which is hereby acknowledged, grants to ARIZONA WATER COMPANY, an Arizona corporation, its successors and assigns (hereinafter referred to as "GRANTEE"), a perpetual easement, which runs with the land on that certain real property in the County of Maricopa, State of Arizona, said easement being more particularly described as follows (the "Easement"):

The East Eight (8) feet of Lots 32 and 33, MARWEST ESTATES (151-26), a subdivision in the Northeast quarter (NE¼) of Section 3, Township 1 North, Range 2 West, G&SRB&M, Maricopa County, Arizona.

GRANTEE, its agents, and its employees shall have the right and privilege forever to use the Easement for all public water utility purposes, including but not limited to: the right to excavate for, install, operate, maintain, replace, and remove any facilities, equipment, and appurtenances related to GRANTEE'S public water utility business; conveying water for domestic use, fire protection, and irrigation; ingress and egress at any time without prior notice; and discharge of water.

GRANTOR shall clear and keep clear the Easement of any structures, plants, or trees which directly or indirectly interfere with GRANTEE'S rights and privileges, facilities, equipment, and appurtenances. GRANTOR may not construct or place any structure, plant, or tree on or over the Easement; or enclosing the Easement; or which directly or indirectly interferes with GRANTEE'S rights and privileges without obtaining GRANTEE'S prior written consent; paying to GRANTEE all costs of relocating GRANTEE'S facilities, equipment, and appurtenances; and providing at GRANTOR'S cost an alternative easement satisfactory to GRANTEE.

GRANTEE shall have the right to remove and keep removed at the expense of GRANTOR all or parts of any structure, plant, or tree on or over or enclosing this Easement or any of GRANTEE'S facilities, equipment, and appurtenances; all or parts of any structure, plant, or tree which, while not on or over or enclosing this Easement, in any way endangers or interferes with or may endanger or interfere with GRANTEE'S rights and privileges, GRANTEE'S public water utility service, and GRANTEE'S facilities, equipment, and appurtenances; or which violates local, state, or federal laws and regulations, Arizona Corporation Commission rules, or GRANTEE'S tariffs.

Notwithstanding the foregoing, GRANTOR may install a paved driveway over the easement to allow access from 179th Avenue to the real property identified herein; provided however, if GRANTEE installs, maintains, repairs, replaces, or removes any facilities, equipment, and appurtenances in the easement after GRANTOR installs a paved driveway over the easement, GRANTOR will at its own expense remove, repair, and replace as needed those portions of the driveway that conflict with GRANTEE's installation, maintenance, repair, replacement, or removal of facilities, equipment, and appurtenances in the easement. GRANTOR will also at all times maintain at least 36 inches of cover in place over GRANTEE's facilities, equipment, and appurtenances located in the easement, not including the depth of any paved driveway GRANTOR installs over the easement.

GRANTOR and GRANTEE further agree that this easement does not merge with, extinguish, cause GRANTEE to abandon, or affect in any way those certain easements dated May 1, 1973 and May 4, 1973, both recorded on the books of the Maricopa County Recorder in Docket 10209, Page 924 and Docket 10209, Page 928.

GRANTEE will use reasonable care in the exercise of this easement to avoid damage to GRANTOR'S property.

The individual signing this Grant of Easement warrant that he/she has read this Grant of Easement, has the authority to execute this Grant of Easement, and will furnish such evidence reasonably necessary to validate such authority upon request.

EXECUTED this 10 day of December, year of 2014.

Amerco Real Estate Company, a Nevada corporation

By: Carlos Vizcarra

Its: President

STATE OF Arizona)
) ss
COUNTY OF Maricopa)

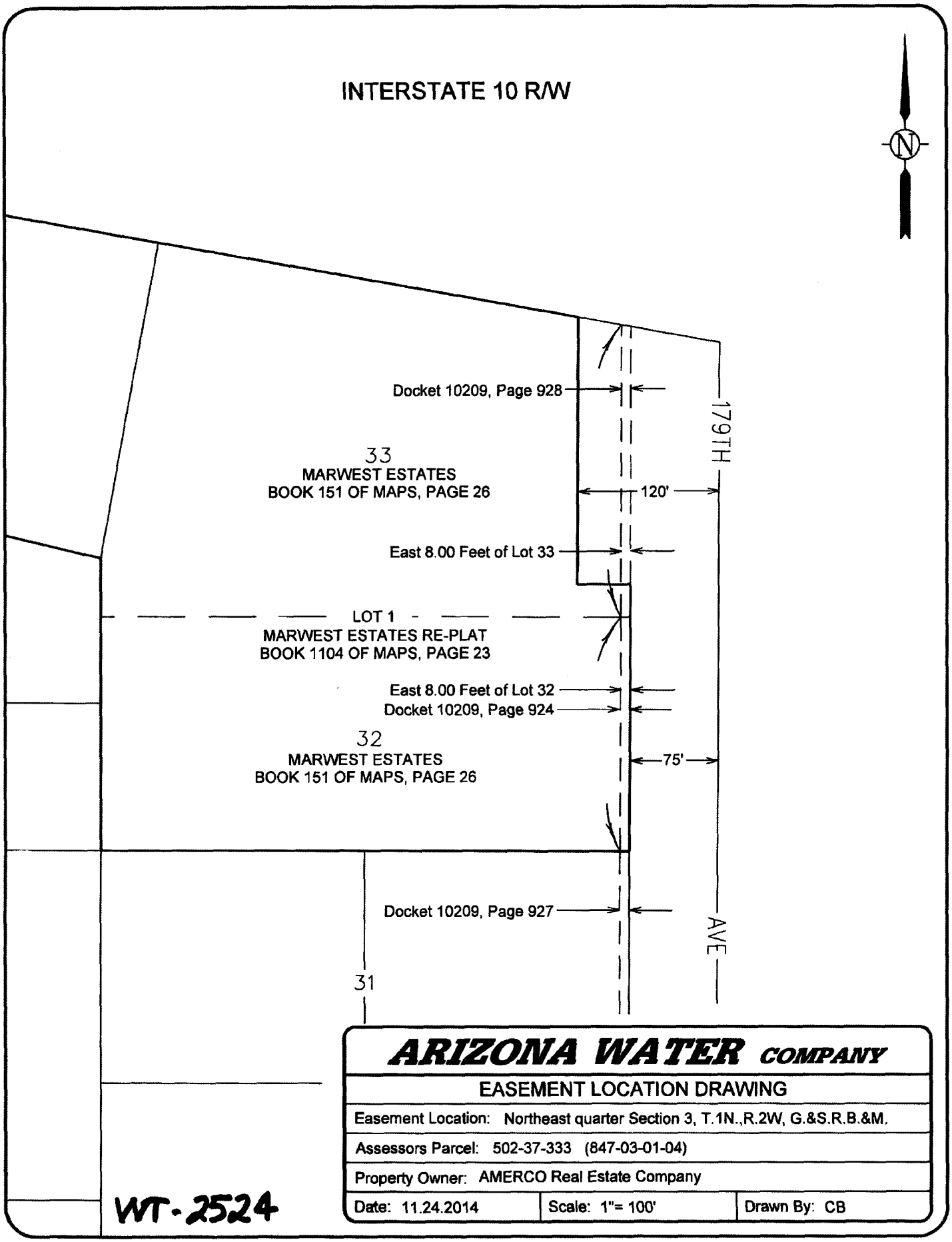
This foregoing instrument was acknowledged before me this 10 day of December in the year 2014 by Carlos Vizcarra its President of the Amerco Real Estate Company, a Nevada corporation, on behalf of the corporation.

My Commission Expires: 6/23/15

Misty Farrow
Misty Dorman Notary Public

Notary Public State of Arizona
Maricopa County
Misty Dorman
My Commission Expires 06/23/2015

WT-2524



ARIZONA WATER COMPANY

EASEMENT LOCATION DRAWING

Easement Location: Northeast quarter Section 3, T.1N.,R.2W, G.&S.R.B.&M.		
Assessors Parcel: 502-37-333 (847-03-01-04)		
Property Owner: AMERCO Real Estate Company		
Date: 11.24.2014	Scale: 1"= 100'	Drawn By: CB

WT-2524

AGREEMENT FOR GENERAL ENGINEERING SERVICES BETWEEN ARIZONA WATER COMPANY AND BLACK MOUNTAIN SURVEYING

TASK ORDER AUTHORIZATION

Black Mountain Surveying Project Number 15009

AWC Project Number Surveying Services for U-Haul Site on Citrus Road in Goodyear, AZ.

Arizona Water Company
P.O. Box 29006
Phoenix, Arizona 85038-9006

Effective Date of Authorization January 15, 2015

Upon execution of this Task Order, and effective as of the date shown above, the parties agree that Black Mountain Surveying shall perform the following services:

SCOPE OF SERVICES

As per the attached "Scope of Services" per the attached "Exhibit A". **NOTE: Authorization to commence will be given verbally by Division Manager (Ray Murrieta or in his absence, Roy Freeman, Operations Superintendant).**

COMPENSATION

As per the attached "Land Survey Proposal" Exhibits "A" and "B" dated January 15, 2015

GENERAL TERMS AND CONDITIONS

Surveying's services shall be governed by the Master Agreement dated January 25, 2011 together with this Task Order and any Exhibits attached hereto.

The services performed within this Task Order shall commence on or about January 16, 2015, and shall be complete on or before January 31, 2015

Black Mountain Surveying's Representative in charge of the services is Dale Mattingly, who may be contacted at 623-266-0402 and dale@blackmountainsurveying.com. Client's Representative in charge of the services is Charles Briggs, who may be contacted at 602-240-6860 and cbriggs@azwater.com.

ARIZONA WATER COMPANY 1-5263	**BLACK MOUNTAIN SURVEYING**
By [signature]	By [signature]
Title REAL PROPERTY SPECIALIST	Title Owner/Operator
Date JANUARY 15, 2015	Date 1/19/15

BLACK MOUNTAIN SURVEYING
Surveying Arizona For 30 Years.

17308 West Woodrow Lane. Surprise Az. 85388-7784 Phone: 623-266-0402 Fax: 623-266-0402
E-mail: dale@blackmountainsurveying.com www.blackmountainsurveying.com

Land Survey Proposal

January 15, 2015

Charles Briggs
Real property Specialist
Arizona Water Company
PO Box 29006
Phoenix, Az. 85038

Dear Charles,

Black Mountain Surveying is pleased to present you with this proposal for land surveying services requested on the following Project:

"U-Haul Site on Citrus Road" located near Goodyear, AZ.

It is understood that the client listed above wishes to have certain land surveying construction staking services performed on the above referenced project. It is also understood that cost is of concern with this project. All the efforts listed on the attached "Exhibit A" may not be required therefor items which are required as listed will be billed based on the hourly amounts shown on the attached "Exhibit B" fee schedule. Black Mountain Surveying total hourly amount to be billed for surveying and drafting services on this project as outlined on the attached "Exhibit A" shall not exceed $2,000.00

Sincerely,

Dale A. Mattingly R.L.S.
Senior in charge

CB
01-15-2015

"Exhibit A"

Scope of Services

Staking services for UHaul Site on Citrus Road Water Main Replacement, located in Goodyear, AZ.

The purpose of this scope is to outline the survey staking services requested on the above referenced project;

- (1st trip) Provide staking services to locate the following new water main features, tees, watervalves, tie-in locations, tap for water service location, dip location and elevation and air releaf valves. These items will be staked on a 10' offset toward the street per the contractors request.
- (2nd trip) Perform horizontal and vertical as-built measurement for the new water main and dip prior to back fill. **The contractor must notifiy the surveyor prior to back filling so the appropriate measurements can be obtained. The city is going to want to see an as-built elevation of the main everywhere the engineer has provided a grade.**
- (3rd trip) Perform final as-built measurement for the surface features of the new water main replacement.
- Provide the office effort required to produce a 24x36 inch copy of the final "watermain" as-builts for city submital. As-built information will include, stationing, offsets and elevation.
- Provide office effort to adress 2 rounds of city comments. (It is presummed that Arizona Water Company will be providing the city submittal effort.)

A 48 hours notice is required for all staking request. All staking is one time.

CB
01-15-2015

BLACK MOUNTAIN SURVEYING
Surveying Arizona For 30 Years.

17308 West Woodrow Lane. Surprise Az. 85388-7784 Phone: 623-266-0402 Fax: 623-266-0402

E-mail: dale@blackmountainsurveying.com www.blackmountainsurveying.com

"EXHIBIT B"

2015 RATE SCHEDULE
EFFECTIVE January 1st, 2015 – December 31st, 2015

	HOURLY RATE
• **PRINCIPLE**	$125.00
• **REGISTERED LAND SURVEYOR**	$110.00
• **1 MAN GPS FIELD CREW**	$80.00
• **2 MAN CONVENTIONAL SURVEY FIELD CREW**	$100.00
• **DRAFT TECHNICIAN**	$80.00

REIMBURSABLES FOR PRINTING AND DELIVERIES WILL BE BILLED AT COST.

CB
01-15-2015

ADEQ Arizona Department of Environmental Quality

ENGINEERING REVIEW SECTION
DATA REQUIRED WITH ECC

Please complete the test data and submit this form with the Engineers Certificate of Completion. An Approval of Construction cannot be issued without the data identified below in accordance with Arizona Administrative Code (A.A.C.) R18-5-508(C). Please attach all supplemental information and calculations to this form.

DATA

1.

PRESSURE TEST DATA

Indicate Segment Tested	Poe Main			
Pressure and Leakage Test Results (Pass/Fail)	PASS			
Date Tested	1-27-15			
Time Started	12:00 pm			
Time Finished	2:00 pm			
Pipe Diameter	6"			
Footage Tested	233'			
Allowable Leakage	.3			
Leakage Observed	.1			
Pressure at Test Point	195			
Employee Observing the Test (Please Print Legibly)	Robert Reason			
Signature of Employee Observing the Test				

2.

Initial Sampling (Minimum 50 ppm available chlorine)	Date	1-27-15			
	Time	10:30 am			
	ppm Cl_2	100			
After 24 Hours Detention Time (Minimum 10 ppm free chlorine)	Date	1-28-15			
	Time	10:30 am			
	ppm Cl_2	50			
After Sufficient Flushing (Water is clear and system Cl_2 residual is measured)	Date	1-28-15			
	Time	11 am			
	ppm Cl_2	155			
Bacteriological Sampling(s):	Date	1-28-15			
	Time	11 am			
	Attached (Y/N)	Yes			
		Yes/No	Yes/No	Yes/No	Yes/No

3.

CERTIFICATION

I, Robert Reason, certify that I have inspected the work performed and have found it to be satisfactory and in accordance with Arizona Administrative Code, Arizona Engineering Bulletins, and the approved specifications.

Robert Reason 1-30-15

Authorized Persons Signature Date

Professional Seal
As per A.A.C. R18-5-507(B)(1)

http://www.azdeq.gov/environ/water/dw/download/data.pdf
1110 WEST WASHINGTON, PHOENIX, AZ 85007
HTTP://WWW.AZDEQ.GOV/ENGINEERINGREVIEW/ P:\Engineering\ADEQ Construction Completion

LEGEND
Technical Services, Inc.
www.legend-group.com

17631 N. 25th Avenue • Phoenix, AZ 85023
P (602) 324-6100 • F (602) 324-6101

Ray Murrieta
Arizona Water Company - White Tanks 07-128
220 E. 2nd Street
Casa Grande, AZ85222

Project: As, Fe, Mn Rush Rush Rush
Project Number: 07128

Reported:
01/30/15 10:05

Analyte

DRAFT: U-Haul (5012229-01) Drinking Water (Grab) Sampled: 01/28/15 11:00 Received: 01/28/15 12:24

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Legend Technical Services of Arizona, Inc.									
DRAFT: Microbiology									
E. coli	Absent		P/A	1	B5A0755	01/28/15 17:00	01/28/15 17:00	SM 9223B	
Total Coliforms	Absent		P/A	1	B5A0755	01/28/15 17:00	01/28/15 17:00	SM 9223B	

Sample Condition Upon Receipt:

Temperature: 2.20 C
All samples were received in acceptable condition unless noted otherwise in the case narrative.

Case Narrative:

Holding Times: All holding times were met unless otherwise qualified.
QA/QC Criteria: All analyses met method requirements unless otherwise qualified.
Accreditations: AZ(PHX)0004, AZ(TUC)OOO4, AIHA#102982, CDC ELITE Member.
Accreditation is applicable only to the test methods specified on each scope of accreditation held by LEGEND.
Comments: There were no problems encountered during the processing of the samples, unless otherwise noted.
All samples were analyzed on a "wet" basis unless designated as "dry weight".

Notified Regina of the absent results for Total Coliform on 01/29/15. BF
Emailed prelim results for Total Coliform to Regina and Kevin on 01/30/15. BF

Notes and Definitions

Ray Murrieta Arizona Water Company - White Tanks 07-128 220 E. 2nd Street Casa Grande, AZ85222	Project: As, Fe, Mn Rush Rush Rush Project Number: 07128	**Reported:** 01/30/15 10:05

LAB USE ONLY
5012229

CHAIN OF CUSTODY RECORD

LEGEND Technical Services, Inc.
www.legend-group.com

☐ 17631 N. 25th Avenue • Phoenix, AZ 85023 • (602) 324-6100 • Fax (602) 324-6101
☐ 4586 S. Palo Verde Rd, Ste 423 • Tucson, AZ 85714 • (520) 327-1234 • Fax (520) 327-0518

Page 1 of 1

Please Print Clearly

CLIENT INFORMATION

Client Name	Address	City	State	Zip	Phone	Fax or Email
Arizona Water Co	PO Box 11030	CASA Grande	AZ	85021	520 836 8785	520 836 2980

System Name	PWS#	Contact	P.O. No.	
Old White Tanks	07-128	Ray Murrieta		Fax Results ☒ QC Report ☐ EDD ☐ Email Results ☐ Special Detection Limits ☐

IOC OPTIONS

IOCs I: Sb, As, Ba, Cd, Cr, Hg, Ni, Se, Tl, CN, F
IOC's II (New Source): Sb, As, Ba, Be, Ca, Cd, Cr, Cu, Pb, Hg, Mg, Ni, Se, Na, Tl, Ca Hardness, Total Hardness, Alk, Asbestos, CN, F, Langelier, NO_3, NO_2, pH, SO_4, TDS, Temp (in field)

REQUESTED ANALYSES

Client's Sample Identification	Date	Time	POE # / DWR #	Compliance	No. of Containers	pH ✓ (Legend Use)	Asbestos	IOCs (see left)	IOCs II (see left)	Lead & Copper	Nitrate, Nitrite	Radiochemicals	524 (TTHM)	552 (HAA)	524 (VOCs)	SOCs 504	505	515	525	531	547	548	549	1613 (Dioxin)	Perchlorate	Bromate	Chlorite	AS	LAB NO.
U-Haul	1-28	11am			1		X																					01
2,4 + 8	1-27	9:10	Influent		1	✓																					X	02
2,4 + 8	1-27	9:15	Effluent		1	✓																					X	03

RUSH
AS-24HR

TO ENSURE COMPLETION OF ANALYSIS, SAMPLES MUST BE RECEIVED AT LEAST 6 HOURS PRIOR TO THE HOLD TIME EXPIRATION

Comments: Special Samples Not for Reporting to ADEQ

TURN AROUND TIME
☐ Standard 15 - 20 day
☐ Other: RUSH
Laboratory Authorization Required for Rush

☐ Yes, I have followed the instructions provided by the laboratory for dechlorination of my samples.

SAMPLE CONDITION UPON RECEIPT

No. of Containers	3
Temperature	2.2°C
Custody Seals	Y (N)
Seals Intact	Y N
Preserved	(Y) N

White- Lab Yellow- Client
FORM GEN-173 (8/08)

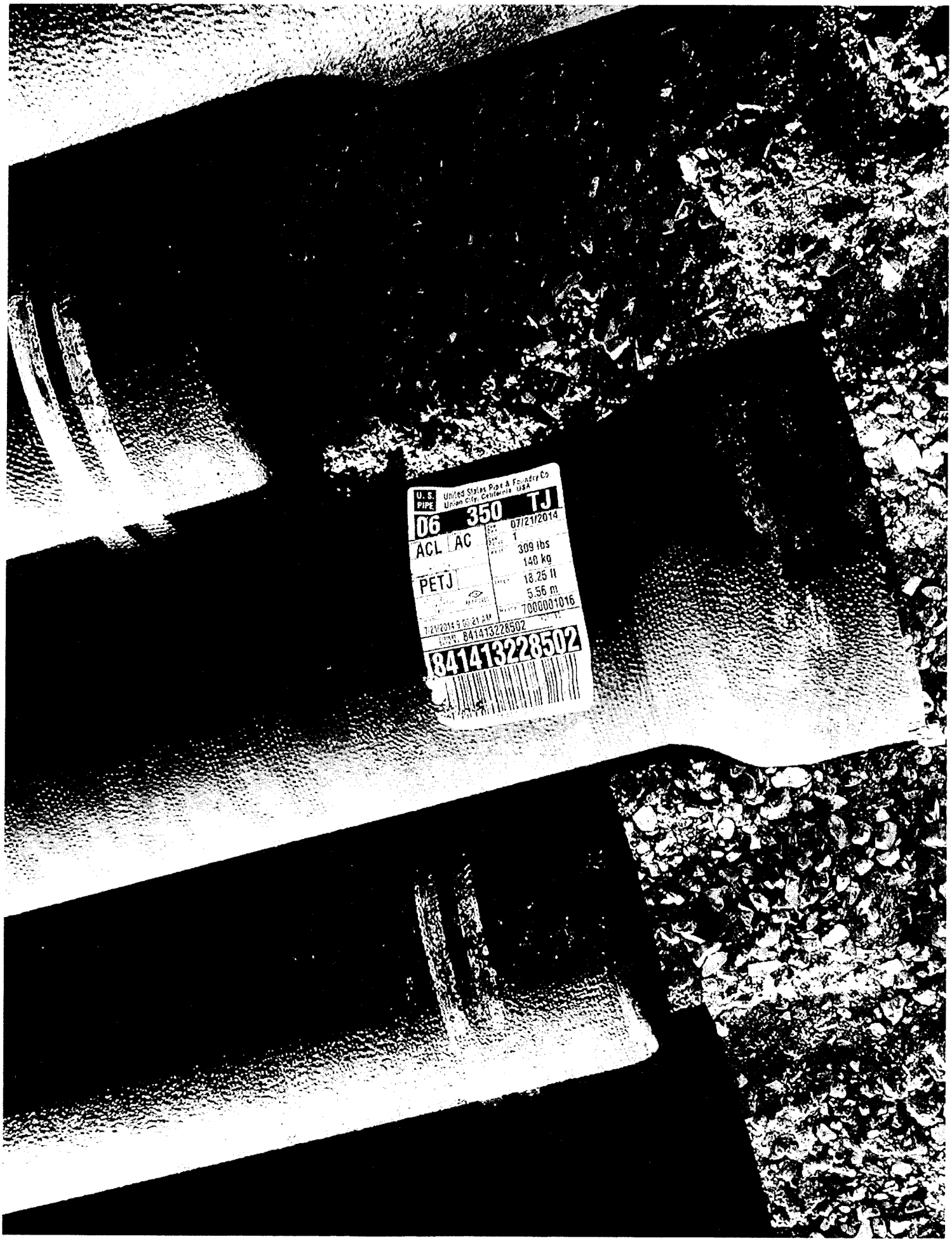
RELINQUISHED BY

① Sampler Signature		Date 1-29-15	Signature
Sampler Printed Name	R Murrieta	Time 9224	Printed Name
② Sampler Signature		Date	Signature
Sampler Printed Name		Time	Printed Name
③ Sampler Signature		Date	Signature
Sampler Printed Name		Time	Printed Name

SAMPLES RECEIVED BY

Signature	Howard Howard	Date 1/29/15 Time 9224
Signature		Date Time
Signature		Date Time

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.


U.S. PIPE
United States Pipe & Foundry Co
Union City, California USA
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07/21/2014
ACL AC
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140 kg
PETJ
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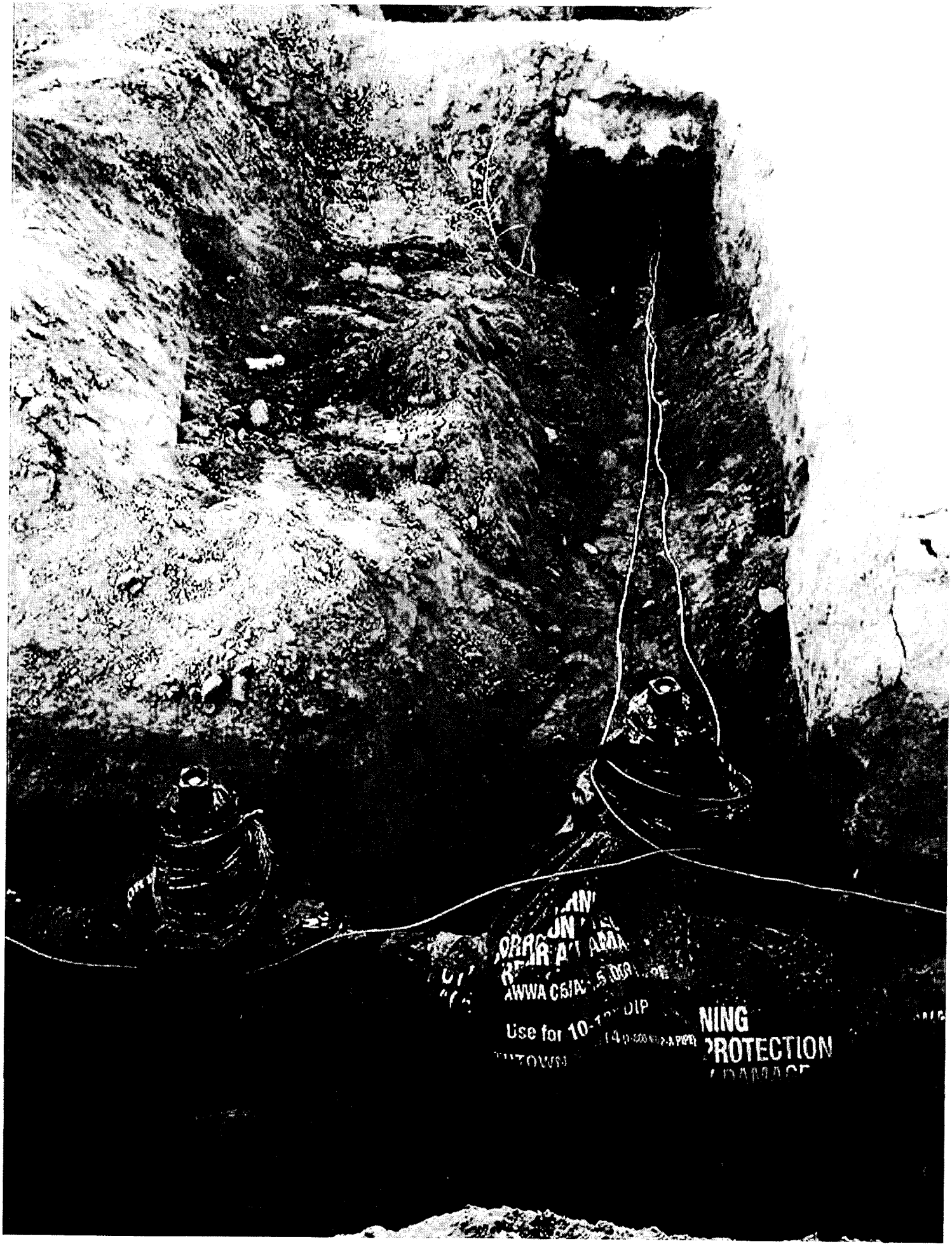
841413228502


AWWA C6
Use for 10-
NING
ROTECTION

WA 1-5309

Western Group Rate Case

Exhibit FKS-1

5309 Blue Horizon Chem Injec

ARIZONA WATER COMPANY
WORK AUTHORIZATION

W.A. NUMBER: 1-5309
P.E. NUMBER:
BUDGET ITEM NO.: 1-5309
SHEET NO.: 1 of 2

SYSTEM:	WHITE TANK	RETENTION REQUIRED:	☑ YES ☐ NO
DIVISION:	CASA GRANDE	WORK TO START BY:	UPON AUTHORIZATION
RESPONSIBLE PERSON:	JOHN KNOBBE	WORK TO BE FINISHED BY:	WITHIN 90 DAYS
TAX CODE:	2590		

DESCRIPTION OF WORK:

Replace 16-inch ductile iron fittings and butterfly valves at the chemical injection point of the Blue Horizon Arsenic Removal Facility (ARF). Company engineers will inspect the condition of the fittings and valves and replace as necessary.

FACTORS JUSTIFYING WORK:

APPROVED 2015 BUDGET ITEM ($35,000)
The chemical injection equipment at the Blue Horizon ARF is corroded due to the injected chemicals. These chemicals caused damage to the interior coating of the piping on the chemical injection portion of the ARF. This piping is critical to the ARF operation and requires replacement. To mitigate future damage to the chemical injection equipment, Company Engineers determined the concrete lined fittings must be replaced with ceramic epoxy lined fittings and the standard epoxy lined valves must be replaced with modified polyamine epoxy lined valves. This site produces 50% of the water supply for the White Tank water system and is critical for the Company to provide safe and reliable water supply to the White Tank water system.

COST ESTIMATE		AUTHORIZATION	DATE
COST OF WORK:		PREPARED BY: John Knobbe 3-20-15	3-13-2015
MATERIAL	19,500		
LABOR	6,580	REVIEWED FOR ESMT/ROW VERIFICATION: Charles Briggs CB 03-24-2015	03-13-2015
CONTRACT PORTION	19,376		
OVERHEAD	5,500	REVIEWED BY: Mario Mendez MM 3/24/15	3/16/15
TOTAL AUTHORIZED EXPENDITURES CHARGEABLE TO THIS W.A.	$ 50,956		
FUNDS RECEIVED:		APPROVED BY ENGINEERING: Fredrick Schneider 3-25-15	3-18-2015
CONTRIBUTIONS RECEIVED	0		
REFUNDABLE ADVANCES RECEIVED	0	APPROVED BY FINANCE: Joseph Harris	3/20/15
TOTAL CONTRIBUTIONS/ADVANCES	0		
NET COMPANY CASH REQUIRED	$ 50,956	AUTHORIZED BY PRESIDENT: William M Garfield	3-20-2015

COMMENTS:

Transfer additional funds required ($15,956) from WA 1-5308 (Camelback Rd. water main).

CONSTRUCTION RELEASE:

RELEASED TO CONSTRUCTION
Authorized by FRED SCHNEIDER
Date 3/24/15

2015 BUDGET

AFH

ARIZONA WATER COMPANY

WORK AUTHORIZATION - DETAIL SHEET

W.A. NUMBER: 1-5309
P.E. NUMBER:
BUDGET ITEM NO.: 1-5309
SHEET NO.: 2 of 2

RETIREMENT PROPERTY UNITS	PLANT PROPERTY ACCOUNT	UNIT DESCRIPTION	QUANTITY	YEAR INSTALLED AND W.A. NUMBER
	332	16-inch DI fitting	8	2006
	332	16-inch butterfly valve	3	2006
	332	16x1 service saddle	2	2006

PROJECT DESCRIPTION:

Replace 16-inch ductile iron fittings and butterfly valves at the chemical injection point of the Blue Horizon Arsenic Removal Facility (ARF). Company engineers will inspect the condition of the fittings and valves and replace as necessary.

	DESCRIPTION	PLANT PROP ACCT	QUANTITY	UNIT COST	TOTAL
CONTRACT WORK	Dismantle and inspect 16-inch ductile iron fittings and valves	332	1	7,276.00	7,276
	Labor to replace 16-inch ductile iron fittings and valves	332	1	7,500.00	7,500
	Provide and coat exterior of 16-inch ductile iron fittings and valves	332	1	2,500.00	2,500
	Provide and install chemical injector support system	332	1	1,000.00	1,000
	Contracting Tax	332	1	800.00	800
	100% Performance and Payment Bonds	332	1	300.00	300
	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					$ 19,376
MATERIALS	16-inch butterfly valve	332	3	$ 2,500.00	$ 7,500
	16-inch ductile iron fittings	332	1	12,000.00	12,000
	SERVICE CONNECTIONS: DOUBLE-LONG	345			
	SERVICE CONNECTIONS: DOUBLE-SHORT	345			
	SERVICE CONNECTIONS: SINGLE-LONG	345			
	SERVICE CONNECTIONS: SINGLE-SHORT	345			
	METERS	346			
TOTAL MATERIALS					$ 19,500
LABOR	Engineering design and project management	332	80	$ 65.00	$ 5,200
	TESTING FEE	332	1	$ 500.00	500
	PERMIT FEE				
	SURVEY FEE				
	FIELD INSPECTION	332	16	55.00	880
	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					$ 6,580
SUBTOTAL - CONTRACT WORK, MATERIALS, AND LABOR					$ 45,456
OVERHEAD					5,500
TOTAL	REFUNDABLE PORTION ☐	NON-REFUNDABLE PORTION ☐		**COST ESTIMATE**	$ 50,956

AFH

ARIZONA WATER COMPANY

3805 N. BLACK CANYON HIGHWAY, PHOENIX, ARIZONA 85015-5351 • P.O. BOX 29006, PHOENIX, AZ 85038-9006
PHONE: (602) 240-6860 • FAX: (602) 240-6874 • TOLL FREE: (800) 533-6023 • www.azwater.com

April 1, 2015

Mr. Michael Young
Fann Environmental, LLC
6708 Corsair Avenue, Suite A
Prescott, AZ 86301

Re: Blue Horizon Chemical Injection Header

PROJECT: Chemical Injection Header	
SYSTEM: White Tank	
CONTRACT NO.:	
P.E. NO.:	W.A. NO.: 1-5309

Dear Mr. Young:

Enclosed is your copy of the Proposal/Contract for the above-referenced project, which has been accepted by Arizona Water Company (the "Company"). The project shall be constructed in accordance with the Company's *General Conditions of Contract, the Specifications and the Drawings* which were included with the Company's previously provided Proposal/Contract, copies of which are being provided again and attached herewith.

Also enclosed are two copies of the Commencement Notice for the above-referenced project. Please sign one of the copies and return it to my attention retaining the other for your records.

As provided in paragraph 4 of the Company's Proposal/Contract executed by the Company on April 6, 2015, Fann Environmental, LLC acknowledged that one hundred percent (100%) Performance and Payment Bonds are required and must be provided to the Company prior to the commencement of work. In addition, as provided in paragraph 44 of the Company's General Conditions of Contract, the 100% Performance and Payment Bonds must be provided within ten (10) calendar days of the date of the Commencement Notice. Failure to provide an acceptable 100% Performance and Payment Bond does not limit the Company's

ability to terminate the Proposal/Contract or seek restitution for damages that the Company may have or will incur.

Prior to the start of construction, please call Ray Murrieta, Division Manager at 520-836-8785 to schedule a pre-construction meeting. In addition, please provide the required Performance and Payment Bonds to the Company promptly so that the contracted work can be completed within the contract's timeline.

If you have any questions, please call me at this office.

Very truly yours,

John P. Knobbe
Lead Designer
engineering@azwater.com

afh
Enclosure

ARIZONA WATER COMPANY

Casa Grande - Pinal Valley
220 E. 2nd Street
Casa Grande, AZ 85122 PH: 520-836-8785

PROPOSAL/CONTRACT

CONTRACTOR: FANN ENVIRONMENTAL LLC	SYSTEM: White Tank
ADDRESS: 6708 CORSAIR AVENUE, SUITE A	W.A. No(s): 1-5309
CITY ST ZIP: PRESCOTT, AZ 86301	BID DUE DATE: March 24, 2015

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.

1. Contractor certifies that it has a complete copy of, and has read, understands 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.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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 Statues ("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. §42-5061 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.
7. 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 thereof. 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.
8. 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.
9. 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.
10. Contractor will not commence work on the Project until the Company gives Contractor a written Commencement Notice. Contractor will complete the Project within 30 calendar days after the Commencement Notice is issued.
11. 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.
12. 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:

Company will make one progress payment and a final payment.

CONTRACTOR	PROPOSAL/CONTRACT ACCEPTED:
FANN ENVIRONMENTAL LLC	ARIZONA WATER COMPANY
By:	By:
Print Name: Michael S. Fann	Print Name: Fredrick K. Schneider, PE
Title: President / Member	Title: Vice President - Engineering
Date: 3-24-15	Date: 4-6-2015

AFH

ARIZONA WATER COMPANY

Casa Grande - Pinal Valley
220 E. 2nd Street
Casa Grande, AZ 85122 PH: 520-836-8785

PROPOSAL/CONTRACT

CONTRACTOR: FANN ENVIRONMENTAL LLC	SYSTEM: White Tank
AZ CONTRACTOR LICENSE NO: CLASSIFICATION:	W.A No(s): 1-5309
ADDRESS: 6708 CORSAIR AVENUE, SUITE A	BID DUE DATE: March 24, 2015
CITY ST ZIP PRESCOTT, AZ 86301	BID BOND REQUIRED: √ Yes ☐ No

DESCRIPTION OF PROJECT: Replace existing 16-inch ductile iron fittings and valves on the chemical injection header at the Blue Horizons arsenic removal facility in Buckeye, Arizona. Construct in accordance with Arizona Water Company standard specifications and/or Drawing No. WT-0320

1-2. MATERIALS EXEMPT FROM CONTRACTING TAX (per Paragraph 6)	QUANTITY	UNIT PRICE LABOR	UNIT PRICE MATERIALS	TOTAL COST LABOR	TOTAL COST MATERIALS
Install Company provided16-inch ductile iron fittings and valves (Labor Only)	Lot	8252.10	0	8252.10	0
				1	2
3. Total Labor to Install Exempt Materials (add the amounts in column 1)				3 8252.10	
4. Total Exempt Materials (add the amounts in column 2)					4 0

5-6. NON-EXEMPT MATERIALS	QUANTITY	UNIT PRICE LABOR	UNIT PRICE MATERIALS	TOTAL COST LABOR	TOTAL COST MATERIALS
Provide and coat exterior of new 16-inch ductile iron fittings and valves	Lot	2600.-	450.-	2600.-	450.-
Provide and install new chemical injector support system	Lot	2400.-	667.-	2400.-	667.-
				5	6
7. Total Labor to Install Non-Exempt Materials (add the amounts in column 5)				7 5000.-	
8. Total Non-Exempt Materials (add the amounts in column 6)					8 1117.-
9. Subtotal A (add lines 3, 7 and 8)					9 14369.10
10. Contracting Tax Base (multiply the amount on line 9 by 0.65)				10 0	
11. Applicable Contracting Tax Rate				11 0	
12. Contracting Tax (multiply the amount on line 10 by line 11)					12 0
13. Subtotal B (add lines 4, 9 and 12)					13 14369.10
14. 100% Performance and Payment Bonds Cost					14 138.-
15. Estimated Total Cost (add lines 13 and 14)					15 14507.10

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. Michael Yound
Fann Environmental, LLC
6708 Corsair Avenue, Suite A
Prescott, AZ 86301

DATE: 4/7/15
DIVISION: CASA GRANDE
SYSTEM: WHITE TANK
W.A.: 1-5309

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

DESCRIPTION OF WORK:

Replace existing 16-inch ductile Iron fittings and valves on the chemical injection header at the Blue Horizons arsenic removal facility in Buckeye, Arizona. Construct in accordance with Arizona Water Company standard specifications and/or Drawing No. WT-0320.

PERFORMANCE AND PAYMENT BONDS REQUIRED: [X] Yes [ ] No

TOTAL DAYS ALLOWED: 40

COMPLETION DATE: 5/12/15

Prior to the start of construction, please call Ray Murrieta, Division Manager at 520-836-8785 to schedule a pre-construction meeting.

ARIZONA WATER COMPANY
Company

FANN ENVIRONMENTAL, LLC
Contractor *(type name)*

By _____
Title Vice President - Engineering

By _____
Title _____

AFH AJH

ARIZONA WATER COMPANY

SPECIFICATIONS

GENERAL CONDITIONS OF CONTRACT: E-4-1

CONSTRUCTION SPECIFICATIONS: E-8-1

STANDARD SPECIFICATION DRAWINGS: E-9-1

4-1-2015

2007 EDITION WITH **2010** REVISIONS;
2012 GENERAL CONDITIONS OF CONTRACT

A copy of this entire Spec Book was sent out with Farn Environmental proposal package for WA 1-5309 Blue Horizon Chemical Injection on 4/7/15 AW

LEGEND
Technical Services, Inc.
www.legend-group.com

17631 N. 25th Avenue • Phoenix, AZ 85023
P (602) 324-6100 • F (602) 324-6101

Ray Murrieta
Arizona Water Company - White Tanks 07-128
220 E. 2nd Street
Casa Grande, AZ85222

Project: Colilerts
Project Number: WT 07-128 4/27/15

Reported:
04/29/15 12:26

Analyte

DRAFT: 044-32501-5309 (5042369-01) Drinking Water (Grab) Sampled: 04/27/15 21:00 Received: 04/28/15 09:11

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Legend Technical Services of Arizona, Inc.									
DRAFT: Microbiology									
E. coli	Absent		P/A	1	B5D0831	04/28/15 15:35	04/28/15 15:35	SM 9223B	
Total Coliforms	Absent		P/A	1	B5D0831	04/28/15 15:35	04/28/15 15:35	SM 9223B	

Sample Condition Upon Receipt:

Temperature: 9.80 C
All samples were received in acceptable condition unless noted otherwise in the case narrative.

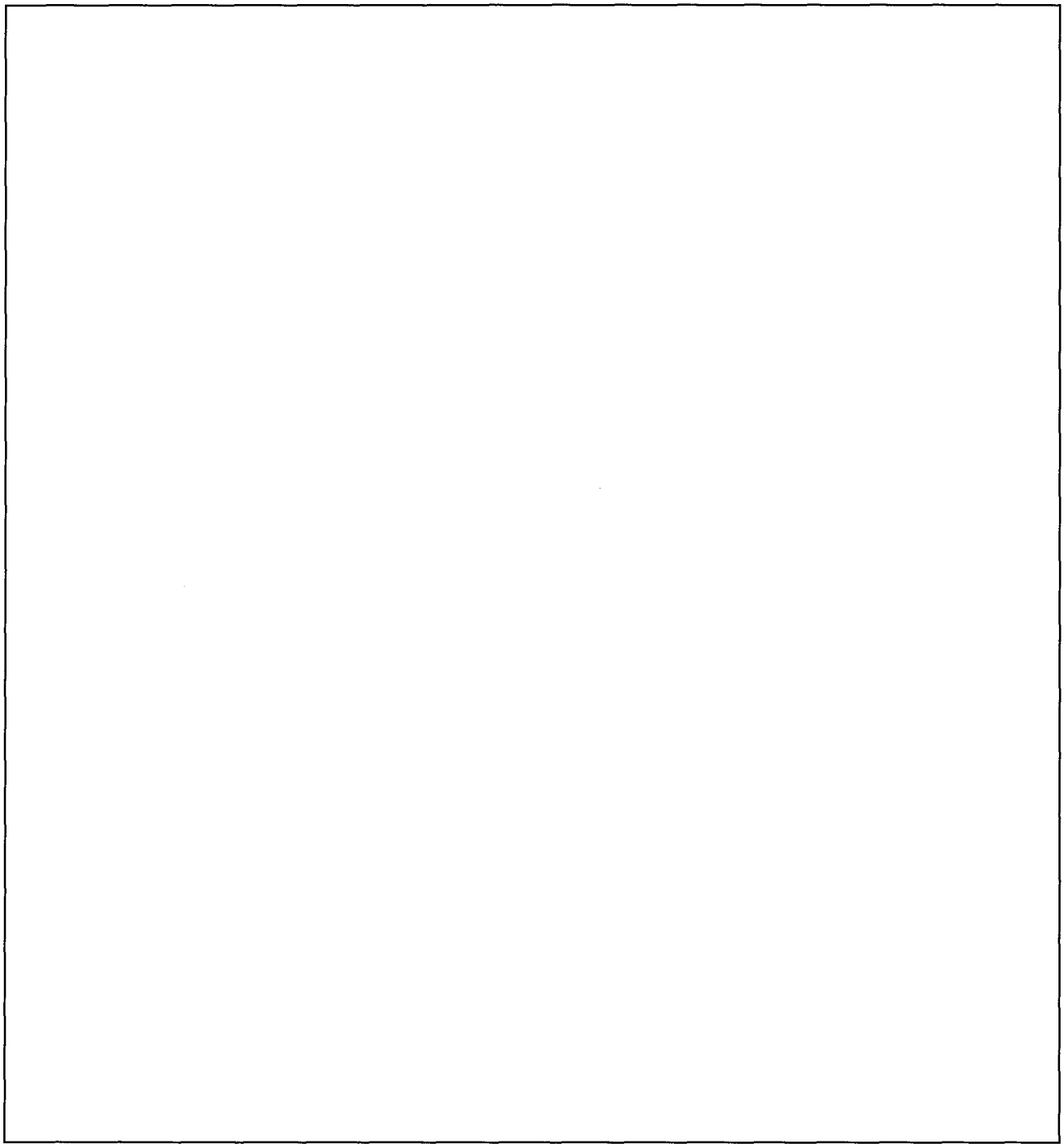
Case Narrative:

Holding Times: All holding times were met unless otherwise qualified.
QA/QC Criteria: All analyses met method requirements unless otherwise qualified.
Accreditations: AZ(PHX)0004, AZ(TUC)OOO4, AIHA#102982, CDC ELITE Member.
Accreditation is applicable only to the test methods specified on each scope of accreditation held by LEGEND.
Comments: There were no problems encountered during the processing of the samples, unless otherwise noted.
All samples were analyzed on a "wet" basis unless designated as "dry weight".

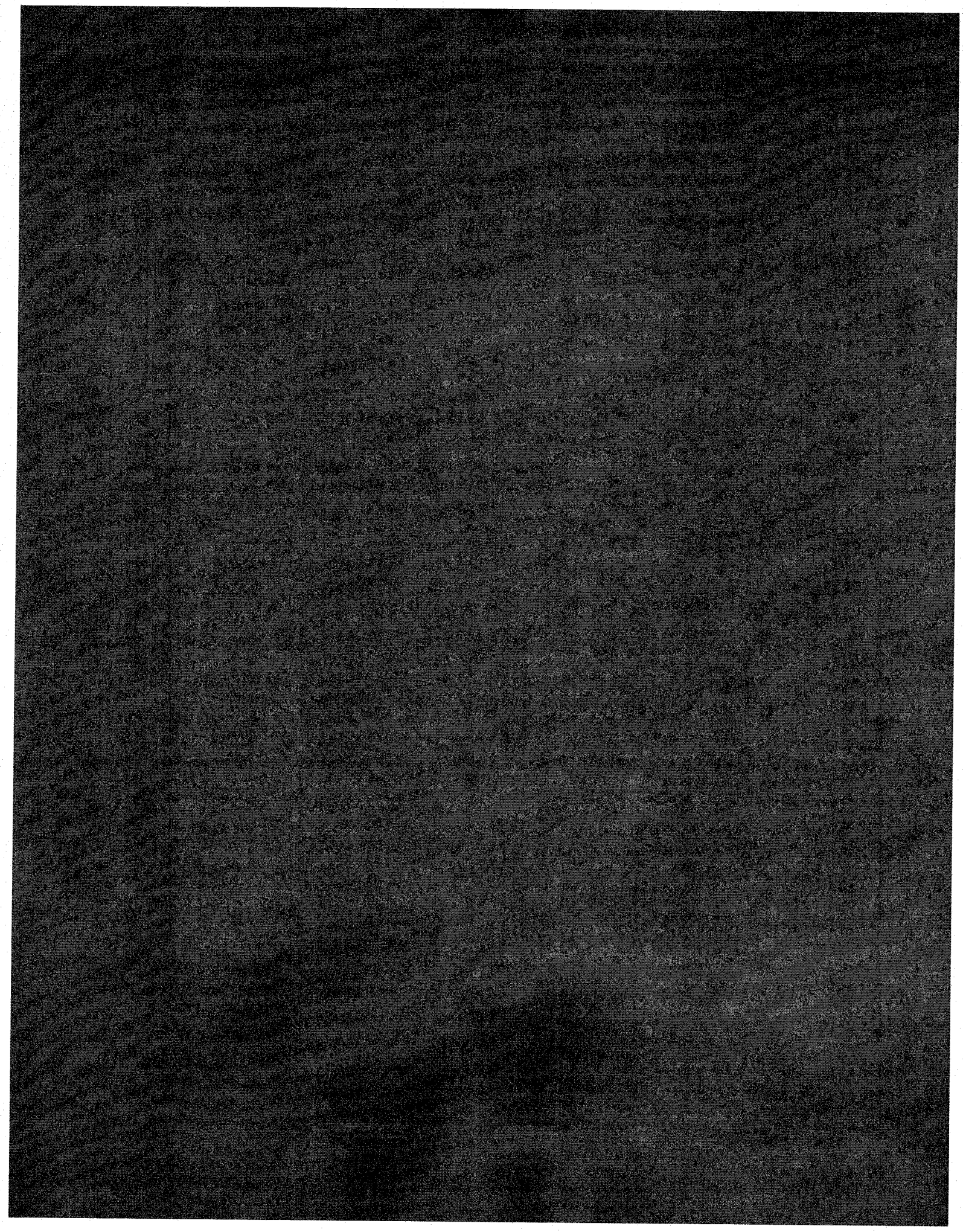
Verbal results via voicemail on 4/29/15 LT

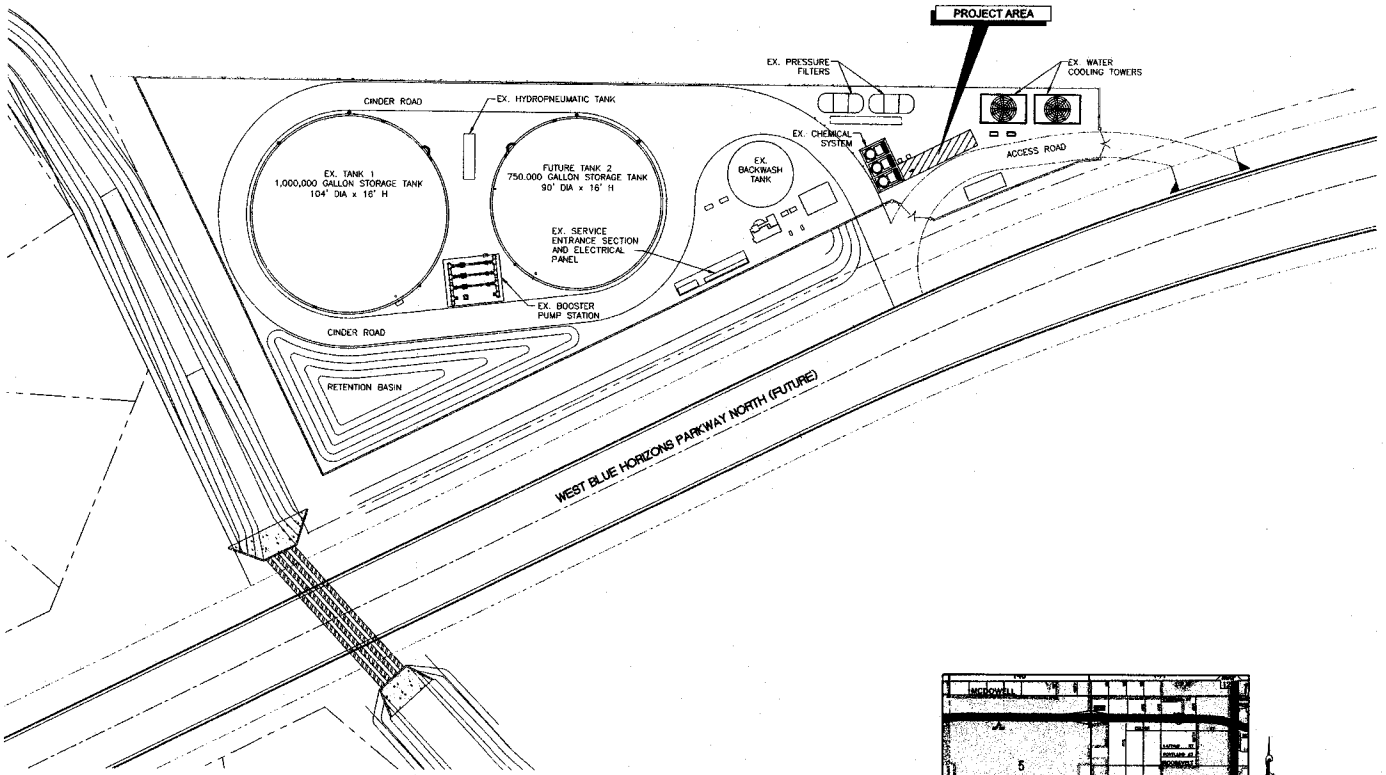
Notes and Definitions

Ray Murrieta	Project: Colilerts	
Arizona Water Company - White Tanks 07-128	Project Number: WT 07-128 4/27/15	
220 E. 2nd Street		**Reported:**
Casa Grande, AZ85222		04/29/15 12:26



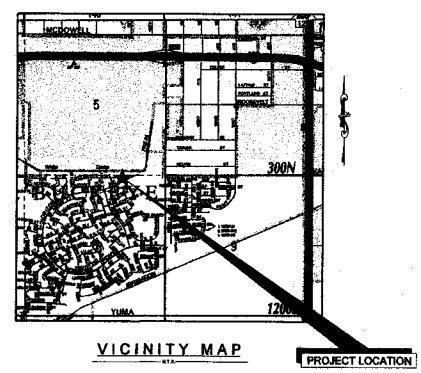
The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.





SITE PLAN

30' 15' 0' 30' 60'



VICINITY MAP

REVISIONS:

The installation shown is to be installed in accordance with the Arizona Water Company standard specifications on file with the Arizona Department of Environmental Quality

CALL AND WORK DAYS BEFORE YOU DIG
263-1100
1-800-STAKE-IT
FOR FREE WORK IN ADVANCE

R.A. No.: 1-5309	P.Z. No.:
SYSTEM: WHITE TANK	
LEGAL DESC.: NE 1/4 SEC. 8, T. 1 N., R. 2 W.	
FAX DIST.: 2590	
DATE: 2/6/2015	SCALE: AS SHOWN
DRAWN BY: BWP	REVIEWED BY:
	CHECKED BY:

ARIZONA WATER COMPANY
3805 N. BLACK CANYON HWY. POST OFFICE BOX 29006
PHOENIX, ARIZONA 85038-9006
(602) 240-6860

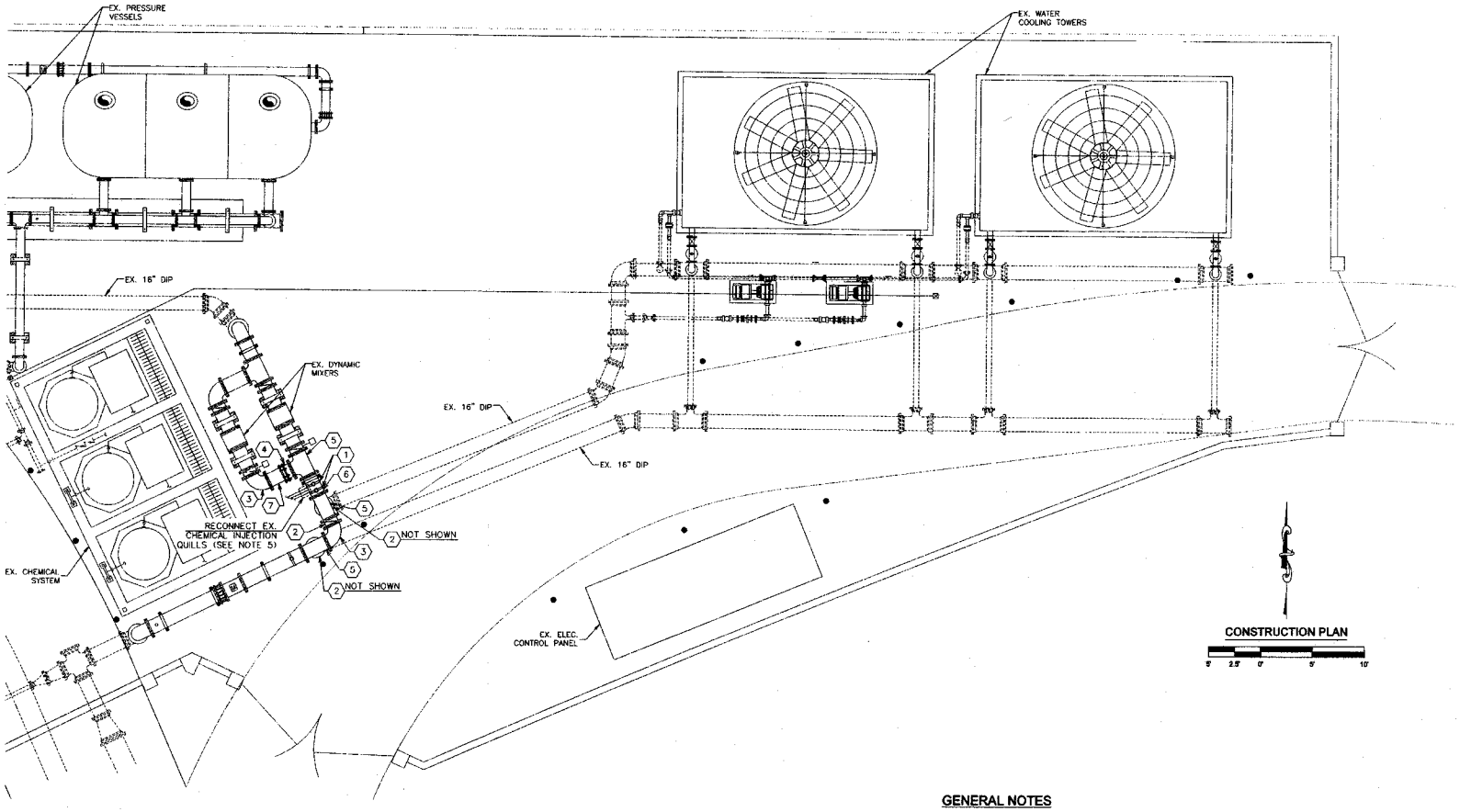
PROJECT DESC.: REPLACE EX. 16" DUCTILE IRON FITTINGS AND VALVES W/ NEW 16" DUCTILE IRON FITTINGS AND VALVES ON THE CHEMICAL INJECTION HEADER AT THE BLUE HORIZON ARF.

PROJECT SHEET DESC.: SITE PLAN

41046
JAMES T. WILSON
Expires 6/30/16

DWG. No.: WT-0320

SHEET 1 OF 3



⬡	FITTINGS SCHEDULE	QUANTITY	SUPPLIED BY	INSTALLED BY
1	16"X1" DOUBLE STRAP SERVICE SADDLE AWWA I.P. THREAD	2	A.W.Co.	CONTR.
2	16" BUTTERFLY VALVE FLG.	3	A.W.Co.	CONTR.
3	16" 90° ELL. FLG.	2	A.W.Co.	CONTR.
4	16" ROMAC IND. R.F.C.A.	1	A.W.Co.	CONTR.
5	16" TEE FLG.	3	A.W.Co.	CONTR.
6	16"X2'-0" D.I.P. SPOOL FLG.	1	A.W.Co.	CONTR.
7	16"X2'-4" D.I.P. SPOOL FLG.XP.E.	1	A.W.Co.	CONTR.

GENERAL NOTES

1. NEW PIPING SHALL BE DISINFECTED IN ACCORDANCE WITH ADEQ ENGINEERING BULLETIN No. 8 BEFORE BEING PLACED INTO SERVICE.
2. ALL MATERIALS AND PRODUCTS USED IN WATER SYSTEM, INCLUDING SURFACE COATINGS & PAINTS, SHALL CONFORM TO NSF STANDARD 61 & CURRENT AWWA D102.
3. CONSTRUCTION MATERIALS USED IN WATER SYSTEM SHALL BE LEAD-FREE AS PER A.A.C. R18-4-504 AND R18-1-101 (43).
4. COAT EXTERIOR OF ALL NEW FITTINGS AND VALVES.

   PRE-COATING PREPARATION: SSPC-SP6
   PRIME COAT: TNEMEC SERIES 135 CHEMBUILD
   FINISH COAT: TNEMEC SERIES 73 ENDURASHIELD (COLOR: 04BR DESERT SANDS)
   REFER TO TNEMEC PRODUCT DATA SHEETS FOR COATING APPLICATION INFORMATION.
5. REPLACE THE EXISTING UNISTRUT CHEMICAL INJECTOR SUPPORT SYSTEM WITH NEW FIBERGLASS UNISTRUT, UNISTRUT POST BASES AND STAINLESS STEEL HARDWARE ON 1'-0"X4"X2'-0" (WXHXL) CONCRETE PAD.

REVISIONS:

The installation shown is to be installed in accordance with the Arizona Water Company standard specifications on file with the Arizona Department of Environmental Quality

CALL THIS SPECIFIC DATE BEFORE YOU DIG
263-1100
1-800-STAKE-IT
(OUTSIDE ARIZONA, COUNTY)

W.A. No.: 1-5309	P.E. No.:
SYSTEM: WHITE TANK	
LOCAL DESC.: NE 1/4 SEC. 8, T. 1 N., R. 2 W.	
TAX DIST.: 2590	
DATE: 2/6/2015	SCALE: AS SHOWN
DRAWN BY: BWP	REVIEWED BY:
	CHECKED BY:

ARIZONA WATER COMPANY
3805 N. BLACK CANYON HWY. POST OFFICE BOX 29006
PHOENIX, ARIZONA 85038-9006
(602) 240-8860

PROJECT DESC.: REPLACE EX. 16" DUCTILE IRON FITTINGS AND VALVES W/ NEW 16" DUCTILE IRON FITTINGS AND VALVES ON THE CHEMICAL INJECTION HEADER AT THE BLUE HORIZON ARF.

PROJECT SHEET DESC.: CONSTRUCTION PLAN

Registered Professional Engineer
CERTIFICATE NO. 41046
JAMES T. WILSON
Date Signed 3/8/16
Expires 6/30/16

DWG. No.: WT-0320

SHEET 2 OF 3

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.

(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 controls 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 (1-1/2") 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, 5-1/4" main valve opening, three way, 6" Mechanical Joint Shoe, 1-1/2" 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) One - 4" Pumper Nozzle, NST and Two - 2-1/2" Hose Nozzles, NST. (These locations only: Ajo, Casa Grande, Coolidge and San Manuel.)

(2) One - 4-1/2" Pumper Nozzle, NST and Two - 2-1/2" Hose Nozzles, NST. (These locations only: Apache Junction, Arizona City, Lakeside, Oracle, Overgaard, Pinewood, Rimrock, Sedona, Sierra Vista, White Tank and Winkelman.)

(3) One - 4-1/2" Pumper Nozzle, NST and Two - 2-1/2" Hose Nozzles, NPT (Bisbee only.)

(4) One - 3" Pumper Nozzle GA 6-350 (6 threads per inch, 3.50 pitch diameter) and Two - 2-1/2" Hose Nozzles, NPT (Miami only.)

(5) One - 3-1/2" Pumper Nozzle GA 6-411 (6 threads per inch, 4.11 pitch diameter) and Two - 2-1/2" 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 II, iron body, including 5/8" x 3/4" 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 1/2" 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. MEGALUG: 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-674-88. 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 port 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"), MaxiFit Xtra 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 Topping Sleeve, JCM 432 18 8 Type 304 Stainless Steel Topping Sleeve, Romac "SST" Type 304 Stainless Steel Topping Sleeve or CASCADE-style CST-EX stainless steel pressure-rated topping 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 16" - 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 13-1/2", 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, B2411B, 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 manufacturers 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/E-9-8-3.

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-8-24-1.

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 (1-1/2") 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 + or - 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

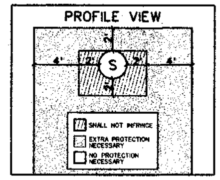
No other utility installations will be permitted in the water pipeline trench or within five feet (5') of the Company's water pipeline when running parallel to the water pipelines.

(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 water and sewer main in concrete. See AWC Standard 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 water and sewer main in concrete. See AWC Standard Detail E-9-30-1 and E-9-30-2.

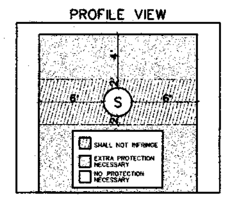
The Construction Drawings shall indicate the installation requirements. The drawings showing these exceptions shall have been approved by the appropriate state and/or county health department.

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.

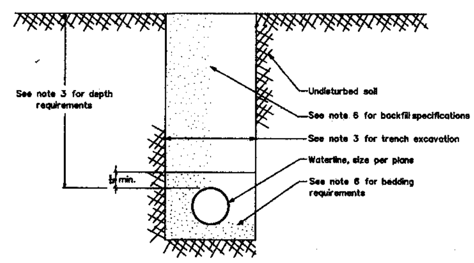
All main line valves shall conform to AWWA C500 with a minimum working pressure of 200 psi.

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°,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°,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').



TYPICAL TRENCH DETAIL
Per MAG Detail 601, 601.4.2, 601.4.6

REVISIONS:

The installation shown is to be installed in accordance with the Arizona Water Company standard specifications on file with the Arizona Department of Environmental Quality

CALL TWO WORKING DAYS BEFORE YOU DIG
263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

W.A. No.: 1-5309	P.E. No.:
SYSTEM: WHITE TANK	
LEGAL DESC.: NE 1/4 SEC. 8, T. 1 N., R. 2 W.	
TAX DIST.: 2590	
DATE: 2/6/2015	SCALE: AS SHOWN
DRAWN BY: BWP	REVIEWED BY: [signature] CHECKED BY: [signature]

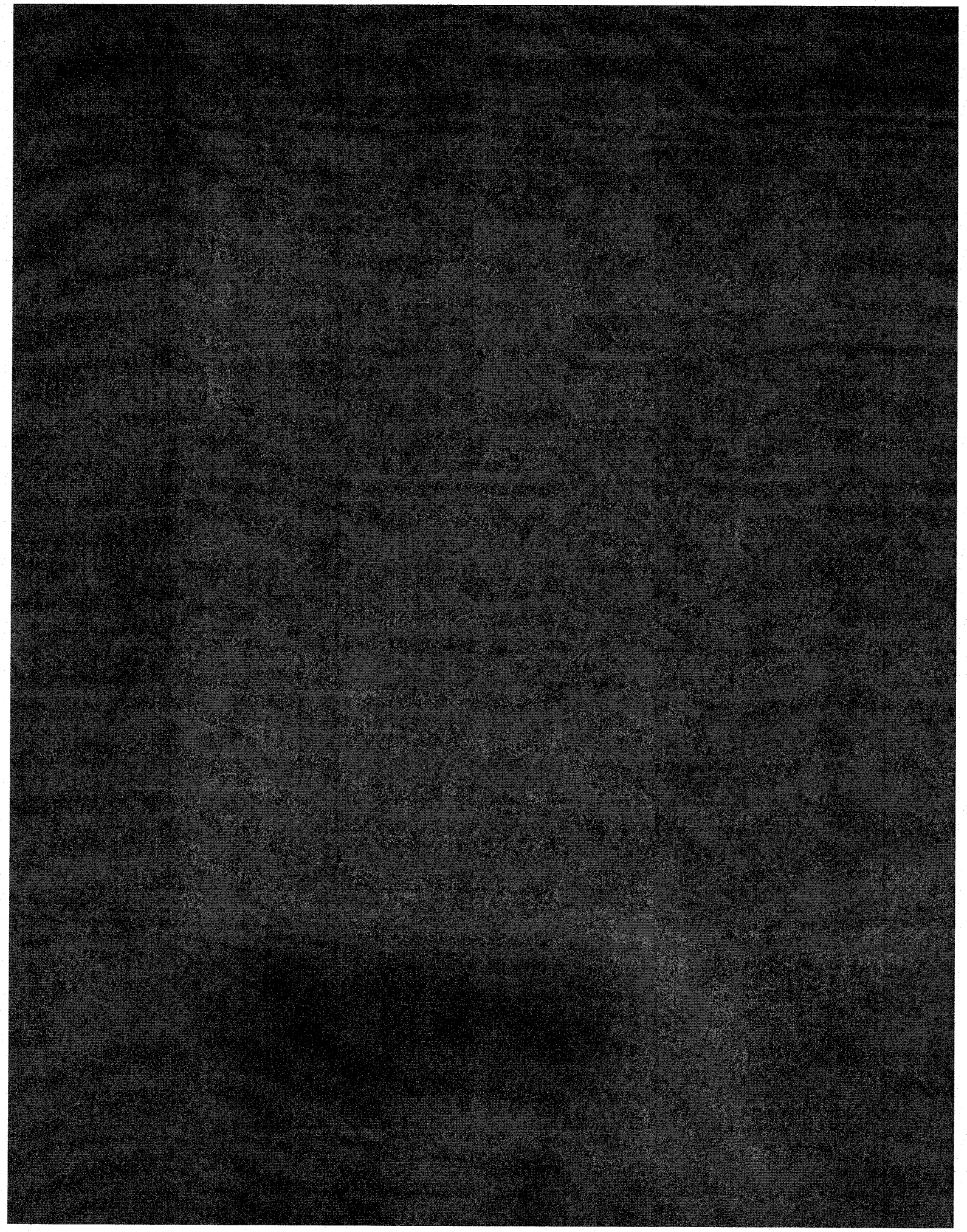
ARIZONA WATER COMPANY
3805 N. BLACK CANYON HWY. POST OFFICE BOX 29006
PHOENIX, ARIZONA 85038-9006
(602) 240-6860

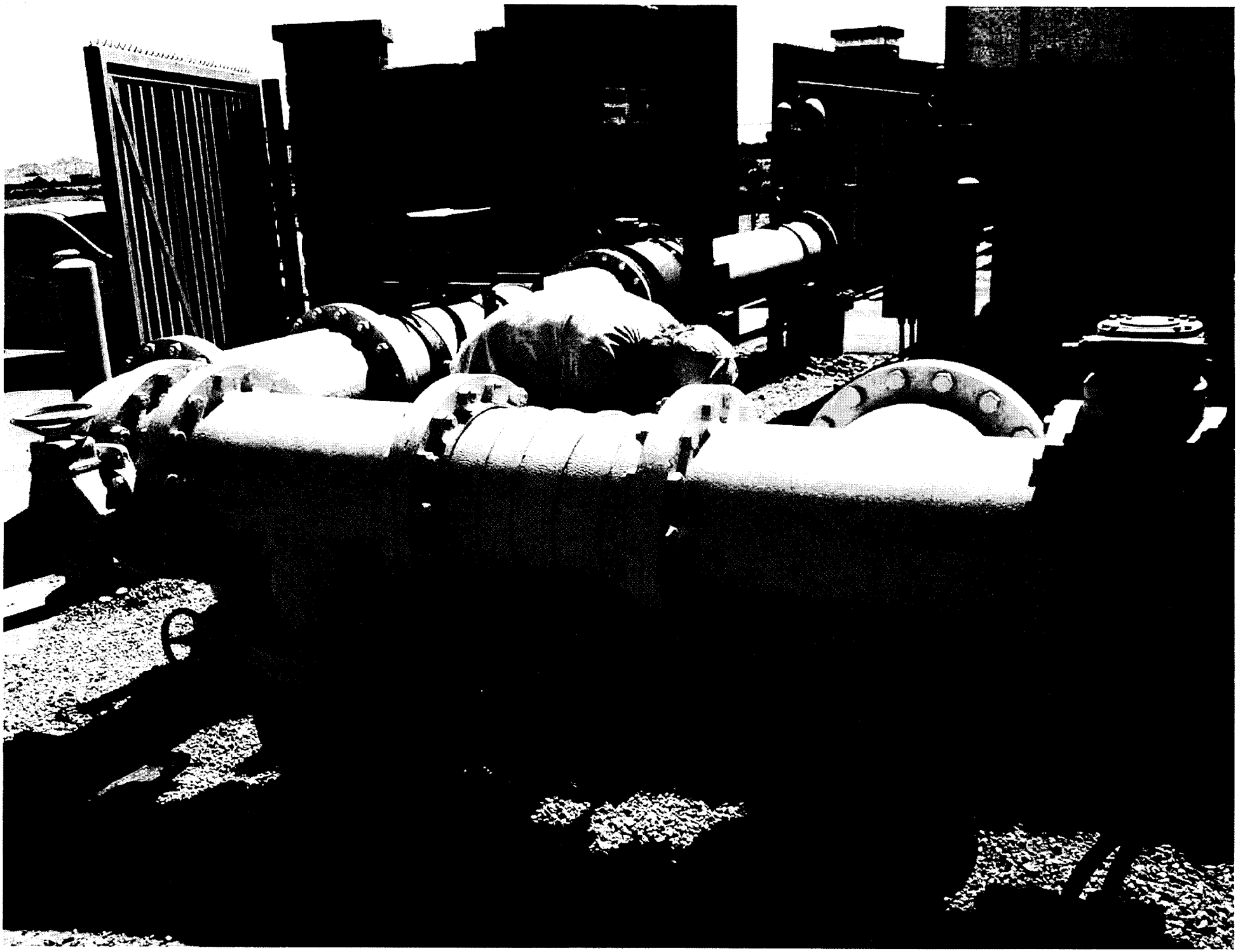
PROJECT DESC.: REPLACE EX. 16" DUCTILE IRON FITTINGS AND VALVES W/ NEW 16" DUCTILE IRON FITTINGS AND VALVES ON THE CHEMICAL INJECTION HEADER AT THE BLUE HORIZON ARF.

PROJECT SHEET DESC: AWC NOTES

Registered Professional Engineer (Mechanical) CERTIFICATE No. 41046 JAMES T. WILSON ARIZONA, U.S.A. Expires 6/30/16

DWG. No.: WT-0320
SHEET 3 OF 3





ARIZONA WATER COMPANY

CONSTRUCTION PLACED IN SERVICE NOTICE

WORK AUTHORIZATION NO.: 1-5309

DIVISION: WT/CG

DATE PLACED IN SERVICE: 4 | 21 | 15

CONTRACT NO:

FOR PURPOSES OF *MODIFIED ACCELERATED COST RECOVERY SYSTEM*, AN ASSET IS "PLACED IN SERVICE" WHEN IT IS IN A CONDITION OR STATE OF READINESS AND AVAILABILITY FOR A SPECIFICALLY ASSIGNED FUNCTION, WHETHER IT BE FOR USE IN A TRADE OR BUSINESS, OR FOR THE PRODUCTION OF INCOME.

I CERTIFY THAT THE ASSET(S) CONSTRUCTED PURSUANT TO THE PROVISIONS OF THE ABOVE-REFERENCED WORK AUTHORIZATION ARE READY FOR SERVICE AS OF THE DATE SHOWN ABOVE.

Division Manager or Operations Superintendent
(signature)

5-29-15
Date

SUBMIT ORIGINAL TO ACCOUNTING DEPARTMENT

A-1-3-1
FKS 11/24/11

WA 1-5360

Western Group Rate Case

Exhibit FKS-1

5360 BAE Tank

ARIZONA WATER COMPANY
WORK AUTHORIZATION

W.A. NUMBER: 1-5360
P.E. NUMBER:
BUDGET ITEM NO.: Special No. 26
SHEET NO.: 1 of 2

SYSTEM:	WHITE TANK	RETENTION REQUIRED:	☐ YES ☑ NO
DIVISION:	CASA GRANDE	WORK TO START BY:	UPON AUTHORIZATION
RESPONSIBLE PERSON:	TED MILLSPAUGH	WORK TO BE FINISHED BY:	WITHIN 30 DAYS
TAX CODE:			

DESCRIPTION OF WORK:

Replace the interior ladder and construct a 12-inch overflow to replace a 6-inch overflow line at the Beautiful Arizona Estates (BAE) water storage tank in the White Tank water system.

FACTORS JUSTIFYING WORK:

The storage tank interior ladder failed and requires replacement. A storage tank interior ladder is required to perform routine tank inspections and maintenance. The existing 6-inch overflow is undersized due to increased production capacity in the White Tank water system. Constructing a 12-inch overflow line is required to comply with Arizona Department of Environmental Quality Bulletin No. 10 requirements and to prevent over pressurizing the tank. The BAE tank provides 30% of the storage capacity to the Northern portion of the White Tank water system.

COST ESTIMATE		AUTHORIZATION	DATE
COST OF WORK:		PREPARED BY: Mario Mendez	
MATERIAL	0		
LABOR	2,200	REVIEWED FOR ESMT/ROW VERIFICATION: Charles Briggs	
CONTRACT PORTION	15,009		
OVERHEAD	2,100	REVIEWED BY: Ted Millspaugh	
TOTAL AUTHORIZED EXPENDITURES CHARGEABLE TO THIS W.A.	$ 19,309		
FUNDS RECEIVED:		APPROVED BY ENGINEERING: Fredrick K. Schneider	
CONTRIBUTIONS RECEIVED	0		
REFUNDABLE ADVANCES RECEIVED	0	APPROVED BY FINANCE: Joseph D. Harris	
TOTAL CONTRIBUTIONS/ADVANCES	0		
NET COMPANY CASH REQUIRED	$ 19,309	SPECIAL ITEM EXCEEDING $10,000; AUTHORIZED BY PRESIDENT: William M. Garfield	
		SPECIAL ITEM EXCEEDING $10,000; AUTHORIZED BY CHAIRMAN: M. L. Whitehead	

COMMENTS:

Transfer $19,309 from WA 1-5308 Camelback Main to fund this project.

CONSTRUCTION RELEASE:

AFH

ARIZONA WATER COMPANY

WORK AUTHORIZATION - DETAIL SHEET

W.A. NUMBER: 1-5360
P.E. NUMBER:
BUDGET ITEM NO.: Special No. 26
SHEET NO. 2 of 3

	PLANT PROPERTY ACCOUNT	UNIT DESCRIPTION	QUANTITY	YEAR INSTALLED AND W.A. NUMBER
RETIREMENT PROPERTY UNITS	342	Interior Ladder	1	
	342	6-inch Overflow	1	

PROJECT DESCRIPTION:

Replace the interior ladder and construct a 12-inch overflow to replace a 6-inch overflow line at the Beautiful Arizona Estates (BAE) water storage tank in the White Tank water system.

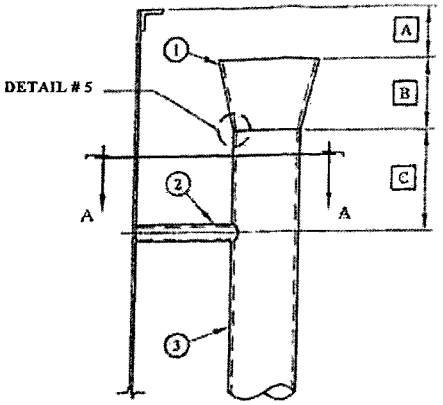
	DESCRIPTION	PLANT PROP ACCT	QUANTITY	UNIT COST	TOTAL
CONTRACT WORK	Replace ladder	342	1	$ 5,469.23	$ 5,469
	Install new 12-inch steel overflow	342	1	9,539.58	9,540
	SERVICE CONNECTIONS COMPLETE: DOUBLE-LONG	345			
	SERVICE CONNECTIONS COMPLETE: DOUBLE-SHORT	345			
	SERVICE CONNECTIONS COMPLETE: SINGLE-LONG	345			
	SERVICE CONNECTIONS COMPLETE: SINGLE-SHORT	345			
TOTAL CONTRACT WORK					$ 15,009
MATERIALS					
	SERVICE CONNECTIONS: DOUBLE-LONG	345			
	SERVICE CONNECTIONS: DOUBLE-SHORT	345			
	SERVICE CONNECTIONS: SINGLE-LONG	345			
	SERVICE CONNECTIONS: SINGLE-SHORT	345			
	METERS	346			
TOTAL MATERIALS					$ -
LABOR	Engineering design and management	342	20	$ 55.00	$ 1,100
	TESTING FEE				
	PERMIT FEE				
	SURVEY FEE				
	FIELD INSPECTION	342	20	55.00	1,100
	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					$ 2,200
SUBTOTAL - CONTRACT WORK, MATERIALS, AND LABOR					$ 17,209
OVERHEAD					2,100
TOTAL	REFUNDABLE PORTION ☐	NON-REFUNDABLE PORTION ☐		**COST ESTIMATE**	$ 19,309

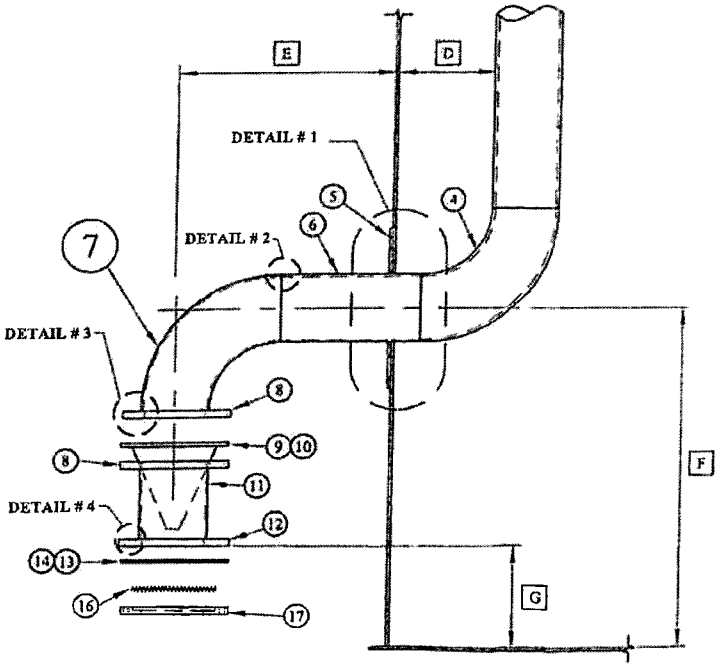
AFH

(11)

12" INSIDE OVERFLOW

A	8"	E	4'- 4"
B	1'- 2"	F	4'- 3"
C	1'- 0"	G	1'- 6"
D	1'- 2 5/8"		





(1) 1 @ 16" x 12" STD # CONCENTRIC REDUCER

(2) 1 @ 1 1/2" STD# x 1'- 2 5/8"

(3) 1 @ 12" STD# x 10'- 3 1/2"

(4) 1 @ 12" STD.# L.R. 90°

(5) 1 @ 1/4" x 12 15/16" ID x 27" OD (ROLL TO 50' Ø)

(6) 1 @ 12" STD# x 3'- 7 5/16"

(7) 1 @ 12" STD# S.R. 90°

(8) 2 @ 1/2" x 12" ID x 19" OD
w/ 12 @ 1" Ø HOLES ON A 17" B.C.

(9) 1 @ 12" SERIES 37 TIDEFLEX VALVE FOR 12" I.D. PIPE
(NO BACK PRESSURE)

(10) 12 @ 7/8" x 2 1/2" A307B ZINC PLATE BOLTS
12 @ 7/8" A307B ZINC PLATE NUTS

(11) 1 @ 12" STD# x 1'- 7"

(12) 1 @ 1/2" x 12" ID x 19" OD
w/ 4 @ 7/8" Ø HOLES ON A 17" B.C.

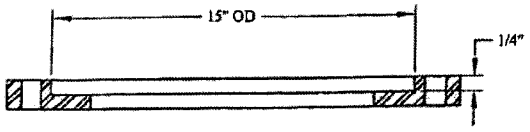
(13) 1 @ 1/8" x 12" ID x 19" OD
w/ 4 @ 7/8" Ø HOLES ON A 17" B.C.
BLACK NEOPRENE GASKET

(14) 4 @ 3/4" x 2" A307B ZINC PLATE BOLTS
4 @ 3/4" A307B ZINC PLATE NUTS

(15) SCREEN OMITTED

(16) 1 @ 3/4" # 9 FLAT EXPANDED METAL x 14" OD
PAINT EXPANDED METAL WITH THE SAME MATERIAL AS THE INTERIOR OF THE TANK.

(17) 1 @ 1/2" x 12" ID x 19" OD
w/ 4 @ 7/8" Ø HOLES ON A 17" B.C.
FLANGE TO BE MACHINED AS SHOWN



ARIZONA WATER COMPANY

White Tank Division
220 E. 2nd Street
Casa Grande, AZ 85122 PH: 520-836-8785

PROPOSAL/CONTRACT

CONTRACTOR: MMI TANK AND INDUSTRIAL SERVICES	SYSTEM: WHITE TANK
ADDRESS: 3240 S. 37TH AVENUE	W.A. No(s):
CITY ST ZIP: PHOENIX, AZ 85009	BID DUE DATE: October 22, 2013

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.

1. Contractor certifies that it has a complete copy of, and has read, understands 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.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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 Statues ("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. §42-5061 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.

7. 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 thereof. 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.

8. 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.

9. 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.

10. Contractor will not commence work on the Project until the Company gives Contractor a written Commencement Notice. Contractor will complete the Project within 60 calendar days after the Commencement Notice is issued.

11. 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.

12. 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	PROPOSAL/CONTRACT ACCEPTED:
MMI TANK AND INDUSTRIAL SERVICES	*ARIZONA WATER COMPANY*
By: Don Marmon	By: Fredrick K. Schneider
Print Name: Don Marmon	Print Name: Fredrick K. Schneider, PE
Title: Coatings Manager	Title: Vice President - Engineering
Date: 10/22/13	Date: 11-4-2013

AFH

ARIZONA WATER COMPANY

White Tank Division
220 E. 2nd Street
Casa Grande, AZ 85122 PH: 520-836-8785

PROPOSAL/CONTRACT

CONTRACTOR: MMI TANK AND INDUSTRIAL SERVICES	SYSTEM: WHITE TANK
AZ CONTRACTOR LICENSE NO: CLASSIFICATION:	W.A No(s):
ADDRESS: 3240 S. 37TH AVENUE	BID DUE DATE: October 22, 2013
CITY ST ZIP PHOENIX, AZ 85009	BID BOND REQUIRED ☑ Yes ☐ No

DESCRIPTION OF PROJECT: Interior and exterior coating of the Beautiful Arizona Estates 500,000 gallon water storage tank in the White Tank water system.

1-2. MATERIALS EXEMPT FROM CONTRACTING TAX (per Paragraph 6)	QUANTITY	UNIT PRICE LABOR	UNIT PRICE MATERIALS	TOTAL COST LABOR	TOTAL COST MATERIALS
Coat interior of the Beautiful Arizona Estates 500,000 water storage tank (49' D X 36' H) in the White Tank water system; near white abrasive blast cleaning; per attached specifications.	1			30,390	25,230
Coat exterior of the Beautiful Arizona Estates 500,000 water storage tank (49' D X 36' H) in the White Tank water system; per attached Level 1 surface preparation specifications.	1			11,662	8,614
				1	2
PRICE ONLY					
Coat exterior of the Beautiful Arizona Estates 500,000 water storage tank (49' D X 36' H); per attached Level 2 surface preparation specifications.	1	18,000	24,731		
Apply Chlor*Rid Surface Treatment on the interior of the Beautiful Arizona Estates 500,000 water storage tank (49' D X 36' H).	1	41,810	44,219		
3. Total Labor to Install Exempt Materials (add the amounts in column 1)				3 42,052	
4. Total Exempt Materials (add the amounts in column 2)					4 33,844

5-6. NON-EXEMPT MATERIALS	QUANTITY	UNIT PRICE LABOR	UNIT PRICE MATERIALS	TOTAL COST LABOR	TOTAL COST MATERIALS
				5	6
7. Total Labor to Install Non-Exempt Materials (add the amounts in column 5)				7 N/A	
8. Total Non-Exempt Materials (add the amounts in column 6)					8 N/A
9. Subtotal A (add lines 3, 7 and 8)					9 42,052
10. Contracting Tax Base (multiply the amount on line 9 by 0.65)				10 27,334	
11. Applicable Contracting Tax Rate				11 6.39%	
12. Contracting Tax (multiply the amount on line 10 by line 11)					12 1722.
13. Subtotal B (add lines 4, 9 and 12)					13 77618
14. 100% Performance and Payment Bonds Cost					14 1552
15. Estimated Total Cost (add lines 13 and 14)					15 79,170.

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

CONTRACT CHANGE ORDER

CONTRACTOR: MMI Tank and Industrial Services	DATE:	CONTRACT DATE: October 22, 2013
	W.A. NO.:	CHANGE ORDER NO.: 2

DESCRIPTION OF WORK:

1. Apply additional coat of Cabolline Carboguard 891 on inside Tank
2. Replace failed interior ladder on Tank
3. Replace existing undersized Tank Overflow
4. Additional 5 days for contract time

APPLICABLE C. O. COST: $ 30,628.00

ORIGINAL CONTRACT AMOUNT: $ 79,170.00

SUM OF ALL CHANGE ORDERS TO DATE: $ 30,628.00

REASON FOR ADDITIONAL WORK:

1. The Tank is very pitted consistently throughout the entire shell and the floor. Two coats of epoxy it would be near impossible to make the tank as "holiday" or pinhole free.
2. Interior ladder is deteriorated and could break away from side straps causing a saftey hazard when entering Tank from top of Tank.
3. The overflow is undersized and is almost level with top of shell line.
4. 5 days for contract time to complete additional work.

APPROVAL LEVEL REQ'D: (CIRCLE ALL THAT APPLY) (BASED ON SUM)

- Mgr & Eng — Up to $10,000 or 10% whichever is less
- VP Eng — Up to $100,000 or 20% whichever is less
- VP Tres & Pres — greater than $100,000 or 20%

BASIS OF PAYMENT:

- ☐ In accordance with rates contained in Contractor's Proposal/Contract dated:
- ☐ In accordance with material prices, labor and equipment rates shown on Proposal dated:
- ☐ Lump Sum Price (including taxes) of: (Include supporting documentation) $
- ☒ Other: Three attached Quotes attached Totaling $30,628.00

Contractor is hereby authorized to proceed with the work as described above. The Company will pay for the above-described work as indicated above.

Contractor agrees, as an independent contractor, to perform the above-described work in accordance with the Company's *General Conditions of Contract, and the Company's Construction Specifications* and *Standard Specification Drawings* ("General Conditions of Contract") and related construction drawings which, were provided with the original Proposal/Contract and supplemented herein, and agrees that all provisions of said General Conditions of Contract dated as of April 2004, including any subsequent amendments thereto, and related construction drawings, apply to work covered under this Contract Change Order.

Work Authorization Approval for additional funds required YES (NO) (circle one) If yes, attach applicable form & proof of payment for outside funded work.

Division Superintendent/Manager

Project Engineer/Project Manager

AWC Vice President – Engineering

MMI TANK AND INDUSTRIAL
Contractor: (Name)

By: _____
Contractor's Representative Signature

Name: STACY PINCHARD
(Printed)

It's: PRESIDENT
(Title or Position)

CHANGE ORDER AUTHORIZATION OVER $100,000 OR 20% OF THE CONTRACT NOT VALID WITHOUT SIGNATURES BELOW

AWC Vice President and Treasurer

AWC President

Date Work Started

Date Work Completed

CONTRACTOR'S INVOICE APPROVED BY:

Company's Representative Overseeing the Work (signature)

DISTRIBUTION:
Original to Person Authorizing Work and, when completed, to Accounting Dept. with approved invoice for the work with supporting documentation. Copy to Contractor. Copy to Project Engineer.

Labor and Material Releases Required: ☐ Yes ☐ No
Releases Received and Approved By:

Company's Authorized Signature

ARIZONA WATER COMPANY

CONTRACT CHANGE ORDER

CONTRACTOR: MMI Tank and Industrial Services	DATE: March 2, 2015	CONTRACT DATE: October 22, 2013
	W.A. NO.: Routine	CHANGE ORDER NO.: 3
DESCRIPTION OF WORK: Sweep Blasting (SSPC SP7) the prime coat on interior floor on White Tank 0.5 MG storage tank. Cost breakdown for labor and material on attached quote from MMI Coatings	APPLICABLE C. O. COST: $5,900.00	
	ORIGINAL CONTRACT AMOUNT: $79,170.00	
	SUM OF ALL CHANGE ORDERS TO DATE: $36,528.00	
REASON FOR ADDITIONAL WORK: 1. Interior coating was stopped on Dec. 23, 2014 when the interior floor prime coat was completed, AWC requested MMI to install new overflow and internal ladder, the design and approval from AWC was over the 30 days recoat time for the Carboline Carboguard 891 coating. Maximum recoat time of 30 days at 60 degrees. 2. Extended days for completion revised in service date is 3-30-15.	APPROVAL LEVEL REQ'D: (CIRCLE ALL THAT APPLY) (BASED ON SUM) Mgr & Engr: Up to $10,000 or 10% whichever is less; VP Eng: Up to $100,000 or 20% whichever is less; VP Tres & Pres: greater than $100,000 or 20%	

BASIS OF PAYMENT:

- ☐ In accordance with rates contained in Contractor's Proposal/Contract dated:
- ☐ In accordance with material prices, labor and equipment rates shown on Proposal dated:
- ☐ Lump Sum Price (including taxes) of: (Include supporting documentation) $
- ☒ Other: Attached quote for $5,900.00

Contractor is hereby authorized to proceed with the work as described above. The Company will pay for the above-described work as indicated above.

Contractor agrees, as an independent contractor, to perform the above-described work in accordance with the Company's *General Conditions of Contract, and the Company's Construction Specifications* and *Standard Specification Drawings* ("General Conditions of Contract") and related construction drawings which, were provided with the original Proposal/Contract and supplemented herein, and agrees that all provisions of said General Conditions of Contract dated as of April 2004, including any subsequent amendments thereto, and related construction drawings, apply to work covered under this Contract Change Order.

Work Authorization Approval for additional funds required

Division Superintendent/Manager

Project Engineer/Project Manager

AWC Vice President - Engineering

YES NO (circle one) If yes, attach applicable form & proof of payment for outside funded work.

MMI Tank & Industrial Services
Contractor: (Name)

By: *Contractor's Representative Signature*

Name: Mike DesPres
(Printed)

It's: Coatings Manager
(Title or Position)

CHANGE ORDER AUTHORIZATION OVER $100,000 OR 20% OF THE CONTRACT NOT VALID WITHOUT SIGNATURES BELOW

AWC Vice President and Treasurer

AWC President

Date Work Started

Date Work Completed

CONTRACTOR'S INVOICE APPROVED BY:

Company's Representative Overseeing the Work (signature)

DISTRIBUTION:
Original to Person Authorizing Work and, when completed, to Accounting Dept. with approved invoice for the work with supporting documentation. Copy to Contractor. Copy to Project Engineer.

Labor and Material Releases Required: ☐ Yes ☐ No
Releases Received and Approved By:

Company's Authorized Signature

MMI
COATINGS

The schedule to complete all interior coating operation will be 6 work days from today February 23, 2015. Completion of interior coating work shall be March 2, 2015. Cure time will begin on the same day.

Cost break down of Cost for change order.

1. **Labor for sweeping blasting (SSPC SP7) the prime coat on the interior floor** **$2600.00**
2. **Abrasive** **No Charge**
3. **Abrasive Disposal** **$920.00**
4. **Man lift** **$601.00**
5. **Air Compressor** **$220.00**
6. **Forklift** **$368.00**
7. **Pickup truck** **$207.00**
8. **Fuel for equipment** **$294.00**
9. **Additional Engineering for overflow pipe** **$690.00**
10. **Total** **$5,900.00**

Sincerely
MMI Tank and Industrial Services

Mike DesPres
C 602-292-1818
O 480-553-6118
miked@mmitank.com

ARIZONA WATER COMPANY

Storage Tank Record

THIS SECTION TO BE COMPLETED BY AWC

STORAGE TANK DATA

System: White Tanks	Map Reference (e.g. Site Name):	Tank No.: Bethany Home Estates #1
W.A. #	Location (e.g. SE ¼ SEC 25 T1N R7E): SW ¼ Sec 17 T2N R2W	Tank Status (e.g. In Service, Not In Service, Abandoned, etc): In Service
Tank Capacity (gal): 500,000	Shell Dia. (feet): 48.67 Ft	Shell Height (feet): 36.00 Ft
Inlet/Outlet Dia. (inch): 8"	Inlet Dia. (inch): 8"	Outlet Dia. (inch): 8"
Tank Material: Steel		
Tank Foundation: Concrete Ring		Floor Elevation (feet):
Built By: Chicago Bridge & Iron	Year Built: 1982	Cathodic Protection (yes/no): No
Cathodic Date:		

Remarks:

THIS SECTION TO BE COMPLETED BY AWC

STORAGE TANK PAINT DATA

Original Interior Paint System:
Original Exterior Paint System:
Original Exterior Color:
Painted By:
Remarks:

ARIZONA WATER COMPANY

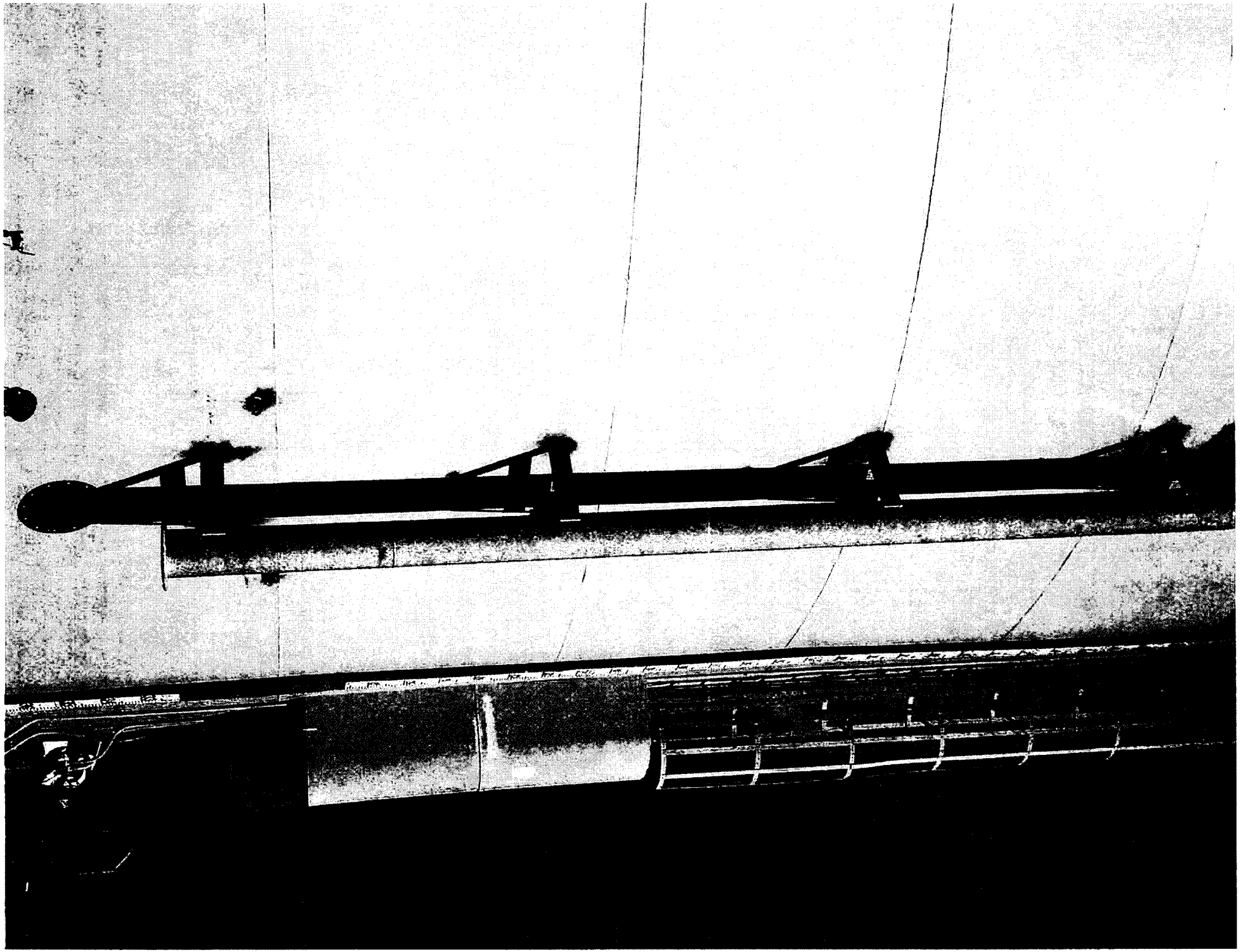
Storage Tank Record

System:	Map Reference (e.g. Site Name):	Tank No.

PHOTOGRAPHS ARE TO BE TAKEN BY AWC

STORAGE TANK PHOTOGRAPHS

insert photos

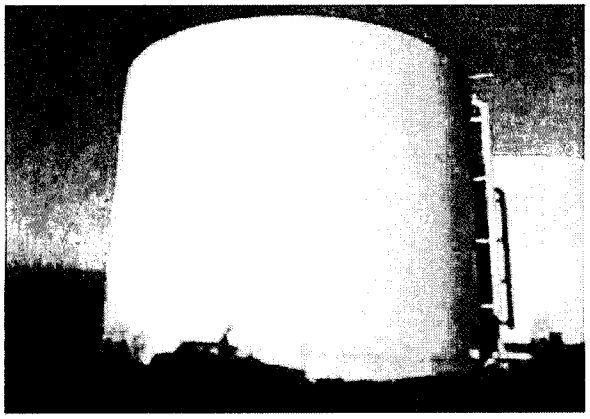


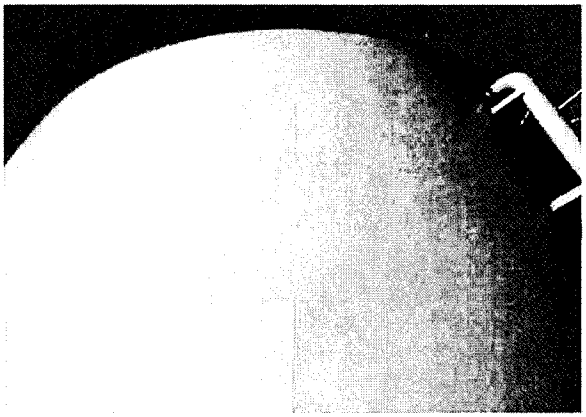
INDUSTRIAL INSPECTION AND CONSULTING, LLC

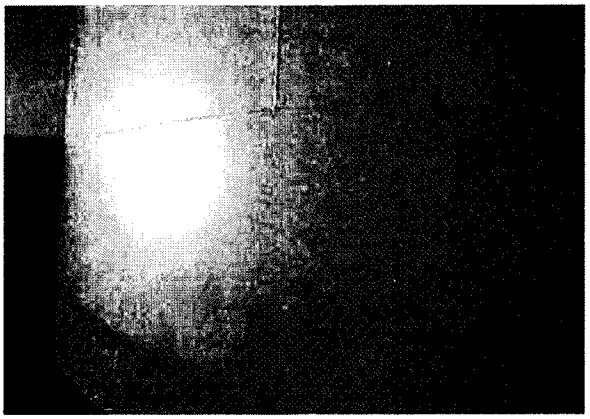
CERTIFIED NACE INSPECTORS

Paint Inspection Photo Documentation

Exterior Coating System - Carboline Carbothane 133HB







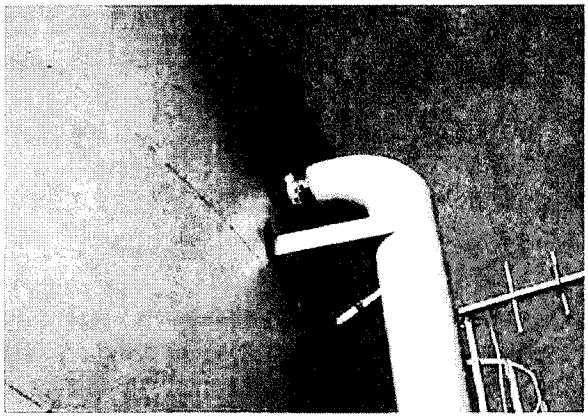
Company:	Arizona Water Company	**Report No.**	7	**Page**	6
Project:	Beautiful Estates Tank Rehabilitation	**Job No.**	Water Storage Tank		
Location:	Buckeye, Arizona	**Date:**	February 26th 2015		

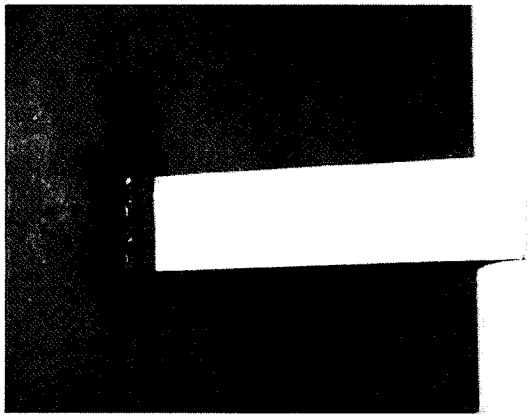
INDUSTRIAL INSPECTION AND CONSULTING, LLC

CERTIFIED NACE INSPECTORS

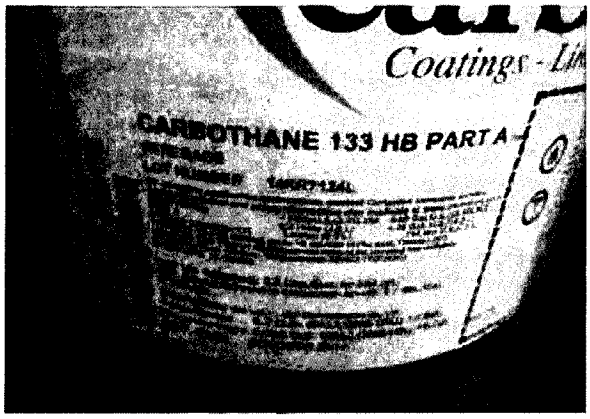
Paint Inspection Photo Documentation

Exterior Weld Seams - Not Prepared At This Time





Carboline Carbothane 133 HB - Product Batch Numbers



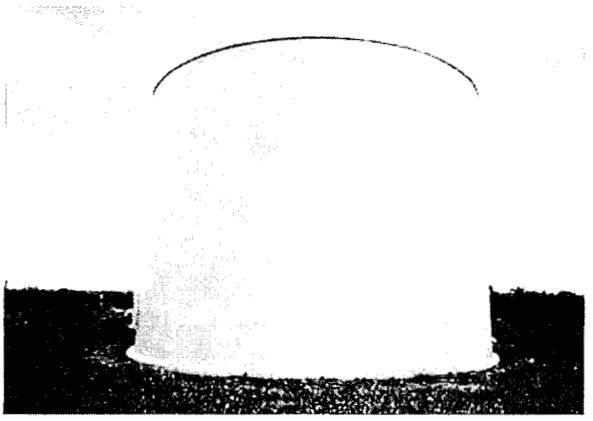
Company:	Arizona Water Company	**Report No.**	7	**Page**	7
Project:	Beautiful Estates Tank Rehabilitation	**Job No.**	Water Storage Tank		
Location:	Buckeye, Arizona	**Date:**	February 26th 2015		

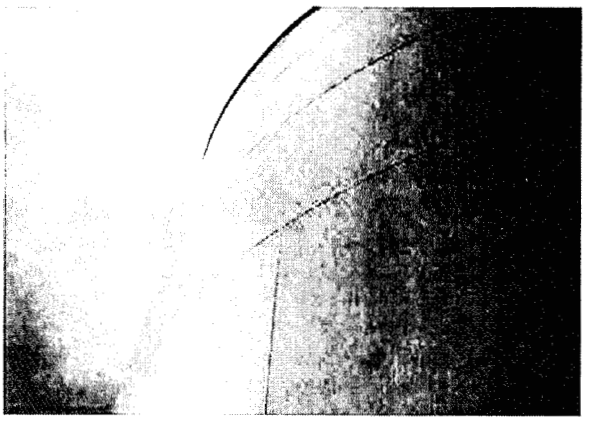
INDUSTRIAL INSPECTION AND CONSULTING, LLC

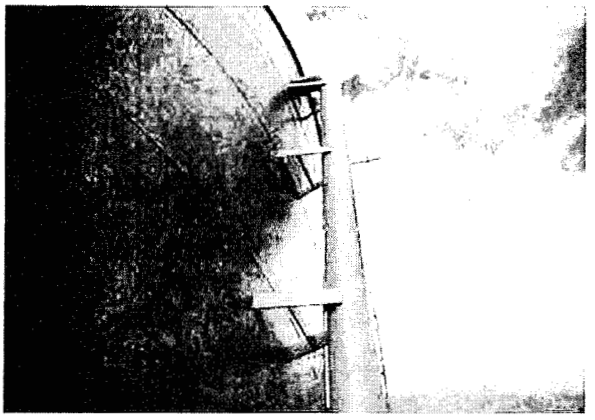
CERTIFIED NACE INSPECTORS

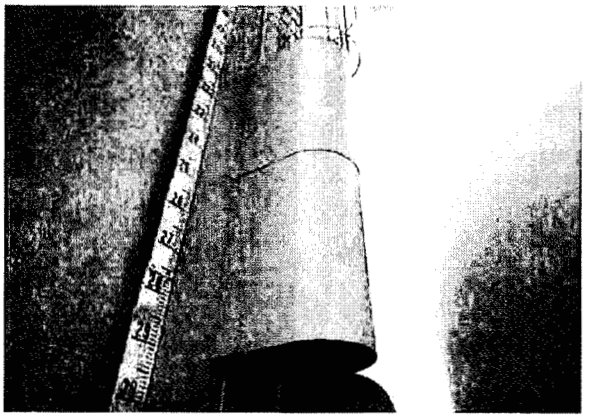
Paint Inspection Photo Documentation

Completed Exterior Coating System - Carboline Carbothane 133HB









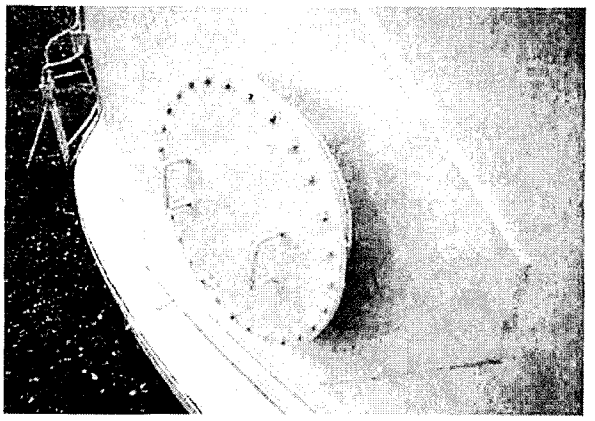
Company:	Arizona Water Company	**Report No.**	11	**Page**	2
Project:	Beautiful Estates Tank Rehabilitation	**Job No.**	Water Storage Tank		
Location:	Buckeye, Arizona	**Date:**	April 24th 2015		

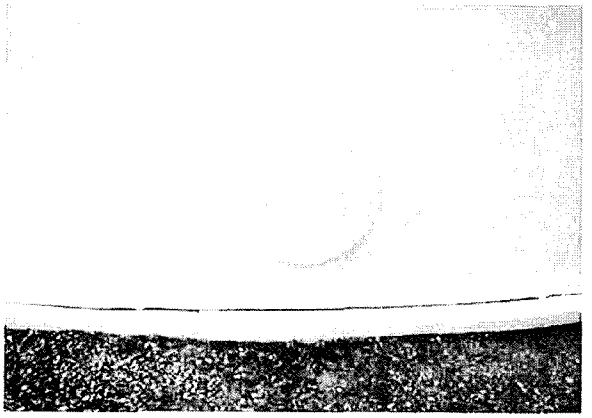
INDUSTRIAL INSPECTION AND CONSULTING, LLC

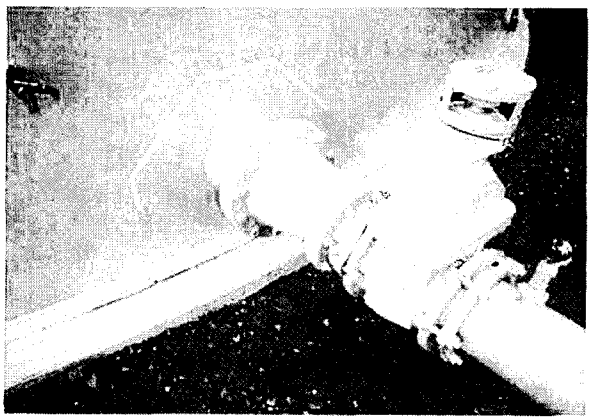
CERTIFIED NACE INSPECTORS

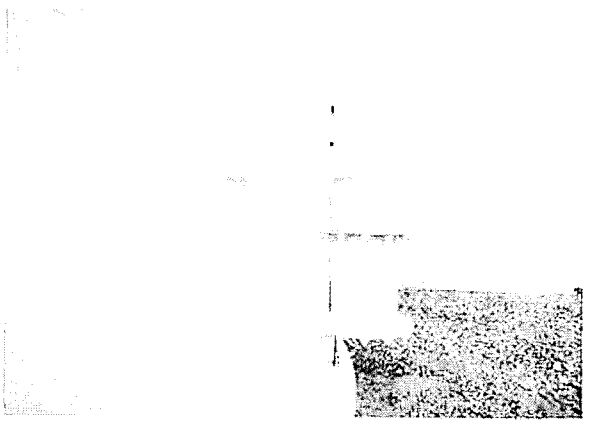
Paint Inspection Photo Documentation

Completed Exterior Coating System - Carboline Carbothane 133HB









Company:	Arizona Water Company	**Report No.**	11	**Page**	3
Project:	Beautiful Estates Tank Rehabilitation	**Job No.**	Water Storage Tank		
Location:	Buckeye, Arizona	**Date:**	April 24th 2015		

LEGEND
Technical Services, Inc.
www.legend-group.com

17631 N. 25th Avenue • Phoenix, AZ 85023
P (602) 324-6100 • F (602) 324-6101

Ray Murrieta
Arizona Water Company - White Tanks 07-128
220 E. 2nd Street
Casa Grande, AZ85222

Project: Drinking Water Analysis
Project Number: 07128

Reported:
04/16/15 08:48

Analyte

BAE Tank (5041231-01) Drinking Water (Grab) Sampled: 04/14/15 11:00 Received: 04/14/15 13:40

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Legend Technical Services of Arizona, Inc.									
Volatile Organic Compounds									Q3
1,1,1-Trichloroethane	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
1,1,2-Trichloroethane	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
1,1-Dichloroethene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
1,2,4-Trichlorobenzene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
1,2-Dichlorobenzene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
1,2-Dichloroethane	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
1,2-Dichloropropane	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
1,4-Dichlorobenzene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
Benzene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
Bromodichloromethane	**0.0016**	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
Bromoform	**0.0307**	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
Carbon tetrachloride	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
Chlorobenzene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
Chloroform	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
cis-1,2-Dichloroethylene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
Dibromochloromethane	**0.0090**	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
Dichloromethane	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
Ethylbenzene	**0.0022**	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
m,p-Xylene	**0.0108**	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
o-Xylene	**0.0032**	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
Styrene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
Tetrachloroethene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
Toluene	**0.0014**	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
Total THMs	**0.0413**	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
trans-1,2-Dichloroethene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
Trichloroethene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
Vinyl chloride	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
Xylenes (total)	**0.0140**	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 15:16	EPA 524.2	
Surrogate: 1,2-Dichlorobenzene-d4		*108 %*		*70-130*	*B5D0397*	*04/14/15 14:30*	*04/14/15 15:16*	*EPA 524.2*	
Surrogate: 1,2-Dichloroethane-d4		*106 %*		*70-130*	*B5D0397*	*04/14/15 14:30*	*04/14/15 15:16*	*EPA 524.2*	
Surrogate: 4-Bromofluorobenzene		*104 %*		*70-130*	*B5D0397*	*04/14/15 14:30*	*04/14/15 15:16*	*EPA 524.2*	
Surrogate: Pentafluorobenzene		*112 %*		*70-130*	*B5D0397*	*04/14/15 14:30*	*04/14/15 15:16*	*EPA 524.2*	

BAE Tank (5041231-02) Drinking Water (Grab) Sampled: 04/14/15 11:00 Received: 04/14/15 13:40

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Legend Technical Services of Arizona, Inc.									
Microbiology									
E. coli	Absent		P/A	1	B5D0414	04/14/15 14:45	04/14/15 14:45	SM 9223B	
Total Coliforms	Absent		P/A	1	B5D0414	04/14/15 14:45	04/14/15 14:45	SM 9223B	

Legend Technical Services of Arizona, Inc.

Barbara Frank

Client Services Representative

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Phone Number: (602) 324-6100

Ray Murrieta	Project: Drinking Water Analysis	
Arizona Water Company - White Tanks 07-128	Project Number: 07128	
220 E. 2nd Street		**Reported:**
Casa Grande, AZ85222		04/16/15 08:48

Travel Blank (5041231-03) DI Water (Grab) Sampled: 04/14/15 11:00 Received: 04/14/15 13:40

Legend Technical Services of Arizona, Inc.

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Volatile Organic Compounds									
1,1,1-Trichloroethane	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
1,1,2-Trichloroethane	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
1,1-Dichloroethene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
1,2,4-Trichlorobenzene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
1,2-Dichlorobenzene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
1,2-Dichloroethane	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
1,2-Dichloropropane	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
1,4-Dichlorobenzene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
Benzene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
Bromodichloromethane	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
Bromoform	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
Carbon tetrachloride	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
Chlorobenzene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
Chloroform	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
cis-1,2-Dichloroethylene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
Dibromochloromethane	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
Dichloromethane	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
Ethylbenzene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
m,p-Xylene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
o-Xylene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
Styrene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
Tetrachloroethene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
Toluene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
Total THMs	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
trans-1,2-Dichloroethene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
Trichloroethene	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
Vinyl chloride	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
Xylenes (total)	<0.0005	0.0005	mg/L	1	B5D0397	04/14/15 14:30	04/14/15 16:18	EPA 524.2	
Surrogate: 1,2-Dichlorobenzene-d4		*117 %*	*70-130*		*B5D0397*	*04/14/15 14:30*	*04/14/15 16:18*	*EPA 524.2*	
Surrogate: 1,2-Dichloroethane-d4		*105 %*	*70-130*		*B5D0397*	*04/14/15 14:30*	*04/14/15 16:18*	*EPA 524.2*	
Surrogate: 4-Bromofluorobenzene		*90 %*	*70-130*		*B5D0397*	*04/14/15 14:30*	*04/14/15 16:18*	*EPA 524.2*	
Surrogate: Pentafluorobenzene		*109 %*	*70-130*		*B5D0397*	*04/14/15 14:30*	*04/14/15 16:18*	*EPA 524.2*	

Sample Condition Upon Receipt:

Temperature: 5.20 C

All samples were received in acceptable condition unless noted otherwise in the case narrative.

Case Narrative:

Holding Times: All holding times were met unless otherwise qualified.

QA/QC Criteria: All analyses met method requirements unless otherwise qualified.

Accreditations: AZ(PHX)0004, AZ(TUC)OOO4, AIHA#102982, CDC ELITE Member.

Accreditation is applicable only to the test methods specified on each scope of accreditation held by LEGEND.

Comments: There were no problems encountered during the processing of the samples, unless otherwise noted.
All samples were analyzed on a "wet" basis unless designated as "dry weight".

Chain of Custody indicates special only do not report to ADEQ- BF
Notified Henry of the absent results on 04/16/15. BF

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Notes and Definitions

Q3 Sample received with improper chemical preservation.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Ray Murrieta	Project: Drinking Water Analysis
Arizona Water Company - White Tanks 07-128	Project Number: 07128
220 E. 2nd Street	
Casa Grande, AZ85222	**Reported:** 04/16/15 08:48

5041231

CHAIN OF CUSTODY RECORD

LEGEND Technical Services, Inc.
www.legend-group.com

☐ 17631 N. 25th Avenue • Phoenix, AZ 85023 • (602) 324-6100 • Fax (602) 324-6101
☐ 4585 S. Palo Verde Rd, Ste 423 • Tucson, AZ 85714 • (520) 327-1234 • Fax (520) 327-0518

Page 1 of 1

Please Print Clearly

CLIENT INFORMATION

Client Name	Address	City	State	Zip	Phone	Fax or Email
Arizona Water Co	PO Box 11030	Casa Grande	AZ	85221	520 836 8715	520 836 3990

System Name	PWS#	Contact	P.O. No.	Fax Results ☒ QC Report ☐ EDD ☐
Off White Tanks	07-128	Ray Murrieta		Email Results ☐ Special Detection Limits ☐

IOC OPTIONS

IOC's I: Sb, As, Ba, Be, Cd, Cr, Hg, Ni, Se, Tl, CN, F
IOC's II (New Source): Sb, As, Ba, Be, Ca, Cd, Cr, Cu, Pb, Hg, Mg, Ni, Se, Na, Tl, Ca Hardness, Total Hardness, Alk, Asbestos, CN, F, Langelier, NO_2, NO_3, pH, SO_4, TDS, Temp (in field)

REQUESTED ANALYSES

Client's Sample Identification	Date	Time	POE # / DWR #	Compliance	No. of Containers	pH ✓ (Legend Use)	Collect	IOCs (see left)	IOCs II (see left)	Lead & Copper	Nitrate, Nitrite	Radiochemicals	524 (TTHM)	552 (HAA)	524 (VOCs)	SOCs 504	505	515	525	531	547	548	549	1613 (Dioxin)	Perchlorate	Bromate	Chlorite	LAB NO
BAE TANK	4-14	11am			3										X												01
BAE TANK	4-14	11am			1		X																				02
			TB		2																						03

RUSH
524.4 4/15/15

TO ENSURE COMPLETION OF ANALYSIS, SAMPLES MUST BE RECEIVED AT LEAST 6 HOURS PRIOR TO THE HOLD TIME EXPIRATION

Comments: Special Samples Not for Reporting to ADEQ

TURN AROUND TIME
☐ Standard 15 - 20 day
☐ Other _____
Laboratory Authorization Required for Rush

☐ Yes, I have followed the instructions provided by the laboratory for dechlorination of my samples.

SAMPLE CONDITION UPON RECEIPT		
No. of Containers	6	
Temperature	5.2°C	
Custody Seals	Y	(N)
Seals Intact	(Y)	N
Preserved	(Y)	N

	RELINQUISHED BY	Date	Time	SAMPLES RECEIVED BY	Date	Time
①	Sampler Signature: R. Tobin	4-14	1340	Signature: Erin Stevens	4/14	1340
	Sampler Printed Name: R. Tobin			Printed Name: Erin Stevens		
②	Sampler Signature	Date		Signature	Date	
	Sampler Printed Name	Time		Printed Name	Time	
③	Sampler Signature	Date		Signature	Date	
	Sampler Printed Name	Time		Printed Name	Time	

White- Lab Yellow- Client
FORM GEN-173 (6/06)

RUSH NOTICE W.O. #: 504031

*** Only verbal or preliminary results can be guaranteed on RUSHES

*****If sample(s) does not come in on day indicated by client, RUSH may not be available.

Company: Az Water - WT Phone: 602 294-2146

Contact: Regina Lynde

Prelim Due Date: _____ Final Due Date: _____

Analysis: 524

Number of Samples: 1 Date Samples Expected*****: 4/14/15

Matrix: DW Expiration Date: _____

Supervisor Approval Inorganics: _____ Specifics: _____

Metals: _____ Specifics: _____

Micro: _____ Specifics: _____

SOC: _____ Specifics: _____

VOC: B 4/13/15 Specifics: _____

Sub1: _____ Specifics: _____

Sub2: _____ Specifics: _____

Comments: 24 hr.

COST: _____ Project Manager: [signature]

RUSH Initiator: _____

FORM GEN-086.2 (02/15)

ARIZONA WATER COMPANY

PROJECT CLOSE-OUT NOTICE

PROJECT CLOSE-OUT DATE:		DIVISION/ SYSTEM:	P.V / W.T
		WORK AUTHORIZATION NUMBER:	ROUTINE

PREPARED BY

THE FOLLOWING RECORD REQUIREMENTS ARE ATTACHED:

1. W.A. FINAL COMPLETION CHECKLIST..... _____
2. FINAL AUTHORIZATION TO BILL HAS BEEN SENT TO PHOENIX ON _____ ..... _____
   Date

WA FINAL COMPLETION CHECK LIST

FACILITIES RECORDS
- ☐ Valve Records – Main & Blow-off
- ☐ Fire Hydrant Records – Include Flow Test Data

ABANDONED FACILITIES
- ☐ Property Disposal Report (PDR)
- ☐ Voided Valve Records
- ☐ Voided Fire Hydrant Records

COMPLETION DOCUMENTS
- ☐ Public Fire Hydrants Installation Request (E-3-23)
- ☐ Notice of Fire Hydrant Installation (E-5-5)
- ☐ Permits Acquired By Division Office
- ☐ Bill Of Sale (E-3-36-3)
- ☐ Final Acceptance of Facilities Letter (E-3-36-5)

ON-SITE PHOTOGRAPHS
- ☐ To Show All New Installations At Completion Of W.A.

IF NO ATB IS REQUIRED

- ☐ ADEQ DATA REQUIRED WITH ECC APPLICATION
  NOTE: "Footage Tested" to match total pipe installed ("343" ONLY)

AS-BUILT DRAWING
- ☐ Label Cover Sheet "AS BUILT"
- ☐ Pipe footage and size to be listed on AS-BUILT cover sheet ("343" ONLY)
- ☐ Printed name of AS-BUILT preparer
- ☐ ONLY Changes to original construction drawing to be marked in red on AS-BUILTs, NOTE: Include any additional Air Release Valves

FORMS
- ☐ Well Record (E-5-7)
- ☒ Storage Tank Record (E-5-8)
- ☐ Booster Pump Record (E-5-9)
- ☐ Hydropneumatic Tank Record (E-5-10)

OPERATIONS & MAINTENANCE MANUALS
- ☐ Electric S.E.S. & M.C.C.
- ☐ S.C.A.D.A./Controls
- ☐ Treatment Facilities

- ☐ AOC (Approval of Construction)
- ☒ Placed in Service Notice
- ☒ Daily Progress Reports

I certify that construction on the above Work Authorization is complete and for which all materials have been accounted. I further certify that I have inspected the work and determined it s satisfactory and in accordance with Company specifications.

Division Manager, Operations Superintendent, or Project Engineer *(signature)* _____ Date of Notice _____

ATTACH TO CONSTRUCTION & ENGINEERING FILE COPY OF WORK AUTHORIZATION

TO: ACCOUNTING DEPARTMENT (ACCOUNTANT II)
CC: ENGINEERING DEPARTMENT (ENG. SEC.)

ARIZONA WATER COMPANY

CONSTRUCTION PLACED IN SERVICE NOTICE

WORK AUTHORIZATION NO.: BAE # 1 Tank Coating

DIVISION: CG/WT

DATE PLACED IN SERVICE: 4 | 13 | 2015

CONTRACT NO:

FOR PURPOSES OF *MODIFIED ACCELERATED COST RECOVERY SYSTEM*, AN ASSET IS "PLACED IN SERVICE" WHEN IT IS IN A CONDITION OR STATE OF READINESS AND AVAILABILITY FOR A SPECIFICALLY ASSIGNED FUNCTION, WHETHER IT BE FOR USE IN A TRADE OR BUSINESS, OR FOR THE PRODUCTION OF INCOME.

I CERTIFY THAT THE ASSET(S) CONSTRUCTED PURSUANT TO THE PROVISIONS OF THE ABOVE-REFERENCED WORK AUTHORIZATION ARE READY FOR SERVICE AS OF THE DATE SHOWN ABOVE.

Division Manager or Operations Superintendent
(signature)

4-27-2015
Date

SUBMIT ORIGINAL TO ACCOUNTING DEPARTMENT

A-1-3-1
FKS 11/24/11

WA 1-5324

Western Group Rate Case

Exhibit FKS-1

5324 Phone System

ARIZONA WATER COMPANY

CONSTRUCTION BUDGET REQUEST

SPECIFIC PROJECT

BUDGET YEAR: 2015 DIVISION: Phoenix

PROJECT NO.: 1-0001 SYSTEM: Phoenix

DESCRIPTION OF FACILITIES TO BE CONSTRUCTED (ATTACH MAP OR SKETCH)

Replace Phoenix, Casa Grande and Coolidge phone systems with a Shoretel Voice Over IP system.

FACTORS JUSTIFYING PROJECT (ATTACH ANY SUPPORTING DOCUMENTS SUCH AS PRESSURE RECORDINGS, ETC.)

The current Phoenix phone system is an analog system that is 15 years old and part of the system runs on Windows NT which hasn't been supported by Microsoft for many years. The phone system itself is no longer supported by the manufacturer and replacement parts have become difficult to obtain. In the last quarter of 2014 the phone system has failed on three occasions causing disruption of company business. Installing a new phone system will improve reliability of the phone system and will support improvements in technology. The phone systems in the Casa Grande and Coolidge offices are experiencing lock-up issues that require re-booting the system and several of the handsets need to be replaced due to poor call quality. By moving to a Voice Over IP system, it will allow the company to tie the Phoenix office and division offices together allowing call transferring between locations, which will make customer call handling more efficient. Additionally, this type of system will allow call overload at the Casa Grande office to be directed to the Coolidge office enabling a more efficient use of Customer Service Resources.

DESCRIPTION OF EXISTING FACILITIES

Inter-tel phone system and handsets.

ARIZONA WATER COMPANY

CONSTRUCTION BUDGET REQUEST

PERMITS REQUIRED None
COST/BENEFIT ANALYSIS
MATERIALS TO BE RETIRED Inter-tel phone system
PROJECT SCHEDULE (ATTACH GANTT CHART)
ESTIMATE OF CONSTRUCTION COST (ATTACH COST ESTIMATE WORKSHEET) $85,000

ENGINEER APPROVAL: _____ Date: _____

MANAGER APPROVAL: _____ Date: _____

VP – ENGINEERING APPROVAL: _____ Date: _____

ARIZONA WATER COMPANY

WORK AUTHORIZATION - DETAIL SHEET

W.A. NUMBER:
P.E. NUMBER:
BUDGET ITEM NO.:
SHEET NO.:

RETIREMENT PROPERTY UNITS	PLANT PROPERTY ACCOUNT	UNIT DESCRIPTION	QUANTITY	YEAR INSTALLED AND W.A. NUMBER
	397	Phone system		1999 1-2606

PROJECT DESCRIPTION:

Replace Phoenis, Casa Grande, Coolidge, White Tank and Ajo phone systems

	DESCRIPTION	PLANT PROP ACCT	QUANTITY	UNIT COST	TOTAL
CONTRACT WORK	Installation labor and project management	397	96	$ 111.00	$ 10,656
	User Training	397	8	115.00	920
	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					$ 11,576
MATERIALS	ShoreGear 90	397	2	$ 2,366.05	$ 4,732
	ShoreGear 50	397	1	1,576.00	1,576
	ShoreGear T1k	397	1	2,761.05	2,761
	ShoreTel IP Phone IP420	397	38	149.31	5,674
	ShoreTel IP Phone IP480g	397	39	291.51	11,369
	Dell PowerEdge R320	391	1	2,551.50	2,552
	Extension and Mailbox License	397	77	158.00	12,166
	ShoreWare Operator Communicator	397	1	470.00	470
	Miscellaneous Phone System Equipment and Software	397	1	9,064.00	9,064
	Switches (48 port and 24 port)	391	2	2,700.00	5,400
TOTAL MATERIALS					$ 55,764
LABOR					
	TESTING FEE				
	PERMIT FEE				
	SURVEY FEE				
	FIELD INSPECTION	397			8,500
	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					$ 8,500
SUBTOTAL - CONTRACT WORK, MATERIALS, AND LABOR					$ 75,840
OVERHEAD					9,100
TOTAL	REFUNDABLE PORTION ☐	NON-REFUNDABLE PORTION ☐		**COST ESTIMATE**	$ 84,940

COPPER • STATE COMMUNICATIONS

CONNECTING BUSINESS TO TECHNOLOGY!

What Differentiates Copper State Communications from the Competition?

OUR PEOPLE

- Our company is financially sound with tenure; we have been in business since 1982.
- Copper State Communications has over 950 years of combined technical experience (as of 8/1/14).
- We have the state of Arizona covered with offices in Phoenix, Tucson and Flagstaff.
- All of our friendly technicians and sales people undergo continuous educational and training courses on existing and emerging technologies.

OUR SERVICE

- Every solution we design is customized to fit your unique needs.
- We offer expense audit management services on all voice and internet bills.
- Copper State Communications assigns a Project Manager to every phone system installation and has a dedicated provisioning team for all voice, internet, and carrier services we order on your behalf.
- Our expert staff will install, set up your equipment and coordinate your carrier services as well as train your staff on proper use and best practices to optimize productivity.
- Various maintenance options are available for your phone system, even if you didn't buy it from us.
- Our fully stocked warehouses throughout the state, mean that if your equipment goes down, we can replace it.
- All service vehicles have GPS, which ensures we can get a technician to you quickly in case of emergency.
- We guarantee a 2 hour emergency response time in the Metro areas. However, since times are monitored, chances are we will get to you much faster:
  - Phoenix- 57 minutes and 37 seconds
  - Tucson- 40 minutes and 53 seconds
  - Flagstaff- 41 minutes and 56 seconds

  (Statistics based on a 2 year average of response times ending June 2014)
- We monitor the success of your solutions and work to continually optimize all systems for maximum efficiency and productivity.

OUR PRODUCTS

- Copper State Communications represents multiple hardware manufacturer's and over 65 voice, internet and carrier service providers including:

AVAYA ShoreTel TOSHIBA

Aerohive NETWORKS Clear there. CLEARLY CONNECTED GANZ twtelecom

CenturyLink Channel Alliance Level(3) Integra windstream

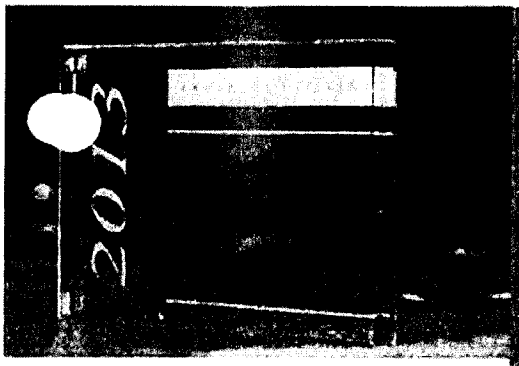
EarthLink BUSINESS MegaPath XO verizon Sprint

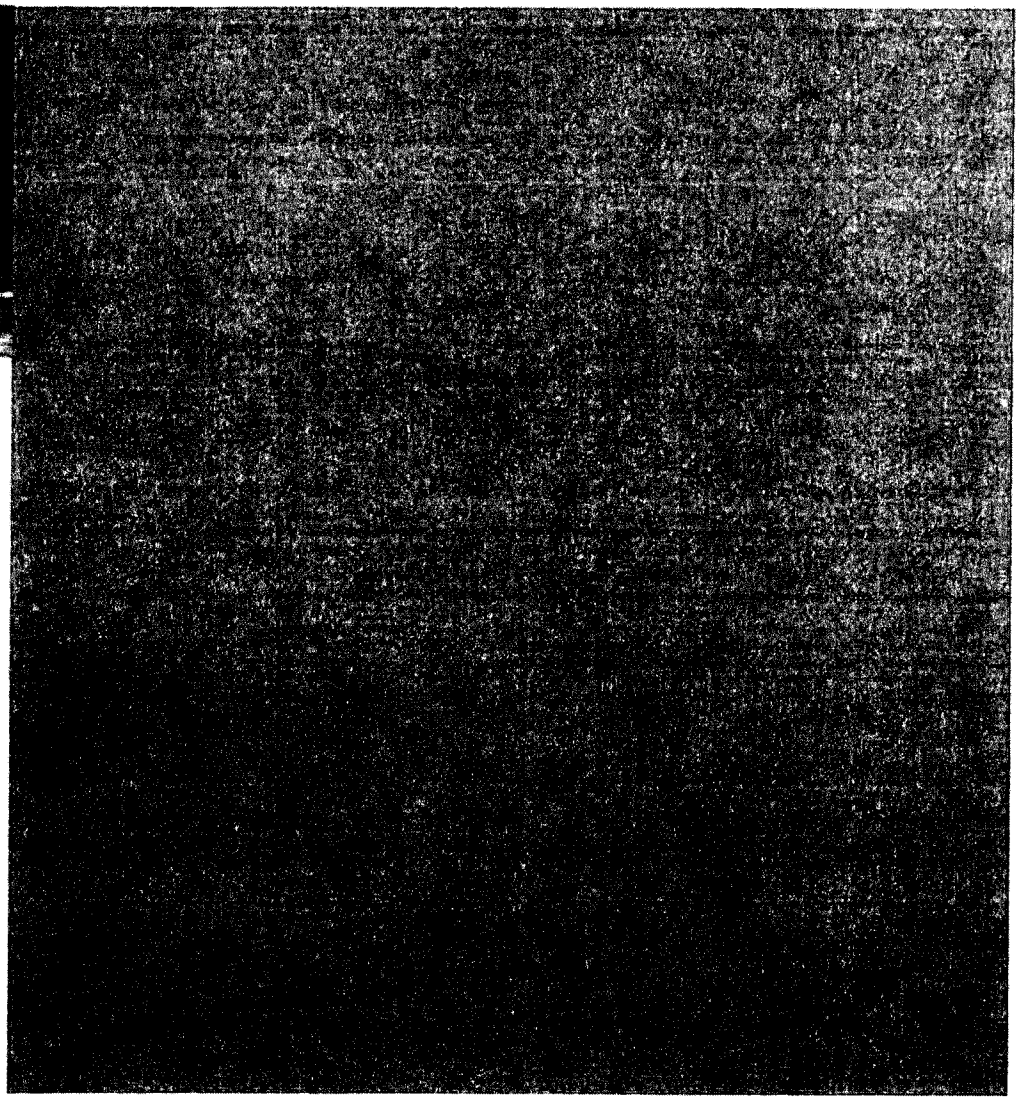
FROST & SULLIVAN

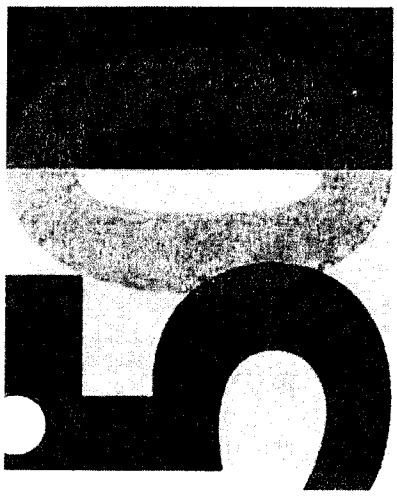
2013

ShoreTel®

2013 North American Unified Communications and Collaboration Company of the Year Award







Company of the Year Award
Unified Communications and Collaboration
North America, 2013

Frost & Sullivan's Global Research Platform

Frost & Sullivan is in its 50th year in business with a global research organization of 1,800 analysts and consultants who monitor more than 300 industries and 250,000 companies. The company's research philosophy originates with the CEO's 360-Degree Perspective™, which serves as the foundation of its TEAM Research™ methodology. This unique approach enables us to determine how best-in-class companies worldwide manage growth, innovation and leadership. Based on the findings of this Best Practices research, Frost & Sullivan is proud to present the 2013 North American Company of the Year Award in Unified Communications to ShoreTel.

Key Industry Challenges

The enterprise communications market is undergoing multiple transitions that are presenting significant challenges to all market participants. Growth rates in the mature premises-based telephony systems market have declined. With few greenfield opportunities available market participants are turning to each other's customer bases for growth and market share gains. This has compelled vendors to revamp competitive strategies in order to ensure long-tem survival and growth.

The weak global economy of the recent years further restricted growth in the telecom market. The recovery in 2013 has been slow and most vendors have been unable to show significant growth in the first half of the year. While other regions have been more impacted, North American vendors with international exposure have suffered too.

One of the key transformational trends in the telecom industry is the migration to software-based communications and the resulting proliferation of advanced, IP-based communications tools. Today, businesses use a plethora of communications applications including: telephony; e-mail; voice and unified messaging; presence, instant messaging and chat; audio, web, and video conferencing; content and file sharing; mobility; and more. Furthermore, the essential role of communications technologies is changing. Previously siloed communications technologies are now becoming more tightly integrated with productivity and business-process software and are thus becoming ever more critical enablers of operational efficiencies and business agility.

As a result of these trends, the pace of technology innovation has accelerated challenging vendors to continually expand and enhance their portfolios in order to stay competitive. Greater choice and intense competition have given customers more power in the purchasing process, forcing vendors to be more creative with how they position and price their solutions. This has put considerable pressure on their resources and many have struggled to maintain profitable growth.

© 2013 Frost & Sullivan

An important facet of the larger industry shift to software-based solutions is the growing migration to cloud communications. Customers have gained considerable awareness of the benefits of cloud business models and are actively exploring hosted IP communications as a viable alternative to existing premises-based implementations. Fiscal uncertainty, coupled with rapid technology evolution and accelerated technology refresh cycles, have increased the risks associated with customer-owned technology investments. Therefore, many businesses are looking to avoid locking into risky CAPEX investments in premises-based solutions. Instead, they are switching to hosted communications for the benefit of predictable monthly charges, which can be adjusted based on actual usage and changing capacity requirements. Furthermore, outsourced solutions provide access to a larger pool of technology expertise and enable businesses to reduce the costs associated with hiring, training, and retraining skilled IT staff.

Vendors in the stagnant premises-based telephony market are compelled to explore growth opportunities with the cloud delivery model and have launched multi-tenant and multi-instance solutions for customers that wish to outsource their communications infrastructure. Going forward, the cloud communications market will represent the new battleground for communications vendors.

Frost & Sullivan recognizes that a company that has demonstrated competitive strategy excellence has properly identified industry trends and has positioned itself for long-term growth through sustainable strategies that deliver superior customer value. Such a forward-thinking provider offers solutions that help enhance user productivity, improve operational efficiencies and accelerate business processes. Its solutions are also easy to deploy and manage and provide investment protection through scalability, resiliency, and reliability. A leader is also fully committed to continually enhancing product and feature functionality to address evolving customer needs. Finally, fiscal discipline and strict cost management are key elements of a successful competitive strategy execution that enable the leader to better address tough macro-economic times, as well as the specific challenges of a maturing industry.

Key Benchmarking Criteria for Company of the Year Award

For the Company of the Year Award, the following criteria were used to benchmark ShoreTel's performance against key competitors:

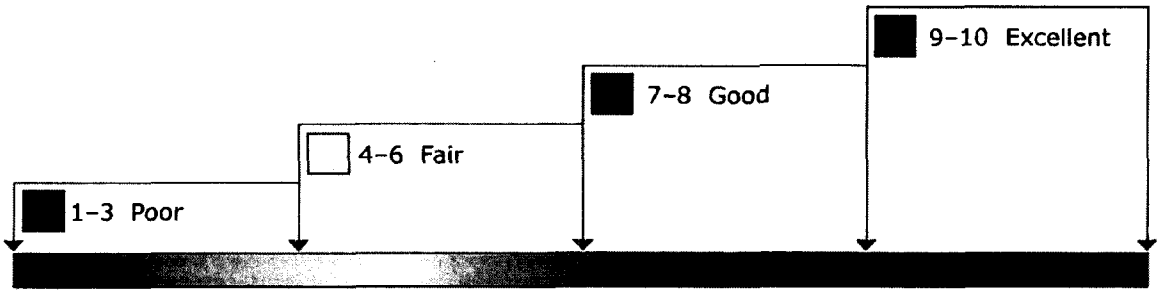
- Growth Strategy Excellence
- Growth Implementation Excellence
- Degree of Innovation with Products and Technologies
- Leadership in Customer Value
- Leadership in Market Penetration

© 2013 Frost & Sullivan

Decision Support Matrix and Measurement Criteria

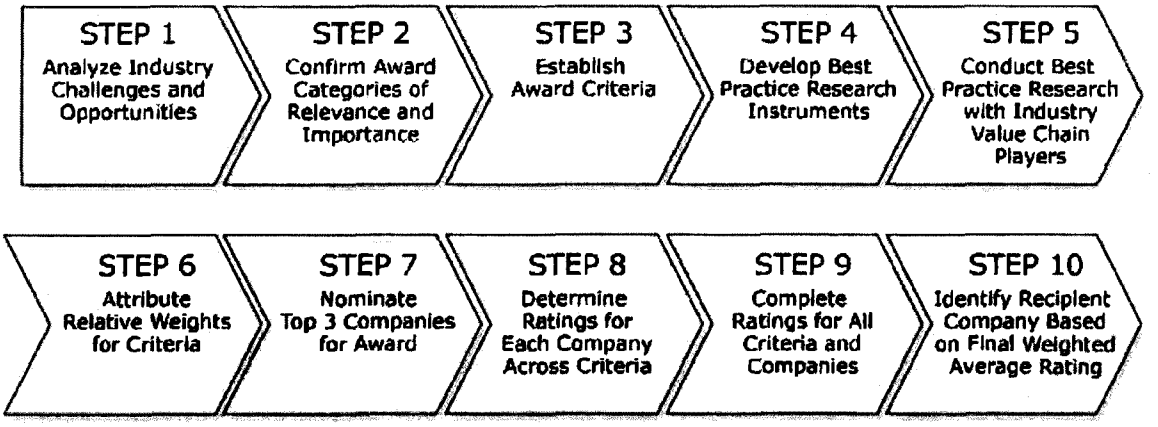
To support its evaluation of best practices across multiple business performance categories, Frost & Sullivan employs a customized Decision Support Matrix (DSM). The DSM is an analytical tool that compares companies' performance relative to each other with an integration of quantitative and qualitative metrics. The DSM features criteria unique to each Award category and ranks importance by assigning weights to each criterion. The relative weighting reflects current market conditions and illustrates the associated importance of each criterion according to Frost & Sullivan. Fundamentally, each DSM is distinct for each market and Award category. The DSM allows our research and consulting teams to objectively analyze each company's performance on each criterion relative to its top competitors and assign performance ratings on that basis. The DSM follows a 10-point scale that allows for nuances in performance evaluation; ratings guidelines are shown in Chart 1.

Chart 1: Performance-Based Ratings for Decision Support Matrix



This exercise encompasses all criteria, leading to a weighted average ranking of each company. Researchers can then easily identify the company with the highest ranking. As a final step, the research team confirms the veracity of the model by ensuring that small changes to the ratings for a specific criterion do not lead to a significant change in the overall relative rankings of the companies.

Chart 2: Frost & Sullivan's 10-Step Process for Identifying Award Recipients



Best Practice Award Analysis for ShoreTel

The Decision Support Matrix, shown in Chart 3, illustrates the relative importance of each criterion for the Company of the Year Award and the ratings for each company under evaluation. To remain unbiased while also protecting the interests of the other organizations reviewed, we have chosen to refer to the other key players as Competitor 1 and Competitor 2.

Chart 3: Decision Support Matrix for Company of the Year Award

Measurement of 1–10 (1 = lowest; 10 = highest)	**Award Criteria**					
	Growth Strategy Excellence	Growth Implementation Excellence	Degree of Innovation with Products and Technologies	Leadership in Customer Value	Leadership in Market Penetration	**Weighted Rating**
Relative Weight (%)	**20%**	**25%**	**20%**	**20%**	**15%**	**100%**
ShoreTel	10.0	10.0	10.0	10.0	9.0	9.9
Competitor 1	9.5	9.5	10.0	10.0	10.0	9.8
Competitor 2	9.0	9.0	10.0	10.0	10.0	9.6

Criterion 1: Growth Strategy Excellence

ShoreTel has founded its growth strategy on the value proposition of delivering "brilliantly simple" communications solutions to the business market. Frost & Sullivan research reveals that this proposition resonates well with customers of all sizes, but it has a particularly strong appeal in the small and medium-size business (SMB) segment, where skilled IT resources are scarcer. The main tenets of ShoreTel's growth strategy and key success factors include its unique architecture, strong focus on innovation, channel expansion, and the ability to deliver a highly competitive premises-based and a cloud alternative to its customers.

From the beginning, ShoreTel focused its solutions on addressing the specific needs of the distributed enterprise. Compared to the more complex hub-and-spoke architectures of the incumbent vendors, ShoreTel's unique distributed architecture provides a flexible, resilient, scalable and cost-effective alternative to businesses with multiple, geographically dispersed sites. Frost & Sullivan analysis confirms that this differentiated approach has enabled ShoreTel to deliver superior value to this particular type of customers and has given ShoreTel a strong competitive advantage in this previously underserved market segment.

Over the years, ShoreTel has continued to innovate and expand its IP communications portfolio. In addition to scaling up its core IP PBX platform, the company has added a number of advanced applications and capabilities to its flagship IP telephony and voice messaging solution, including presence, instant messaging (IM)/chat, multichannel conferencing, mobility, soft clients, third-party integrations and more. With the move to unified communications, it has enabled access to its suite of applications via phone, PC/Mac and mobile interfaces. Today, it delivers a compelling stack of unified communications capabilities to its customers.

An important factor in ShoreTel's growth strategy is its channel expansion. This has enabled the vendor to extend its customer reach and geographic footprint and to compete more successfully against its larger competitors. ShoreTel sells 100 percent through the channel, which helps eliminate conflicts of interest and enables partners to fully leverage existing sales opportunities and deliver greater value to end-user organizations. The Champion Partner Program comprised of Authorized, Silver, Gold and Platinum partners offers compelling benefits and incentives to ShoreTel resellers.

In line with the industry's move to cloud communications, ShoreTel acquired hosted IP communications provider M5, which is now the ShoreTel Sky arm of the company. As the premises-based telephony market matures and growth rates decline, the cloud business provides ShoreTel with new growth opportunities and the ability to offer its customers additional deployment options. ShoreTel customers can choose to deploy ShoreTel's distributed architecture on the premises, subscribe to cloud services or implement a hybrid solution with a mix of both.

ShoreTel can continue to capitalize on certain customers' continued preference to deploy their communications infrastructure on the premises—whether for superior features and functionality, greater security and control or the ability to customize and integrate their system more tightly with other solutions. However, as more customers adopt cloud communications for the flexibility to adjust capacity and features on-demand, gain access to a larger pool of technology expertise or simply to better focus on their core business, ShoreTel is prepared to accommodate their needs. A third option—a hybrid architecture—is often a good fit for distributed organizations with both large and small sites.

Frost & Sullivan firmly believes that ShoreTel has executed on its competitive strategy, and now has the ability to satisfy a wide berth of customer requirements.

Criterion 2: Growth Implementation Excellence

Today, ShoreTel has more than 2.8 million licenses in use and more than 28,000 business customers worldwide, more than 80 percent of which are in the North American region. ShoreTel has gained significant traction in the North American SMB segment and continues to grow its market share in the total North American IP telephony market. In 2012 and the first half of 2013, ShoreTel is one of the top six market share leaders with 3.3 percent share

of IP telephony licenses shipped. While many of its larger competitors are losing share to each other or Microsoft, ShoreTel has held strong and maintained its share of shipments and revenues in 2012 and 2013.

Frost & Sullivan competitive analysis reveals that ShoreTel's competitors have struggled to grow over the past six years, and some are no longer in existence. ShoreTel, on the other hand, has grown its IP telephony shipments by about 13 percent over the period from 2007 to 2013, and its revenues by about 11 percent over the same time period. In 2013, most telephony vendors reported declining shipments and revenues in the first quarters. ShoreTel reported consistent revenue growth year-over-year in all four quarters of its fiscal 2013 (which includes Q1 and Q2 of calendar 2013). It ended its fiscal 2013 (on June 30, 2013) with a record $313.5 million, up 27 percent from fiscal 2012, which is clear evidence of its sound competitive strategy and implementation excellence. ShoreTel's financial performance is all the more impressive in view of its competitors' declining premises-based businesses and the overall stagnant growth rates in the entire North American telephony market.

ShoreTel Sky, the company's cloud division, is also one of the top performers in its industry. In 2012, ShoreTel Sky held the fourth largest share of 4.5 percent of North American hosted IP telephony and cloud UCC revenues and ranked ninth in terms of users with 2.6 percent share of the total installed base in the region. ShoreTel Sky also reported consistent growth and improved metrics throughout fiscal 2013. Fiscal 2013 revenue was up 26 percent year-over-year on an organic basis. The installed base grew at double digits year over the first two quarters of 2013. The company also reported an increase in the average number of seats per customer, stable average revenue per user and low churn rates.

ShoreTel has demonstrated superior competitive strategy implementation than most vendors in the North American market. Its execution has been a balanced combination of growth strategies and fiscal discipline, which have resulted in profitable growth.

Criterion 3: Degree of Innovation with Products and Technologies

ShoreTel continued to innovate in 2013 in spite of macro-economic challenges and slow industry growth. It launched several new products and product enhancements that will enable it to provide greater value to its customers going forward.

In the beginning of the year it launched the Call Flow Editor feature for the ShoreTel Sky Portal, a web-based VoIP management application. It allows customer staff to make changes to auto attendants, ring groups, time-of-day routing and other settings, which can help improve the user experience and also streamline or enhance specific business processes. Also early in the year, ShoreTel Enterprise Contact Center 8.0 was released, delivering feature enhancements to the e-mail and chat capabilities of the multi-channel solution.

Three significant announcements in the year included the release of ShoreTel Mobility 6 for iOS users, followed by ShoreTel Mobility 7 for iOS and Android users, and ShoreTel Conferencing for iOS users. ShoreTel Mobility 6 and 7 provide a native user interface that enables users to place and receive calls with their business identity, exchange instant messages, listen to voicemail messages and initiate multi-party calls by dragging names from enterprise directories with a swipe gesture. With ShoreTel Mobility 7, the new "Today" application integrates with the native calendar of an Android or iOS device and enables a one-click access to a conference call. Another key feature of the latest release is the ability to use the user's personal ID with non-business calls. ShoreTel Conferencing for iOS allows users to share presentations on their iPads and iPhones and view content on their colleagues' PC and MAC desktop/laptop computers.

Later in the year, ShoreTel introduced ShoreTel SBE 100, an innovative solution for businesses with up to 100 users. It is an integrated hardware and software package that is very easy to set up and manage, even by customer staff with no technical skills, yet provides the reliability and scalability of a business-grade solution. With a software upgrade, the solution can scale up to thousands of users should the customer require additional capacity. ShoreTel SBE 100 features advanced capabilities such as desktop call control and unified messaging (access to e-mail, voicemail and fax from the e-mail box). Contact center and collaboration capabilities can be added a-la-carte.

ShoreTel also launched a new series of IP phones and business-grade DECT phones. The ShoreTel 400 series of IP phones feature visual voice mail, an advanced user interface and built-in diagnostics. The new DECT phones feature the full set of ShoreTel deskphone capabilities, including directory access and multiple line appearances.

Arguably the most interesting announcement from ShoreTel in 2013 and the most unique product it launched to the marketplace this year is the ShoreTel Dock for iPhone and iPad. When paired with ShoreTel Mobility, the dock transforms an iOS device into a full-featured desk phone. With the Dock, the mobile device stays fully charged during the day and can be used with a high-quality speakerphone, a convenient dial pad, and a familiar handset. Since ShoreTel Mobility works over WiFi and cellular, the dock can be used in a variety of office settings.

ShoreTel's multiple product launches and enhancements in 2013 evidence its continued focus on innovation and ability to promptly address new customer needs.

Criterion 4: Leadership in Customer Value

ShoreTel's distributed IP telephony architecture offers a compelling balance of cost efficiencies, scalability, resiliency and functionality to multi-site businesses. Frost & Sullivan notes that unlike incumbent vendors, ShoreTel built its solution with the distributed enterprise in mind from the ground up; so ShoreTel's customers do not need to deal with the complexity and cost of adjusting legacy technologies for new use cases. As ShoreTel's

solution evolves, new capabilities are added to a core architecture that already has the foundation to meet the key needs of that particular customer segment.

ShoreTel's solution is also designed to be very easy to deploy, manage and use. Customers attest to ShoreTel's leadership in delivering "brilliantly simple" solutions, which is a key factor in the SMB segment, but is also becoming increasingly important in the large enterprise segment as businesses choose to focus their resources on their core operations in order to be more competitive.

ShoreTel also delivers considerable customer value through a rich set of IP telephony and UC features and capabilities. Its customers can choose to deploy voice, voice mail and unified messaging, presence and IM, a UC client, conferencing, mobility, and more. ShoreTel also integrates its applications with popular software platforms such as Outlook and Sametime calendars and e-mail, CRM and ERP software, partner-provided video conferencing systems and more. Continued innovation in key areas such as mobility and conferencing enables ShoreTel to respond promptly to evolving customer demand.

Finally, Frost & Sullivan finds that ShoreTel brings superior value to customers by giving them a choice of a deployment model. They can deploy their communications solution on their premises or in the cloud. As more businesses choose to outsource their communications, they will see significant value in having a partner that offers both options. ShoreTel's ability to offer both types of solutions not only allows businesses to make the right choice today, but also gives them the flexibility and piece of mind that they can switch in the future, or deploy a hybrid architecture, if that best suits their needs.

Criterion 5: Leadership in Market Penetration

ShoreTel has proven to be a nimble competitor that promptly addresses market trends and customer needs, which has enabled it to grow and gain market share. It has climbed steadily to the top sixth market share position in terms of North American IP telephony line license shipments and is well positioned to grow its share as competitors struggle. Its growth rates and overall performance over the years and throughout the tough 2013 have been outstanding.

ShoreTel Sky ranks fourth in terms of revenue in the North American hosted IP telephony market and reported double-digit growth rates in 2013 so far. It has one of the strongest track records in this market and has grown consistently over the years.

Both ShoreTel and ShoreTel Sky are well positioned to remain among the top competitors in their respective markets and eventually increase their penetration.

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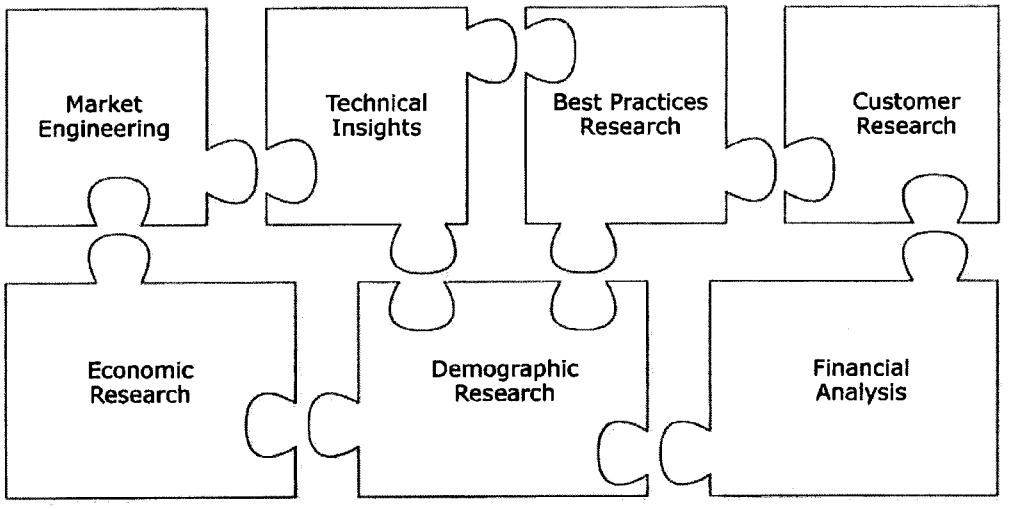
Conclusion

Frost & Sullivan's independent analysis of the Unified Communications market clearly shows that with a sound growth strategy in place, a strong track record of successful execution and unwavering focus on innovation and customer value, ShoreTel is well positioned to continue to grow its revenues and gain market share. Frost & Sullivan is proud to present the 2013 Company of the Year Award in the North American Unified Communications and Collaboration Market to ShoreTel for its outstanding accomplishments.

Critical Importance of TEAM Research

Frost & Sullivan's TEAM Research methodology represents the analytical rigor of our research process. It offers a 360-degree view of industry challenges, trends, and issues by integrating all seven of Frost & Sullivan's research methodologies. Our experience has shown over the years that companies too often make important growth decisions based on a narrow understanding of their environment, leading to errors of both omission and commission. Frost & Sullivan contends that successful growth strategies are founded on a thorough understanding of market, technical, economic, financial, customer, best practices, and demographic analyses. In that vein, the letters T, E, A and M reflect our core technical, economic, applied (financial and best practices) and market analyses. The integration of these research disciplines into the TEAM Research methodology provides an evaluation platform for benchmarking industry players and for creating high-potential growth strategies for our clients.

Chart 4: Benchmarking Performance with TEAM Research

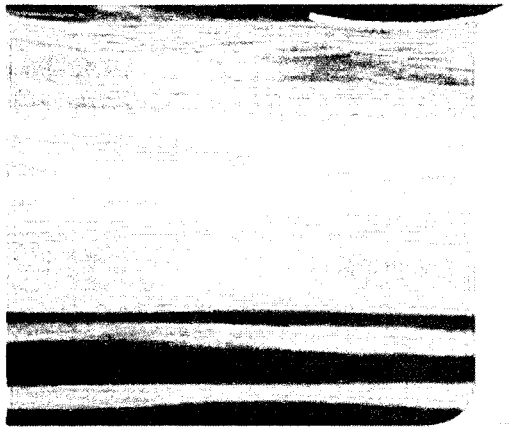


About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, enables clients to accelerate growth and achieve best-in-class positions in growth, innovation and leadership. The company's Growth Partnership Service provides the CEO and the CEO's Growth Team with disciplined research and best-practice models to drive the generation, evaluation and implementation of powerful growth strategies. Frost & Sullivan leverages 50 years of experience in partnering with Global 1000 companies, emerging businesses and the investment community from more than 40 offices on six continents. To join our Growth Partnership, please visit http://www.frost.com.

ShoreTel

Brilliantly simple



Introducing ShoreTel IP 400 Series Phones

ShoreTel
Brilliantly simple

ShoreTel offers a wide array of choices for users

Multiple devices

Multimedia

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ShoreTel
Brilliantly simple

Including a wide selection of desktop devices

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ShoreTel
Brilliantly simple

Introducing the New ShoreTel IP 400 Series Phones

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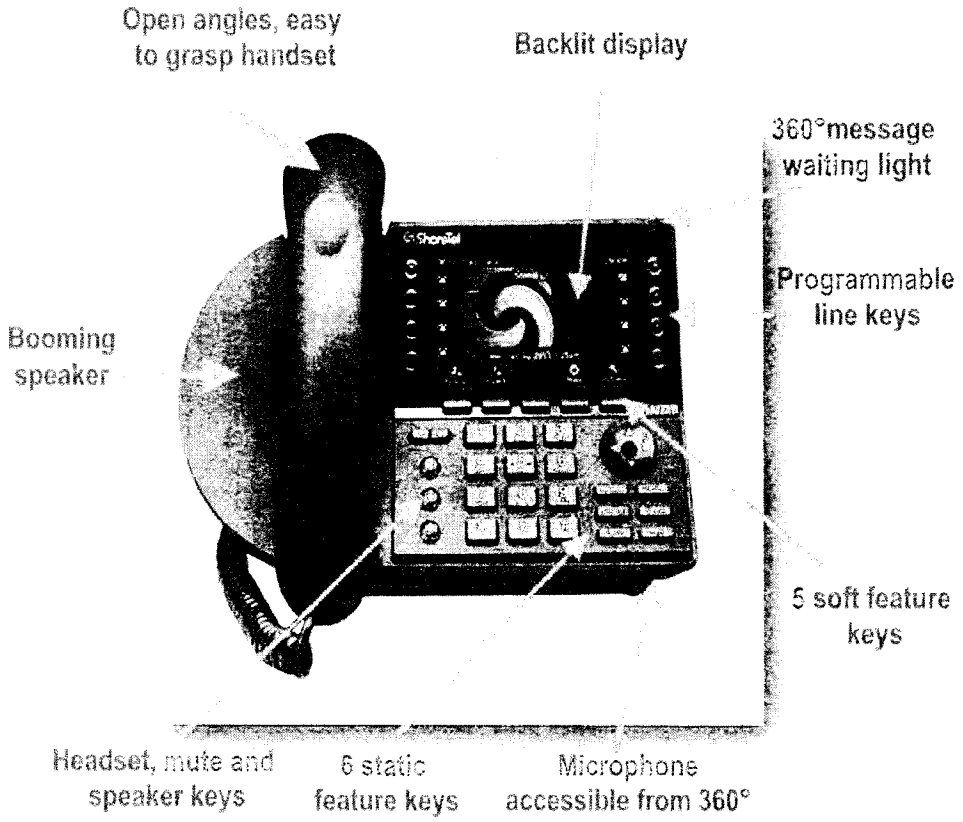
ShoreTel
Brilliantly simple

Designed by phone users for the best user experience

SIGHT: Visually appealing
- Unique angular design
- Concave profile keeps keys horizontal and display vertical

TOUCH: Tactile handset
- Contoured grip
- Finger notch
- Balanced weight
- Easily rests on shoulder

SOUND: Unmatched clarity
- Wideband audio
- 7 versus 3 octaves of range
- High gain microphones
- Booming speakerphone



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ShoreTel
Brilliantly simple

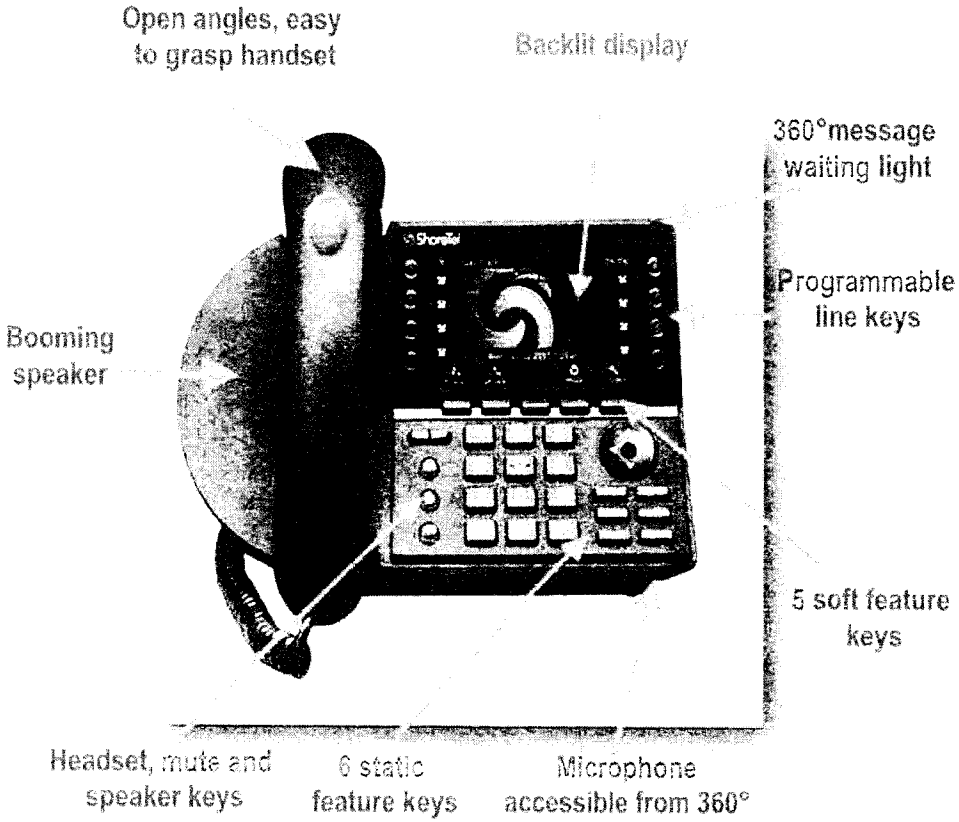
Incorporates new functionality requested by users

VISUAL VOICE MAIL
- Play voice mail in any order
- Intuitive user interface

EXTENDED FEATURES:
- More info in directory and history
- More call appearance buttons
- More soft feature keys

BUILT IN DIAGNOSTICS
- Network tools and log file capture for faster issue resolution

DEPLOYMENT FLEXIBILITY:
- Support for ShoreTel Sky cloud services in early 2014



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ShoreTel IP Phone 485g

BACKLIT COLOR SCREEN

8 LINE KEYS

EXPANDED CALL HISTORY

VISUAL VOICE MAIL

INTEGRATED 10/100/1000 NETWORK

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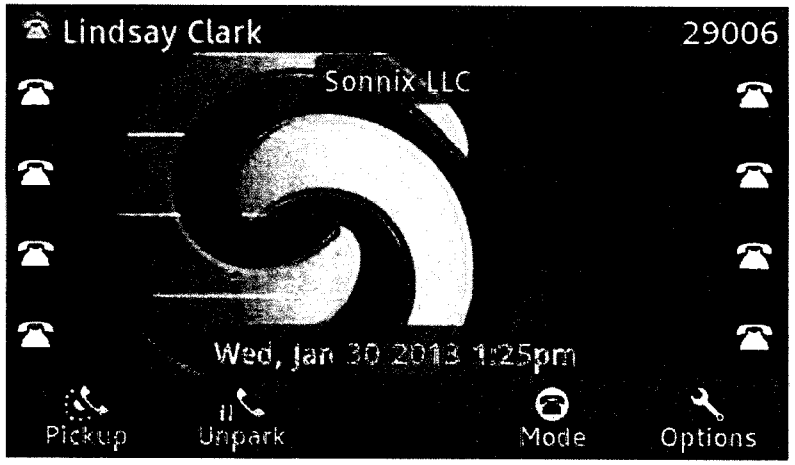
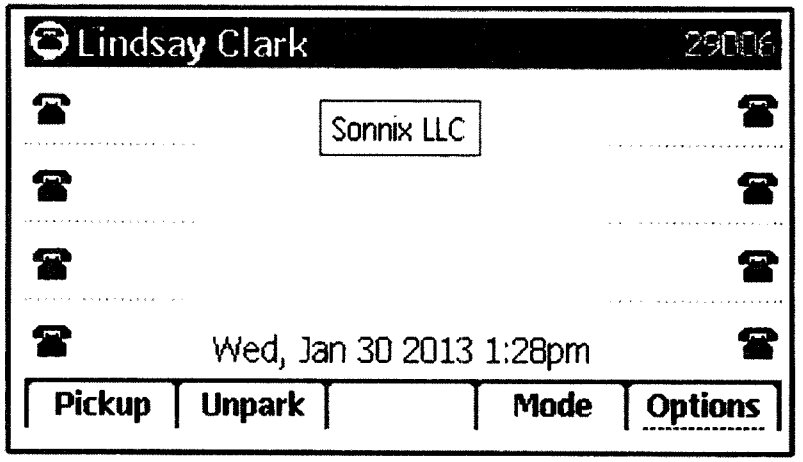
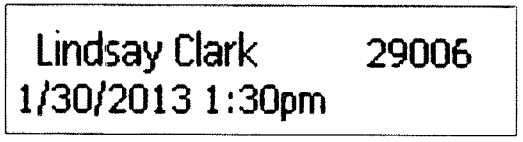
ShoreTel
Brilliantly simple

Screen Shots







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ShoreTel
Brilliantly simple

Questions

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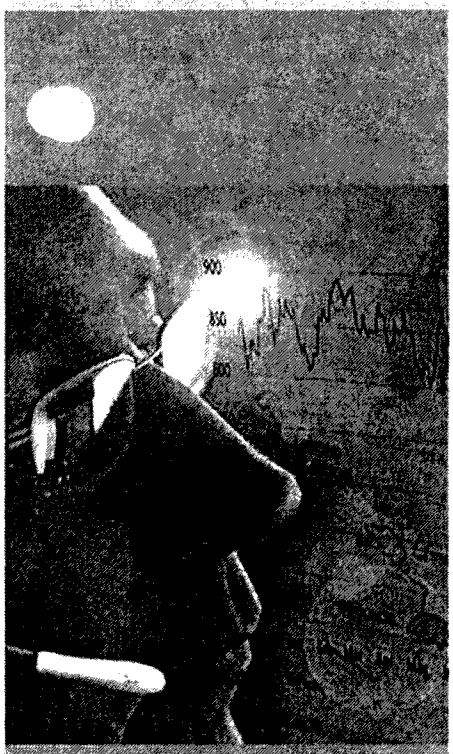

AVAYA

The Power of We™

Ethernet Switch Product Feature Comparison

The Avaya Ethernet Switch product line provides complete coverage ranging from entry-level branch office through premium high-performance wiring closet, to campus core and data center applications. Our continuous improvement program has led to a number of pioneering products and capabilities. Recent development includes the introduction of the 'Unified Access' solution, leveraging the high performance data plane of the ERS 8800 and the scalable control plane of the WLAN 8100 Series.

The Avaya Ethernet Switch portfolio:

- Virtual Services Platform 9000
- Ethernet Routing Switch 8800
- Ethernet Routing Switch 8300
- Virtual Services Platform 7000 Series
- Ethernet Routing Switch 5000 Series
- Ethernet Routing Switch 4000 Series
- Ethernet Routing Switch 3500 Series
- Ethernet Routing Switch 2500 Series

Core Ethernet Switching

The core plays a pivotal role in determining overall network availability and performance.

Positioned at the heart of the network, core Ethernet Switches provide the aggregation point between users (connected to the Access Switches) and applications (running to the data center infrastructure). 'Switch Clustering' is an Avaya capability that delivers simplified always-on resiliency, extending beyond just the Switches to empower true end-to-end application availability that clearly differentiates the Avaya strategy. The 'Distributed Top-of-Rack' capability delivers improved application performance by reducing the latency of server-to-server transactions. The key to our competitive advantage in the LAN Switching segment is our field-proven ability to create more resilient networks that need fewer and less complex elements, and our network design and build approach that ensures delivery of the highest levels of performance and

reliability. Avaya is again leading the market with the development of a true end-to-end network fabric capability; our 'Fabric Connect' leverages the Shortest Path Bridging standard – with key Avaya enhancements and extensions – to dramatically optimize availability, performance, and time-to-service.

Access Ethernet Switching

The Avaya portfolio of fixed-format 'Stackable Chassis' Switches reflects the evolution of a number of innovative products that offer converged data and voice services for the enterprise branch and remote sites. We have completely refreshed our award winning Stackable line with solutions that provide even greater resiliency, performance, efficiency, and flexibility. A common thread that links the portfolio is our truly resilient, high-performance 'Stackable Chassis' architecture – leveraging Flexible Advanced Stacking Technology (FAST) – one of many differentiators that makes our solutions genuinely unique and superior to competitive offerings.

Learn More

To learn more about the Avaya Ethernet Switch product line, contact your Avaya Account Manager or Avaya Authorized Partner. Or, visit us online at avaya.com.

Avaya Fixed-Format Ethernet Feature Matrix

	Product Lines	ERS 2500	ERS 3500	ERS 4000			ERS 5000		VSP 7000
				4500 Switches	4500-PWR+ Switches	4800 Switches	5600 Switches	5600 Switches	
Models		2526T 2526T-PWR 2550T 2550T-PWR	3510GT 3510GT-PWR+ 3526T 3526T-PWR+ 3524GT 3524GT-PWR+	4526FX 4526T 4526T-PWR 4550T 4550T-PWR 4524GT 4524GT-PWR 4548GT 4548GT-PWR 4526GTX 4526GTX-PWR	4526T-PWR+ 4526T-PWR+	4826GTS 4826GTS-PWR+ 4850GTS 4850GTS-PWR+	5510-24T 5510-48T 5520-24T-PWR 5520T-PWR 5530-24TFD	5632FD 5650TD 5650TD-PWR 5698TFD 5698TFD-PWR	7024XLS
Avaya UVP	Avaya VENA Fabric Connect	-	-	-	-	-	-	-	-
	Avaya VENA Switch Clustering	-	-	-	-	-	Y	Y	-
	Avaya VENA Stackable Chassis	Y	-	Y	Y	Y	Y	Y	Y
	Avaya VENA Distributed ToR	-	-	-	-	-	-	-	Y
	Avaya VENA Unified Access	-	-	-	-	-	-	-	-
	Avaya Energy Saver	-	-	Y	Y	Y	Y	Y	-
	Avaya Dynamic PoE Power Management	Y	Y	Y	Y	Y	Y	Y	-
	Avaya Automatic QoS	Y	Y	Y	Y	Y	Y	Y	-
	Avaya Custom Auto Negotiation Advertisement	Y	Y	Y	Y	Y	Y	Y	-
	Avaya Virtual Link Aggregation Control Protocol	Y	Y	Y	Y	Y	Y	Y	Y
Feeds	100BASE-FX	-	Y	Y	Y	Y	-	Y	Y
	10/100BASE-TX	Y	Y	Y	Y	Y	-	-	-
	1000BASE-T	Y	-	-	-	-	-	-	-
	10/100/1000BASE-T	Y	Y	Y	Y	Y	Y	Y	Y
	1000BASE-X SFP	Y	Y	Y	Y	Y	Y	Y	Y
	10GBASE-X XFP	-	-	Y	-	-	Y	Y	-
	10GBASE-X SFP+	-	-	-	-	Y	-	-	Y
	802.3af Power-over-Ethernet	Y	Y	Y	-	Y	Y	Y	-
	802.3at Power-over-Ethernet	-	Y	-	Y	Y	-	-	-
Layer 2	MAC Addresses	16k	16k	8k	8k	8k	16k	16k	128K
	Switch Fabric (Gbps)	12.8-15.6	12.8-52	48.8-184	48.8-77.6	128-184	80-193	288-394	1,280
	Forwarding Rate (Mpps)	9.5-11.6	9.5-38.7	6.6-72	6.6-10.2	66-102	35.7-71.4	101.2-172.7	960
	Virtual Backplane (Gbps)	32	-	324	384	384	640	1,152	5,120
	802.1D Spanning Tree (STP)	Y	Y	Y	Y	Y	Y	Y	Y
	802.1s Multiple STP	Y	Y	Y	Y	Y	Y	Y	Y
	802.1w Rapid Reconfiguration STP	Y	Y	Y	Y	Y	Y	Y	Y
	Avaya Multiple Spanning Trees	Y	Y	Y	Y	Y	Y	Y	Y
	802.1Q VLANs	256	256	1,024	1,024	1,024	1,024	1,024	1,024
	802.1aq Shortest Path Bridging	-	-	-	-	-	-	-	-
	IPv6 VLANs	Y	Y	Y	Y	Y	Y	Y	Y
	Hardware Queues	4	4	8	8	8	8	8	8
	802.1p/DSCP Quality of Service (QoS)	Y	Y	Y	Y	Y	Y	Y	Y
	Advanced QoS Filtering & Remarking	Y	Y	Y	Y	Y	Y	Y	Y
	Avaya Auto Discovery & Auto Configuration	Y	Y	Y	Y	Y	Y	Y	-
	802.1AB Media End-point Discovery	Y	Y	Y	Y	Y	Y	Y	-
	802.1AB Location TLV	Y	Y	Y	Y	Y	Y	Y	-
Layer 3	IP Static/Default Routing	Y	Y	Y	Y	Y	Y	Y	-
	IP RIP v1/v2 Routing	-	-	Y	Y	Y	Y	Y	-
	IP OSPF Routing	-	-	Y	Y	Y	Y	Y	-
	IP BGP Routing	-	-	-	-	-	-	Y[5]	-
	IP VRRP	-	-	Y	Y	Y	Y	Y	-
	IP ECMP	-	-	Y	Y	Y	Y[4]	Y	-
	IP VRF-Lite	-	-	-	-	-	-	Y	-
	Content-Based Forwarding	-	-	-	-	-	-	Y	-
	IPv6 Routing	-	-	-	-	-	-	Y	-
	Multi-Netting	-	-	-	-	-	Y	Y	-

	Product Lines	ERS 2500	ERS 3500	ERS 4000			ERS 5000		VSP 7000
				4500 Switches	4500-PWR+ Switches	4800 Switches	5500 Switches	5600 Switches	
Security	DHCP Snooping / ARP inspection	Y	Y	Y	Y	Y	Y	Y	f
	BPDU Filtering	Y	Y	Y	Y	Y	Y	Y	f
	IP Source Guard	Y	Y	Y	Y	Y	Y	Y	f
	802.1X EAPoL (Single Host Single Authentication)	Y	Y	Y	Y	Y	Y	Y	-
	802.1X Multiple Host Single Authentication (MHSA)	Y	Y	Y	Y	Y	Y	Y	-
	802.1X Multiple Host Multiple Authentication (MHMA)	Y	Y	Y	Y	Y	Y	Y	-
	802.1X MHMA Multi-VLAN	-	f	Y	Y	Y	Y	Y	-
	802.1X Guest VLAN	Y	Y	Y	Y	Y	Y	Y	-
	802.1X Non-EAP	Y	Y	Y	Y	Y	Y	Y	-
	802.1X/NEAP & Guest VLAN support	Y	Y	Y	Y	Y	Y	Y	-
	802.1X/NEAP Last Assigned RADIUS VLAN	Y	Y	Y	Y	Y	Y	Y	-
	802.1X/NEAP Fail-Open VLAN	Y	Y	Y	Y	Y	Y	Y	-
	802.1X/NEAP with VLAN Names	Y	Y	Y	Y	Y	Y	Y	-
	RADIUS Accounting	Y	Y	Y	Y	Y	Y	Y	Y
	802.1AE MACsec	-	-	-	-	f[4]	-	-	-
	Identity Engines	Y	Y	Y	Y	Y	Y	Y	-
Multicast	IGMPv1	Y	Y	Y	Y	Y	Y	Y	Y
	IGMPv2	Y	Y	Y	Y	Y	Y	Y	Y
	IGMPv3	Y	Y	Y	Y	Y	Y	Y	f
	PIM-SM	-	-	-	f	f	Y[4]	Y	f
	PIM-SSM	-	-	-	-	-	Y[4]	f	-
ncy	Flexible Advanced Stacking Technology (FAST)	Y	f	Y	Y	Y	Y	Y	Y
	Auto Unit Replacement (AUR)	Y	f	Y	Y	Y	Y	Y	Y
	802.3ad Link Aggregation Control Protocol (LACP)	Y	Y	Y	Y	Y	Y	Y	Y
	Avaya Simple Loop Prevention Protocol (SLPP)	-	-	-	-	-	Y	Y	f
	ulti-Link Trunking (MLT)	Y	Y	Y	Y	Y	Y	Y	Y
	Distributed MLT	Y	Y	Y	Y	Y	Y	Y	Y
	Single Link Trunking (SLT)	-	-	-	-	-	Y	Y	f
	External HA Power (RPS 15)	-	-	Y	-	-	Y	-	-
	Internal HA Power	-	-	-	Y	Y	-	Y	Y
Management & Miscellaneous	Standardized CLI	Y	Y	Y	Y	Y	Y	Y	Y
	GUI Management	Y	Y	Y	Y	Y	Y	Y	Y
	SNMPv3	Y	Y	Y	Y	Y	Y	Y	-
	SSHv2	Y	Y	Y	Y	Y	Y	Y	Y
	TACACS+	Y	Y	Y	Y	Y	Y	Y	Y
	RADIUS Authentication	Y	Y	Y	Y	Y	Y	Y	Y
	IPv6 Management	Y	Y	Y	Y	Y	Y	Y	Y
	802.1ag Connectivity Fault Management	-	-	-	-	-	-	-	f
	IP Flow Information Export (IPFIX)	-	f	Y	Y	Y	Y	Y	f
	Multi-Port Mirroring	-	f	Y	Y	Y	Y	Y	f
	802.3az Energy Efficient Ethernet	-	f	-	f	f	-	-	Y
	Software Licensing	Y[5]	-	Y	Y	Y	Y	Y	f

Based on:

ERS 2500 4.4 ERS 3500 5.0 ERS 4000 5.7 ERS 5000 6.3 VSP 7000 10.1

Legend:

Y = Support f = Future (i.e. Roadmapped & Hardware-ready) n = Scale - = Not supported

Notes:

[1] Supported on ERS 5632TFD only

[2] ERS 2500 PWR models support PoE on half of their Link Ports

[3] Future models

[4] Supported on ERS 5520 models, but not 5510 models

[5] Partial implementation: that is iBGP

[6] Software Licensing available to field-enable Stacking on the stand-alone ERS 2500 models

Avaya Modular Ethernet Feature Matrix

	Product Lines	ERS 8300	ERS 8600/8800			VSP 9000
			8600 R Modules	8600 RS Modules	8800 Modules	
	Avaya VENA Fabric Connect	-	Y	Y	Y	Y
	Avaya VENA Switch Clustering	Y	Y	Y	Y	Y
	Avaya VENA Unified Access	-	Y	Y	Y	-
	Avaya IP VPN-Lite	-	Y	Y	Y	-
	Avaya Energy Saver	Y	-	-	-	-
	Avaya Dynamic PoE Power Management	Y	-	-	-	-
	Avaya Automatic QoS	Y	Y	Y	Y	Y
	Avaya Custom Auto Negotiation Advertisement	Y	Y[9]	Y[9]	Y[9]	Y
	Avaya Virtual Link Aggregation Control Protocol	Y	Y	Y	Y	Y
Speeds & Feeds	100BASE-FX	Y	Y	Y	Y	-
	10/100BASE-TX	Y	-	-	-	-
	1000BASE-T	Y	-	-	-	-
	10/100/1000BASE-T	Y	Y	Y	Y	Y
	1000BASE-X SFP	Y	Y	Y	Y	Y
	10GBASE-X XFP	Y	Y	Y	Y	-
	10GBASE-X SFP+		-	-	Y	Y
	802.3af Power-over-Ethernet	Y	-	-	-	-
	MAC Addresses	16k	64k	64k	64k	128k
	Switch Fabric (Gbps)	Up to 464	Up to 512	Up to 512	Up to 512	Up to 8,400
	Forwarding Rate (Mpps)	Up to 345	Up to 380	Up to 380	Up to 380	Up to 1,050
Layer 2	802.1D Spanning Tree (STP)	Y	Y	Y	Y	Y
	802.1s Multiple STP	Y	Y	Y	Y	Y
	802.1w Rapid Reconfiguration STP	Y	Y	Y	Y	Y
	Avaya Multiple Spanning Trees	Y	Y	Y	Y	Y
	802.1Q VLANs	2k	4k	4k	4k	4k
	802.1aq Shortest Path Bridging	-	Y	Y	Y	Y
	IPv6 VLANs	Y	Y	Y	Y	Y
	Hardware Queues	8	Up to 64	Up to 64	Up to 64	8
	802.1p/DSCP Quality of Service (QoS)	Y	Y	Y	Y	Y
	Advanced QoS Filtering & Remarking	Y	Y	Y	Y	Y
	802.1Qbb Priority-based Flow Control	-	-	-	-	Y
	802.3x Pause-based Flow Control	-	Y	Y	Y	Y
	Avaya Auto Discovery & Auto Configuration	Y	Y	Y	Y	-
	802.1AB Core	Y	f	f	f	f
	802.1AB Media End-point Discovery	Y	-	-	-	-
Layer 3	IP Static/Default Routing	Y	Y	Y	Y	Y
	IP RIP v1/v2 Routing	Y	Y	Y	Y	Y
	IP OSPF Routing	Y	Y	Y	Y	Y
	IP VRRP	Y	Y	Y	Y	Y
	IP VRRP Backup Master	Y	Y	Y	Y	Y
	IP ECMP	Y	Y	Y	Y	Y
	IP BGP	Y[9]	Y	Y	Y	Y
	IPv6 Routing	Y[9]	Y[9]	Y[9]	Y[9]	Y
	Avaya VRF-Lite	Y	Y[8]	Y[8]	Y[8]	Y
	RFC 2547/4364 IP VPN	-	Y[8]	Y[8]	Y[8]	-
	Multi-Procotol Label Switching	-	Y[8]	Y[8]	Y[8]	-
	Microsoft Network Load-Balancing (NLB)	Y	Y	Y	Y	Y
	Multi-Homing	Y	Y	Y	Y	Y
	Multi-Netting	-	Y	Y	Y	Y
Security	DHCP Snooping / ARP Inspection	Y	Y	Y	Y	f
	BPDU Filtering	Y	Y	Y	Y	f
	IP Source Guard	Y	Y	Y	Y	f
	802.1X EAPoL (Single Host Single Authentication)	Y	Y	Y	Y	Y
	802.1X Multiple Host Single Authentication (MHSA)	Y	-	-	-	-
	802.1X Multiple Host Multiple Authentication (MHMA)	Y	-	-	-	-
	802.1X Non-EAP	Y	Y	Y	Y	-
	RADIUS Accounting	Y	Y	Y	Y	-
	802.1AE MACsec	-	-	-	-	Y
	Identity Engines	Y	Y	Y	Y	f

	Product Lines	ERS 8300	ERS 8600/8800			VSP 9000
			8600 R Modules	8600 RS Modules	8800 Modules	
Multicast	IGMPv1	Y	Y	Y	Y	Y
	IGMPv2	Y	Y	Y	Y	Y
	IGMPv3	Y	Y	Y	Y	Y
	PIM-SM	Y	Y	Y	Y	Y
	PIM-SSM	-	Y	Y	Y	Y
	DVRMP	-	Y	Y	Y	-
	MSDP	-	Y	Y	Y	-
	Multicast over SPB (MoSPB)	-	Y[a]	Y[a]	Y[a]	f
Resiliency	802.3ad/ax Link Aggregation Control Protocol (LACP)	Y	Y	Y	Y	Y
	Avaya Simple Loop Prevention Protocol (SLPP)	Y	Y	Y	Y	Y
	Multi-Link Trunking (MLT)	Y	Y	Y	Y	Y
	Distributed MLT	Y	Y	Y	Y	Y
	Routed Split Multi-Link Trunking (RSMLT)	Y	Y	Y	Y	Y
	Single Link Trunking (SLT)	Y	Y	Y	Y	Y
	Bi-Directional Forwarding Detection (BFD)	-	Y	Y	Y	-
Management & Miscellaneous	Standardized CLI	Y	Y	Y	Y	Y
	GUI Management	Y	Y	Y	Y	Y
	SNMPv3	Y	Y	Y	Y	Y
	SSHv2	Y	Y	Y	Y	Y
	TACACS+	Y	Y	Y	Y	f
	RADIUS Authentication	Y	Y	Y	Y	Y
	IPv6 Management	Y	Y	Y	Y	Y
	802.1ag Connectivity Fault Management (CFM)	-	Y	Y	Y	Y
	IP Flow Information Export (IPFIX)	Y	Y	Y	Y	Y
	Multi-Port Mirroring	-	Y	Y	Y	Y
	Layer 2 Remote Port Mirroring	-	Y	Y	Y	Y
	Layer 3 Remote Port Mirroring	-	-	-	-	Y
	802.3az Energy Efficient Ethernet	-	-	-	-	-
	Software Licensing	Y	Y	Y	Y	Y

Based on:

ERS 8300 4.2.3 ERS 8800 7.2 VSP 9000 3.3

Legend:

Y = Support f = Future (i.e. Roadmapped & Hardware-ready) n = Scale - = Not Supported

Notes:

[a] Requires V-Mode to be enabled; therefore requires the exclusive use of V-Mode capable hardware

[b] Requires the 8895SF, or the 8692SF with the Enhanced CPU Daughter Card (SuperMezz) upgrade

[c] Requires R, RS, or 8800 Series interface Models

About Avaya

Avaya is a global provider of business collaboration and communications solutions, providing unified communications, contact centers, networking and related services to companies of all sizes around the world. For more information please visit **www.avaya.com**.

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10/12 • DN4532-02

WA 1-5325

Western Group Rate Case

Exhibit FKS-1

5325 Office Signs

ARIZONA WATER COMPANY

INTER-OFFICE CORRESPONDENCE

To: Bill Garfield, Fred Schneider, Joe Harris, Rob Spear *Date:* July 14, 2015

From: Ted Millspaugh and Robert Romo

Subject: Phoenix Office

There are currently two Arizona Water Company signs on the Phoenix office and are located on the Southwest (back) and the Northwest (front) corners of the building. These signs are difficult to see by Vendors, Customers and Business Partners looking for the office. Currently, there is not a sign in front of the office adjacent to Indianola where you enter the driveway into the parking lot.

The sign on the Northwest corner cannot be seen until you turn into the parking lot off Indianola. The sign located on the Southwest corner is difficult to see while traveling on I-17 Northbound or the frontage road adjacent to I-17 Northbound.

I will discuss options for increasing the visibility at each of the locations below.

Option No. 1: Shows the existing signs currently on the Northwest corner and the Southwest corner of the building. With this option, we would add hallo illuminated reverse pan channel letters with the AWC Logo. The cost for option no. 1 is approximately $19,500 for both signs.

Option No. 2: Shows the existing signs currently on the Northwest corner and the Southwest corner of the building. With this option, we would refurbish the old letters and add halo illuminated pan letters with the AWC Logo. The proposed display on option 2 does not show the logo but it is included in the proposal. The cost for option no. 2 is approximately $18,000 for both signs.

Both of these options would require electrical installed within 5-feet of each sign. We would contract for the installation of electrical with a separate contractor.

To assist visitors in identifying the office, I also developed two options for signs at the driveway entrance from Indianola. Those are described below:

Option No. 3: Shows a new non-illuminated sign installed on the 3 foot block wall on the east side of the west driveway entrance off Indianola to the Phoenix office, see attached map. This sign would be made using aluminum flat cut letters painted blue and mounted on existing block wall. This cost is approximately $2,800.

Option No. 4: Shows a new sign installed at the same location as option no. 3 but is a new non-illuminated sign with the AWC logo and aluminum flat letters stud mounted to sign. This cost is approximately $8,200.

Recommendation:
I recommend the Company complete option no. 2 and install a new sign at driveway from Indianola using option no. 3. The addition of illuminated signs at the front of the Phoenix office would improve the visibility for the company's visitors.

PRELIMINARY ☐

ACTUAL ☐

ARIZONA WATER COMPANY
COST ESTIMATE WORKSHEET

DATE PREPARED:

PREPARED BY:

SYSTEM:

SHEET OF

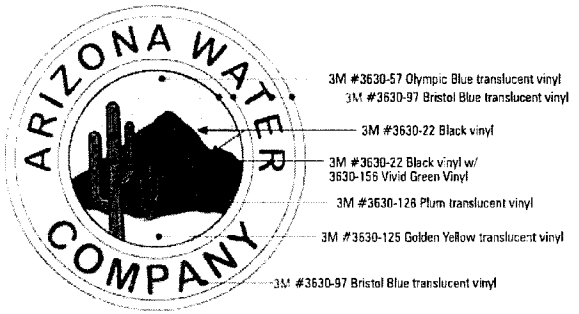
PROJECT LOCATION:

DRAWING NO

PROJECT DESCRIPTION:

Cost for Three Signs @ AWC Nhx. Office

	DESCRIPTION	PLANT PROP ACCT	QUANTITY	UNIT COST	TOTAL
CONTRACT WORK	HALO ILLUMINATED REVERSE PAN CHANNEL LETTERS W/ FACE & HALO ILLUMINATED LOGO		2	4550	9100
	NON ILLUMINATED D/F MONUMENT SIGN		1	5450	5450
	PERMITS		1	3000	3000
	TAX		1	2000	2000
	ELECTRICAL TO SIGNS		3	2500	7500
	SERVICE CONNECTIONS: DOUBLE-LONG	345			
	SERVICE CONNECTIONS: DOUBLE-SHORT	345			
	TAXABLE SERVICE CONNECTIONS COMPLETE: SINGLE-LONG	345			
	TAXABLE SERVICE CONNECTIONS COMPLETE: SINGLE-SHORT	345			
					$ 27,050 -
MATERIALS					
	SERVICE CONNECTIONS: DOUBLE-LONG	345			
	SERVICE CONNECTIONS: DOUBLE-SHORT	345			
	TAXABLE SERVICE CONNECTIONS: SINGLE-LONG	345			
	TAXABLE SERVICE CONNECTIONS: SINGLE-SHORT	345			
	TAXABLE METERS	346			
	METERS	346			
TOTAL MATERIALS					$ -
LABOR					
	TESTING FEE				
	PERMIT FEE				
	SURVEY FEE				
	FIELD INSPECTION				
	INSTALL SERVICE CONNECTIONS: DOUBLE-LONG	345			
	INSTALL SERVICE CONNECTIONS: DOUBLE-SHORT	345			
	INSTALL **TAXABLE** SERVICE CONNECTIONS: SINGLE-LONG	345			
	INSTALL **TAXABLE** SERVICE CONNECTIONS: SINGLE-SHORT	345			
TOTAL LABOR					$ -
SUBTOTAL - CONTRACT WORK, MATERIALS, AND LABOR					$ 27,050 -
OVERHEAD				15%	4058 -
TOTAL	REFUNDABLE PORTION ☐ NON-REFUNDABLE PORTION ☐			**COST ESTIMATE**	$ 31,000 -



A **HALO ILLUMINATED REVERSE PAN CHANNEL LETTERS w/ FACE & HALO ILLUMINATED LOGO**
SCALE: 1/2"=1'-0"

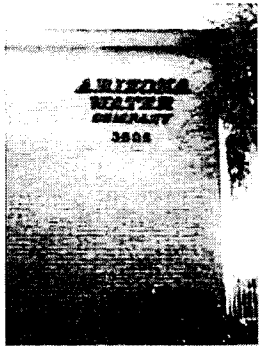
Scope of Work
Manufacture and install one (1) set of halo illuminated reverse pan channel letters with 3" returns & blue LED modules.

Manufacture and install one (1) set of halo illuminated & halo illuminated pan channel logo with pushed through ½" acrylic. 5" returns and are white .125" aluminum face & White LED module illumination. Mount spaced off wall 1-1/2"

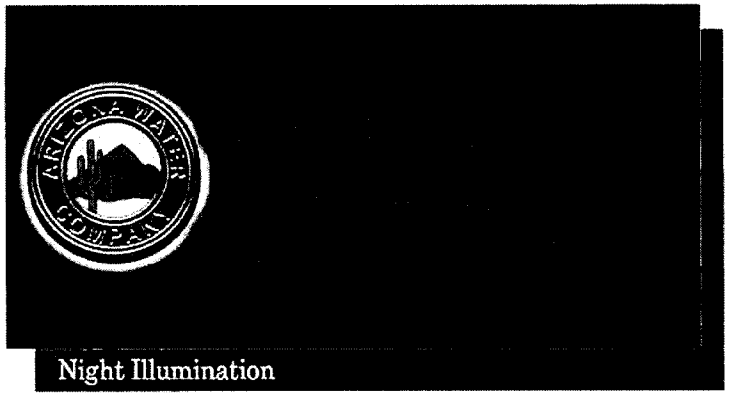
CUSTOMER RESPONSIBLE TO BRING ONE (1) DEDICATED, 120V/20A CIRCUIT TO WITHIN 5' OF DISPLAY AREA.

$4550.00 + TAX AND PERMITS PER CITY EA.

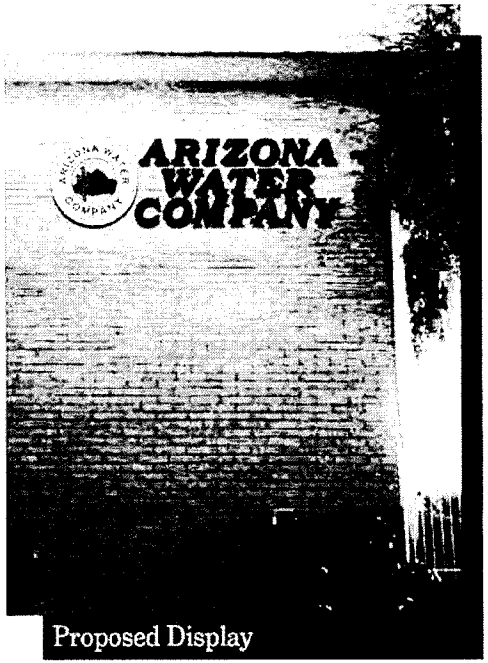
Existing Wall



Existing Wall



Night Illumination



Proposed Display

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ARIZONA COMMERCIAL SIGNS
4018 E. WINSLOW • PHOENIX, AZ 85040
OFFICE: (480) 921-9900 • FAX: (602)437-8073

PROJECT NAME
ARIZONA WATER COMPANY
PHOENIX, AZ

CONTACT:
PHONE:

CONTACT REP
JAY BOYD~480-478-5117

DESIGNER
MIKE KEEN

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DESIGN NUMBER
AZ WATER PHX 12-05-14 DESIGN

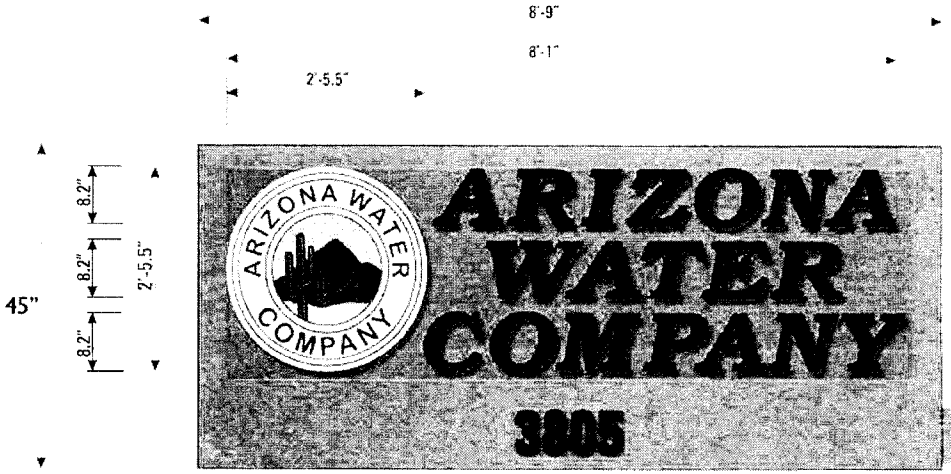
SCALE
AS NOTED

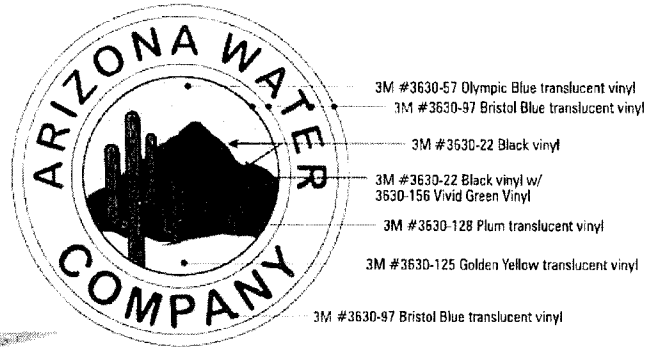
REVISIONS
1
2
3
4
5

LANDLORD / DEVELOPER APPROVAL SIGNATURE & DATE

CUSTOMER APPROVAL SIGNATURE & DATE

SHEET:
1 OF 3
DESIGN





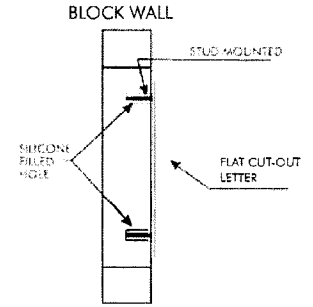
$5450.00 + TAX AND PERMITS PER CITY

A **NON-ILLUMINATED D/F MONUMENT SIGN**

SCALE: 3/4" = 1'-0"

MANUFACTURE AND INSTALL (1) NON-ILLUMINATED D/F MONUMENT SIGN. PAINTED TO MATCH SITE WALL COPY AND LOGO ARE .25" ALUMINUM FLAT CUT LETTERS STUD MOUNTED TO SIGN.

CROSS SECTION: FLAT CUT-OUT LETTER



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DESIGN NUMBER
AZ WATER PHX 12-05-14 DESIGN

SCALE
AS NOTED

REVISIONS

LANDLORD / DEVELOPER APPROVAL SIGNATURE & DATE

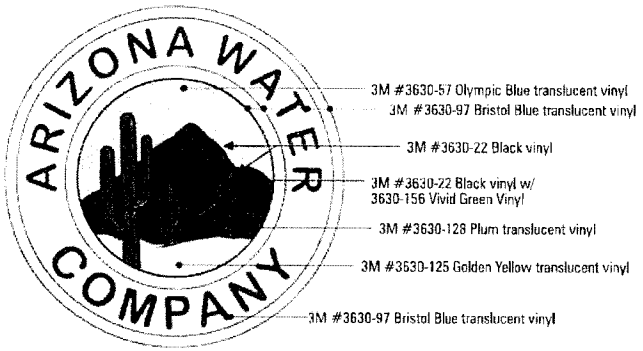
CUSTOMER APPROVAL SIGNATURE & DATE

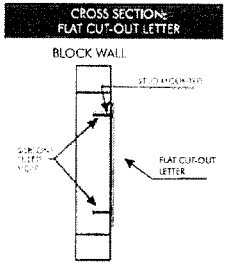
SHEET:
3 OF 3
DESIGN

C **.25" FLAT CUT LETTERS**
Scale: 1-1/2" = 1'-0"

Scope of Work
Manufacture and install one (1) set of aluminum flat cut letters stud mounted to existing site wall.

$2,260.00 + TAX AND PERMITS PER CITY





Proposed Display

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DESIGN NUMBER
AZ WATER PHX 12-05-14 DESIGN

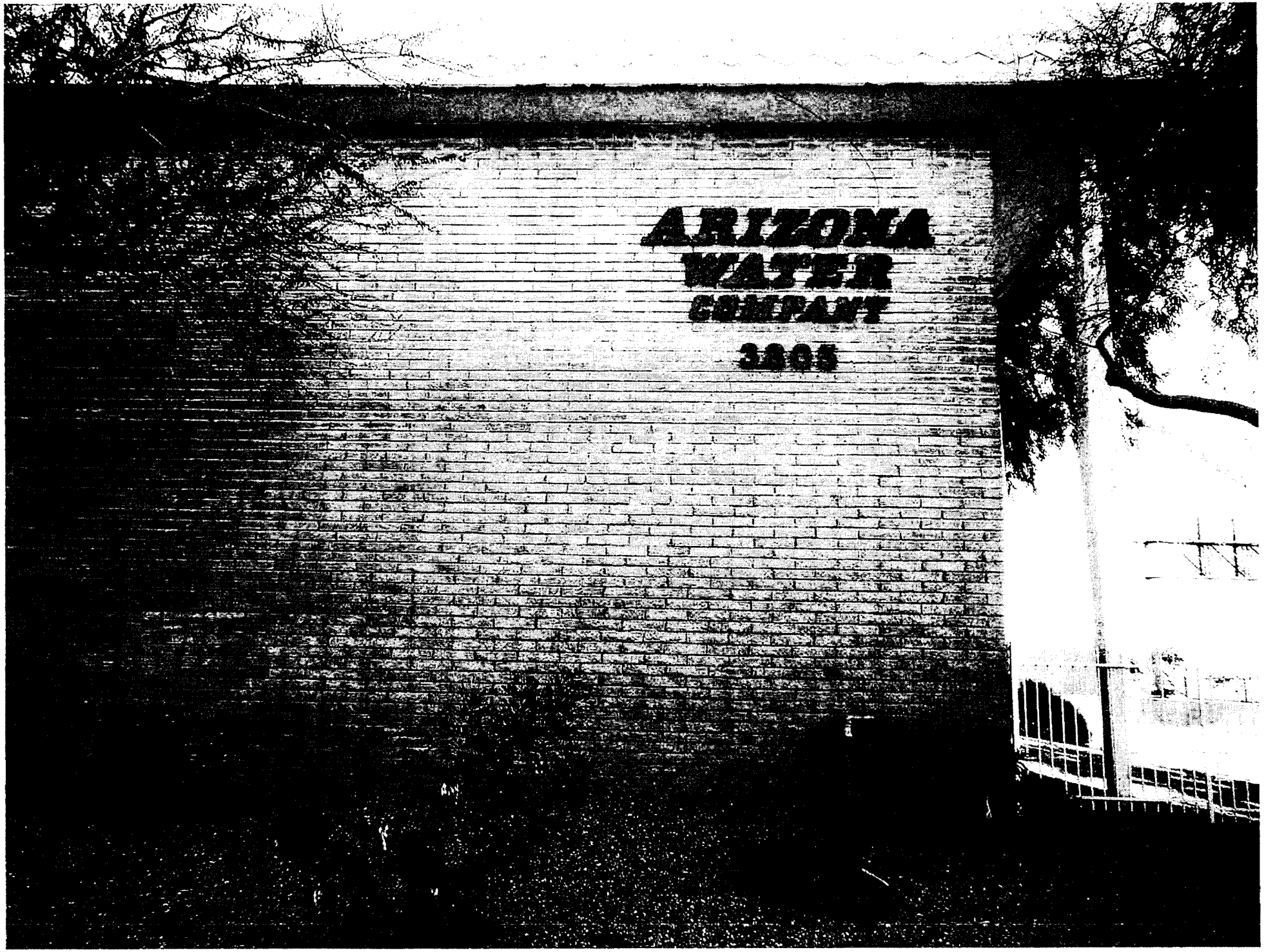
SCALE
AS NOTED

REVISIONS
1
2
3
4
5

LANDLORD / DEVELOPER APPROVAL
SIGNATURE & DATE

CUSTOMER APPROVAL
SIGNATURE & DATE

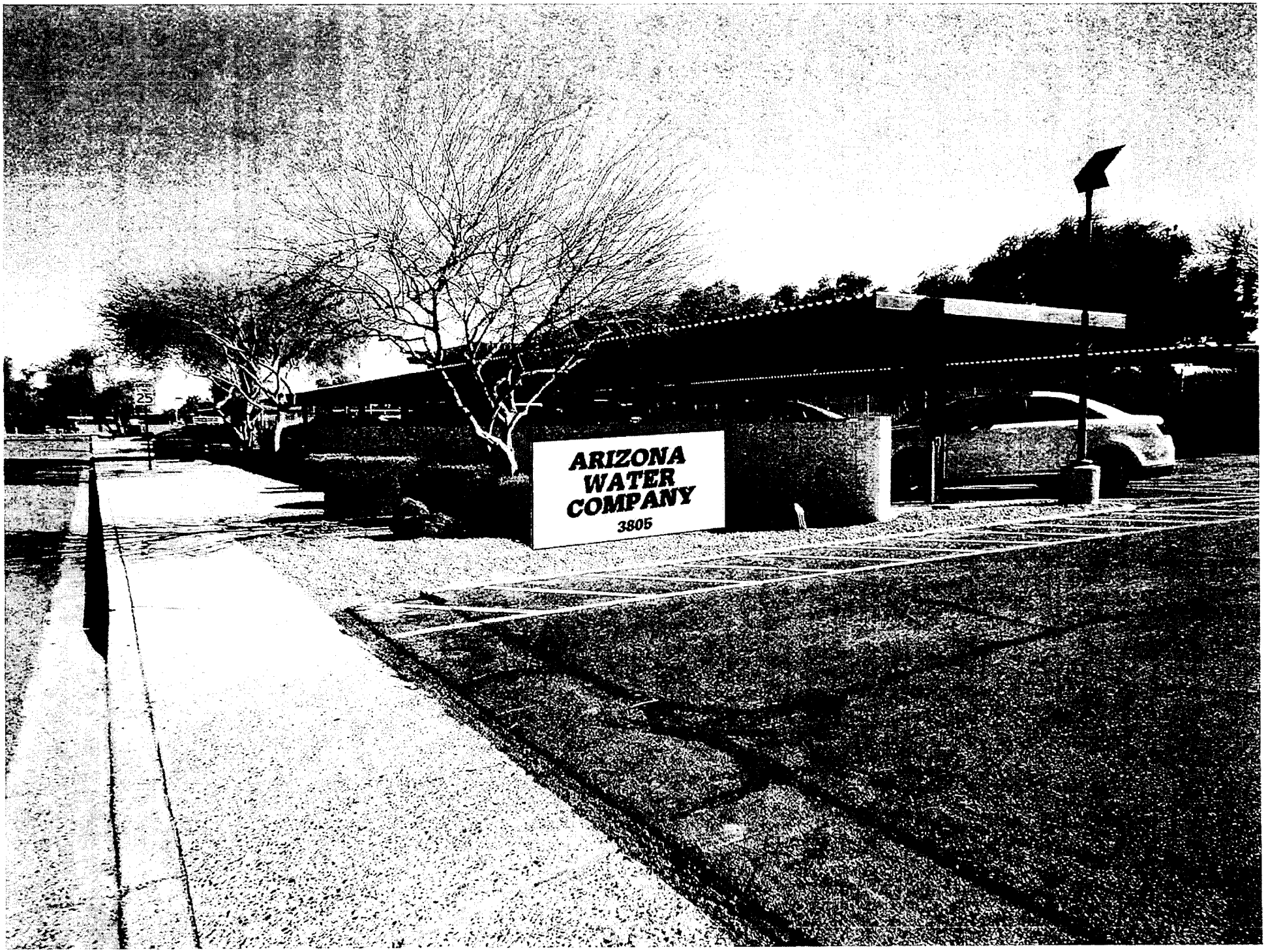
SHEET:
2 OF 3
DESIGN


ARIZONA
WATER
COMPANY

ARIZONA WATER COMPANY
ARIZONA WATER COMPANY
3805

ARIZONA
WATER
COMPANY
3805

ARIZONA WATER COMPANY
ARIZONA WATER COMPANY
3805


ARIZONA
WATER
COMPANY
3805

WA 1-5326

Western Group Rate Case

Exhibit FKS-1

5326 Server Replacement

ARIZONA WATER COMPANY

CONSTRUCTION BUDGET REQUEST

SPECIFIC PROJECT

BUDGET YEAR: 2015 DIVISION: Phoenix

PROJECT NO.: 1-0003 SYSTEM: Phoenix

DESCRIPTION OF FACILITIES TO BE CONSTRUCTED (ATTACH MAP OR SKETCH)

Replace the anti-virus and patch servers and migrate Active Directory to new server.

FACTORS JUSTIFYING PROJECT (ATTACH ANY SUPPORTING DOCUMENTS SUCH AS PRESSURE RECORDINGS, ETC.)

The patch and anti-virus servers are used to push software updates to user workstations and to run the company's anti-virus software. These functions are critical to maintain the health and reliability of the company's computer network. These servers are also five plus years old and need to be replaced. The Company evaluates all of its servers for age and performance issues and makes replacements when necessary. The Active Directory service which controls all user access to the network needs to be migrated. Migrating Active Directory to a newer server will help ensure trouble free user access to the company's network.

DESCRIPTION OF EXISTING FACILITIES

Existing patch and anti-virus servers.

ARIZONA WATER COMPANY

CONSTRUCTION BUDGET REQUEST

PERMITS REQUIRED None
COST/BENEFIT ANALYSIS
MATERIALS TO BE RETIRED N/A
PROJECT SCHEDULE (ATTACH GANTT CHART)
ESTIMATE OF CONSTRUCTION COST (ATTACH COST ESTIMATE WORKSHEET) $14,000

ENGINEER APPROVAL: _____ Date: _____

MANAGER APPROVAL: _____ Date: _____

VP – ENGINEERING APPROVAL: _____ Date: _____

ARIZONA WATER COMPANY

WORK AUTHORIZATION - DETAIL SHEET

W.A. NUMBER:
P.E. NUMBER:
BUDGET ITEM NO.:
SHEET NO.:

RETIREMENT PROPERTY UNITS	PLANT PROPERTY ACCOUNT	UNIT DESCRIPTION	QUANTITY	YEAR INSTALLED AND W.A. NUMBER
	391	Servers		

PROJECT DESCRIPTION:

Design and implement new company website

	DESCRIPTION	PLANT PROP ACCT	QUANTITY	UNIT COST	TOTAL
CONTRACT WORK	Consulting services - migration of Active Directory	391			$ 6,500
	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					$ 6,500
MATERIALS	Dell PowerEdge R210II Server	391	2	$ 2,800.00	$ 5,600
TOTAL MATERIALS					$ 5,600
LABOR					
	TESTING FEE				
	PERMIT FEE				
	SURVEY FEE				
	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					$ -
SUBTOTAL - CONTRACT WORK, MATERIALS, AND LABOR					$ 12,100
OVERHEAD					1,500
TOTAL	REFUNDABLE PORTION ☐	NON-REFUNDABLE PORTION ☐		COST ESTIMATE	$ 13,600

WA 1-5327

Western Group Rate Case

Exhibit FKS-1

5327 Company Website

ARIZONA WATER COMPANY

CONSTRUCTION BUDGET REQUEST

SPECIFIC PROJECT

BUDGET YEAR: 2015 DIVISION: Phoenix

PROJECT NO.: **1-0004** SYSTEM: Phoenix

DESCRIPTION OF FACILITIES TO BE CONSTRUCTED (ATTACH MAP OR SKETCH)

Design and implement a new company website.

FACTORS JUSTIFYING PROJECT (ATTACH ANY SUPPORTING DOCUMENTS SUCH AS PRESSURE RECORDINGS, ETC.)

The company's website is used by customers to find payment options, local office addresses, phone numbers, tariffs, conservation tips and Consumer Confidence Reports. Over time the website has become difficult to maintain and can be difficult for customers to navigate. Designing and implementing a new website will allow the company to address these issues, as well as allow it to plan for future offerings such as e-billing.

DESCRIPTION OF EXISTING FACILITIES

Existing company website.

ARIZONA WATER COMPANY

CONSTRUCTION BUDGET REQUEST

PERMITS REQUIRED None
COST/BENEFIT ANALYSIS
MATERIALS TO BE RETIRED N/A
PROJECT SCHEDULE (ATTACH GANTT CHART)
ESTIMATE OF CONSTRUCTION COST (ATTACH COST ESTIMATE WORKSHEET) $20,000

ENGINEER APPROVAL: _____ Date: _____

MANAGER APPROVAL: _____ Date: _____

VP – ENGINEERING APPROVAL: _____ Date: _____

ARIZONA WATER COMPANY

WORK AUTHORIZATION - DETAIL SHEET

W.A. NUMBER:
P.E. NUMBER:
BUDGET ITEM NO.:
SHEET NO.:

RETIREMENT PROPERTY UNITS	PLANT PROPERTY ACCOUNT	UNIT DESCRIPTION	QUANTITY	YEAR INSTALLED AND W.A. NUMBER
	391	Company website		

PROJECT DESCRIPTION:

Design and implement new company website

	DESCRIPTION	PLANT PROP ACCT	QUANTITY	UNIT COST	TOTAL
CONTRACT WORK	Content development / site architecture	391			$ 1,500
	Page design	391			3,500
	Page development	391			3,000
	Creation/testing/archiving	391			1,300
	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					$ 9,300
MATERIALS					
TOTAL MATERIALS					$ -
LABOR					
	TESTING FEE				
	PERMIT FEE				
	SURVEY FEE				
	COMPANY LABOR	391			8,500
	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					$ 8,500
SUBTOTAL - CONTRACT WORK, MATERIALS, AND LABOR					$ 17,800
OVERHEAD					2,100
TOTAL	REFUNDABLE PORTION ☐	NON-REFUNDABLE PORTION ☐		COST ESTIMATE	$ 19,900