

Appendix E

DAF WHITEWATER SYSTEM®

ADVANCED DISSOLVED AIR FLOTATION TECHNOLOGY

PERFORMANCE GUARANTEED

The innovative and proven **DAF Whitewater System®** technology was developed by Water Resources, Inc. to provide wastewater treatment solutions for suspended solids, fats, oils, BOD, COD and metals.

INNOVATIVE TUBE FLOCCULATOR

Wastewater is pumped into the **DAF Whitewater System®** flotation cell through the innovative tube flocculator. Treatment chemicals are injected into the tube flocculator to achieve maximum liquid - solids separation under easily controlled process conditions.

DAF WHITEWATER SYSTEM®

A portion of the DAF clean, treated water is recycled with a **whitewater** pump. 0.1 - 0.3 cfm air is injected into the pump at 100 psi, creating microscopic air bubbles called **whitewater** because the air- saturated water is white. The **whitewater** is injected into the tube flocculator.

Characteristic	Untreated (mg/L)	Treated (mg/L)
pH	11.2	8.9
TSS	1672	18
Oil & Grease	2480	16
BOD	432	124
COD	1120	312
Cadmium	0.18	<0.02
Chromium	0.24	<0.02
Copper	1.16	<0.10
Lead	0.87	<0.10
Nickel	0.48	<0.05
Zinc	1.93	<0.03

Typical results of a DAF Whitewater System®



200 GPM STAINLESS STEEL **DAF WHITEWATER SYSTEM®**
DIMENSIONS WITHOUT STAIRS: 13'L X 9'W X 9'H

HIGH MIXING ENERGY INCREASES EFFICIENCY

The high mixing energy created by the **whitewater** in the tube flocculator increases chemical treatment efficiency and reduces the time required for flocculation of the waste particles. This process eliminates the need for chemical reaction tanks and mixers.

DAF WHITEWATER SYSTEM® FLOTATION CELL

In the tube flocculator, the **whitewater** encapsulates the flocculated waste particles, making them highly buoyant. The buoyant flocculated waste particles rise rapidly to the flotation surface and are skimmed into the float solids sump, ready to dewater.

HIGH FLOW RATES

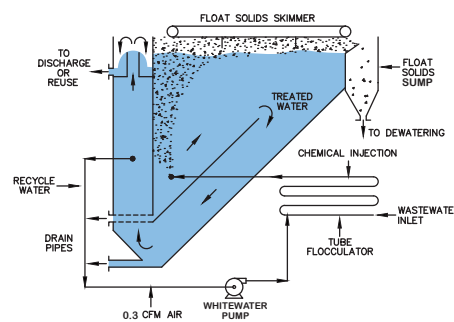
Because of the rapid rise velocity of the flocculated particles in the DAF flotation cell, less surface area is required. Flow rates of 4 - 6 gpm per square feet of surface area are easily achieved.

HIGH QUALITY TREATED WATER CAN BE REUSED

Because the **DAF Whitewater System®** treated water is high quality, the water can be reused in the plant process.

UPGRADING CONVENTIONAL FLOTATION SYSTEMS

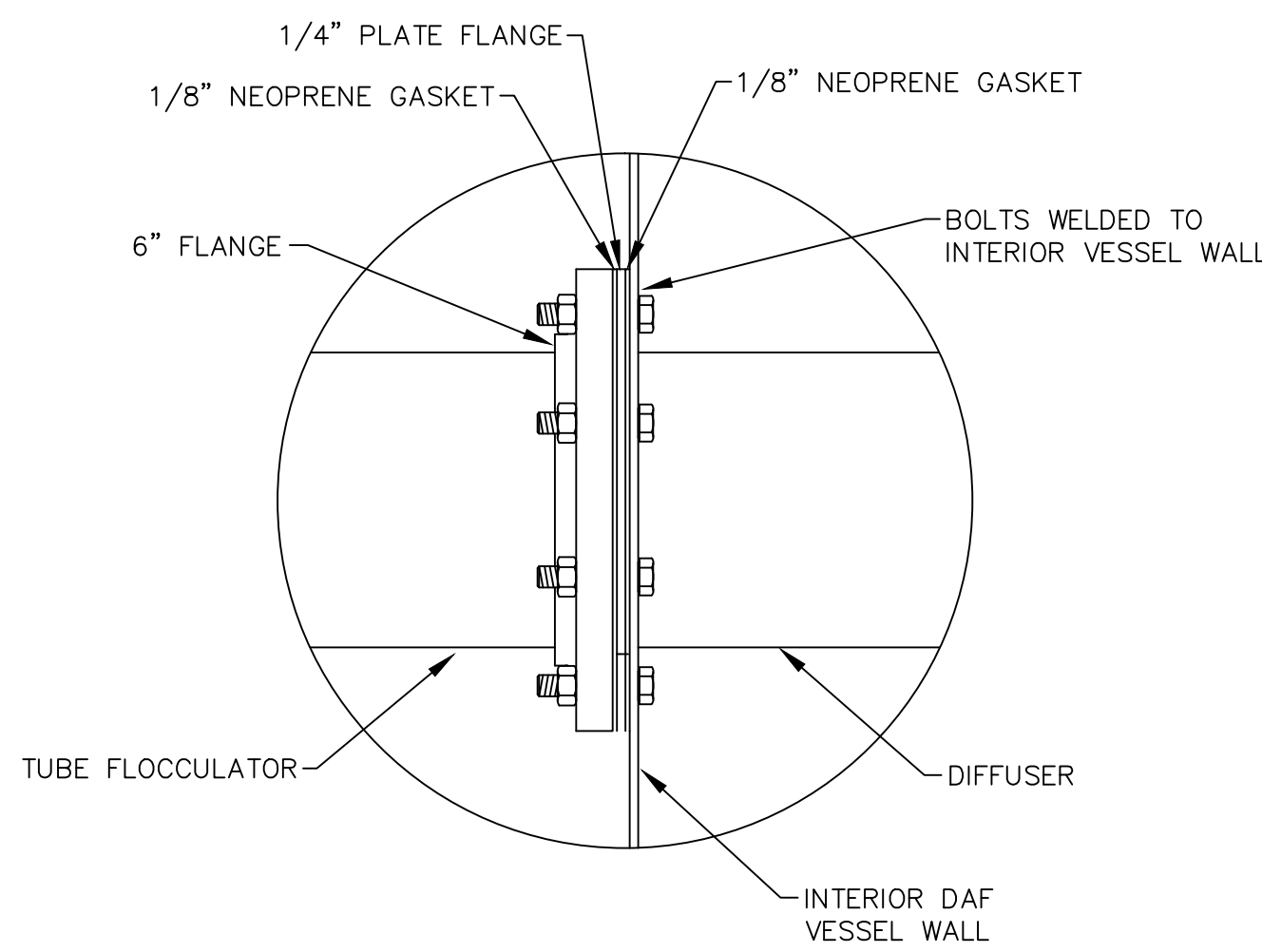
Most conventional flotation systems can be upgraded to a **DAF Whitewater System®** process by installing a **whitewater** pump, air injection system and tube flocculator to replace chemical reaction tanks and mixers. Results are higher DAF flow rates, high quality treated water and low treatment cost.



SYSTEM DIAGRAM

DAF WHITEWATER SYSTEM®
DAF'S FROM 50 TO 1000 GPM

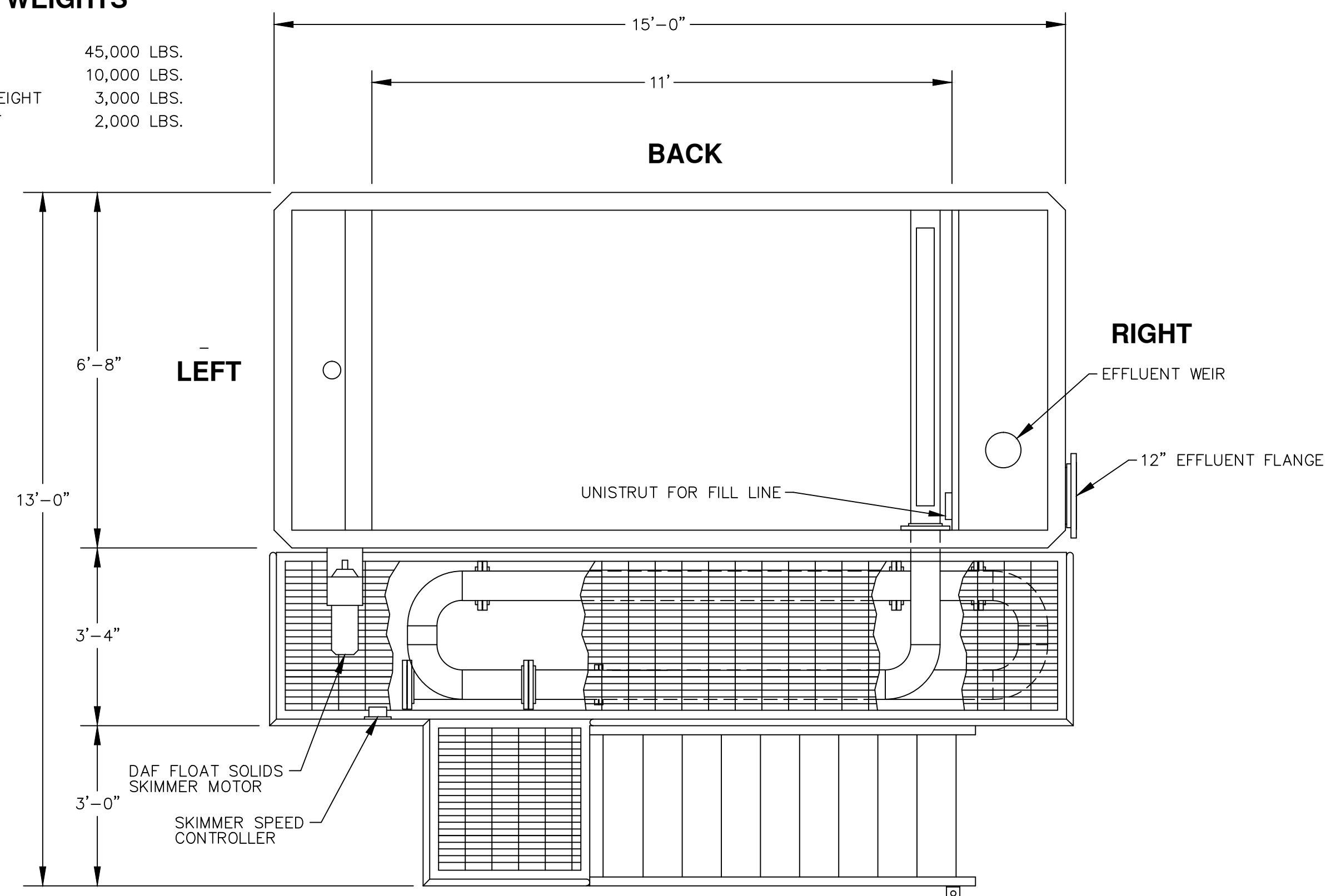




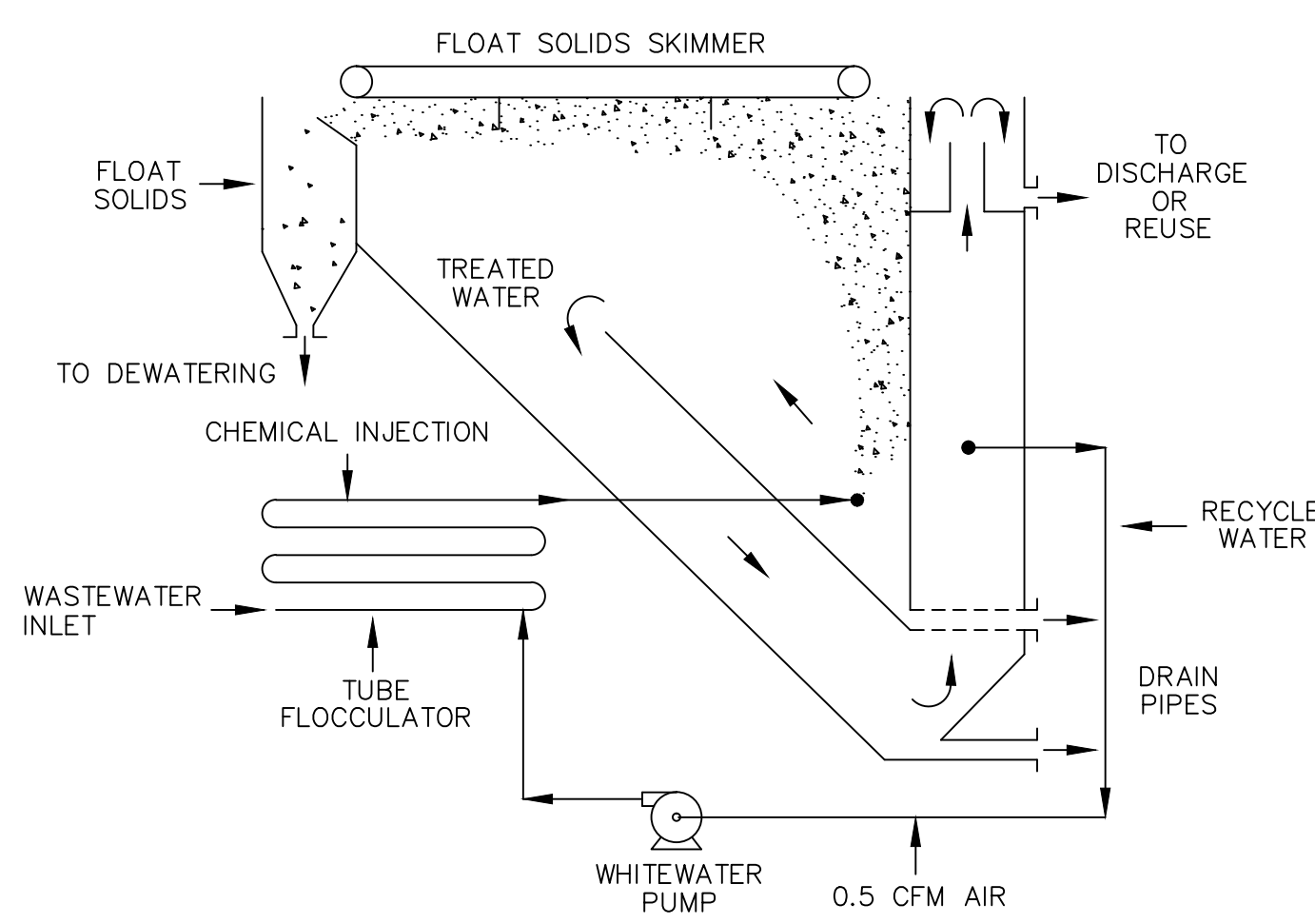
DETAIL A
TUBE FLOCCULATOR CONNECTION

APPROXIMATE WEIGHTS

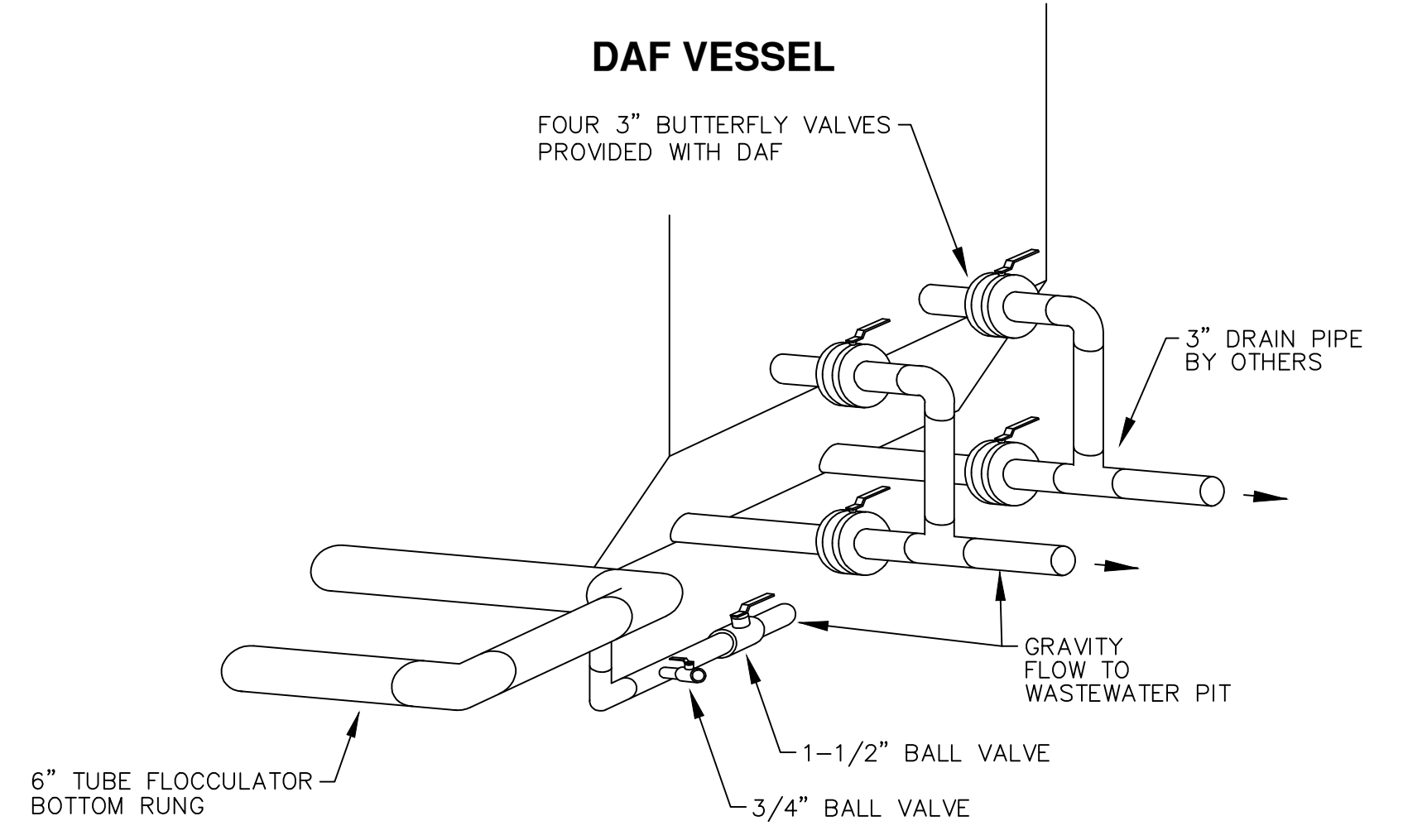
OPERATING WEIGHT	45,000 LBS.
EMPTY DAF VESSEL WEIGHT	10,000 LBS.
EMPTY TUBE FLOCCULATOR WEIGHT	3,000 LBS.
WALKWAY AND STAIRS WEIGHT	2,000 LBS.



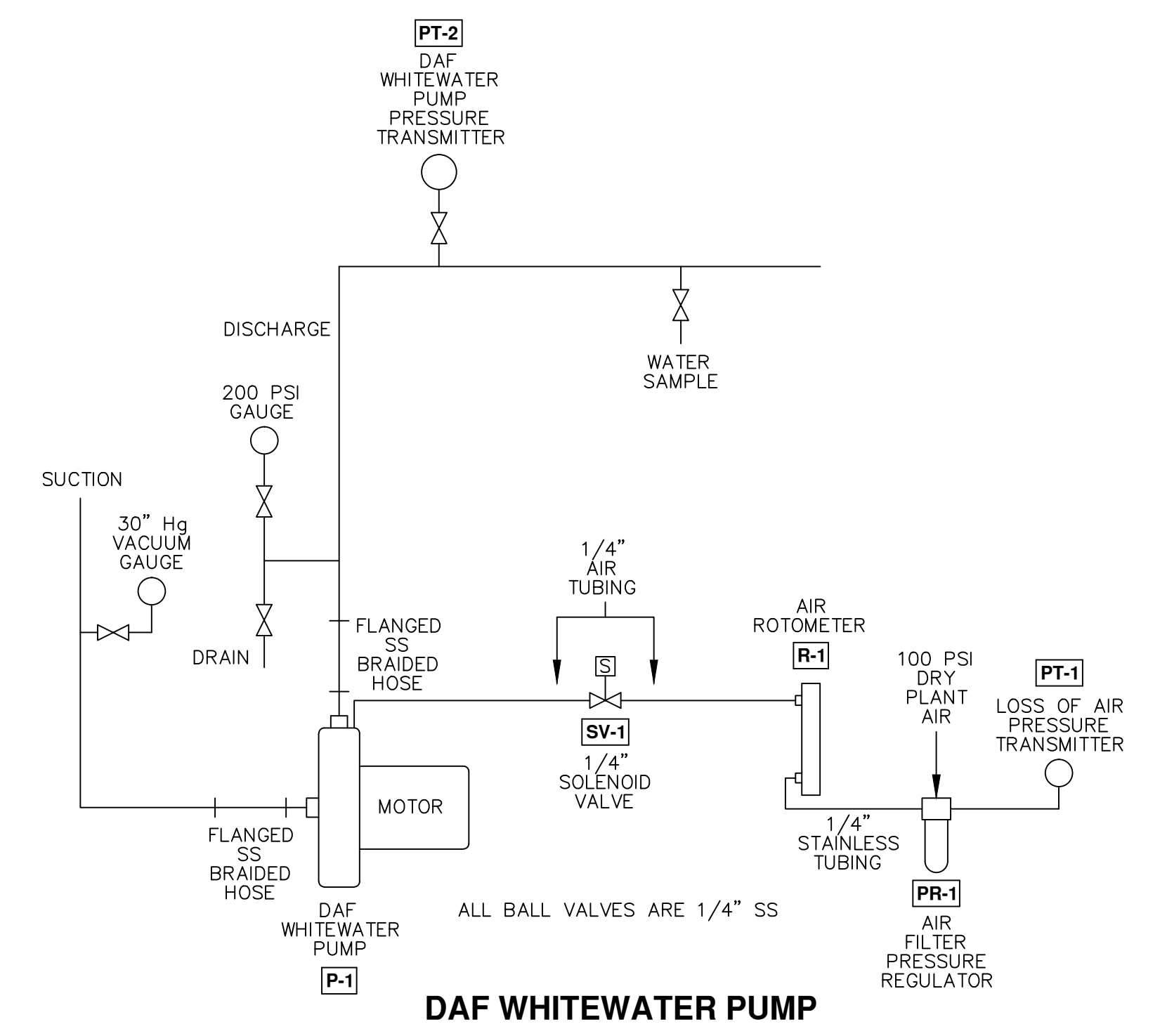
FRONT
TOP VIEW



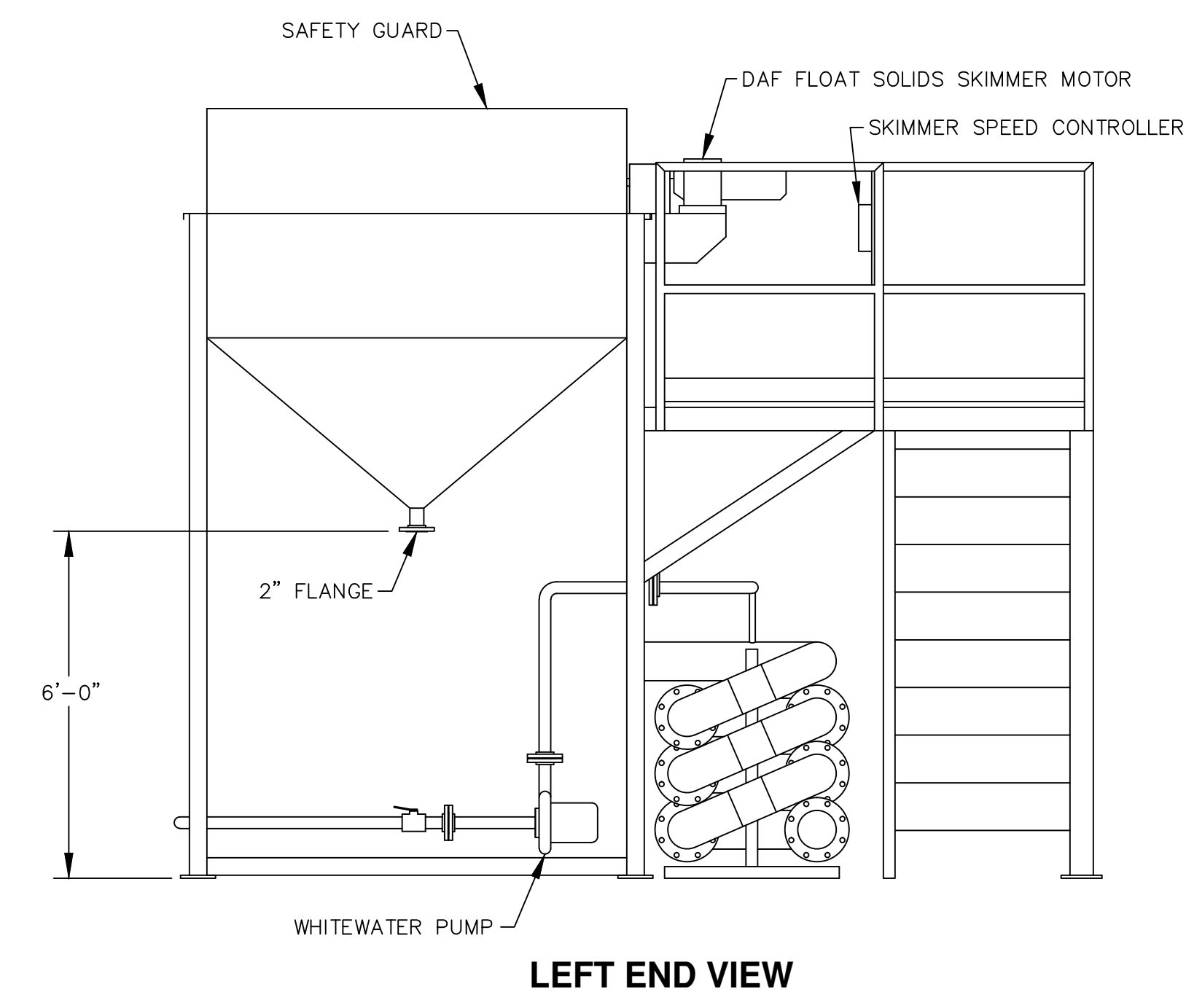
SYSTEM DIAGRAM



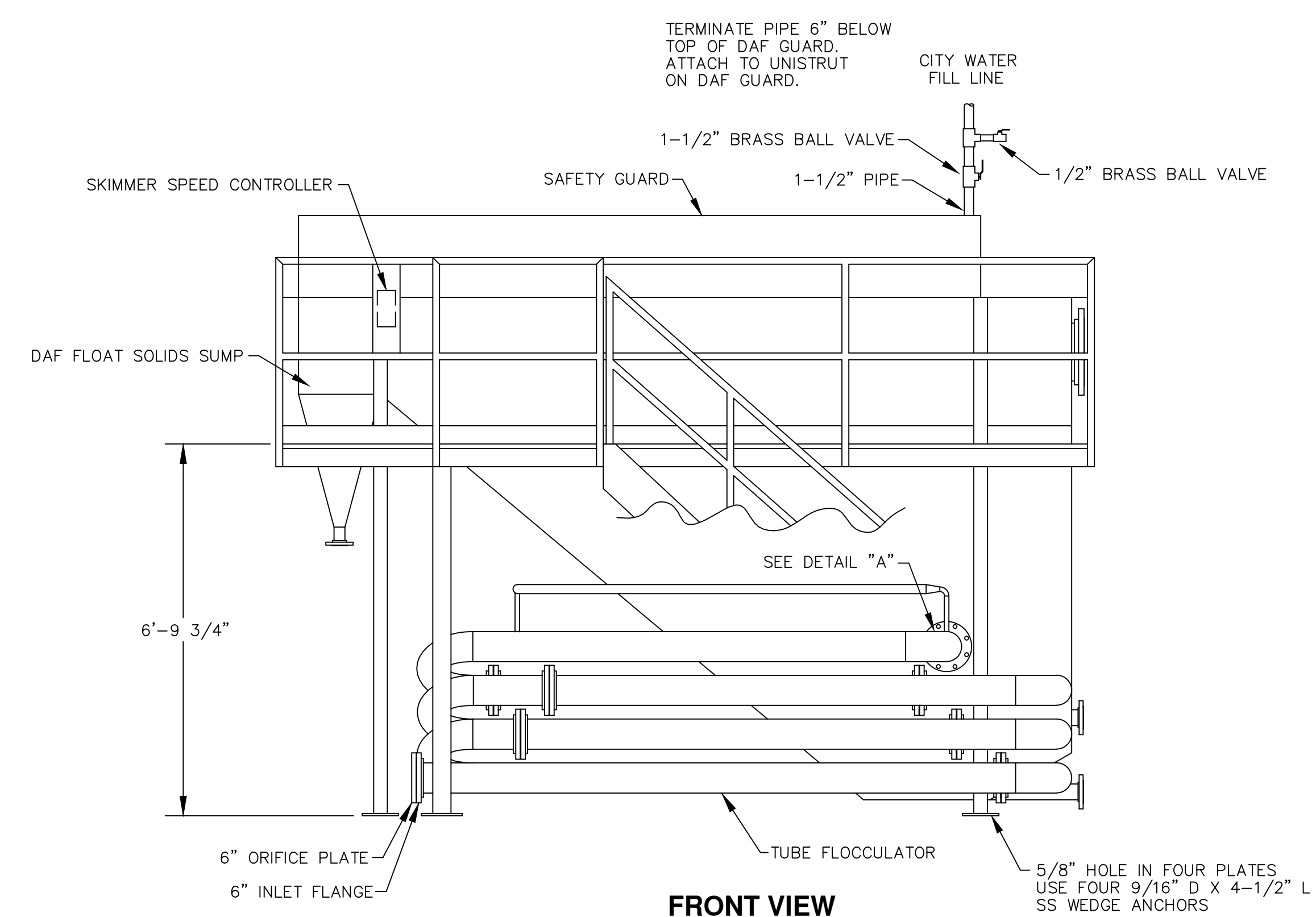
DRAIN PIPE DETAIL



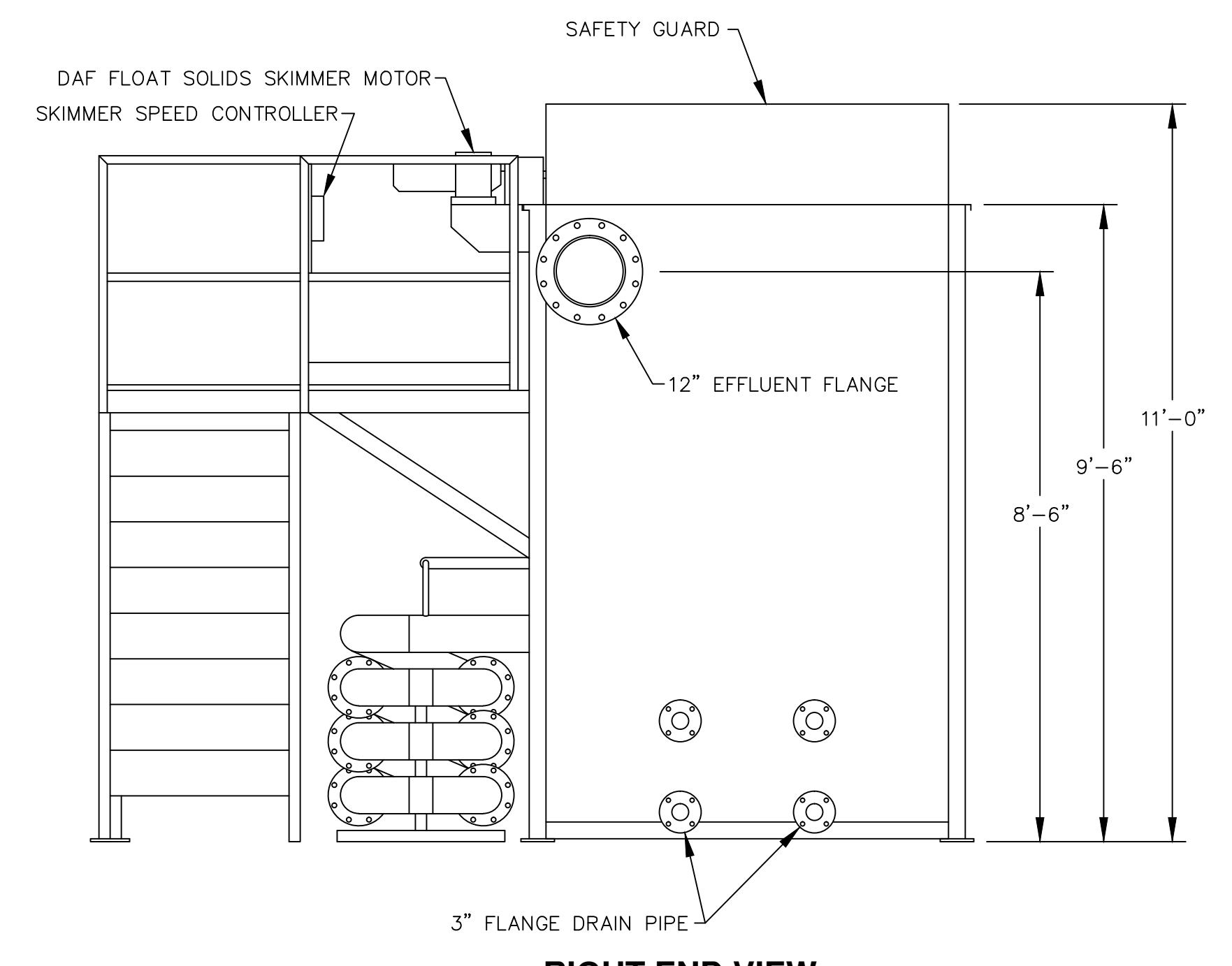
DAF WHITEWATER PUMP



LEFT END VIEW



FRONT VIEW



RIGHT END VIEW

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PREPARED BY WATER RESOURCES, INC. FOR:

CANADIAN LINEN AND UNIFORM SERVICE
WINNIPEG, MANITOBA, CANADA

300 GPM DISSOLVED AIR FLOTATION WHITEWATER SYSTEM
WATER RESOURCES, INC.
 P. O. BOX 470 AUBURN, ALABAMA 36831
 TEL 334.821.1135 FAX 334.821.2451

DAF DETAILS

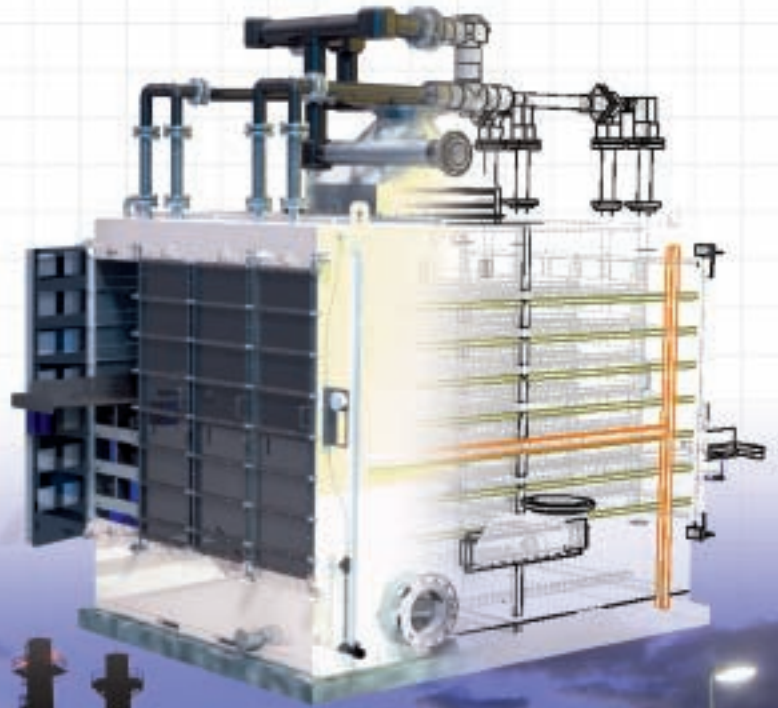
DRAWING TITLE: **300 GPM DISSOLVED AIR FLOTATION WHITEWATER SYSTEM**
 DATE: **9/10/13**
 SCALE: **1/2" = 1'-0"**
 SHEET **1** OF **1**



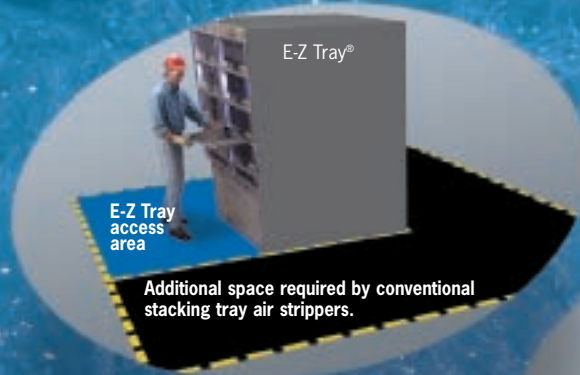
Environmental Systems

A **TestAmerica** Company
THE LEADER IN ENVIRONMENTAL TESTING

Sliding Tray, High-Efficiency Air Strippers for VOC Removal



Flow Rates from 1 to 1,000 gpm and Options to Fit Every Treatment Project



Conventional air strippers need more than twice the access and tray removal space than E-Z Tray® air strippers.



Flow rates available from 1 to 1,000 gpm.



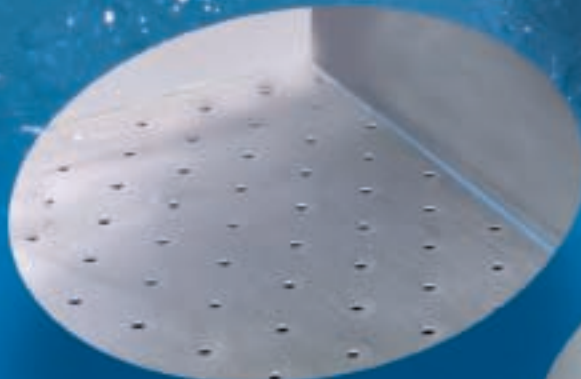
Hinged door option allows for easy access without door removal.



Front access hatches seal tight and are removed quickly with hand-knobs.



Split-tray option reduces maximum tray weight to only 28 lbs., even on the 1,000 gpm unit!



Air flows up through perforated trays creating a turbulent froth zone with a high air-to-liquid surface area for mass transfer of volatile organic compounds (VOCs)



Front access slide-out trays allow unit maintenance by one person.

E-Z Tray[®]

Easier tray cleaning and superior technical support make E-Z Tray[®] air strippers a smart choice!

The E-Z Tray[®] Air Stripper (U.S. Patent Number 5,518,668) is a sliding tray, stainless steel air stripper used to remove volatile organic compounds (VOC) from contaminated groundwater and waste streams. The exclusive design of the E-Z Tray stripper results in very high removal efficiencies in an easier to maintain process unit.

Any air stripping process subject to fouling conditions has to contend with periodic cleaning in order to retain treatment efficiencies and capacity. Tower air strippers can become maintenance headaches when the tower packing becomes clogged and cemented together with bio-fouling or precipitants. When the perforated trays in stacking tray air strippers become fouled they require major disassembly, cranes or hoists, and lots of room.

Unlike these traditional types of air strippers, QED's E-Z Tray air strippers use removable, lightweight, front slide-out trays. This unique feature provides many advantages, including one person cleaning and less building space.

E-Z Tray air strippers are available in configurations with 4 or 6 trays, with maximum flow rates from 1-25 gpm (4-100 Lpm) all the way up to 1,000 gpm (3,784 Lpm).

NEW – High Capacity Process Air Strippers

These air strippers are engineered to serve in larger, process-type projects involving multiple treatment stages, where they are an effective component of large-scale water or wastewater processes in



E-Z Tray Advantages

E-Z Tray

- Single person cleaning
- Easy process monitoring and inspection, even while in operation
- Reduced footprint for installation and maintenance
- High removal efficiencies easier to maintain
- Easily modeled online by customer to help process evaluation

Tower Air Strippers

- Condition of packing and liquid and air flow distribution are very difficult to observe
- Small footprint but very tall structure required
- More difficult to keep at design performance
- More complex process assistance required

Stacking Tray Air Strippers

- Major disassembly steps and crew needed
- Difficult to impossible to observe air and liquid flow distribution during operation
- Lots of space needed for disassembly, to access all sides and to lift and store tray stages
- More difficult to keep at design performance
- Online modeler not offered

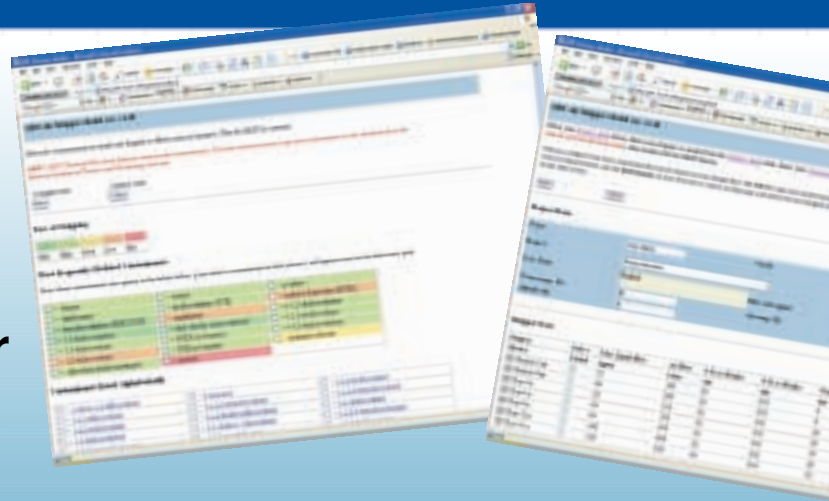
manufacturing, refining, chemical processing and other industries. They can act as a pre-treatment stage for other process elements, such as large aerobic biotreatment units, removing VOCs at much lower airflow rates to reduce the costs of off-gas treatment.

All of this combined with the easier maintenance and smaller footprint of QED's sliding tray air strippers, has led E-Z Tray to become the preferred choice for major remediation and process stream projects in the U.S. and abroad.

The QED VOC Removal Advantage

Proven equipment, expert help with its selection and installation, and support you can count on

Exclusive Online Performance Modeler has been developed to assist you in selecting the most effective air stripping package for your groundwater cleanup project



**E-Z Tray®
Model 6.4**



**E-Z Tray®
Model 16.4**



**E-Z Tray®
Model 24.4**

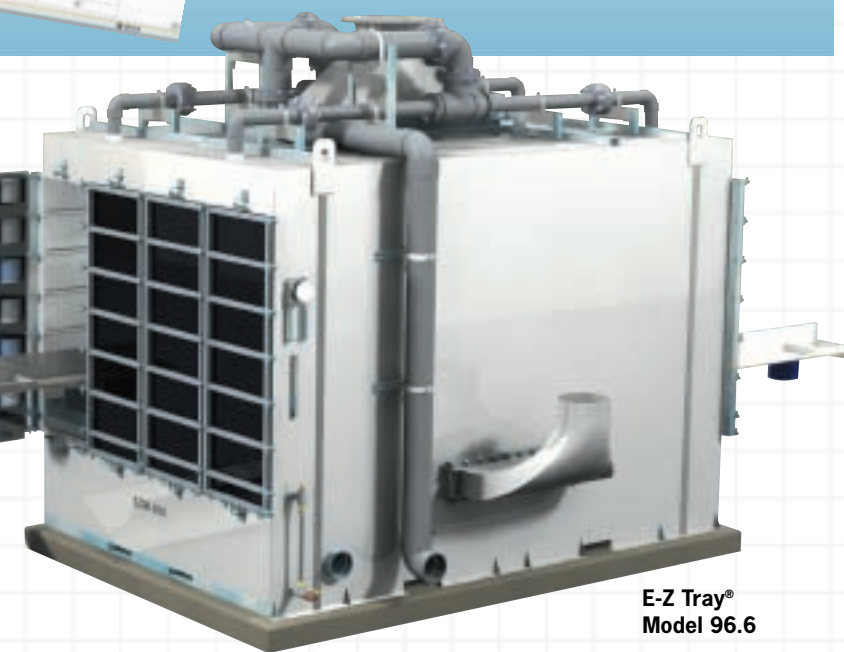
Air Stripper Specifications

Model No.	Maximum Flow Range	Dry Weight	Operating Weight	Shell Dimension (LxWxH)	Trays Per Tier
4.4	1-50 gpm (4-189 Lpm)	630 lbs. (286 kg)	985 lbs. (447 kg)	29 x 27 x 82 in. (74 x 69 x 208 cm)	4 x 29 lbs. (4 x 13 kg)
4.6	1-50 gpm (4-189 Lpm)	780 lbs. (354 kg)	1,219 lbs. (553 kg)	29 x 27 x 102 in. (74 x 69 x 259 cm)	6 x 29 lbs. (6 x 13 kg)
6.4	1-65 gpm (4-246 Lpm)	790 lbs. (358 kg)	1,285 lbs. (583 kg)	37 x 27 x 82 in. (94 x 69 x 208 cm)	4 x 40 lbs. (4 x 18 kg)
6.6	1-65 gpm (4-246 Lpm)	978 lbs. (443 kg)	1,591 lbs. (722 kg)	37 x 27 x 102 in. (94 x 69 x 259 cm)	6 x 40 lbs. (6 x 18 kg)
8.4	1-75 gpm (4-284 Lpm)	955 lbs. (433 kg)	1,580 lbs. (717 kg)	49 x 27 x 82 in. (124 x 69 x 208 cm)	4 x 50 lbs. (4 x 23 kg)
8.6	1-75 gpm (4-284 Lpm)	1,182 lbs. (536 kg)	1,956 lbs. (887 kg)	49 x 27 x 102 in. (124 x 69 x 259 cm)	6 x 50 lbs. (6 x 23 kg)
12.4	1-120 gpm (4-454 Lpm)	1,165 lbs. (528 kg)	2,105 lbs. (955 kg)	73 x 27 x 82 in. (185 x 69 x 208 cm)	4 x 60 lbs. (4 x 447 kg)
12.6	1-120 gpm (4-454 Lpm)	1,442 lbs. (654 kg)	2,606 lbs. (1,182 kg)	73 x 27 x 102 in. (185 x 69 x 259 cm)	6 x 60 lbs. (6 x 447 kg)
16.4	1-150 gpm (4-566 Lpm)	1,625 lbs. (737 kg)	2,870 lbs. (1,302 kg)	49 x 52 x 84 in. (124 x 132 x 213 cm)	8 x 50 lbs. (8 x 23 kg)
16.6	1-150 gpm (4-566 Lpm)	2,011 lbs. (912 kg)	3,553 lbs. (1,612 kg)	49 x 52 x 104 in. (124 x 132 x 264 cm)	12 x 50 lbs. (12 x 23 kg)
24.4	1-250 gpm (4-946 Lpm)	2,100 lbs. (953 kg)	3,980 lbs. (1,805 kg)	73 x 52 x 84 in. (185 x 132 x 213 cm)	8 x 60 lbs. (8 x 27 kg)
24.6	1-250 gpm (4-946 Lpm)	2,599 lbs. (1,179 kg)	4,926 lbs. (2,234 kg)	73 x 52 x 104 in. (185 x 132 x 264 cm)	12 x 60 lbs. (12 x 27 kg)
48.4	1-500 gpm (1,893 Lpm)	5,000 lbs. (2,268 kg)	12,500 lbs. (5,670 kg)	98 x 71 x 84 in. (249 x 180 x 213 cm)	16 x 60 lbs. (16 x 27 kg)
48.6	1-500 gpm (1,893 Lpm)	5,500 lbs. (2,495 kg)	13,000 lbs. (5,897 kg)	98 x 71 x 104 in. (249 x 180 x 264 cm)	24 x 60 lbs. (24 x 27 kg)
96.4	1-1,000 gpm (3,785 Lpm)	11,000 lbs. (4,990 kg)	25,000 lbs. (11,340 kg)	142 x 98 x 84 in. (361 x 249 x 213 cm)	32 x 60 lbs. (32 x 27 kg)
96.6	1-1,000 gpm (3,785 Lpm)	11,500 lbs. (5,216 kg)	30,000 lbs. (13,608 kg)	142 x 98 x 104 in. (361 x 249 x 264 cm)	48 x 60 lbs. (48 x 27 kg)

Standard construction is 304 SS, other alloys upon request. *Allow additional space for accessory components. (blower, piping, etc.)

count on when you need it

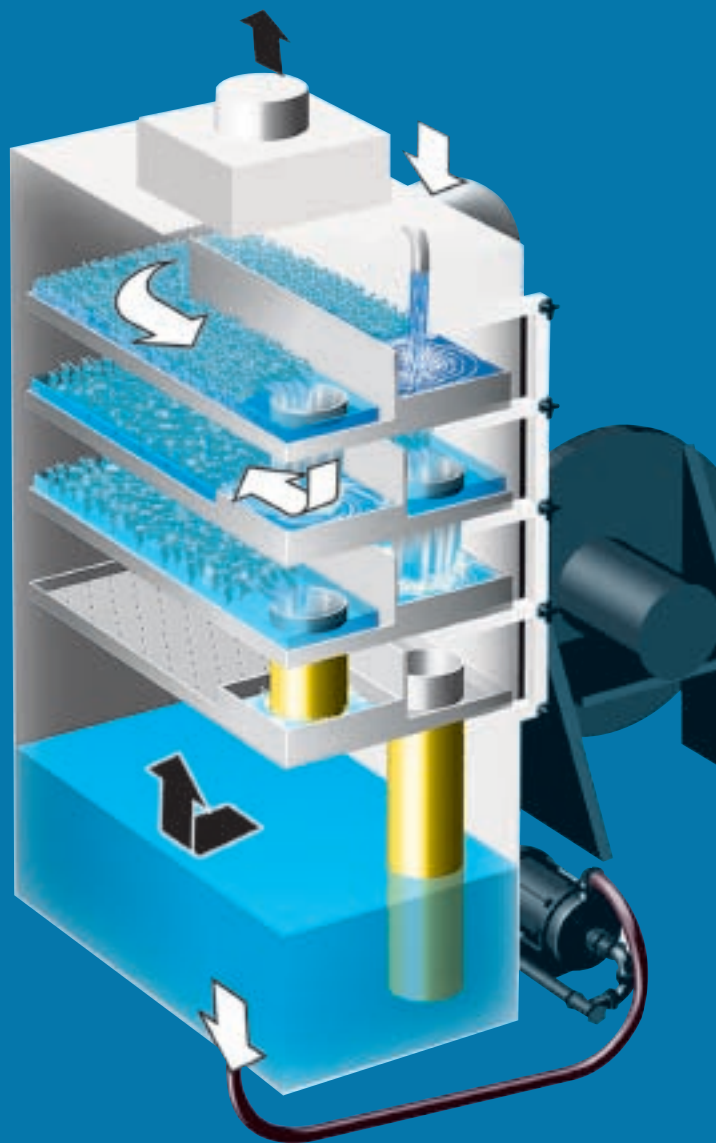
Try it for yourself today! Use our exclusive online stripper modeler at www.qedenv.com/model/model.html to spec the exact size and configuration for your project. Then talk to a QED applications specialist toll-free at **(800) 624-2026** for fast, free system design assistance and a price quote.



**E-Z Tray®
Model 96.6**

How it Works

As contaminated groundwater enters through the top of the air stripper, millions of air bubbles are forced by blower pressure up through the perforated trays. This creates a turbulent froth zone with an extremely high air-to-liquid surface area for mass transfer of volatile organic compounds (VOCs) from liquid to air. Using the froth instead of a conventional tower packing delivers high VOC removal efficiencies even under fouling conditions, and is easier to inspect and maintain.



Active Area	Nominal Air Flow	Additional Space for Tray Removal*
2.8 ft. ² (0.26 m ²)	210 cfm (5.95 m ³ /min)	27 in. (69 cm)
2.8 ft. ² (0.26 m ²)	210 cfm (5.95 m ³ /min)	27 in. (69 cm)
3.8 ft. ² (0.35 m ²)	320 cfm (9.06 m ³ /min)	35 in. (89 cm)
3.8 ft. ² (0.35 m ²)	320 cfm (9.06 m ³ /min)	35 in. (89 cm)
5.6 ft. ² (0.52 m ²)	420 cfm (11.89 m ³ /min)	47 in. (119 cm)
5.6 ft. ² (0.52 m ²)	420 cfm (11.89 m ³ /min)	47 in. (119 cm)
8.8 ft. ² (0.82 m ²)	600 cfm (16.99 m ³ /min)	71 in. (180 cm)
8.8 ft. ² (0.82 m ²)	600 cfm (16.99 m ³ /min)	71 in. (180 cm)
11.1 ft. ² (1.03 m ²)	850 cfm (24.07 m ³ /min)	47 in. (119 cm)
11.1 ft. ² (1.03 m ²)	850 cfm (24.07 m ³ /min)	47 in. (119 cm)
17.5 ft. ² (1.63 m ²)	1,300 cfm (36.81 m ³ /min)	72 in. (183 cm)
17.5 ft. ² (1.63 m ²)	1,300 cfm (36.81 m ³ /min)	72 in. (183 cm)
27 ft. ² (2.51 m ²)	2,600 cfm (73.62 m ³ /min)	72 in. (183 cm)
27 ft. ² (2.51 m ²)	2,600 cfm (73.62 m ³ /min)	72 in. (183 cm)
54 ft. ² (5.02 m ²)	5,200 cfm (147.25 m ³ /min)	2 x 72 in. (2 x 183 cm)*
54 ft. ² (5.02 m ²)	5,200 cfm (147.25 m ³ /min)	2 x 72 in. (2 x 183 cm)*

QED Quality Control, Manufacturing Standards and Customer Service

Experienced site owners, including major oil companies, are increasingly choosing E-Z Tray® air strippers from QED due to their unique features and solid technical support, including:

- **Lower long-term O&M costs due to easier tray maintenance than tower-type or stacking tray air strippers.**
- **Lightweight, slide-out trays don't require hoists, regardless of the size of the air stripper.**
- **E-Z Tray air strippers need less building space, which can lower building costs.**
- **QED's staff and resources are #1 in air stripper technical and service support, including for unusual applications.**
- **Online Performance Modeler tool available 24/7 to help you select the proper air stripper.**
- **QED quote & delivery times are quick and dependable.**



Visit qedenv.com/air-strippers to view and use the exclusive Online Performance Modeler, which allows you to model your process conditions and select the most efficient air stripping package for your VOC removal project. You can also view case studies where E-Z Tray air strippers were the top choice in successful projects.

The World Leader in Air-Powered Remediation

For Remediation, Landfills and Groundwater Sampling



A **TestAmerica** Company
THE LEADER IN ENVIRONMENTAL TESTING

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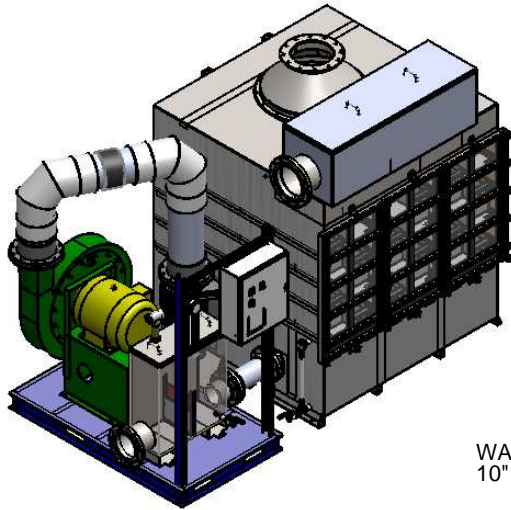
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www.qedenv.com

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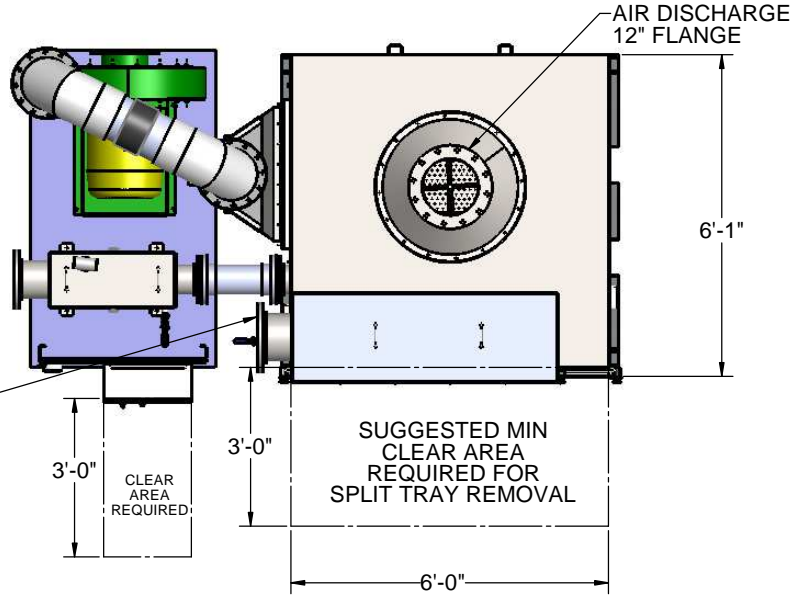
NOT FOR PRODUCTION

REVISIONS

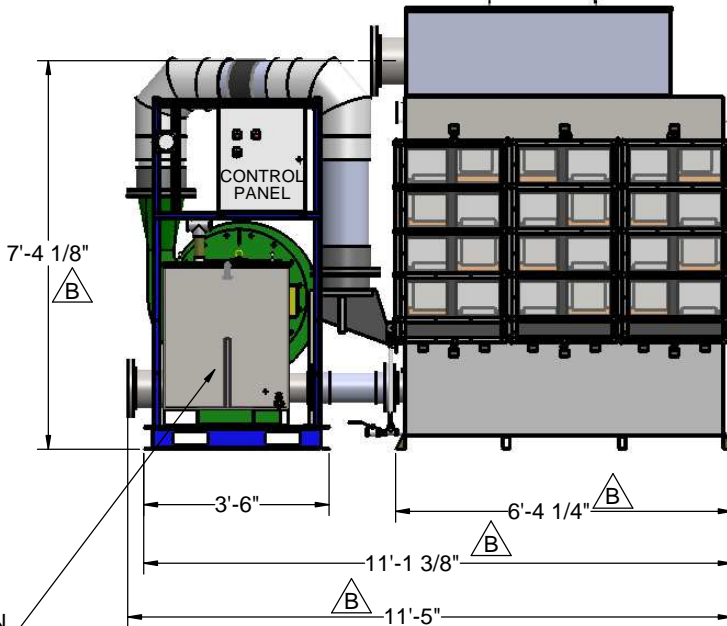
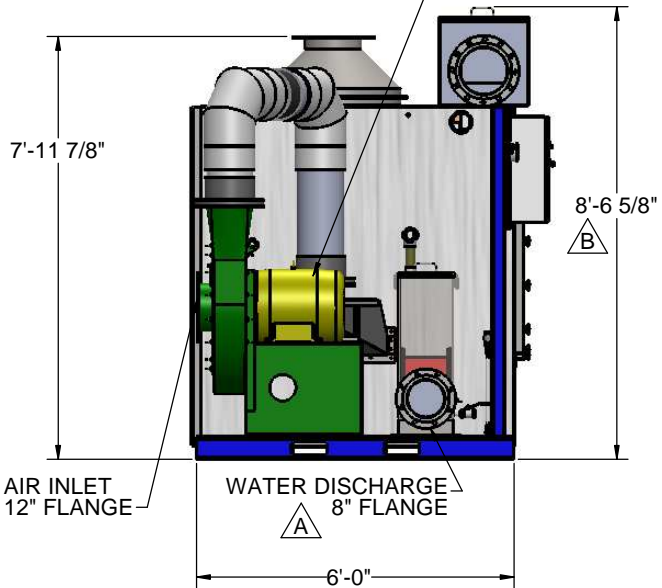
REV.	DESCRIPTION	ECO #	DRAWN BY	CHECKED BY	DATE
-	RELEASED FOR APPROVAL		BS	JB	10-21-13
A	WATER DISCHARGE WAS 6"		BS	JB	10/24/2013
B	OVERALL LENGTH WAS 12'-5 7/8", WATER INLET BOX ADDED TO UNIT.		BS	JB	11/26/2013



WATER INLET
10" FLANGE



AERATION BLOWER
20HP 575 3PH TEFC



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE PLATING REMOVE ALL BURRS	DRAWN BY	BS	DATE	10-21-13	IWCL.CA 1-487 WASTNEY ROAD, SOUTH, AJAX, ON L1S 6W7 TITLE INDUSTRIAL WASTE TREATMENT SYSTEM
	CHECKED BY	JB	DATE	10-21-13	
	APPROVED BY	CH	DATE	10-21-13	
TOLERANCES XX +/- .25 FRACT +/- 1/2 XXX +/- .005 ANGLES +/- 1/2 OTHER TOLERANCES AS SPECIFIED	NEXT ASSY -	MATERIAL -	DWG. NO.	13T-00565 LAYOUT	REV B
	USED ON -	FINISH -	SCALE	1:20	SHEET 1 OF 1

Appendix F



AmeriPride Services • Canadian Linen & Uniform Service • Québec Linge Service D'Uniformes

Location code and name: **D24 - Winnipeg**

Noise Level Test

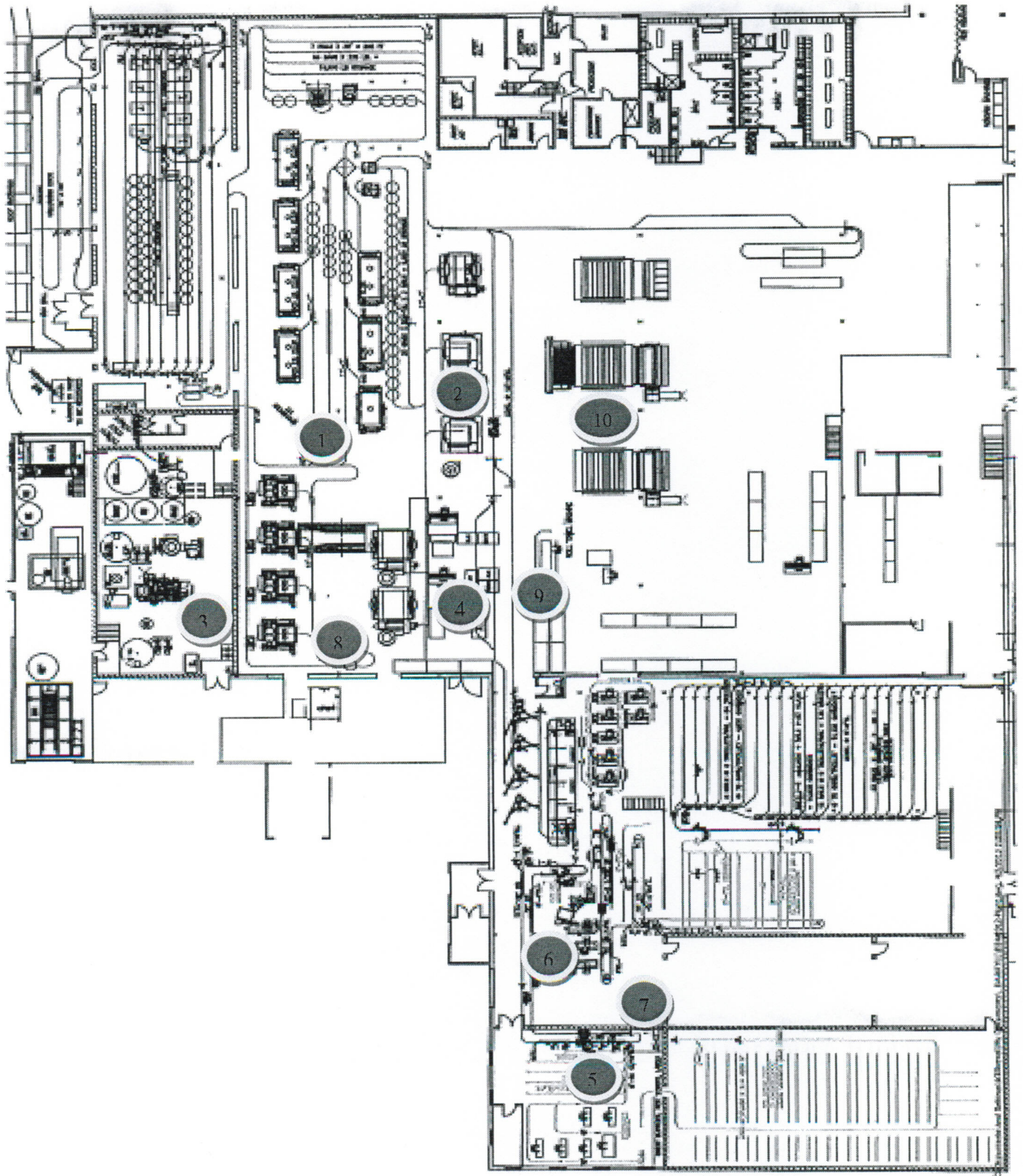
(Sound level ranges are to be recorded and filled every six months or when higher noise levels are suspected). The only type of sound level meter to be used must meet ANSI and IEC Type 2 standards for OSHA Compliance, Noise Ordinances, or Machine Noise Evaluation. **The Noise level meter (must) be re calibrated before each use.**

	AREA	TIME OF DAY	SOUND LEVEL RATE
1	Wash aisle area	1:40pm	Peak Noise 93db / 80db avg
2	Drying area	2:00pm	Peak Noise 84db / 80db avg
3	Boiler / Shaker / Compressor	2:05pm	Peak Noise 87db / 80db avg
4	Mat Room	2:10pm	Peak Noise 85db / 80db avg
5	Counting - In	2:20pm	Peak Noise 78db / 74db avg
6	Tunnel	2:20pm	Peak Noise 76db / 73db avg
7	Presses	2:25pm	Peak Noise 79db / 73db avg
8	Mat Washers	2:00pm	Peak Noise 88db / 84db avg
9	CT Rollers	2:10pm	Peak Noise 83db / 80db avg
10	Flat Irons	2:15pm	Peak Noise 82db / 79db avg
11			
12			
13			

Date of sound level test: April 3/2013
 Test taken by: Helm Foster, Mario L.
 Test posted date: **April 9/2013**

Estimate date for next test: **October /2013**
 Meter calibrated by: Mario Leblanc / Helm Foster

Sound Survey Map
D24 - Winnipeg (Main floor plan)





AmeriPride Services • Canadian Linen & Uniform Service • Québec Linge Service D'Uniformes

Location code and name: **D24 - Winnipeg**

Noise Level Test

(Sound level ranges are to be recorded and filled every six months or when higher noise levels are suspected). The only type of sound level meter to be used must meet ANSI and IEC Type 2 standards for OSHA Compliance, Noise Ordinances, or Machine Noise Evaluation. **The Noise level meter (must) be recalibrated before each use.**

	AREA	TIME OF DAY	SOUND LEVEL RATE
1	Wash aisle area	11:49am	Peak Noise 83db / 77db avg
2	Drying area	11:50am	Peak Noise 80db / 79db avg
3	Boiler / Shaker / Compressor	12:00pm	Peak Noise 80db / 79db avg
4	Mat Room	11:53am	Peak Noise 77db / 76db avg
5	Counting - In	11:49am	Peak Noise 70db / 69db avg
6	Tunnel	11:52am	Peak Noise 76db / 75db avg
7	Presses	11:52am	Peak Noise 76db / 75db avg
8	Mat Washers	11:51am	Peak Noise 82db / 82db avg
9	CT Rollers	11:53am	Peak Noise 77db / 76db avg
10	Flat Irons	11:52am	Peak Noise 79db / 76db avg
11			
12			
13			

Date of sound level test: November 6/2013
 Test taken by: Helm Foster, Mario L.
 Test posted date: **November 13/2013**

Estimate date for next test:
 Meter calibrated by: Mario Leblanc

Sound Survey Map
D24 - Winnipeg (Main floor plan)

