



DATE: January 3, 2014

TO: Chuck Warner, Operations Manager of Engineering
Rainier View Water Company
P. O. Box 44427
Tacoma, WA 98444

FROM: Cullen J. Wilder, P.E.

SUBJECT: Summary of Pilot Testing, Rainier View Water Company, Shining Mountain Well

Dear Mr. Warner,

ATEC Systems Associates, Inc. pilot tested Rainier View Water Company's Shining Mountain Well. This pilot test was a retest of one done November 13, 2013, which was anomalous. The objective was to determine the efficacy of the ATEC system in removing iron and manganese from the water of this well, and to identify the optimal ATEC filtration equipment for treatment that will reliably remove these constituents to less than the following limits set by the USEPA: iron and manganese to less than one-half their Secondary Maximum Contamination Levels (SMCLs) of 0.300 mg/L and 0.050 mg/L, respectively. The treatment system should have a capacity of 600 gpm.

The pilot filter system is designed to simulate actual operation of an ATEC filter system on a small scale in terms of retention, media depth, flow per cubic foot of media, flow per square foot of media (loading rate) and so forth. For the test, differing amounts of chlorine are applied to the raw water and the loading rates are varied to determine the most economical filtration equipment necessary to meet the treatment objectives. During the pilot testing the pilot trailer's field lab was used to determine chlorine, iron, manganese, H₂S and ammonia concentrations in the raw and finished water.

Based on the results of the pilot testing, a system comprised of (6) 48-inch diameter vertical filters with 60-inch side walls containing 42-inches of AS-741M media (pyrolusite), is recommended. This system would be shipped on two skids, each with three filters, finished painted with underdrain support, underdrain, piping, manifolds and valves shop assembled.

Preliminary drawings for the recommended system are included in this report. Dimensions are subject to change and points of connections can be revised to suit field conditions.

The remainder of the report discusses the pilot testing and the recommended system. This report is meant to summarize and document the results of the pilot testing and the basis for the recommended system. This pilot test report should be helpful in preparing a Technical report given in WAC 246-290-110, but is not meant to wholly satisfy the requirements in this section.

Treated Water Objectives

A TEC guarantees the removal of iron and manganese to less than one-half their SMCLs of 0.300 mg/L and 0.050 mg/L, or 0.150 mg/L and 0.025 mg/L, respectively. These values are less than the concentrations we have found will cause odor, taste and staining.

Ammonia and H₂S can also be the cause of taste and odor problems. The A TEC system will also reduce the concentrations of these constituents, if present.

General Description of the A TEC Iron, Manganese Removal Process

A TEC Systems uses its proprietary AS-700 Series Filter Media, based on manganese dioxide mineral ore (Pyrolusite) as the basis for its high rate arsenic, iron, and manganese removal systems. This media is unusually robust, has a very high adsorptive capacity, and lends itself to the design of relatively simple treatment systems that do not require multi-media filter beds or the use of anthracite caps thus eliminating the need for surface wash and air scour systems. Currently A TEC has approximately 350 systems in operation. We have never supplied equipment that has failed to meet its treatment objectives.

The iron is oxidized to its insoluble state and filtered while the manganese is adsorbed on the surface of the media where it is secured and oxidized in place. Chlorine is injected immediately upstream of the filters. The chlorine is used to oxidize the iron and to maintain the filter bed in an oxidized state, not to oxidize and precipitate the manganese as is the case with most other treatment systems. This key difference allows for high loading rates and correspondingly small equipment footprints.

This is in sharp contrast with the more commonly used oxidation-precipitation-filtration methods where the iron is typically oxidized first with the addition of chlorine;

manganese is often oxidized later with potassium permanganate prior to filtration. Depending on the pH of the water and other factors, detention often follows the introduction of these oxidants to allow for the chemical reactions, usually manganese oxidation, to occur and for the oxidized iron and manganese to form a filterable floc. The presence of H₂S, ammonia, and/or organic matter (organic carbon) can make iron and manganese removal more difficult.

In this pilot test, chlorine was introduced to the influent immediately ahead of four 6-inch diameter filter columns with 60-inch filter sidewalls. The filters are manifolded together at the inlet and outlet and filled with 42-inches of AS-741M Filter Media. The pilot test characteristics are detailed in Tables 1 and 2.

Raw Water Quality, Rainier View Water Company, Shining Mountain Well Wells

As given in Tables 3 and 4 and shown in Figures 1, 2, and 3 in this report, iron concentrations varied from 0.320 mg/L to 0.400 mg/L, averaging 0.370 mg/L, or about 123 percent of the SMCL of 0.300 mg/L. Manganese concentrations in the raw water varied from 0.041 mg/L to 0.109 mg/L, averaging 0.090 mg/L or about 180 percent of the SMCL of 0.050 mg/L.

One samples hydrogen sulfide was taken, very low at 0.001 mg/L.

One sample of ammonia was taken at 0.040 mg/L.

Iron and manganese at these levels are likely the cause of problems with taste, odor and staining.

The following table summarizes the raw water quality of the wells at the Rainier View Water Company, Shining Mountain Well.

Rainier View Water Company, Shining Mountain Well Wells Raw Water Quality

Parameter	Low	High	Average
Iron	0.320 mg/L	0.400 mg/L	0.370 mg/L
Manganese	0.041 mg/L	0.109 mg/L	0.090 mg/L
H ₂ S	0.001 mg/L	0.001 mg/L	0.001 mg/L
Ammonia	0.040 mg/L	0.040 mg/L	0.040 mg/L

Pilot Test Results, Rainier View Water Company, Shining Mountain Well Wells

Pilot testing was performed on December 2, 2013. A total of 16 samples were taken over a period of 7.5 hours. Breakthrough, which would have been indicated by the spike in finish water iron and manganese concentrations, did not occur during the test.

Influent flow was varied from a low of 2.73 gpm to a high of 9.18 gpm corresponding to loading rates of 3.48 gpm/sqft and 11.69 gpm/sqft with an average loading rate of 7.88 gpm/sqft.¹

The first three samples of chlorine were taken before the dosing was properly regulated and are therefore not considered in the following discussion. Chlorine was added to the influent water in varying amounts from a low of 2.50 mg/L to a high of 4.50 mg/L, averaging 3.49 mg/L. Total Chlorine concentration in the finish water varied from a low of 0.86 mg/L to a high of 1.72 mg/L, averaging 1.10 mg/L. Chlorine demand averaged 2.39 mg/L.

In order for the media to remain charged, it is necessary to maintain a residual chlorine concentration and we recommend a free chlorine residual of no less than 0.600 mg/L after filtration.

Finish water iron concentrations varied from 0.070 mg/L to 0.130 mg/L, averaging 0.110 mg/L, about 38 percent of the SMCL of 0.300 mg/L SMCL.

Finish water manganese concentrations varied from non-detect to 0.044 mg/L, averaging 0.014 mg/L, about 28 percent of the SMCL of 0.05 mg/L.

One finish water sample of ammonia was taken at non-detect.² As well, a sample of hydrogen sulfide was taken, unchanged from the raw water, very low at 0.001 mg/L. The taste of the finish water was reported as good. A single same of each was taken because we had taken multiple samples in the previous pilot test on November 13, 2013.

There was a loss of silica across the media. In a proprietary process, ATEC has found that the loss of treatment efficacy because of this loss can be prevented with a small dose (0.100 mg/L, as manganese) of permanganate. The designer should provide a

¹ Area of the filter testing equipment is 0.784 sqft.

² Oxidation by chlorine can remove ammonia from water. When chlorine is added to water containing ammonia the ammonia initially reacts with hypochlorous acid to form chloramines. Continued contact with chlorine after the "breakpoint" when free chlorine forms, converts the chloramines to nitrogen gas.

means of dosing permanganate to prevent silica coating and resulting loss of treatment efficacy.

The following table summarizes the pilot testing of the Rainier View Water Company, Shining Mountain Well.

**Rainier View Water Company, Shining Mountain Well Well
Pilot Test Summary**

Parameter	Low	High	Average	Percent of SMCL
Iron	0.070 mg/L	0.130 mg/L	0.110 mg/L	37.7 %
Manganese	Non-detect	0.044 mg/L	0.014 mg/L	27.6 %
Loading Rate	3.48 gpm/sqft	11.69 gpm/sqft	7.88 gpm/sqft	-

Recommended System

At the 600 gpm required capacity, the recommended system of (6) 48-inch diameter filters would have a loading rate of 8.14 gpm/sqft during production and 9.76 gpm/sqft during backwash when one filter is out of production. The system would be shipped finish painted on two skids of four filters each, pre-plumbed, pre-wired, fusion epoxy coated tanks and manifolds, 0.25-inch heads and sidewalls. This includes 6-inch inlet and outlet manifolds, 4-inch backwash line, and a 120 VAC automatic controller. Also available and shipped loose by ATEC Systems, may be a 4-inch backwash assembly 75-inches long, which has a threaded port for a sight glass, and provisions for a backwash meter to set the backwash at the correct rate of 350 gpm (28 gpm/sqft).

To prevent the loss of treatment efficacy because of the loss of silica, the designer will need to provide a system for feeding permanganate. Optional, and as a convenience to the client ATEC can provide a permanganate saturator for a cost of about \$5,000 (feed pump by client).

ATEC guarantees this system will remove iron and manganese to or less than one-half their respective SMCLs.

Backwash

Based on ATEC's experience with similar water, we expect that the backwash interval proven with experience could be set at 24 hours of production.

The required backwash rate for the media is 28 gpm/sf, or 350 gpm for the 48-inch filters recommended. The gate valve provided in a backwash assembly is used to set the flow to that rate.

Filters are backwashed sequentially for five minutes each, using a portion of the finish water produced by the other filters. During the 30 minutes of backwash 350 gpm of the 600 gpm produced by the wells would be used for backwash and approximately 250 gpm would be provided to the system.

Operating Characteristics of the Recommended Filter System

<u>Parameter</u>	<u>Value</u>
Production Rate	600 gpm
Loading Rate	8.14 gpm/sqft
Backwash Rate	28 gpm/sqft
Backwash Flow	350 gpm
Backwash Duration	5-minutes per filter
Maximum Backwash Frequency	24 hours of production
Backwash Amount	10,500 gallons
Production Between Backwash Cycles	864,000 gallons
Backwash as a Percentage of Production	1.2 %

Please contact me if you have any questions or need further information.

Yours truly,

Cullen Wilder

Cullen J. Wilder, P. E.

858-755-7702 (Direct)

**Table 1
Pilot Test Equipment Characteristics**

Pilot Filters¹

Sidewall Height (inches)	48 to 60
Overall Height (inches)	62 to 74
Diameter (inches)	6
Filter Surface Area (each) (ft. ²)	0.1964
Total Filter Surface Area (ft ²)	0.7854
Underdrain	Stainless Steel Wedgewire, 0.01" slots
Media Support	³ / ₄ " minus crushed granite, 4"
Source Water Connections	³ / ₄ " Standard Hose
Recommended Minimum/Maximum Working Pressure	20/90 psi

Filter Media²

Depth in Filters (inches)	36 to 48
Volume in Filters (ft ³)	2.36 to 3.15
Approximate Weight in Filters (lbs.)	285
Weight (lbs./ft ³)	120.5
Physical Size (mm)	0.32 –to-0.85

Maximum Removal Capacity

Iron Removal (mg/L)	10
Manganese Removal (mg/L)	10
Hydrogen Sulfide Removal (mg/L)	5
Non-Adsorptive Removal (microns)	>20

Chemical Dosing Equipment³

Stenner Peristaltic Solution Metering Pumps (up to 17.0 gpd @ 100 psi)
LMI Solution Metering Pumps (various capacities)

Analytical Equipment

See following page.

^{1/} The pilot filter plant consists of four, 6" filter columns connected by common manifolds for influent, effluent and backwash water. Each filter is controlled by a three-way ball valve. The system is set up to closely mimic a full-scale filter system in terms of media depth, application rates in terms of both area (gpm/ft² of filter area) and volume (gpm/ft³ of media), and backwash characteristics to the extent possible. Source water is metered using a totalizing flow meter. Pressure is measured on the influent and effluent manifold to determine headloss. Chemical injection points are located as close to the filter as possible to simulate actual operation. In cases where extended contact time is desired before the source water enters the filters, a pipe section of pre-determined volume is placed between the chemical injection points and the filters to provide accurate contact time measurement. Sidewall height is variable to a maximum of 60" without modification, allowing a maximum media bed depth of 48".

^{2/} AS-721M and AS-741M Filter Media, 0.85 to 2.36mm and 0.42mm to 0.85mm, respectively, are both granular manganese dioxide media, derived from naturally occurring pyrolusite, and are certified to ANSI/NSQFT Standard 61.

^{3/} Solution metering pumps are available for the injection of up to three chemicals, if needed. Normally, the only chemical injected is chlorine. And in the case of arsenic, ferric chloride. There are, however, provisions for special circumstances, such as pH adjustment for corrosion control or the treatment of water at fish hatcheries that do not permit chlorine.

Table 2 Analytical Equipment

The following analytical equipment is normally carried on our pilot trailers.

Spectrophotometer, Model DR/2800, Hach Co., Loveland, CO
Digital Titrator, Hach Co., Loveland, CO
pH Meter, Model 266, Orion Co., Boston, MA
Stir Plate, Hach Co., Loveland, CO
0.45-Micron Filter, Nalgene

Glassware—beakers, flasks, columns, sample cells, 10 and 25 ml

Although not normally carried in each trailer, a turbidity meter is available.

Reagents for the following field tests:

Spectrophotometer

Free Chlorine, DPD, Method 8021 and 10059 (300 tests)
Total Chlorine, DPD, Method 8167 or 10060 (300 tests)

Iron, FerroZine Method, Method 8147 (500 tests)
Iron, Total, FerroVer Method, Method 8008 (300 tests)

Manganese, Low Range, PAN Method, Method 8149 (500 tests)

Nitrogen, Ammonia, Salicylate Method, Method 8155 (100 tests)

Sulfide, Methylene Blue Method, Method 8131 (100 tests)

Silica, Molybdate Method, Method 8282 (100 tests)

Digital Titrator

Alkalinity, Phenolphthalein and Total Method, Method 8203 (100 tests)
Hardness, Phenolphthalein and Total Method, Method 8203 (100 tests)
Total Chlorine, Iodometric Method, Method 8209 (100 tests)

Field tests not listed above may be available. Please note that we send all tests for arsenic and other contaminants that require digestion or distillation to a commercial laboratory.

ATEC Iron and Manganese Removal Pilot Plant



The exterior of ATEC Systems' pilot trailer is shown above. The source and product water connections are shown entering and exiting the trailer. Inside dimensions are 14' x 6' x 6½'.



The front one-half of the trailer is shown above. The instrument foreground on the wall is an in-line chlorine analyzer. The smaller boxes on the wall above the light are electronic flow meters used to monitor cumulative as well as instantaneous flow for each treatment train in the pilot plant.



Picture above shows the interior of the pilot plant trailer from the rear. The sample outlets and the analytical equipment are on the desk in the front of the trailer.



The picture on the left shows one set of filters. Source water enters through the hose inlet in the wall, passes through a flow meter, past a chlorine injection point, through an in-line static mixer, into the inlet manifold, down through the filter media. Product water is discharged through the wall. The pail holding the sodium hypochlorite solution can be seen to the right of the filter vessels and the in-line chlorine analyzer is on the wall above the NaOCl container. The sample ports and analytical equipment is forward of the chlorine analyzer. A second container of Ferric Chloride solution and feed pump is provided for pilot testing for arsenic removal.

Table 3
Summary of Pilot Study Test Conditions
Rainier View Water Company, Shining Mountain Well
December 2, 2013

<u>Date</u>	<u>Sample Number</u>	<u>Time</u>	<u>Meter Reading (Gallons)</u>	<u>Average Flow (gpm)</u>	<u>Loading Rate (gpm/ft²)</u>	<u>Loading Rate (gpm/ft³)</u>	<u>Media Contact Time (Minutes)</u>	<u>Cl₂ Dose (mg/L)</u>	<u>KMnO₄ (mg/L) as Mn</u>	<u>Temp °C</u>
12/02	Start	8:30	-	7.75	9.87	2.82	3.38	5.81	0.194	11.6
	1	9:00	140.1	4.67	5.95	1.70	3.78	9.64	0.120	11.5
	2	9:30	315.2	5.84	7.43	2.12	3.02	7.72	0.030	11.7
	3	10:00	511.9	6.56	8.35	2.39	2.69	2.50	ND	11.8
	4	10:30	661.5	4.99	6.35	1.81	3.54	3.28	ND	11.7
	5	11:00	794.0	4.42	5.62	1.61	4.00	3.24	ND	11.7
	6	11:30	936.6	4.75	6.05	1.73	3.71	2.58	ND	11.8
	7	12:00	1,100.5	2.73	3.48	0.99	6.46	4.50	ND	11.8
	8	12:30	1,194.5	3.13	3.99	1.14	5.63	3.92	ND	11.9
	9	13:00	1,469.9	9.18	11.69	3.34	1.92	2.68	ND	11.9
	10	13:30	1,667.1	6.57	8.37	2.39	2.69	3.74	ND	11.9
	11	14:00	1,896.9	7.66	9.75	2.79	2.30	3.21	ND	11.9
	12	14:30	2,117.5	7.35	9.36	2.68	2.40	3.34	ND	11.9
	13	15:00	2,352.5	7.83	9.97	2.85	2.25	3.14	ND	11.9
	14	15:30	2,569.9	7.25	9.23	2.64	2.44	3.39	ND	11.9
	15	16:00	2,821.3	8.38	10.67	3.05	2.11	2.93	ND	11.9
	Total or Average		2,821.30	6.19	7.88	2.25	3.27	4.10	0.115	11.8

NA, indicates Not Applicable for this test

Not Dosed, (ND) indicating the period of the test

Not Tested, (NT) indicating no value entered because there was no sample to test

Media contact time = Empty bed contact time

600 gpm (pumped at 564, 72 psi), 65 psi

Pumped Well at ±546 gpm

Used 42" AS-741 media

Sodium Hypochlorite titrated @ 7370.4

BW start of the test

Used Rochelle Salts

Dosed KMnO₄ Until 10:00

Hardness = 42 mg/L as CaCO₃

Reduced Chemical Feed, 10:00

Increased Flow @ 12:47

Table 4
Summary of Pilot Test Results
Rainier View Water Company, Shining Mountain Well
December 2, 2013

Sample Number	Source Water							Product Water								
	pH (Units)	Fe (mg/L)	Mn (mg/L)	H ₂ S (mg/L)	Ammonia (mg/L)	Silica (mg/L)	PSI	pH (Units)	Cl ₂ (F) (mg/L)	Cl ₂ (T) (mg/L)	Fe (mg/L)	Mn (mg/L)	H ₂ S (mg/L)	Ammonia (mg/L)	Silica (mg/L)	PSI
Start	7.40	0.40	0.100			42.80	30	7.64	4.68	4.85	0.12	0.044			45.10	25
1	7.67	0.38	0.085				29	7.63	3.99	5.09	0.13	0.041				25
2	7.63	0.32	0.086			45.30	30	7.76	3.79	4.68	0.12	0.013			45.50	25
3	7.73	0.37	0.105				29	7.71	1.30	1.72	0.12	0.010				25
4	7.79	0.37	0.109		0.040		29	7.77	1.13	1.52	0.12	0.009		-		24
5	7.72	0.36	0.092			47.50	29	7.71	1.06	1.33	0.13	0.011			45.10	25
6	7.70	0.37	0.091	0.001			29	7.63	0.77	1.10	0.12	0.010	0.001			24
7	7.66	0.39	0.041				29	7.64	0.89	1.09	0.12	-				24
8	7.53	0.39	0.088				30	7.63	0.97	1.13	0.13	0.011				28
9	7.63	0.33	0.090			44.60	27	7.60	0.72	0.96	0.07	0.011			45.90	22
10	7.65	0.38	0.091				27	7.63	0.79	0.86	0.11	0.011				22
11	7.69	0.35	0.093				28	7.69	0.73	0.94	0.10	0.012				22
12	7.65	0.36	0.095				28	7.63	0.81	0.86	0.09	0.009				22
13	7.65	0.36	0.091			49.00	28	7.63	0.76	0.93	0.10	0.010			43.20	22
14	7.65	0.38	0.091				27	7.63	0.68	0.93	0.12	0.010				22
15	7.10	0.37	0.090				28	7.09	0.75	0.90	0.11	0.009				22
Total or Average	7.62	0.37	0.090	0.001	0.040	45.84	29	7.63	1.49	1.81	0.11	0.014	0.001	-	44.96	24
Average as Percent of MCL		122.5%	179.8%													
Average Removal Rate											69.2%	84.63%				

Non Detect, indicating the absence of a metal or chemical at or above the method detection limit is shown as "-" and calculated in the total or average as zero.

Figure 1
Pilot Test Results
Chlorine Dosage and Free Residual Concentrations
Rainier View Water Company, Shining Mountain Well
November 13, 2013

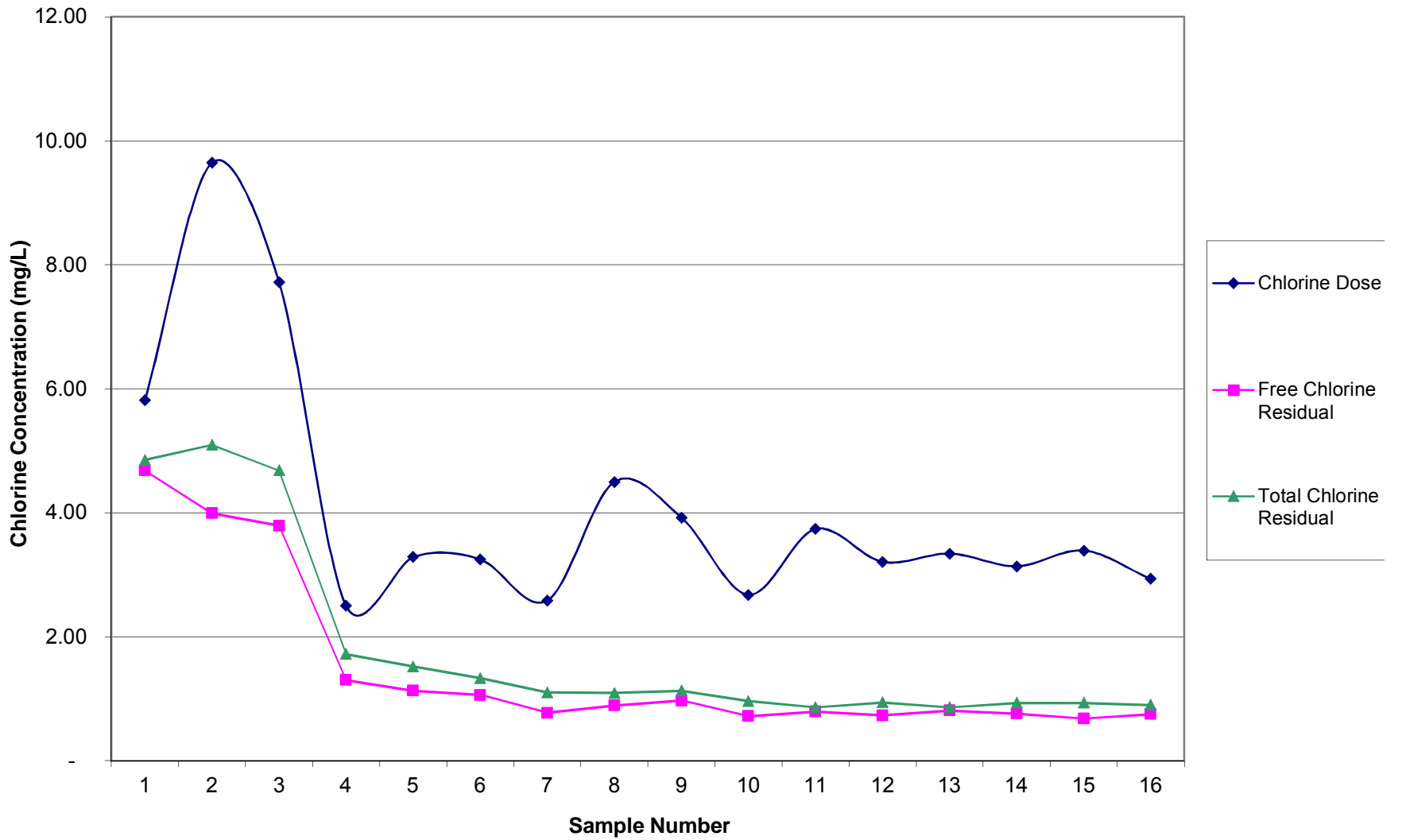


Figure 2
Pilot Test Results
Manganese Removal Using AS-741M Filter Media
Rainier View Water Company, Shining Mountain Well
November 13, 2013

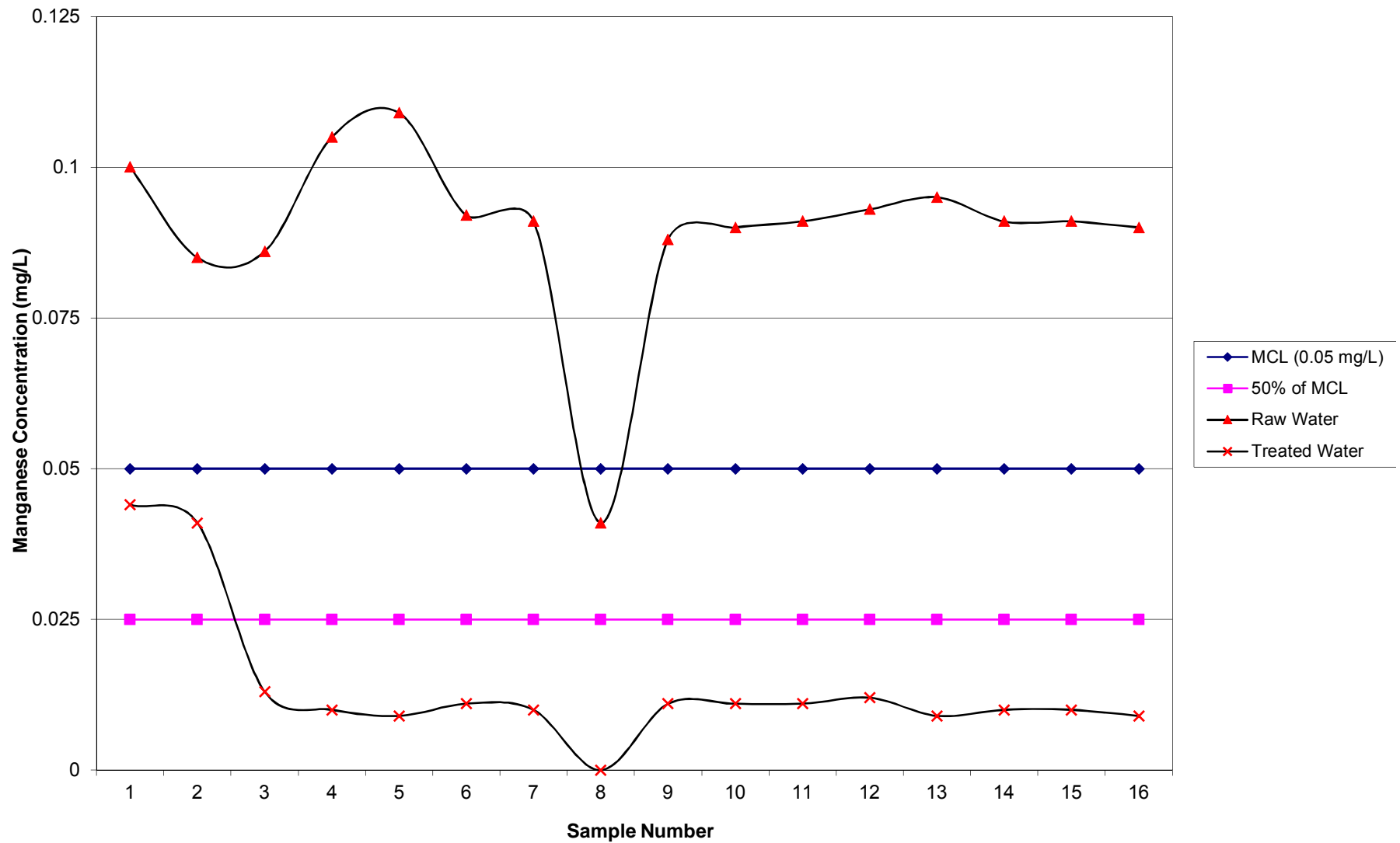
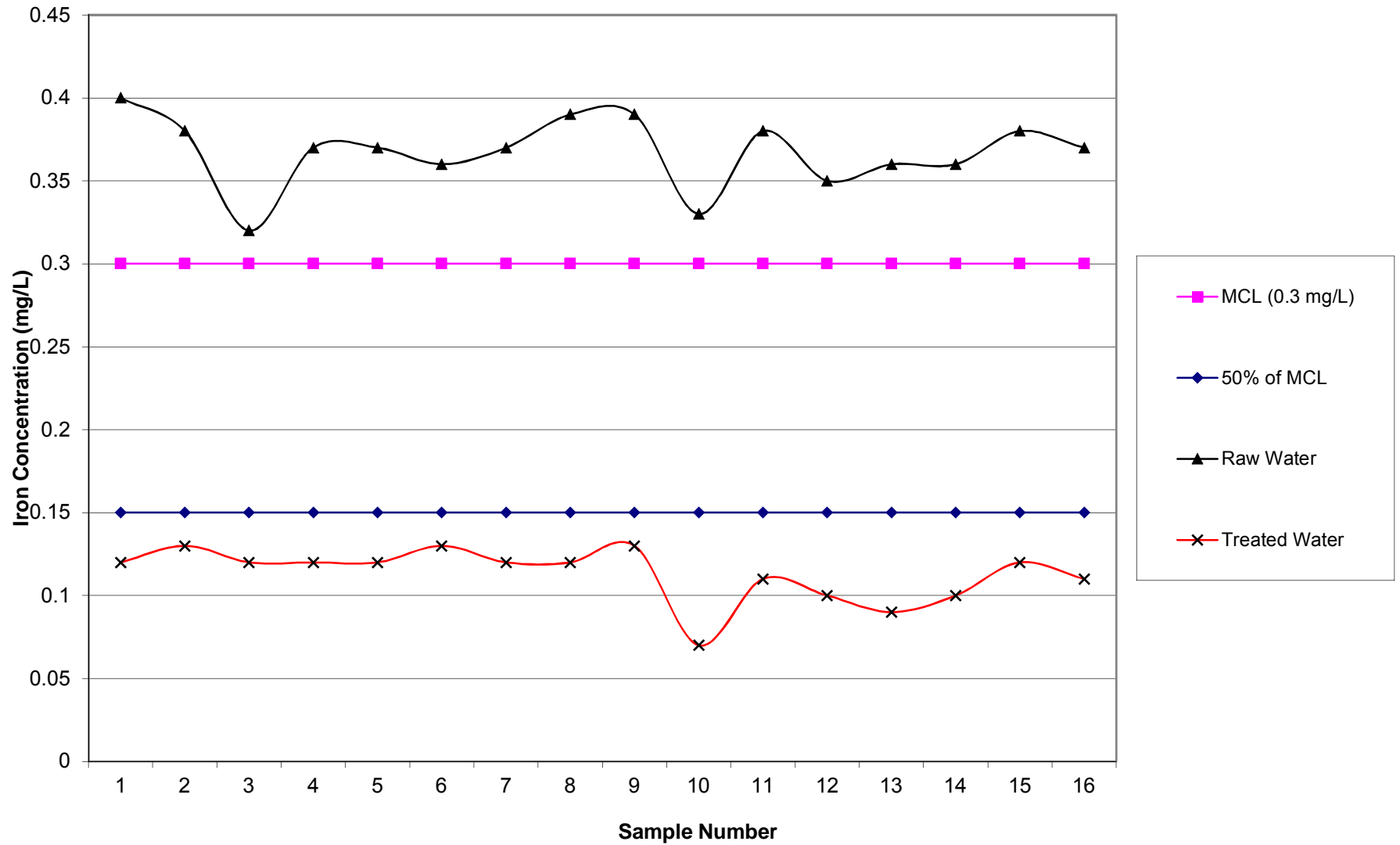
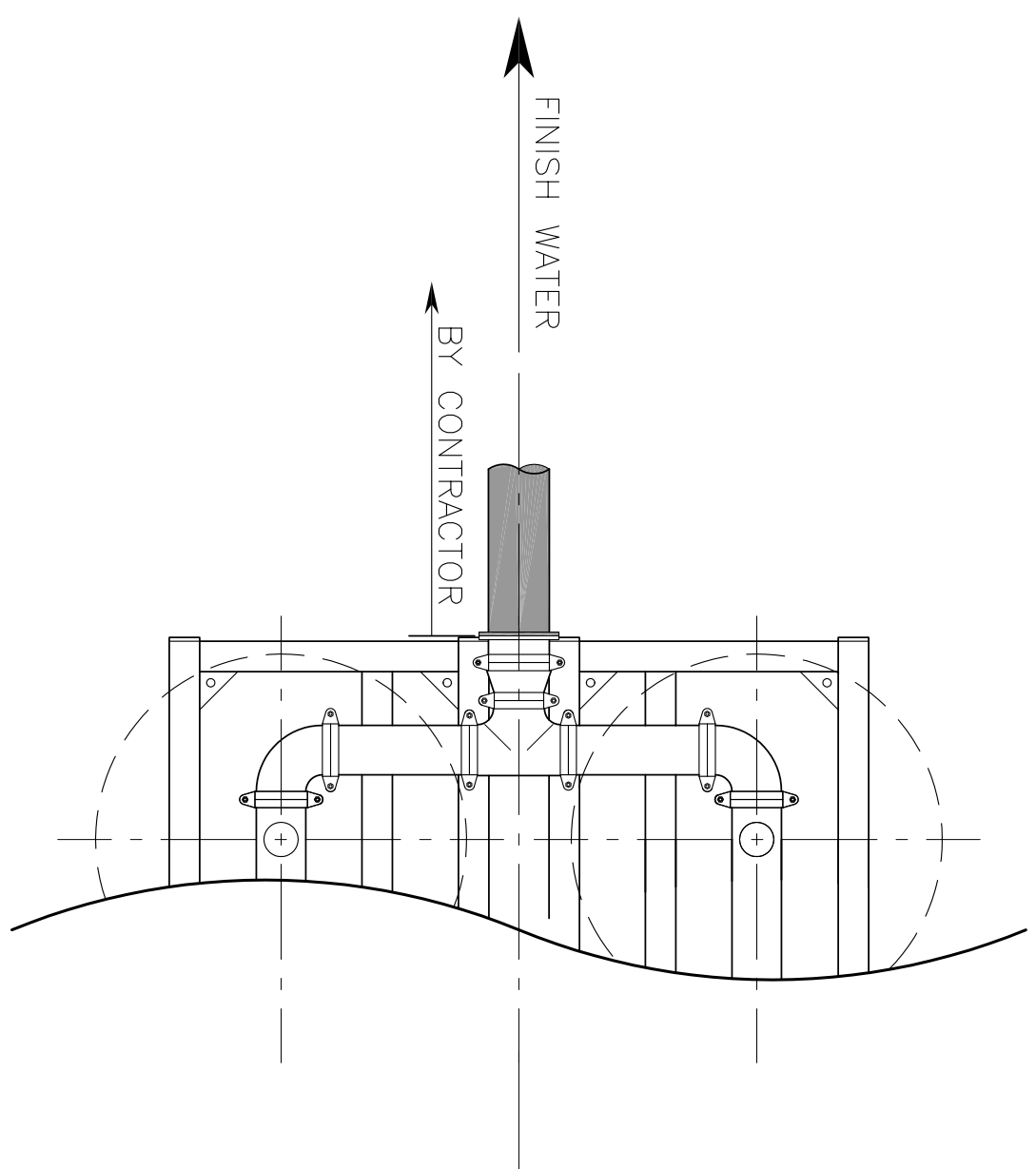
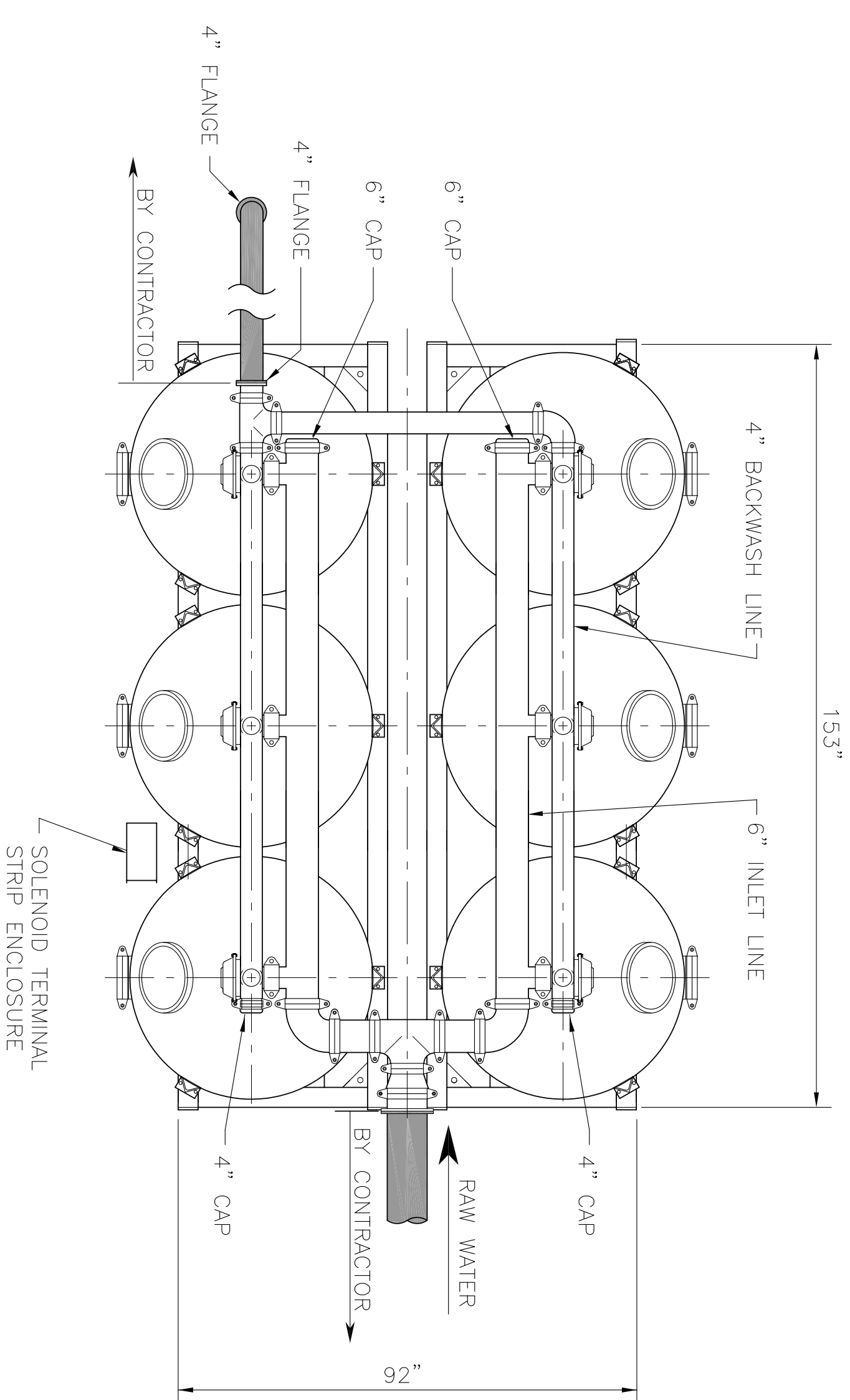


Figure 3
Pilot Test Results
Iron Removal Using ATEC AS-741M Filter Media
Rainier View Water Company, Shining Mountain Well
November 13, 2013

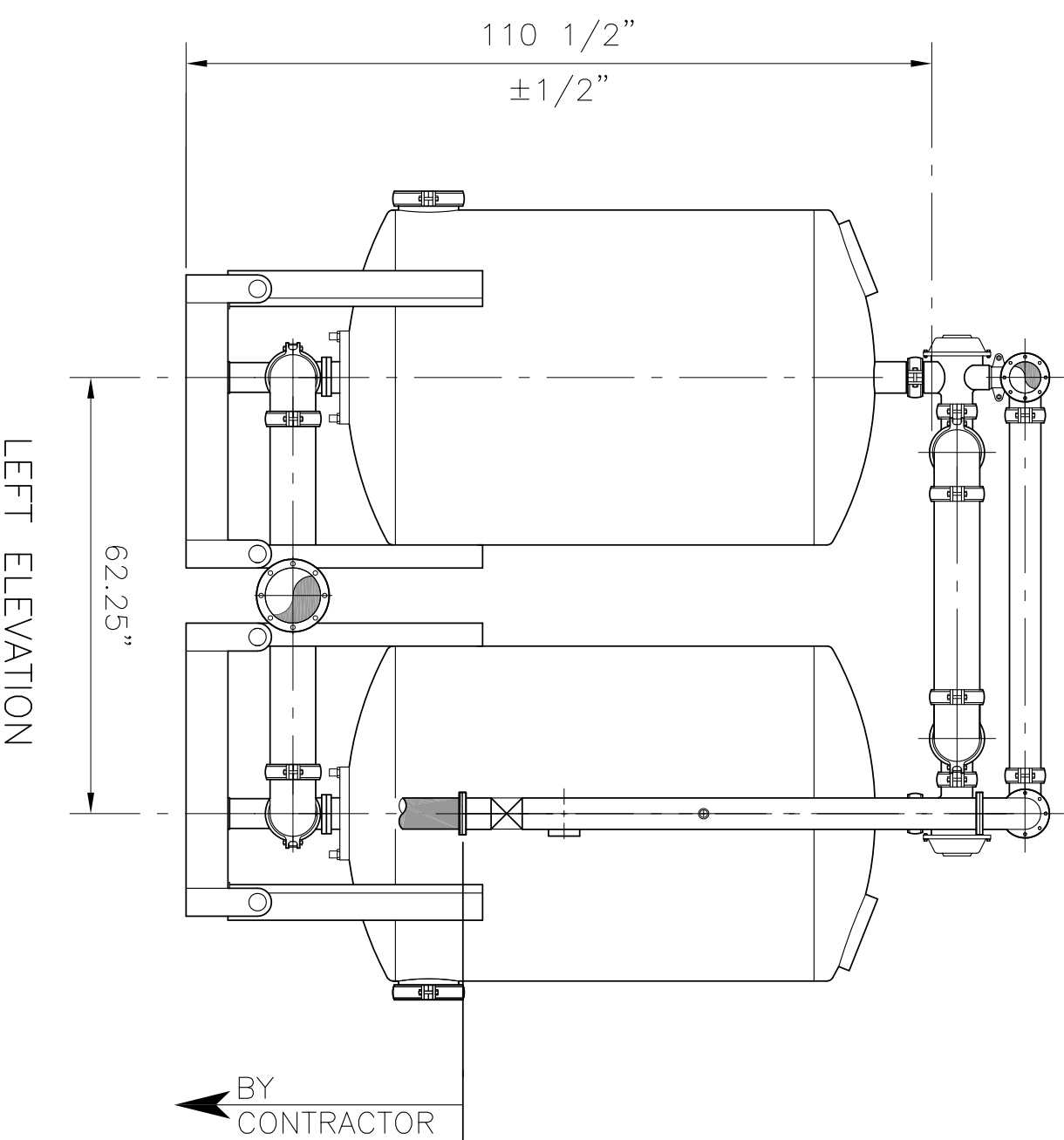




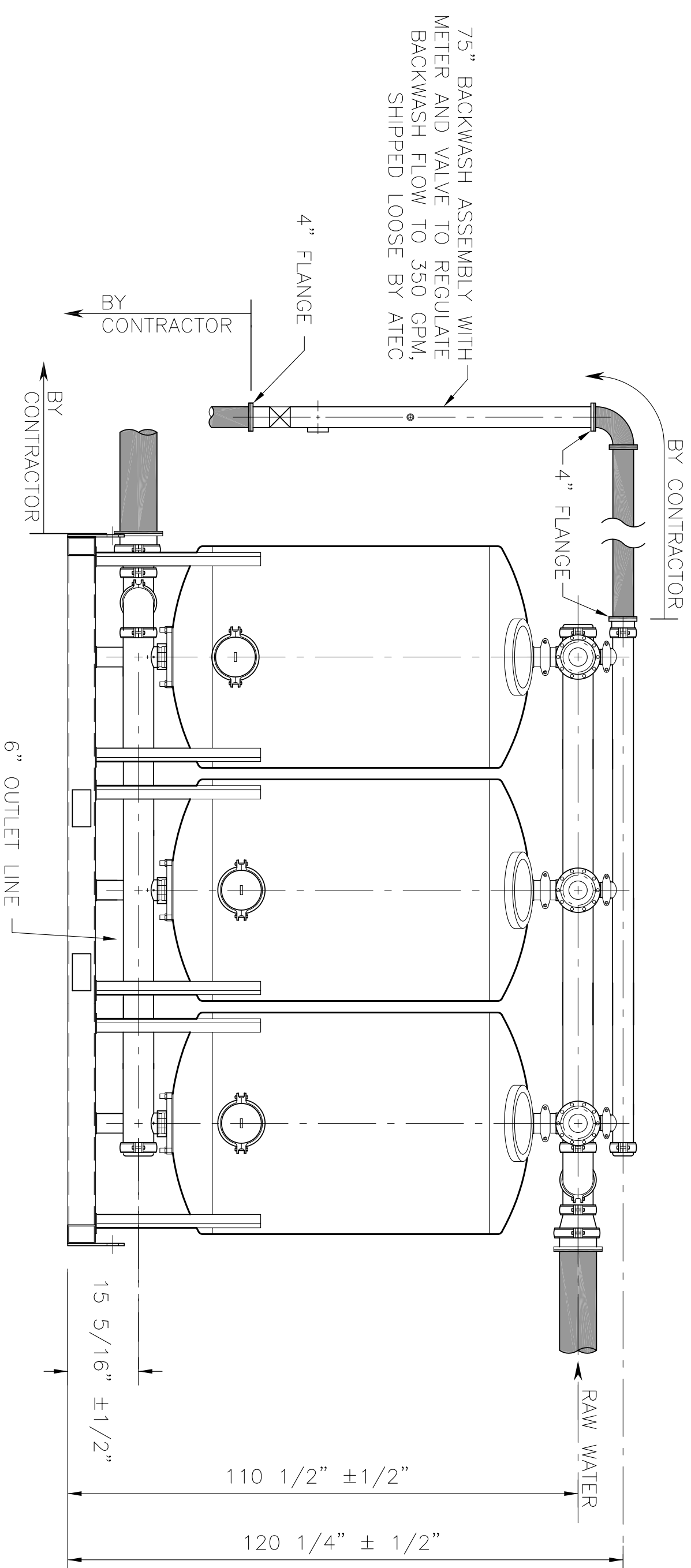
LEFT SIDE, FILTERS REMOVED



RIGHT SIDE, FILTERS REMOVED



LEFT ELEVATION



RIGHT ELEVATION

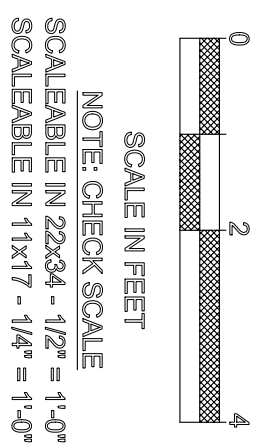
- NOTES:
- [A] THE FOUR (6) FILTER SYSTEM IS DELIVERED ON (2) FILTER SKID.
 - [B] AIR RELIEF/VACUUM RELIEF VALVE WILL BE SUPPLIED FOR INSTALL ON 2" COUPLING ON INLET LINE.

- [C] SHADED PIPING BY CONTRACTOR.
- [D] FILTER PIPING CONNECTIONS WILL BE PROVIDED TO SUIT FIELD CONDITIONS.

ATEC
SYSTEMS ASSOCIATES
P.O. BOX 10329
BAINBRIDGE ISLAND, WASHINGTON 98110-0329
PHONE: (360) 414-9223 FAX: (360) 397-0375

DESIGN BY:	
DRAWN BY:	
CHECKED BY:	
APRD BY:	

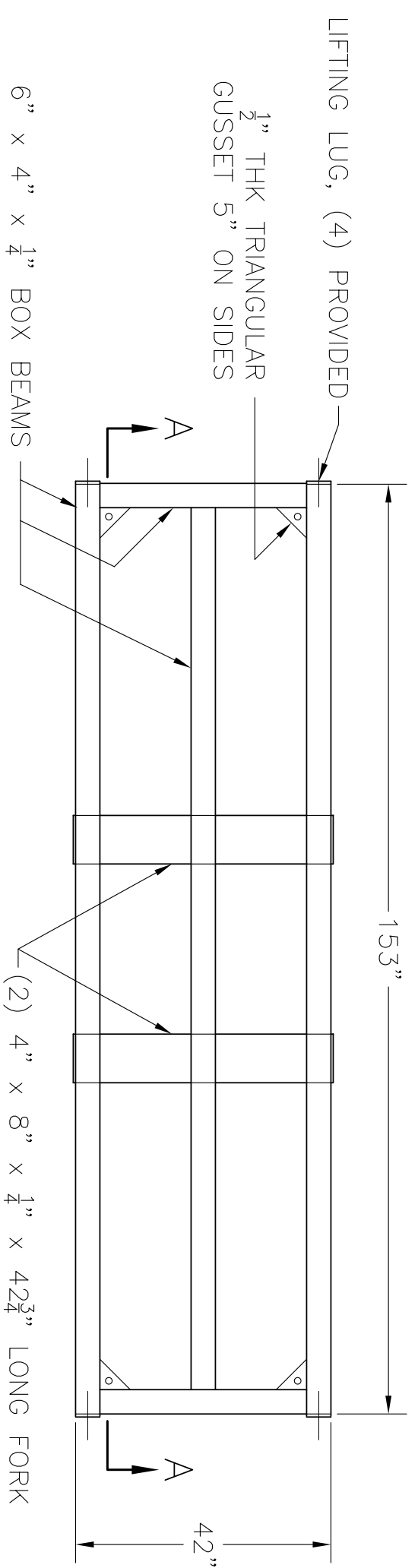
NO.	DATE	BY	APVD



RAINIER VIEW WATER CO.
SHINING MOUNTAIN WELL
600 GPM IRON AND MANGANESE
TREATMENT SYSTEM

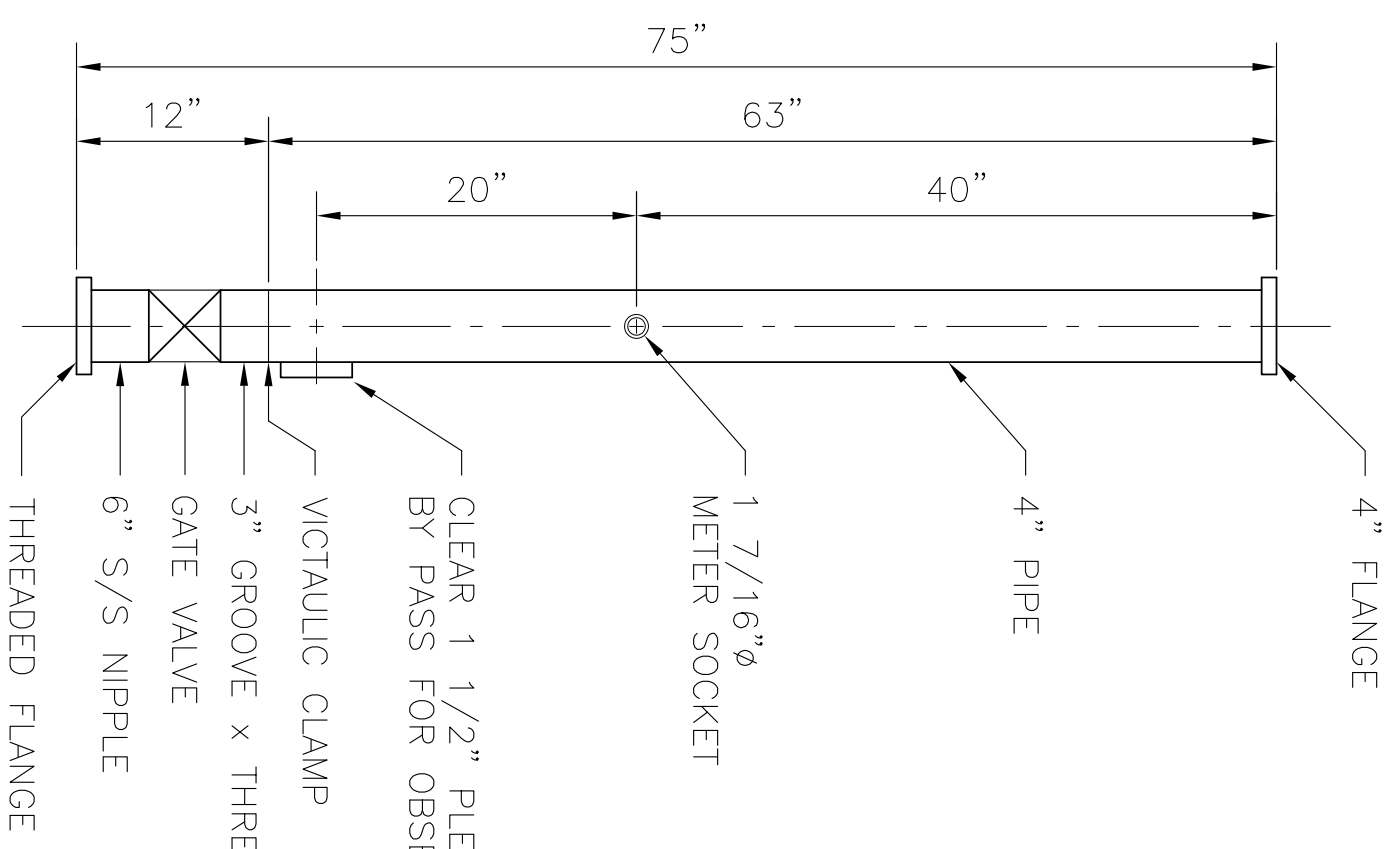
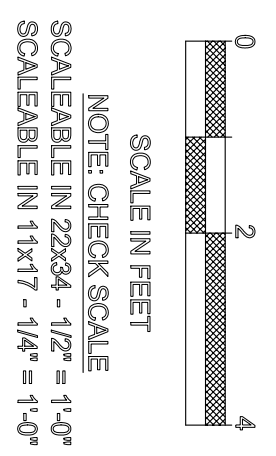
FILTER DETAILS

SHEET NO. 1 of 2
DWG. NO.
DATE: 12-30-2013
FILE: Rainier Shining Mountain

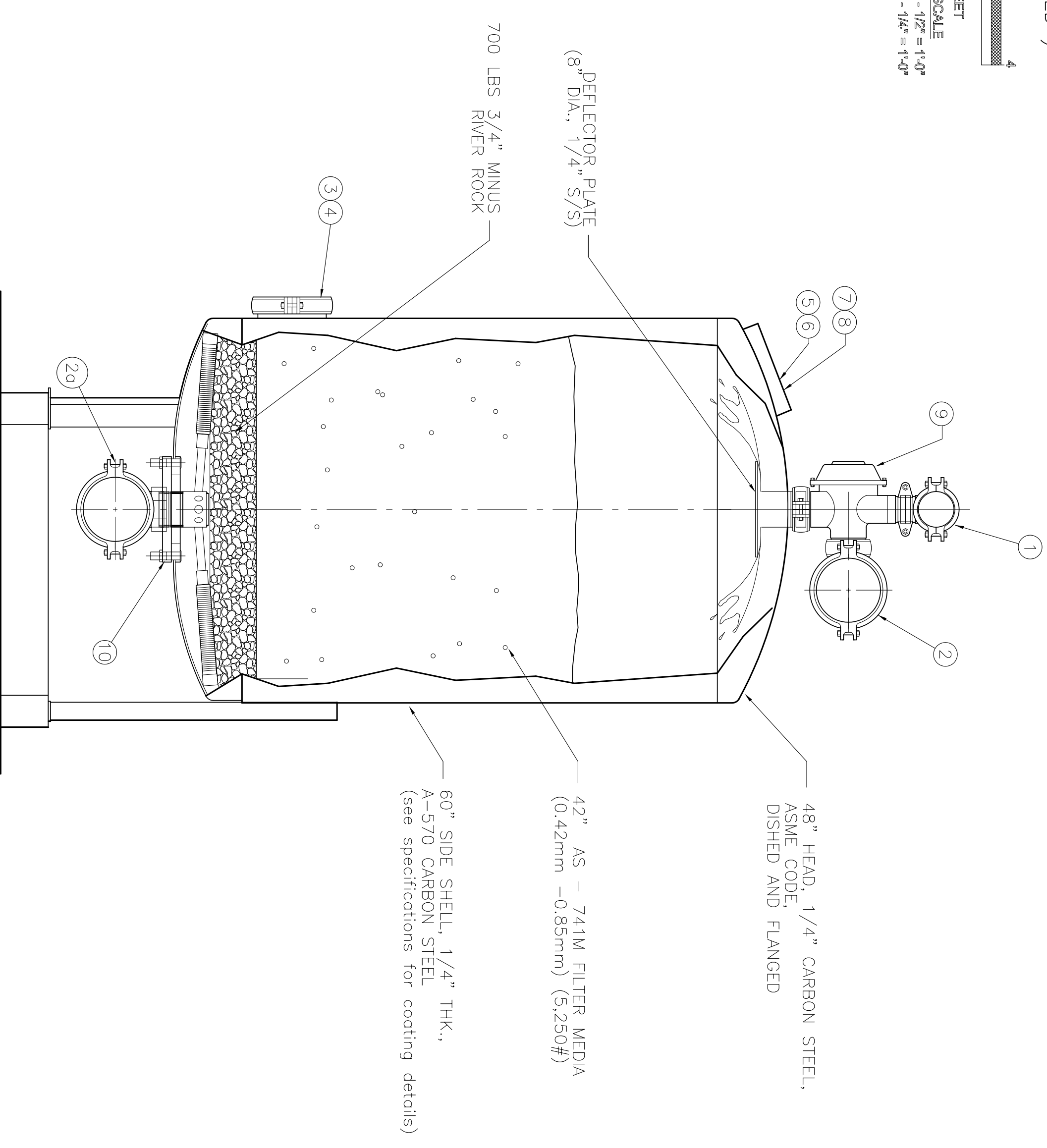
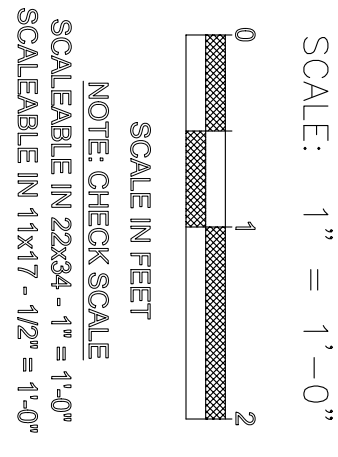


NOTE: WEIGHT OF 3 FILTER SKID: EMPTY 11,400# WITH MEDIA AND WATER 36,000#

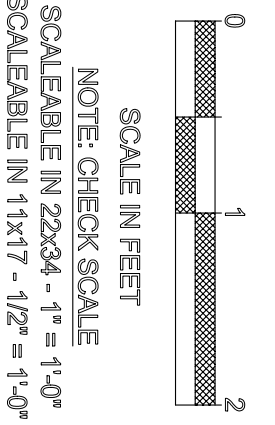
3 FILTER SKID (2 REQUIRED)



STANDARD BACKWASH ASSEMBLY

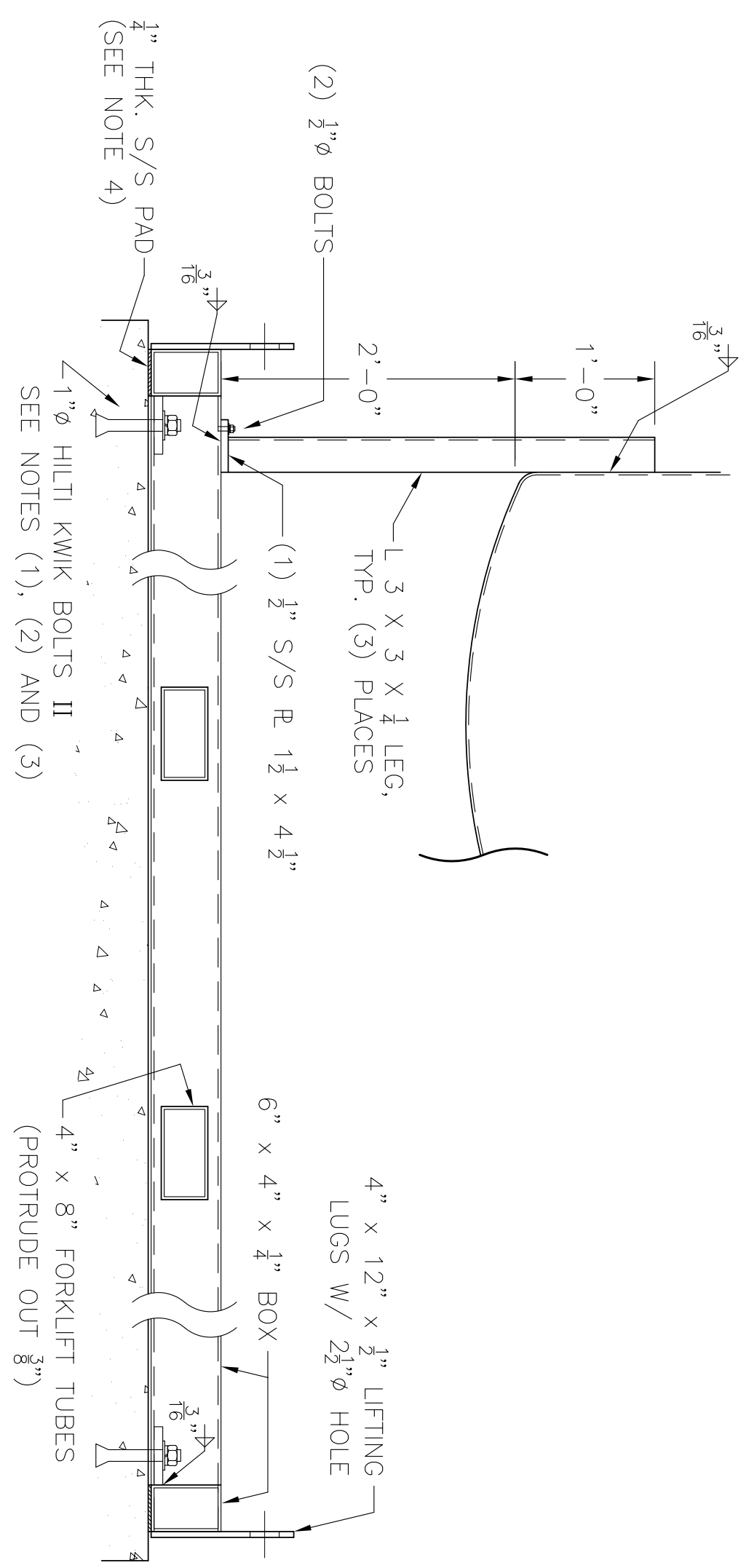


TANK SECTION

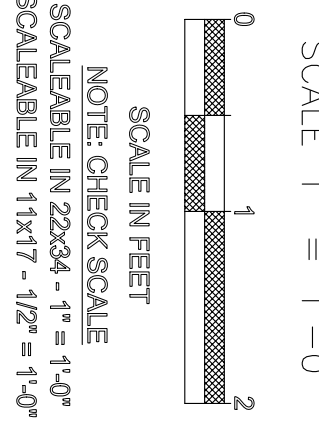


BILL OF MATERIAL		
ITEM	QTY	PART NO. DESCRIPTION
1	1	PFS-CPJ03 4" GROOVED COUPLING, CAST IRON W/ BOLTS & GASKET
2	3	PFS-CPJ04 6" GROOVED COUPLING, CAST IRON W/ BOLTS & GASKET
3	1	PFS-CPA08 8" GROOVED END CAP
4	1	PFS-CPJ08 8" GROOVED COUPLING, CAST IRON W/ BOLTS & NUTS
5	1	PFS-HHP11 11" x 15" HAND HOLE PLATE
6	1	PFS-HH011 11" x 15" HAND HOLE GASKET
7	1	PFS-HH0S11 11" x 15" HAND HOLE BOLT SET
8	1	PFS-HH0R11 11" x 15" HAND HOLE HOLD DOWN GRAB
9	1	V-BF4 4" x 4" X3" SERIES 350 BERHAD BACKWASH VALVE
10	1	UA SS48 UNDER-DRAIN ASSEMBLY 31BL SS W/ SCH 80 PVC CAP COMPLETE

NOTE: QUANTITIES FOR ONE (1) TANK



SECTION A-A



FILTER/SYSTEM INFORMATION	
ITEM	
CAPACITY	600 GPM
Fe	0.37 mg/L
MN	0.09 mg/L
COLOR	
BACKWASH	350 GPM
PRESSURE	65 PSI
SHIPPING ADDRESS	

ATEC
 SYSTEMS ASSOCIATES
 P.O. BOX 10329
 BAINBRIDGE ISLAND, WASHINGTON 98110-0329
 PHONE: (360) 414-9223 FAX: (360) 397-0375

DESIGN BY:		NO.	DATE
DRAWN BY:		BY	APVD
CHECKED BY:			
APRD BY:			

SCALE AS NOTED

RAINIER VIEW WATER CO.
 SHINING MOUNTAIN WELL
 600 GPM IRON AND MANGANESE
 TREATMENT SYSTEM

FILE: Rainier Shining Mountain
 SHEET NO. 2 of 2
 DWG. NO.
 DATE: 12-30-2013