



DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS 377TH AIR BASE WING (AFMC)

ENTERED

Colonel John C. Kubinec  
377 ABW/CC  
2000 Wyoming Blvd SE  
Kirtland AFB NM 87117-5600

JUN 04 2012

Mr. John Kieling, Manager  
RCRA Permits Management Program  
Hazardous Waste Bureau (HWB)  
New Mexico Environment Department (NMED)  
2905 Rodeo Park Road  
Santa Fe New Mexico 87505



Dear Mr. Kieling

In response to an agreement reached at the 5 April 2012 Tiger Team Meeting, Kirtland AFB is submitting the attached document. The *"Soil Vapor Extraction System Components Partial Design, Interim Measures Work Plan, Bulk Fuels Facility Spill, Solid Waste Management Units St-106 and SS-111, Addendum May 2012"* (Attachment 1) formalizes previous discussion concerning proposed SVE system components and design. Submittal and approval of the attached document will expedite system procurement and installation.

Please contact Mr. L. Wayne Bitner at (505) 853-3484 or at [ludie.bitner@kirtland.af.mil](mailto:ludie.bitner@kirtland.af.mil) or Ms. Victoria R. Martinez at (505) 846-6362 or at [victoria.martinez@kirtland.af.mil](mailto:victoria.martinez@kirtland.af.mil) if you have any questions.

Sincerely

  
JOHN C. KUBINEC, Colonel, USAF  
Commander

Attachment:

*"Soil Vapor Extraction System Components Partial Design, Interim Measures Work Plan, Bulk Fuels Facility Spill, Solid Waste Management Units ST-106 and SS-111, Addendum May 2012"*


cc:

NMED-RPD (Davis) w/o attachment  
NMED-HWB (Moats, McDonald, Brandwein) w/attachment  
NMED-GWQB (J. Schoepner) w/attachment  
NMED-PSTB (Reuter) w/attachment  
NMED-OGC w/o attachment  
EPA Region 6 (L. King) w/o attachment  
AFCEE/CMSE (Mr. Oyelowo) w/o attachment  
Public Info Repository (Central New Mexico)  
Administrative Record/Information Repository (AR/IR)  
File, w/ attachment



**40 CFR 270.11**  
**DOCUMENT CERTIFICATION**  
**May 2012**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

  
\_\_\_\_\_  
JOHN C. KUBINEC, Colonel, USAF  
Commander, 377th Air Base Wing

This document has been approved for public release.

  
\_\_\_\_\_  
KIRTLAND AIR FORCE BASE  
377 ABW Public Affairs



Shaw Environmental and Infrastructure, Inc.

Shaw Environmental, Inc.

2440 Louisiana Blvd NE, Suite 300  
Albuquerque, NM 87110  
Phone: 505.262.8928

May 23, 2012

**Subject: Soil Vapor Extraction System Components Partial Design  
Interim Measures Work Plan, Bulk Fuels Facility Spill, Solid Waste Management  
Units ST-106 and SS-111  
Addendum May 2012  
Kirtland Air Force Base, New Mexico**

This letter is being submitted as an addendum to the Final Interim Measures Work Plan, prepared by Shaw Environmental and Infrastructure, Inc. (Shaw) for the U.S. Army Corps of Engineers (USACE) under contract W912DY-10-D-0014, Delivery Order 0002. This letter is based on the discussion and agreement reached during the 5 April 2012 Tiger Team working group meeting and includes a list of Soil Vapor Extraction (SVE) Treatment System components that require a long lead time due to manufacturer availability and requirements. The intent is to obtain New Mexico Environment Department approval of the SVE treatment system components in this letter so that they can be ordered, thereby expediting the construction and operation of the treatment system.

Based on the soil and soil vapor data that has been collected at the site, the proposed system is designed to have the flexibility to manage the wide range of inlet gas hydrocarbon concentrations that are expected. The system components meet the requirements of NFPA 91, *Standard for Exhaust Systems for Air Conveying Vapors, Gases, Mists, and Noncombustible Particulate Solids*. It can extract and treat 1600 standard cubic feet per minute (scfm) of air with hydrocarbon concentrations of up to 25% of the lower explosive limit (LEL) (or 3450 parts per million by volume gasoline range organics). If inlet air from the extraction wells exceeds this level, dilution air can be pulled into the system. If inlet air is below the design level, the heat recovery and catalytic options can reduce fuel consumption under these conditions.

The SVE skid that Shaw is proposing for the treatment system is:

- T-1001 Vapor Liquid Knockout Pot – 3foot diameter by 6 feet length
- P-1001 SVE Liquid Pump (centrifugal) – 10 gallons per minute (gpm) by 50 feet head
- T-1002 SVE Liquid Storage Tank – 2500 gallon capacity
- B-1001 SVE Extraction Blower – 1000 1000 scfm at 11-inches HG vacuum and 1600 SCFM at 40-inches water vacuum)

The SVE skid equipment will include silencers and sound enclosure on the blower, as well as all of the required piping, valves, electrical instruments, and a control panel.

In addition to the SVE skid, Shaw is proposing a thermal oxidizer skid for the treatment system:

- Z-1001: Thermal/Catalytic Oxidizer System
- B-2003: Combustion Air Blower

The proposed thermal oxidizer skid is a Dual Thermal/Catalytic Oxidizer System, complete with a combustion air blower, exhaust stack, and all instrumentation and controls. Hydrocarbon destruction efficiency for the proposed component is at least 98% of Gasoline Range Organics at 1600 scfm. The dual thermal/catalytic oxidizer system can run in pure thermal oxidation mode when SVE gas is high in hydrocarbons and in catalytic mode (to reduce fuel consumption) when gas concentrations taper off. An optional heat recovery exchanger is available and will probably be purchased. Cost savings from reduced fuel consumption at low inlet hydrocarbons will likely offset initial cost of the heat recovery exchanger. Auxiliary fuel in all cases is natural gas.

Additional information on the proposed system including a flow diagram and typical drawings for these units is included on the attached CD (Attachment A). Drawings are typical and have not been finalized to reflect exact design for Kirtland Air Force Base.

Shaw is continuing to work on the complete treatment system design, which will be submitted as a letter addendum to the Interim Measures Work Plan.

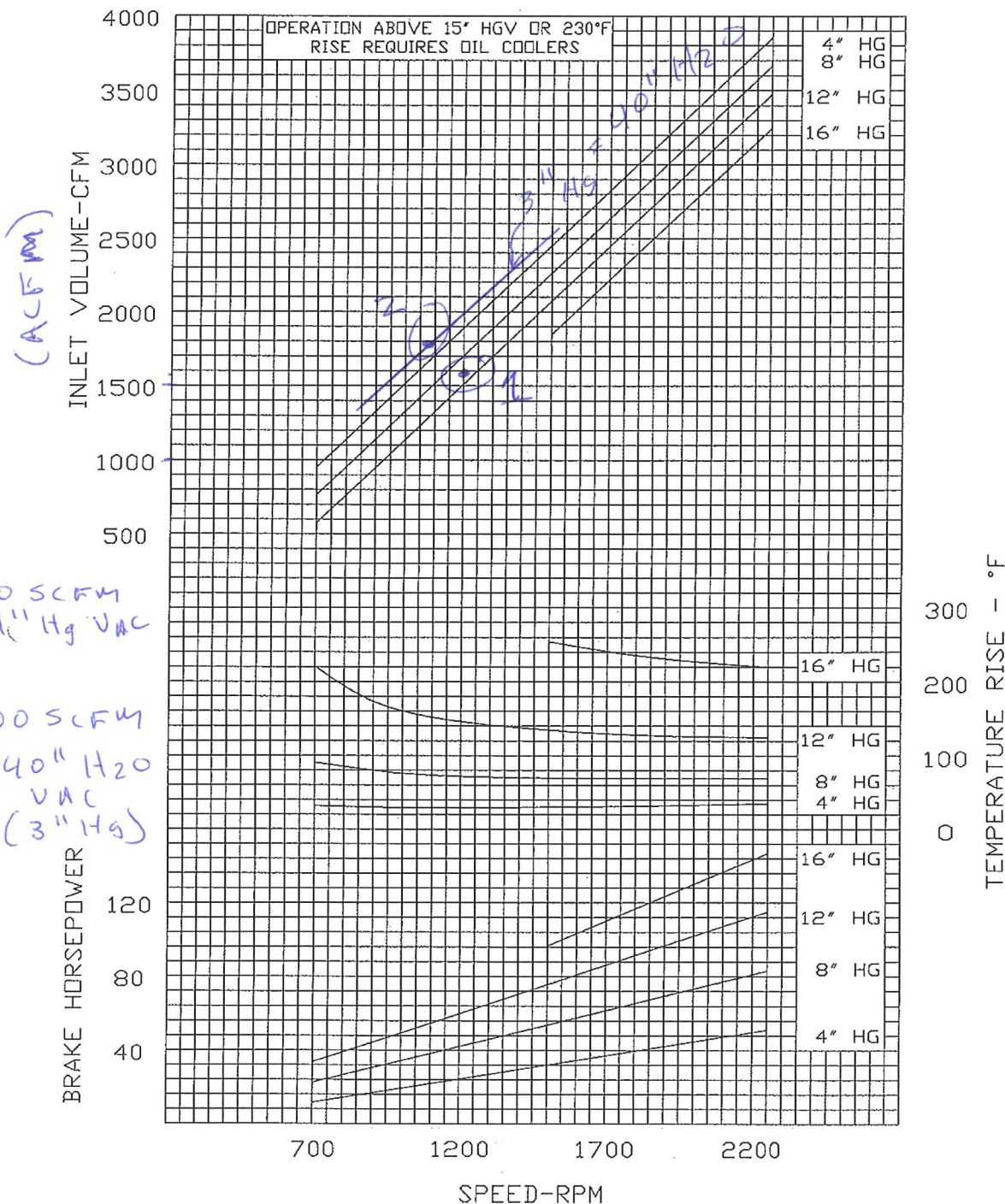
## **ATTACHMENT A**

### **Additional Information on Proposed SVE Treatment System**

DRESSER INDUSTRIES, INC.  
 ROOTS DIVISION  
 900 WEST MOUNT STREET  
 CONNERSVILLE, INDIANA 47331  
 PRINTED IN U.S.A.

PERFORMANCE BASED ON  
 INLET AIR = 68°F  
 DISCHARGE PRESSURE = 30" HG ABS.  
 JUNE, 1994

VACUUM PERFORMANCE  
 FRAME 821 RCS-J BLOWER  
 MAXIMUM VACUUM=16 IN. HG  
 MAXIMUM SPEED=2250 RPM



1 - 1000 SCFM @ 11" Hg VAC  
 2 - 1600 SCFM @ 40" H2O VAC (3" Hg)

Blower has VFD drive VC-25-821

## **SVE System Equipment List Kirtland Bulk Fuels Facility**

### **Soil Vapor Extraction Skid(s)**

T-1001	Vapor Liquid Knockout Pot	(3ft Dia. x 6 ft)
P-1001	SVE Liquid Pump	(centrifugal – 10 gpm x 50 ft head)
T-1002	SVE Liquid Storage Tank	(2500 gal)
B-1001	SVE Extraction Blower	(1000 SCFM at 11-in. HG vac)

SVE skid equipment includes silencers and sound enclosure on blower as well as all required piping, valves, electrical, instruments and control panel.

### **Thermal Oxidizer Skid**

Z-1001	Thermal/Catalytic Oxidizer System
B-2003	Combustion Air Blower

Thermal oxidizer skid is a Dual Thermal/Catalytic Oxidizer System, complete with combustion air blower, exhaust stack and all instrumentation and controls. Hydrocarbon destruction efficiency is at least 98%. Unit can run in pure thermal oxidation mode when SVE gas is high in hydrocarbons and in catalytic mode (to reduce fuel consumption) when gas concentrations taper off. An optional heat recovery exchange is available. Auxiliary fuel in all cases is natural gas.

# Global Technologies

The remediation division of Anguil Environmental Systems, Inc.

## Proposal for SVE Blower System and Dual Thermal/Catalytic Thermal Treatment System

**Date:** March 9, 2012

**Proposal #:** AES-120851

**Project Name:** Kirtland AFB

**Prepared for:**

Ron Miller  
Sr. Subcontract Administrator  
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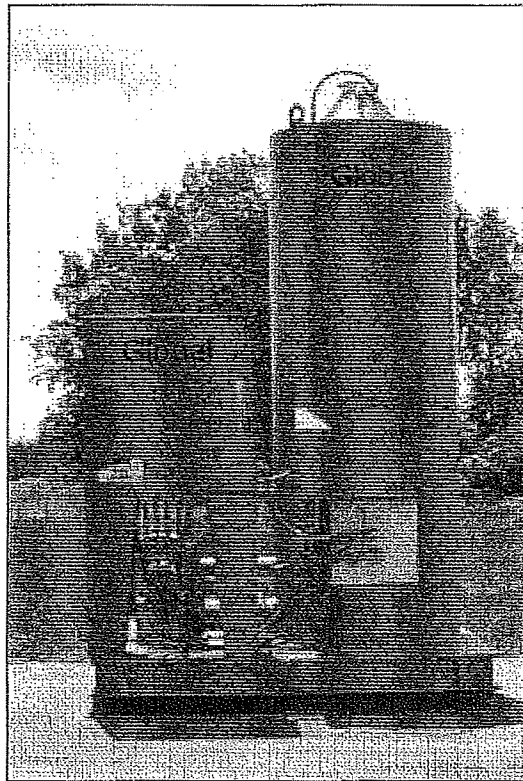
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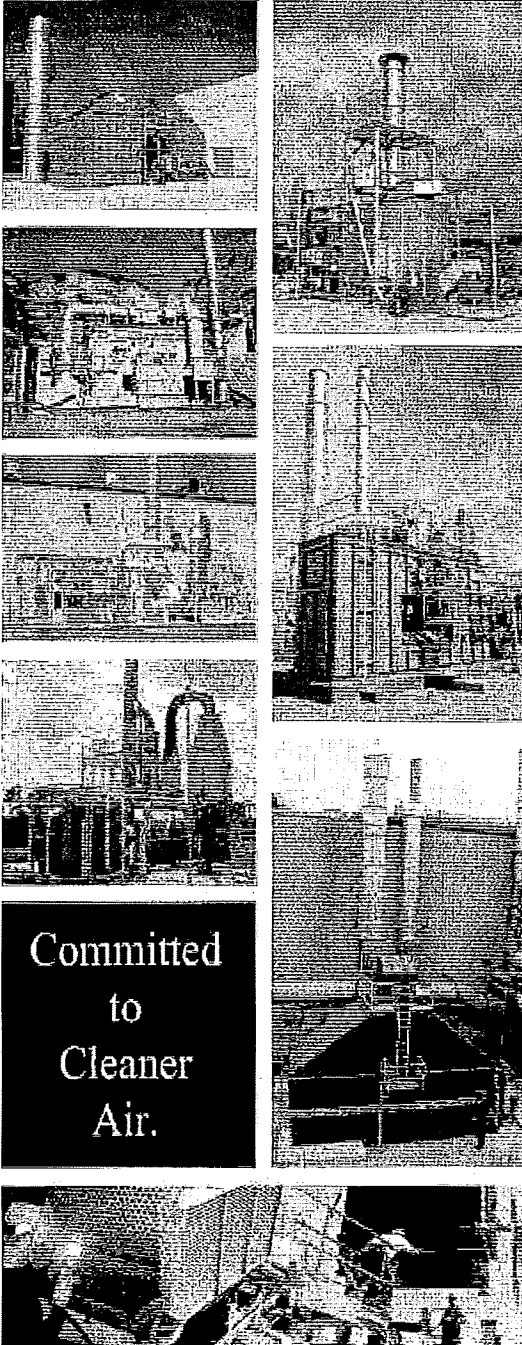
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*"Our goal is to provide solutions today  
which help our customers remain profitable  
tomorrow"*

– Gene Anguil / Founder and CEO



#### **Background:**

- Founded in 1978
- Second generation family owned and operated
- Headquartered in Milwaukee, WI, USA with offices in Asia and Europe
- Over 1,650 oxidizers and countless heat recovery systems installed on six continents in a wide variety of industries

#### **Company Size and Make-up:**

- Annual sales in excess of \$25 million
- In-house engineering staff consists of chemical, mechanical and electrical engineers
- Highly motivated employees who enjoy profit sharing and a rewarding work environment

#### **What Makes Anguil Unique?**

- Regulatory compliance is guaranteed
- Broad range of technology solutions that ensure an unbiased equipment selection
- Quality assurance program with complete factory acceptance testing prior to shipment
- An established safety program with continuous training for Anguil technicians
- Equipment is designed in Solidworks, ensuring accuracy and rapid completion

#### **Products:**

##### **Air pollution control systems...**

- Regenerative Thermal Oxidizers (RTO)
- Catalytic, Recuperative and Direct-Fired Thermal Oxidizers
- Concentrator systems
- Permanent Total Enclosures

##### **...for VOC, HAP and odor abatement**

##### **Heat and energy recovery systems...**

- Air-to-air heat exchangers
- Air-to-liquid heat exchangers
- Heat-to-power
- Energy Evaluations

##### **...for improved efficiency and reduced operating costs**

#### **Aftermarket:**

##### **Service and Maintenance...**

- 24/7 Emergency service response
- Operating cost reviews
- System upgrades and retrofits
- Spare parts and component packages
  - Preventive Maintenance Evaluations (PME)

##### **... on any make or model, regardless of original manufacturer**

#### **Partial List of Satisfied Customers:**

Boeing, Dow Chemical, Northrop Grumman, ExxonMobil, Johnson and Johnson, Peterbilt, Qualcomm, Rexam Beverage, Silgan Containers, Wyeth

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**\*Note:** This proposal contains confidential and proprietary information of Anguil Environmental Systems, Inc. and is not to be disclosed to any third parties without the express prior written consent of Anguil.

## **Executive Summary**

### **1. Equipment Description**

Shaw Environmental & Infrastructure Group has requested a proposal for equipment to destroy VOCs produced from their SVE remediation operation. The proposed Dual Thermal/Catalytic Oxidizer will process the VOC stream and provide the required destruction efficiencies.

### **2. Facility to be Controlled**

Kirtland AFB/ WERS Kirtland AFB

### **3. Proposed Equipment**

Model 10 (1,000 SCFM) Dual Thermal/Catalytic Oxidizer. A shell and tube heat exchanger is quoted as an option to reduce the supplemental fuel use of the oxidizer.

### **4. Anguil Benefits**

- \* Seamless integration with the current process
- \* Fully automated PLC based controls
- \* Modem for remote diagnostics
- \* Field Tested and proven technology
- \* Full equipment warranty
- \* Factory test prior to shipment
- \* 24 hour service support

### **5. Results**

\* Anguil guarantees the VOC conversion efficiency of the 98% per the specification or an outlet concentration of 20 ppmv as C1 (methane), whichever is less stringent per EPA Method 25A.

**Customer Process Specifications**

- Process Producing Emissions: Contaminated soil vapors
- Process Flow: 1,000 SCFM
- Process Temperature: 60°F to SVE blower
- VOCs\*: BTEX: 0 – 4,800 ppmv  
GRO ~ 5500 ppmv

*\*Assumes no halogenated or sulfur bearing compounds are present*

- Facility Operating Schedule: 24 hr/day, 7 days/wk
- Facility Power: 480 V / 60 Hz / 3 Ph
- Fuel Source: Natural Gas
- Process Water Content: Assumed negligible
- Process Oxygen Content: Expected to be at least 18% by volume
- Process Particulate: Assumed to be negligible
- Performance Requirements: 98% VOC Destruction Efficiency per spec
- Electrical Area Classification: General, with NEMA 4 panel (it is our understanding that C1D2 and NEMA 7 panel is not required although listed in the specification)
- Oxidizer location on Site: Outdoors

**Note: Equipment has been designed and sized based on these customer parameters.**

**SVE Blower Specifications**

The SVE blowers will be provided per the following specifications.

B-1001

- **One SVE Model FVP125X3-Roots 821 RCS-J rated for 1,000 SCFM at 11" HG Vacuum with .25 PSI Discharge Pressure (89 dba without the sound enclosure) with the following:**
  - 125 HP Premium Efficiency EXP 230/460 VAC 1750 RPM motor.
  - Roots Model 821 RCS-J positive displacement rotary lobe vacuum pump with Blower Manufacturers warranty.
  - 12" inlet, with 12" Butterfly Valve, Vacuum gauge, temperature gauge, and sample port.
  - One (1) Inlet Vacuum Transmitter
  - One (1) 12" 10 micron in-line filter between tank and vacuum pump.
  - Mini Magnehelic to monitor differential pressure across filter element.
  - Vacuum relief valve on inlet side of pump, field adjustable from 0 to 15"
  - Easily replaceable sheaves and bushings.
  - Adjustable motor slide base.
  - One (1) 4" dilution valve with silencer
  - Two (2) 10" Discharge Silencers in series
  - One (1) Discharge Pressure Switch
  - Pressure gauge w/sample port, and temperature Gauge on discharge.
  - One (1) 12" Averaging pitot tube flow sensor with Magnehelic Gauge one on Inlet
  - One (1) 10" Averaging pitot tube flow sensor with Magnehelic Gauge one on Discharge
  - Two (2) 4 to 20 Flow Transmitters
  - Low Vacuum Switch
  - High Discharge Pressure Switch
  - Steel Base Frame with fork lift pockets
  - 125 HP VFD

T-1001

- **"Cyclonic Action" Knockout tank with Internal Demister Pad**
  - 36" diameter Internal Demister Pad and removable top cover
  - 12" Flanged Inlet and a 12" Flanged Discharge
  - Sight gauge, 6" cleanout, and bottom drain with check valve
  - High Liquid Level Shutdown Switch
  - Heat Trace and Insulation of tank

P-1001

- **Automatic Drain Pump**
  - Gould 1<sup>st</sup>1E7D4 Centrifugal Pump rated for 10 GPM at 50 feet TDH
  - 1 HP EXP motor
  - Two (2) Pump Control Float Switches
  - Inlet wye strainer, Check valve, and Ball Valve
  - Discharge Check Valve, Gate Valve, and Pressure gauge w/sample port
  - Manual Flow Meter and Totalizer Pulse Output

- **One (1) Sound Enclosures for SVE Blower and Motor**
  - 6' by 7' Steel Framed sound enclosure around blower and motor with hinged access panels for Blower maintenance
  - One (1) Layer of 2" Convuluted Polyester Noise Absorption Foam panels
  - Inlet Air Vents, Exp Vent Fan
  - **This enclosure will reduce the sound by 2-5 dba**

**The interconnecting duct from the SVE blowers to the oxidizer is not included.**

**Design Specifications**

- Thermal Oxidizer Z-1001

**Size and Weight**

- Oxidizer processing capacity: 1,000 SCFM
- Approximate Oxidizer Footprint: 12' x 6'
- Approximate Oxidizer Weight: 5,500 lbs
- Stack Height: 30' from grade
- Stack Diameter: 14"
- Oxidizer Control Panel Location: Outdoors on oxidizer skid

**Utilities Required**

- Fuel Requirements: 5 psig
- Electrical Power: 460V / 60 Hz / 3 Ph
- Required Compressed Air: 80-100 psig (-40°F dewpoint) 5-10 SCFM

**Operation Information**

- VOC Destruction Efficiency: 98% or an outlet concentration of 20 ppmv as C1 (methane), whichever is less stringent per EPA Method 25A.
- Operating Set Point: Thermal Mode: 1400-1500°F  
Catalytic Mode: 500 - 600°F catalyst inlet temperature

**\*Note: All weights, dimensions, horsepower ratings, burner sizing, and specific engineering details within the proposal are approximate and will be confirmed by Anguil Environmental following order placement.**

## Standard Oxidizer Equipment Specifications

The Dual Thermal/Catalytic Oxidizer destroys Hazardous Air Pollutants (HAPs), Volatile Organic Compounds (VOCs) and odorous emissions that are discharged from industrial processes.

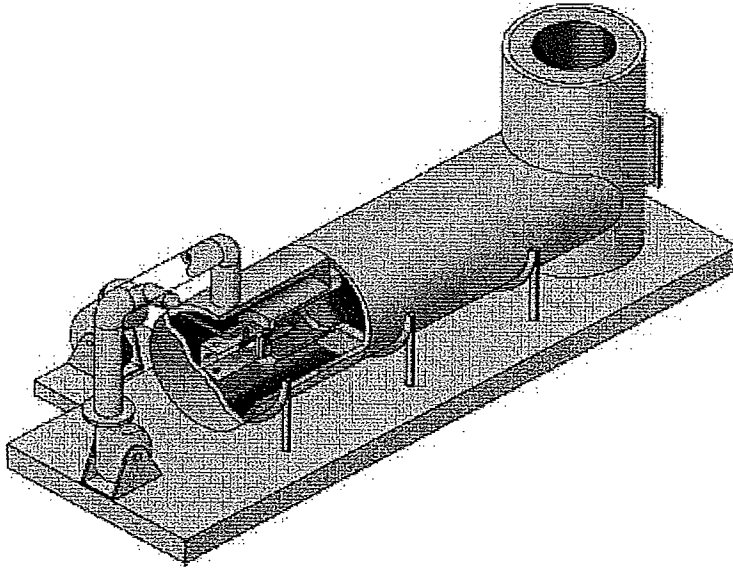
### **Design Basis -**

The Therm-Cat model is designed to operate in both thermal (1400° - 1500°F) and catalytic (500° - 600°F) modes for maximum operational flexibility. The Therm-Cat is capable of adjusting to the changing conditions of any remediation site.

During startup, the Therm-Cat operates in thermal mode to effectively destroy the high concentration of VOCs in the airstream (up to 50% LEL). Later in the lifecycle of the site, as the VOC concentrations decrease, the VOCs can be cost-effectively destroyed by switching the Therm-Cat to catalytic mode. The addition of catalyst to the Therm-Cat lowers the operating temperature and reduces operating cost.

### **How the Dual Oxidizer Works-**

During the system operation, VOC laden air will be exhausted from the SVE blowers into the system fan and discharged into the burner section and will be heated to the preset oxidation (catalyzing) temperature. When the VOC laden air is oxidized (passes through the thermal combustion chamber Reactor or catalyst) an exothermic reaction will take place. The VOCs in the air stream are converted to carbon dioxide and water. The hot purified air will then finally be exhausted to atmosphere, or through the optional heat exchanger. The heat exchanger will further reduce operational cost by preheating the process exhaust gas prior to entry into the burner section..





The equipment will be assembled, factory pre-wired and supplied per the following specifications:

### REACTOR

The reactor is a circular cross-section constructed of carbon steel. In order to allow for routine service and inspection of the interior reactor, an access door complete with gaskets is included.

- "L" shaped reactor with circular cross section
  - Internally insulated: 8" thick, 8# density ceramic module insulation
  - Insulation rated for 2300°F
- Exterior shell painted with 2 coats of UV resistant polyurethane paint
- Reactor designed for a 1 second residence time at a temperature of 1500° F to guarantee a destruction efficiency of 98%
- **Optional catalyst insert** will be slid into a fully welded 321 or 309 stainless steel configuration with high temperature gasketing to ensure no VOC bypass
- Thermocouples will be located before and after the reactor (catalyst) to ensure proper temperature control
- Access door with gaskets

### HEAT EXCHANGER (quoted as an option)

- 50% nominal efficiency
- Shell and tube type design
- 321L or 309 stainless steel construction
- Continuously seam welded
- VOC laden air will pass through the shell side, hot purified air will pass through the tube side

*will be purchased if warranted by expected savings in natural gas cost.*

### FLAME ARRESTOR

- Metal grid type
- Placed between system fan and oxidizer inlet

### LEL MONITOR (quoted as an option)

- With the fresh air dilution capability, a LEL monitor is not required, but provided as an option to meet the specifications
- Monitor located at oxidizer inlet with sufficient distance between the sensing point and isolation valve to allow the valve to shut on high alarm condition
- Monitor will shut down oxidizer at high LEL concentrations
- Control Instruments PrevEx flame type for quick response time

*will be purchased*

**COMBUSTION AIR FAN**B - 2003

- Sized to provide the proper amount of fresh air to the burner for oxidation and temperature control
- Twin City Fan, New York Blower or equal
- Pre-piped and pre-wired
- Inlet filter
- Independent controlled fuel and combustion air valves

**BURNER/GAS TRAIN**

The burner installed capacity is higher than required during normal operation. This allows the system to respond rapidly to significant process exhaust flow increases, preventing loss of proper oxidizer operation temperatures. The burner capacity is also sufficient to maintain system operating temperature during full flow, VOC free conditions.

- Fuel source –natural gas
- Fuel Trains fabricated to FM Global specifications
- Burner selected to bring reactor up to oxidation temperature with 25% ambient air during start-up
- Burner will have capacity to maintain system operating temperature during VOC free, full flow conditions
- Expected system heat up time from cold start is 30-60 minutes
- 3" burner view port
- Fireeye flame safety control with self-checking dynamic UV scanner

**EXHAUST STACK**

- Constructed of 304 stainless steel
- Supported by guy wires
- Two (2) EPA tests ports: 90° to each other

**SYSTEM CONTROLS**

The system controls are located in a NEMA 4 purged control panel enclosure to be mounted on the oxidizer skid. In the event of a system shutdown, the touch screen will indicate the cause of the shutdown via a digital message in English.

- NEMA 4 purged control panel enclosure to be mounted on oxidizer skid
- Allen Bradley MicroLogix PLC (Programmable Logic Controller) controls
- Allen Bradley Panelview Plus 600 color display
- Digital chart recorder: monitors Reactor Combustion Chamber temperature
- Ethernet modem for remote diagnostics and service support

## **PAINTING**

All exposed surfaces of the oxidizer shall be primed coated with a high solids epoxy coating. The finish coat shall be a gloss high solids polyurethane multi-function weather resistant coating. The natural gas piping will be primed and painted with one (1) coat of Anguil's standard coating. All other equipment will be the manufacturer's standard paint and color. Prior to painting, all welds will be caulked.

- UV resistant polyurethane paint
- Paint color can be specified by the customer

## **OPERATION & MAINTENANCE MANUALS**

- Two (2) hard copy sets of the Operation and Maintenance Manuals (O&M) containing the sequence of operation and drawings
- CD-ROM of all Vendor Bulletins

## **FINAL ASSEMBLY AND SHOP TEST**

We pre-assemble and pre-test modular components in our factory to provide significant savings of time and money during installation and start-up. Units are prewired and pre-piped at the factory for improved quality control and trouble-free start-up.

- Temporary assembly of system
- Inspection of the unit for manufacturing quality
- Check fuel and electrical connections
- Starting of burner and fuel train
- Warning labels are installed
- Test ports are installed
- Run electrical rigid conduit
- Fans and motors installed, cleared of debris and checked for quality
- Customer is invited to witness shop testing

## ROOTS™ RCS-J WHISPAIR™ Rotary Positive Blowers

Frames 715J thru 832J

### BASIC BLOWER DESCRIPTION

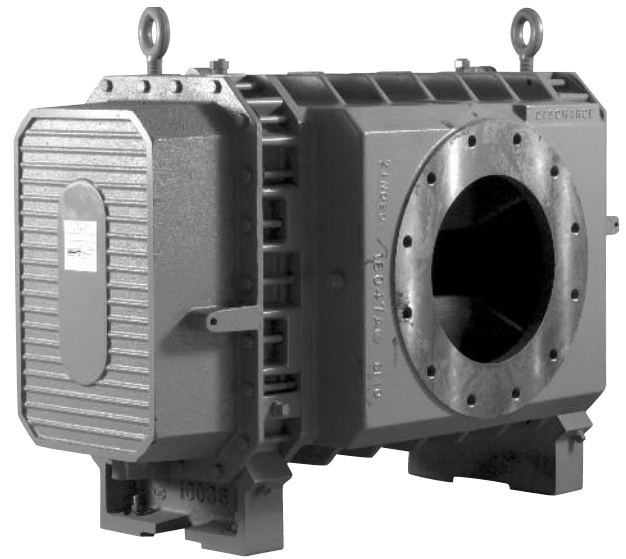
RCS-J WHISPAIR™ rotary blowers are heavy-duty units designed with integral-shaft ductile iron impellers having an involute profile. WHISPAIR blowers reduce noise and power loss by utilizing an exclusive wrap-around plenum and proprietary WHISPAIR jet to control pressure equalization – feeding backflow in the direction of impeller movement, thereby aiding rotation.

The headplates, gear cover, drive end cover and rigid, one-piece casing are grey iron. Carburized and ground alloy steel spur timing gears are taper mounted on the shafts, secured with a locknut. Cylindrical roller bearings are used.

Piston rings reduce air leakage through the shaft openings in the headplates, and lip-type oil seal prevent lubricant from entering the air chamber. The RCS-J incorporates thrust control, with splash oil lubrication at both ends of the blower.

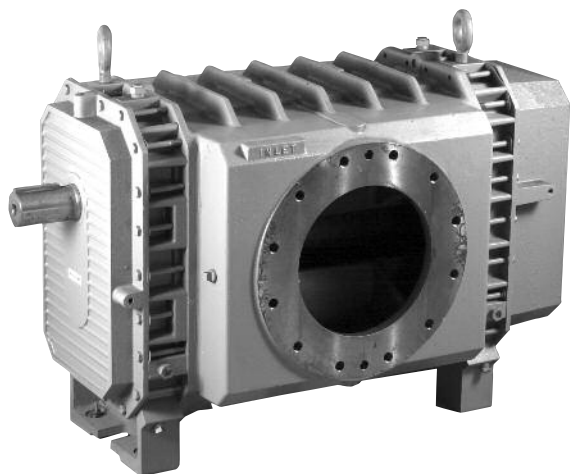
Frame sizes 715J and 721J are designed with detachable rugged steel mounting feet that permit in-field adaptability to either vertical or horizontal installation requirements.

The top shaft is extended for drive on side outlet blowers, and either shaft can be extended for drive on top or bottom outlet blowers.

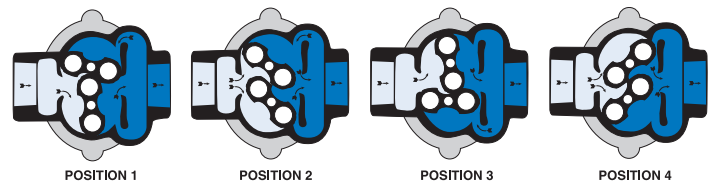


### DESIGN AND CONSTRUCTION FEATURES

1. Low noise level, less operating power required
2. Alloy steel timing gears
3. Cylindrical roller bearings
4. Piston ring air seals
5. Lip-type oil seals
6. Splash oil lubrication
7. High volumetric efficiency
8. Horizontal and vertical configurations available



### OPERATING PRINCIPLE



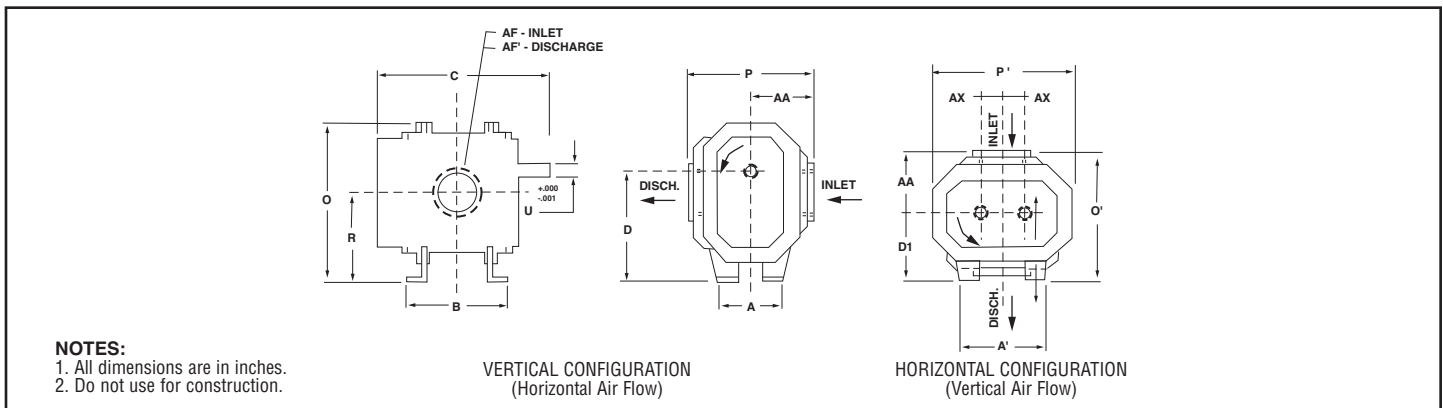
Incoming air is trapped by the impellers. Simultaneously, pressurized air (right) is being discharged. As the lower impeller passes wrap-around flange, Whispair jet equalizes pressure between trapped air and discharge area, aiding impeller movement and reducing power. Impellers move air into the discharge area (right). Backflow is controlled, resulting in reduction of noise relative to conventional blowers.

## PERFORMANCE TABLE

FRAME SIZE	SPEED RPM	4 PSI		6 PSI		8 PSI		10 PSI		12 PSI		15 PSI		18 PSI		MAX. VACUUM		
		CFM	BHP	CFM	BHP	CFM	BHP	CFM	BHP	CFM	BHP	CFM	BHP	CFM	BHP	"Hg	CFM	BHP
715J	1180	935	23.0	870	33.4	815	44.0	766	54.6	722	65.0	663	81.0			14.0	705	37.2
	1770	1548	37.3	1483	53.0	1428	68.8	1379	84.5	1335	100.3	1276	123.9			15.0	1281	61.4
	2600	2410	63.4	2345	86.0	2290	108.5	2241	131.0	2198	153.7	2138	187.5			15.0	2144	95.4
721J	1180	1266	30.5	1178	44.8	1103	59.0	1037	73.5	978	87.8	892	109.2			14.0	955	50.0
	1770	2096	49.1	2008	70.4	1933	91.7	1867	113.1	1808	134.4	1727	166.4			15.0	1735	81.7
	2600	3264	81.4	3176	112.0	3101	142.5	3035	173.1	2976	203.7	2895	249.5			15.0	2903	124.8
817J	880	982	24.9	895	36.8	821	48.7	756	60.6									
	1770	2368	55.0	2280	78.5	2206	102.0	2142	125.4	2083	148.9	2004	184.1	2055	219.4	16.0	1962	95.9
	2250	3116	75.6	3028	105.0	2955	134.0	2890	164.0	2830	193.0	2751	237.0	2680	281.0	16.0	2707	126.0
821J	880	1179	29.6	1074	43.9	985	58.1	907	72.4									
	1770	2842	65.7	2738	93.9	2648	122.1	2571	150.3	2500	178.4	2405	220.7			16.0	2354	114.8
	2250	3740	92.3	3635	127.0	3546	163.0	3468	198.0	3398	233.0	3302	286.0			16.0	3249	153.0
826J	880	1473	37.1	1342	55.0	1231	72.8	1134	90.7									
	1770	3554	81.4	3423	116.7	3311	151.9	3214	187.1	3126	222.3					16.0	2944	142.8
	2250	4676	105.0	4545	156.0	4434	200.0	4336	247.0	4248	288.0					16.0	4062	188.0
832J	880	1768	44.4	1610	65.8	1477	87.2	1360	108.6									
	1770	4264	97.5	4107	139.8	3972	182.0	3857	224.3							16.0	3531	168.4
	2250	5610	134.0	5452	186.0	5320	239.0	5202	292.0							16.0	4874	225.0

- Notes:**
1. Pressure ratings based on inlet air at standard pressure of 14.7 psia, standard temperature of 68° F, and specific gravity of 1.0.
  2. Vacuum ratings based on inlet air at standard temperature of 68°F, discharge pressure of 30" Hg and specific gravity of 1.0.
  3. 800J frame size only – Operation above 15 psi pressure rise, 15" Hg vacuum or 230° F temperature rise requires oil coolers – refer to Factory. Oil cooler not available on 600J and 700J frame sizes.

## OUTLINE DRAWING & DIMENSIONAL TABLE

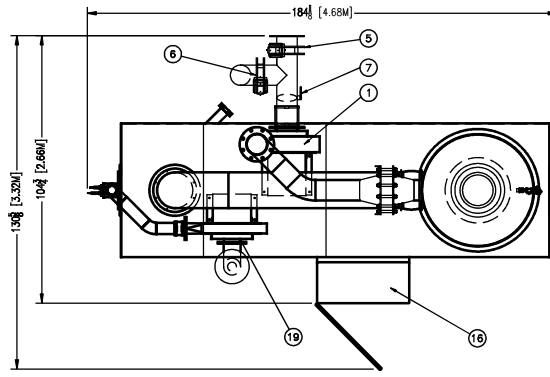


FRAME SIZE	A	A'	B	C	Drive Shaft Location		O	O'	P	P'	R	U	Keyway	AF Inlet Diameter	AF' Discharge Diameter	AA	AX	Approx. NetWt (lbs)
					D	D1												
715J	19.00	26.00	21.50	33.38	17.00	10.00	25.13	19.00	18.00	23.25	13.50	2.375	.625 x.313	10.0 FLG	8.0 FLG	9.00	3.50	1100
721J	19.00	26.00	27.00	39.38	17.00	10.00	25.13	19.00	18.00	23.25	13.50	2.375	.625 x.313	12.0 FLG	10.0 FLG	9.00	3.50	1200
817J	13.75	22.00	24.25	38.63	21.00	13.00	30.00	25.75	25.50	25.00	17.00	2.750	.625 x.313	10.0 FLG	10.0 FLG	12.75	4.00	1620
821J	13.75	22.00	27.88	42.25	21.00	13.00	30.00	25.75	25.50	25.00	17.00	2.750	.625 x.313	12.0 FLG	10.0 FLG	12.75	4.00	1800
826J	13.75	22.00	33.13	47.50	21.00	13.00	30.00	25.75	25.50	25.00	17.00	2.750	.625 x.313	12.0 FLG	12.0 FLG	12.75	4.00	2075
832J	13.75	22.00	38.50	52.88	21.00	13.00	30.00	25.75	25.50	25.00	17.00	2.750	.625 x.313	14.0 FLG	12.0 FLG	12.75	4.00	2325

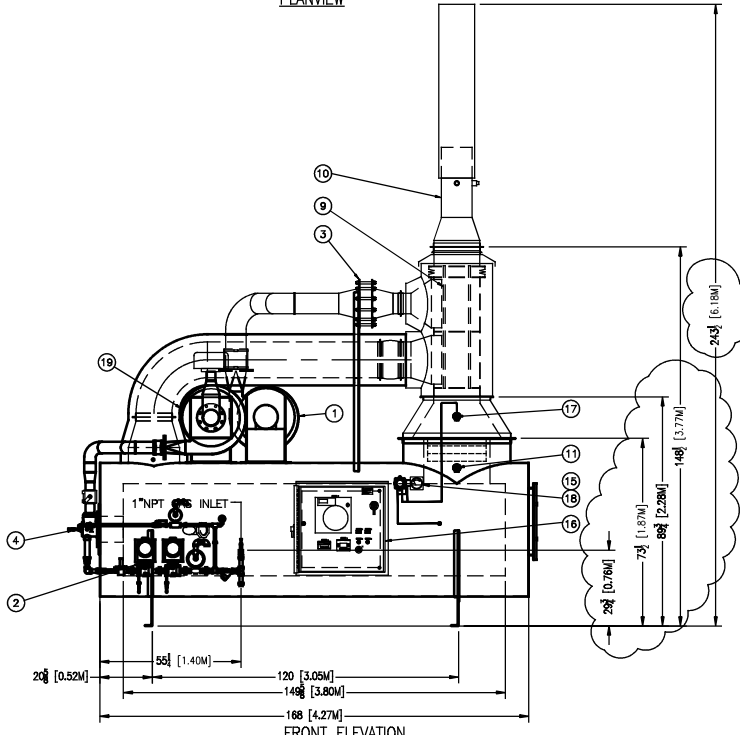
### Dresser Roots

Houston, Texas Headquarters • U.S. Toll Free Phone: 1-877-363-ROOT(S) (7668) • Direct Phone: +1 832-590-2600  
 Connersville, Indiana Operations • U.S. Toll Free Phone: 1-877-442-7910 • Direct Phone: +1 765-827-9285  
 United Kingdom Operations • Phone: +44 (0) 1695 52600  
 USA/Canada Sales • Phone: +1 773-444-3360  
 Houston, Texas Factory Service • Phone: +1 713-896-4810  
 Mexico City Sales and Factory Service • Phone: +52 55 5889 5811  
 Dubai Sales and Factory Service • Phone: +971 4-8830831  
 Malaysia Sales • Phone: +60 3 2163 0480  
 China Sales • Phone: +86 10 8486 2440  
 Shanghai Factory Service • Phone: +86 21 5858 7638

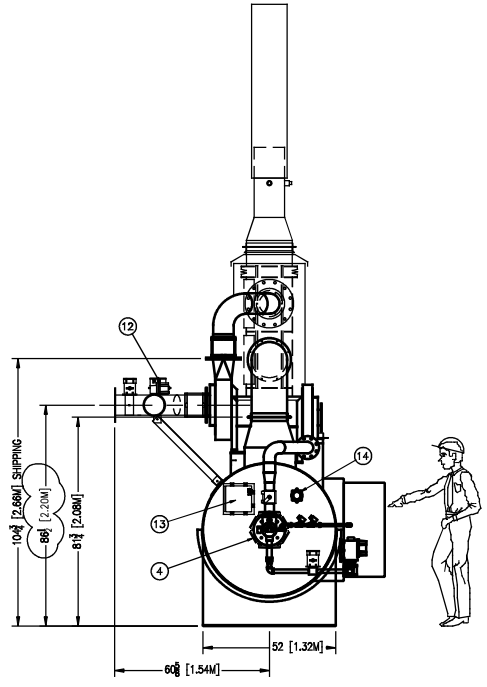




PLANVIEW



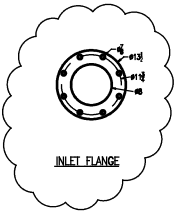
FRONT ELEVATION



END ELEVATION



ITEM NO	DESCRIPTION	DWG. NO	TAG NO	COMMENTS
1	SYSTEM FAN CW, UB0, ARR.4	D000	F-101	
2	FUEL TRAIN RIGHT TO LEFT FLOW	H000		
3	FLAME ARRESTOR 12" #	D000		
4	BURNER	H010	B-301	
5	SYSTEM INLET VALVE 8" W. ACTUATOR		XV-401	
6	FRESH AIR DAMPER 6" W. ACTUATOR		TCV-400	
7	BALANCING DAMPER 8" #			
8	ASSEMBLY	A000		
9	HEAT EXCHANGER	B000		
10	EXHAUST STACK 12" W. (2) 2" SAMPLE PORTS	E000		
11	THERMOCOUPLE 24" LONG	E000	TE-121 A/B	
12	SYSTEM INLET DUCTWORK	D000		
13	IGNITION TRANSFORMER AND ENCLOSURE	-451	IT-233	
14	BURNER AIR PROVING SWITCH	-500	PD5H-204	
15	CATALYST PRESSURE DIFFERENTIAL SWITCH	-500	PD5H-126	
16	CONTROL PANEL	-450		
17	THERMOCOUPLE - TYPE K 18" LONG		TE-122 A/B	
18	CATALYST DIFFERENTIAL PRESSURE INDICATOR	-500	PDI-125	
19	COMBUSTION BLOWER CW, UB0, ARR.4	F000	F-102	



INLET FLANGE

APPROXIMATE WEIGHT:  
6150# (2800 KG)

<b>GLOBAL</b>		Global Technologies Div. of Anguil Environmental Systems, Inc. Milwaukee, Wisconsin	
<small>REGARDING COMPANY POLICY ON THE PROTECTION OF PERSONAL ENVIRONMENTAL INFORMATION, YOU MAY REQUEST ACCESS TO, OR CORRECTION OF, INFORMATION OF WHICH YOU ARE THE SUBJECT. PLEASE CONTACT US AT 414-224-1100 FOR MORE INFORMATION.</small>			
TITLE MODEL 10 CATALYTIC / THERMAL OXIDISER GENERAL ARRANGEMENT		DRAWING NO. 11081A-7	
DRAWN JW		DATE 4/30/03	
CHECKED		DATE	
APPROVED		DATE	
CUSTOMER Sample Dual unit with Heat Recovery		REV. A	
LAST DRAWN LB		DATE 5/25/03	
SOURCE MD7RCT		PAGE OF 1	
LAST PLOT BY LB		DATE 5/25/03	

A	LB	5/25/03	ADDED PROCESS INLET DIMENSION
REV	BY	DATE	CHANGE

**TERMINAL POINT SCHEDULE**

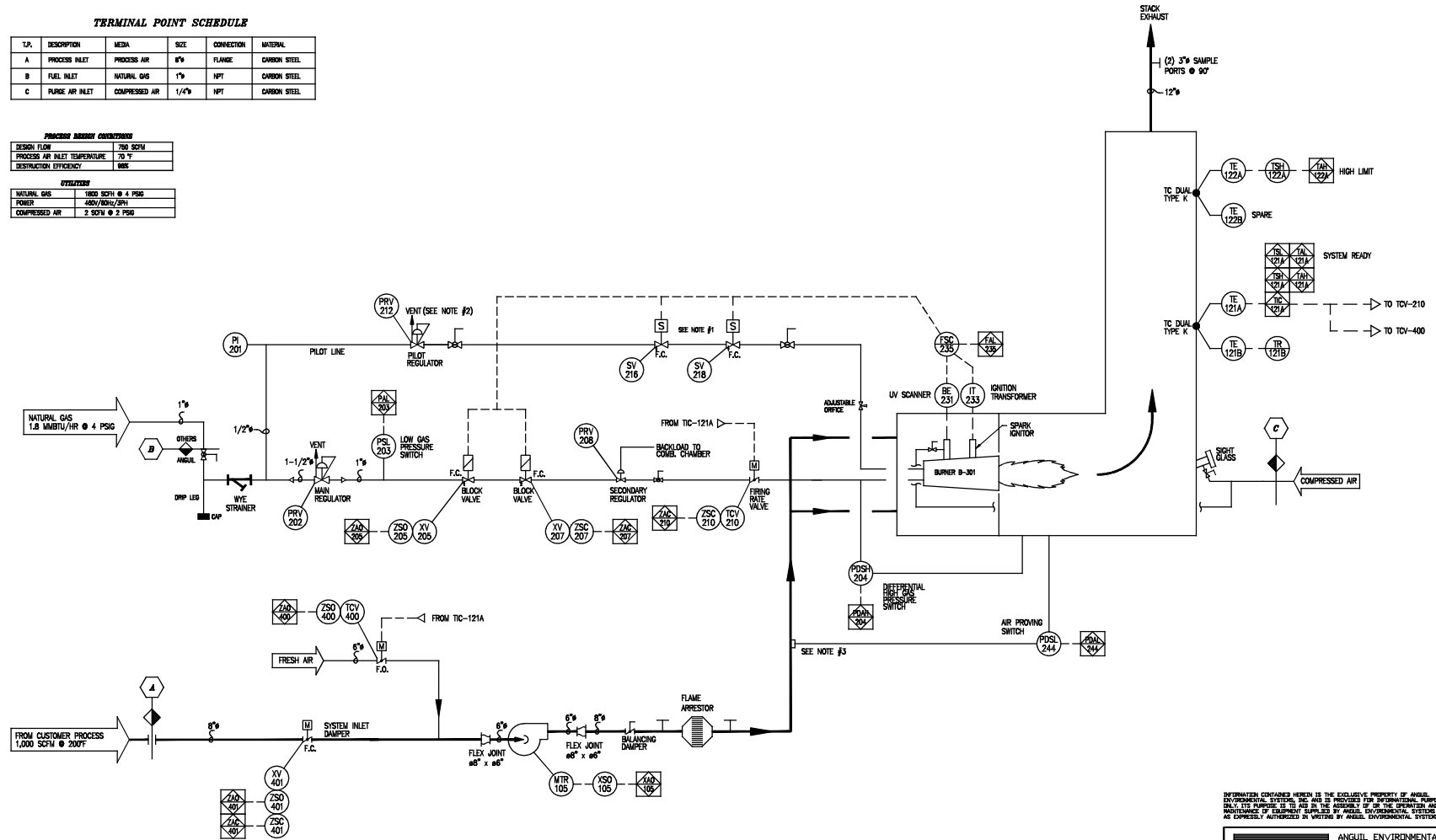
T.P.	DESCRIPTION	MEDIA	SIZE	CONNECTION	MATERIAL
A	PROCESS INLET	PROCESS AIR	8"	FLANGE	CARBON STEEL
B	FUEL INLET	NATURAL GAS	1"	NPT	CARBON STEEL
C	PURGE AIR INLET	COMPRESSED AIR	1/4"	NPT	CARBON STEEL

**PROCESS BURNER CONDITIONS**

DESIGN FLOW	750 SCFM
PROCESS AIR INLET TEMPERATURE	70 °F
DESTROYATION EFFICIENCY	99%

**OPERATORS**

NATURAL GAS	1000 SCFH @ 4 PSIG
POWER	400V/60HZ/3PH
COMPRESSED AIR	2 SCFM @ 2 PSIG



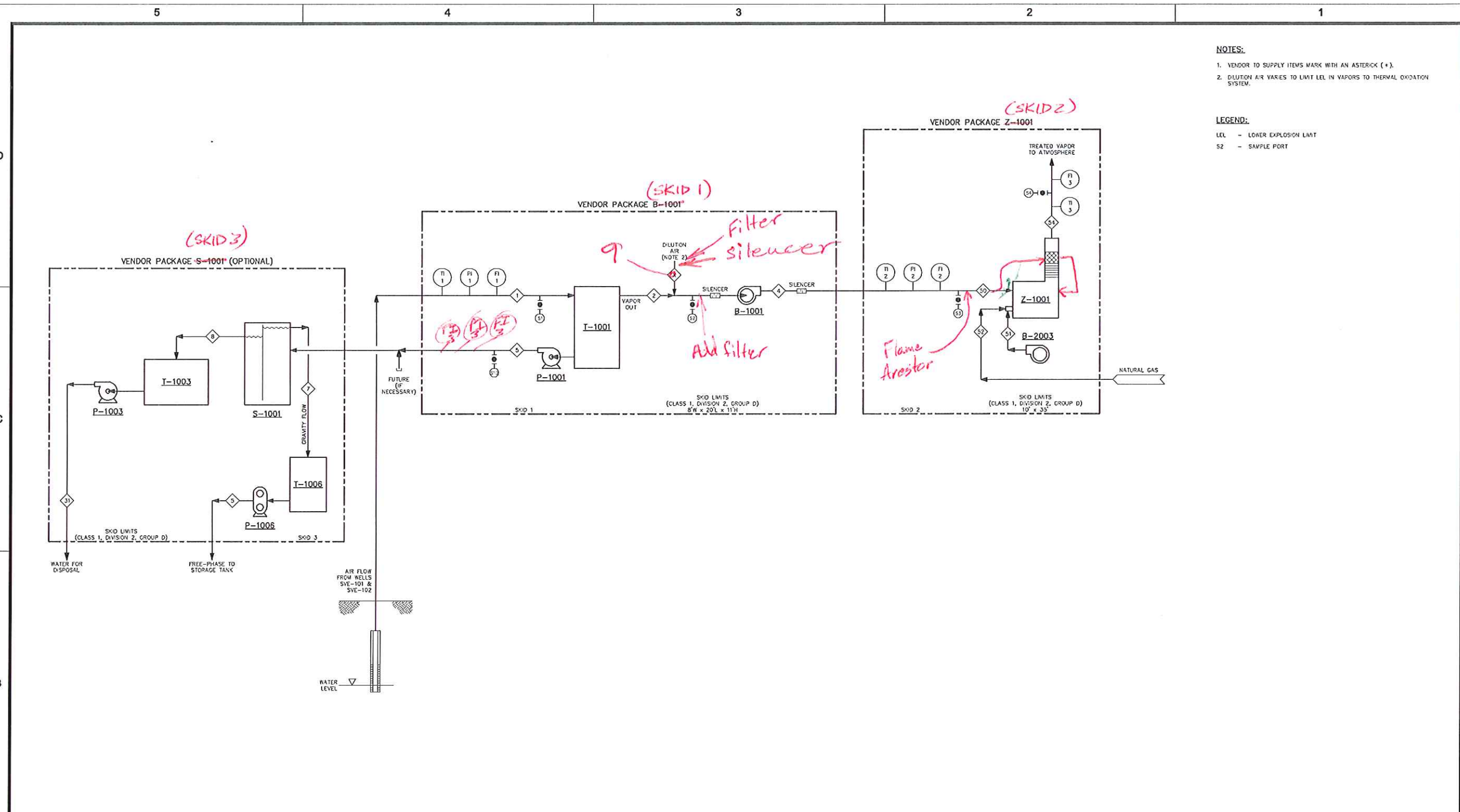
- NOTE:
- 1) LOCATE PILOT SOLENOIDS AS CLOSE TO BURNER AS POSSIBLE
  - 2) FUEL TRAIN GAS VENTS TO HAVE BUG SCREENS
  - 3) SENSING TAPS TO BE LOCATED ON TOP OF DUCT
  - 4) ALL DAMPER SHAFTS TO BE ORIENTED IN HORIZONTAL PLANE

INFORMATION CONTAINED HEREIN IS THE EXCLUSIVE PROPERTY OF ANGUIL ENVIRONMENTAL SYSTEMS, INC. AND IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY. ITS PURPOSE IS TO AID IN THE ASSEMBLY OF THE OPERATION AND MAINTENANCE OF EQUIPMENT SUPPLIED BY ANGUIL ENVIRONMENTAL SYSTEMS, INC. AS EXPRESSLY AUTHORIZED IN WRITING BY ANGUIL ENVIRONMENTAL SYSTEMS, INC.

<b>ANGUIL</b>		ANGUIL ENVIRONMENTAL SYSTEMS, INC. MILWAUKEE, WISCONSIN	
TITLE MODEL 10 THERM-CAT SAMPLE PROCESS AND INSTRUMENTATION DIAGRAM		DRAWING NO. 11436-1	
SCALE NTS		REV.	
DRAWN LM	DATE 02/10/04	CUSTOMER	REV.
CHECKED	DATE		
APPROVED	DATE		
LAST DRAWN BY LM	DATE 02/16/04	SOURCE	PAGE 1 OF 1

REV BY DATE CHANGE

LAST PLOTTED BY LM DATE 02/16/04



- B-1001** SVE-1 BLOWER SYSTEM 1,000 SCFM 15" HG 125 HP
- B-2003** COMBUSTION AIR BLOWER 2,000 SCFM 15" HG 10 HP
- P-1001** SVE-1 LIQUID PUMP 5 GPM 15" HP
- P-1003** WATER TRANSFER PUMP CENTRIFUGAL TYPE 20 GPM 2 HP
- P-1006** RECOVERED OIL PUMP 2 GPM
- S-1001** OIL/WATER SEPARATOR FSP RATED FOR 3 GPM 9'-6" L x 3'-11" W x 9'-15" H
- T-1006** RECOVERED OIL STORAGE TANK CS 550 GALLON
- T-1001** SVE-1 AIR/WATER SEPARATOR CS 600 GALLON 45" DA x 6'H
- T-1003** RECOVERY WATER STORAGE TANK CS 200 GALLON 36" x 8" x 4'H
- Z-1001** THERMAL OXIDATION SYSTEM I 50" O.D. x 15' H x 35" L 10 KW/HR @ 700°F

COMPONENT	UNIT	STREAM NO.											
		1	2	3	4	5	6	7	8	9	10	11	12
		INLET VAPOR	SEPARATOR VAPOR	BLOWER VAPOR	WATER FREE #4	FREE PHASE	WATER	DILUTION AIR	WATER	EXTRACTED VAPOR	COMBUSTION AIR	NATURAL GAS	STACK GAS
WATER FLOW (average)	lb/hr	1,001			1,001	3.4	997			997			
AIR FLOW (average)	lb/hr	4,500	4,500	4,500									
WATER/AIR (W/V) (average)		0.0008											
INITIAL TOTAL VOC IN VAPOR	lb/hr	765	765	765						765			7.65
LIQUID FLOW (maximum)	gpm	3			3	0.02	2.95						
LIQUID FLOW (average)	gpm	2			2	0.01	1.99		1.99				
AIR FLOW (at 15" Hg)	ccfm	2,000	2,000	2,539						2,539			
AIR FLOW	scfm	1,000	1,000	1,000						1,000	VENDOR (+)	VENDOR (+)	
TEMPERATURE	°F	60	60	200	60	60	60	60	60	200	70	70	1,400
PRESSURE		15" Hg VAC	15" Hg VAC	20" WG						20" WG	ATM		ATM
THERMAL CONTENT	btu/ft <sup>3</sup>												
AIR (standard)	lb/ft <sup>3</sup>	0.075										1.029	
DENSITY (water)	lb/gal	8.34			8.34	5.6	8.34			8.34			

**\$\$ - THINK VALUE ENGINEERING - \$\$**

Revisions			
Symbol	Description	Date	Approved
A	PRELIMINARY ISSUE	11/22/11	

Shaw Environmental, Inc.
 U.S. ARMY ENGINEER DISTRICT  
CORPS OF ENGINEERS  
ALBUQUERQUE, NEW MEXICO

Designed by: **KT**      KIRKLAND AIR FORCE BASE      ALBUQUERQUE, NEW MEXICO  
 Drawn by: **JWH**  
 Checked by: **KT**  
 Reviewed by: **JTS**  
 Submitted by:

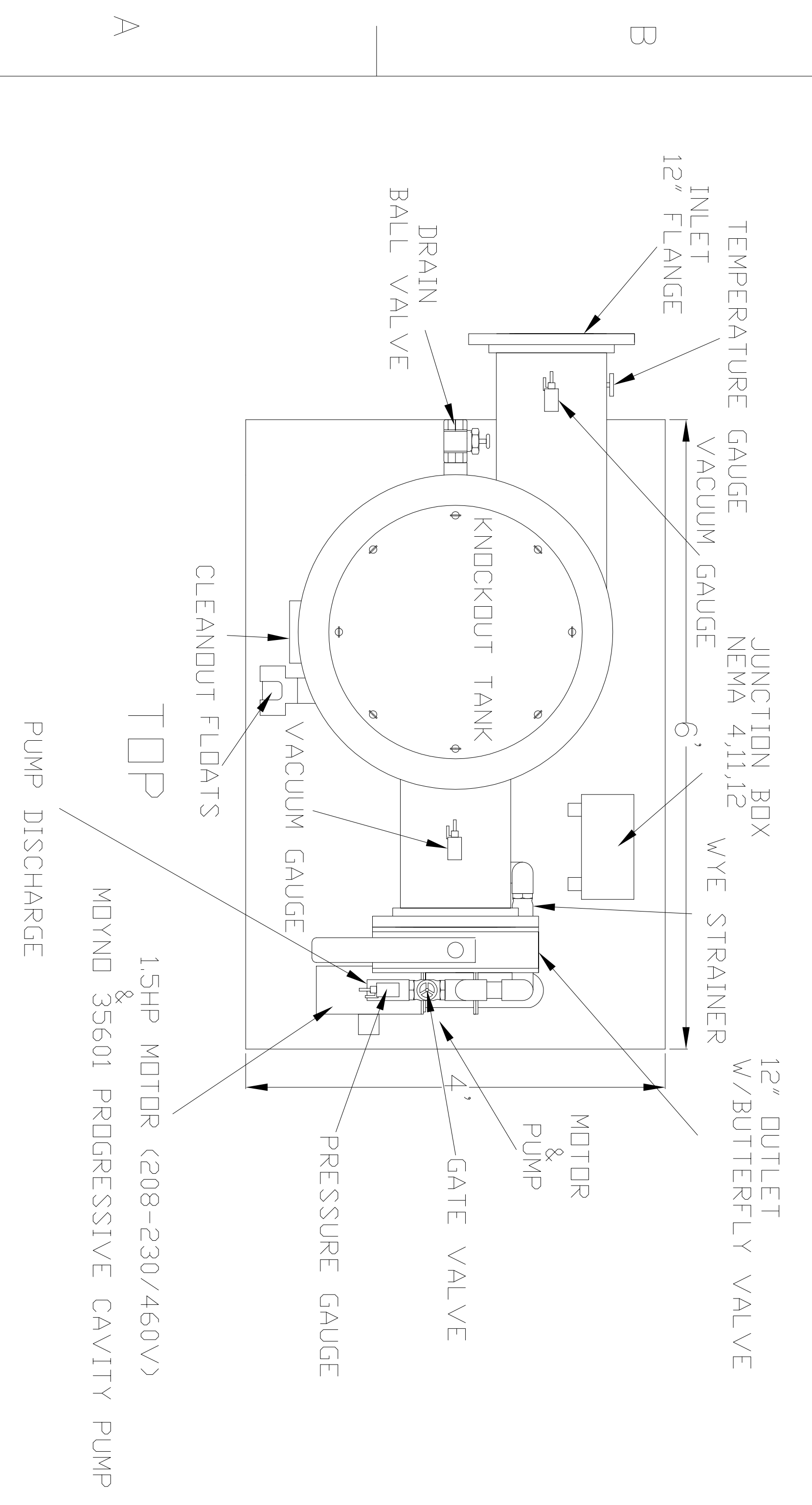
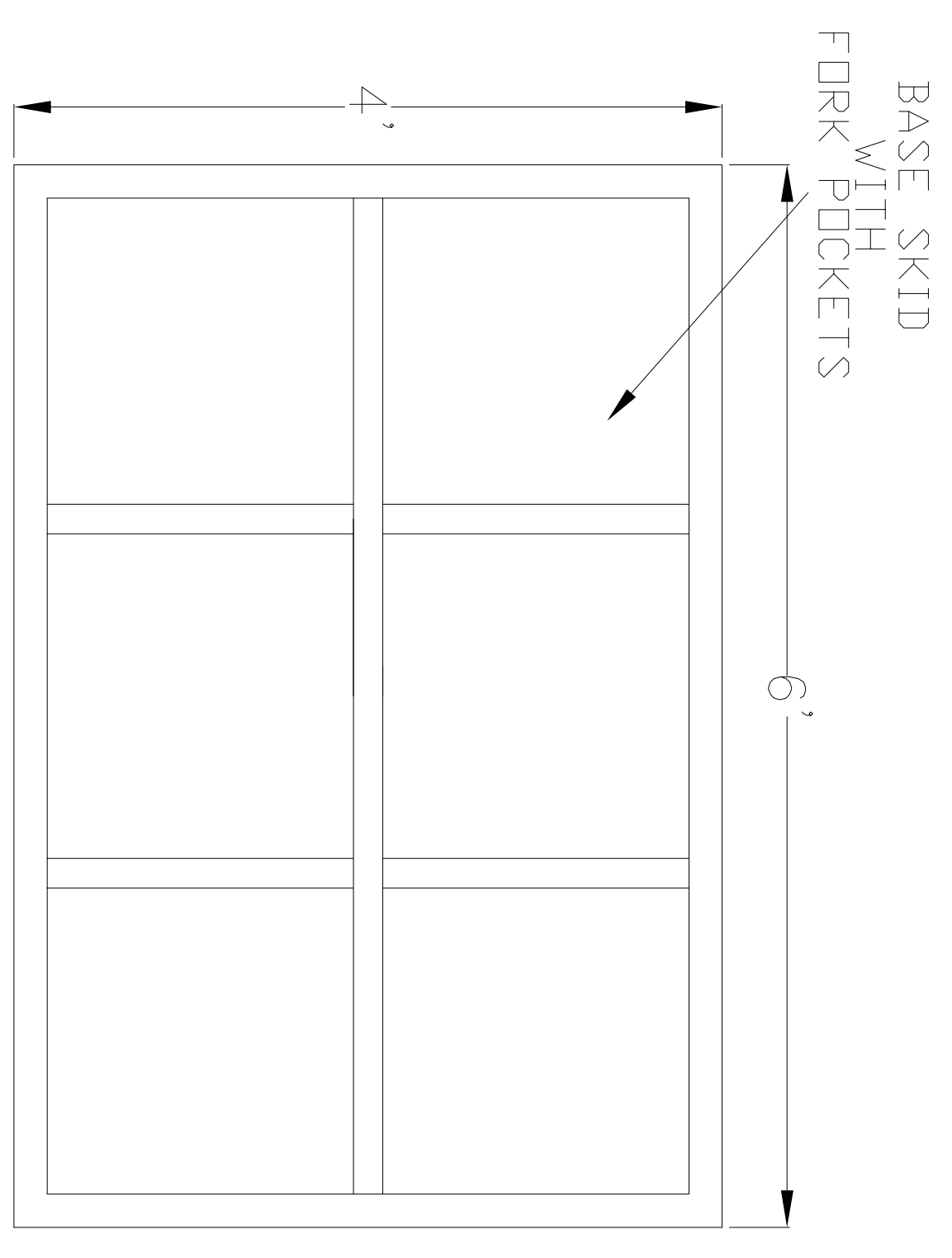
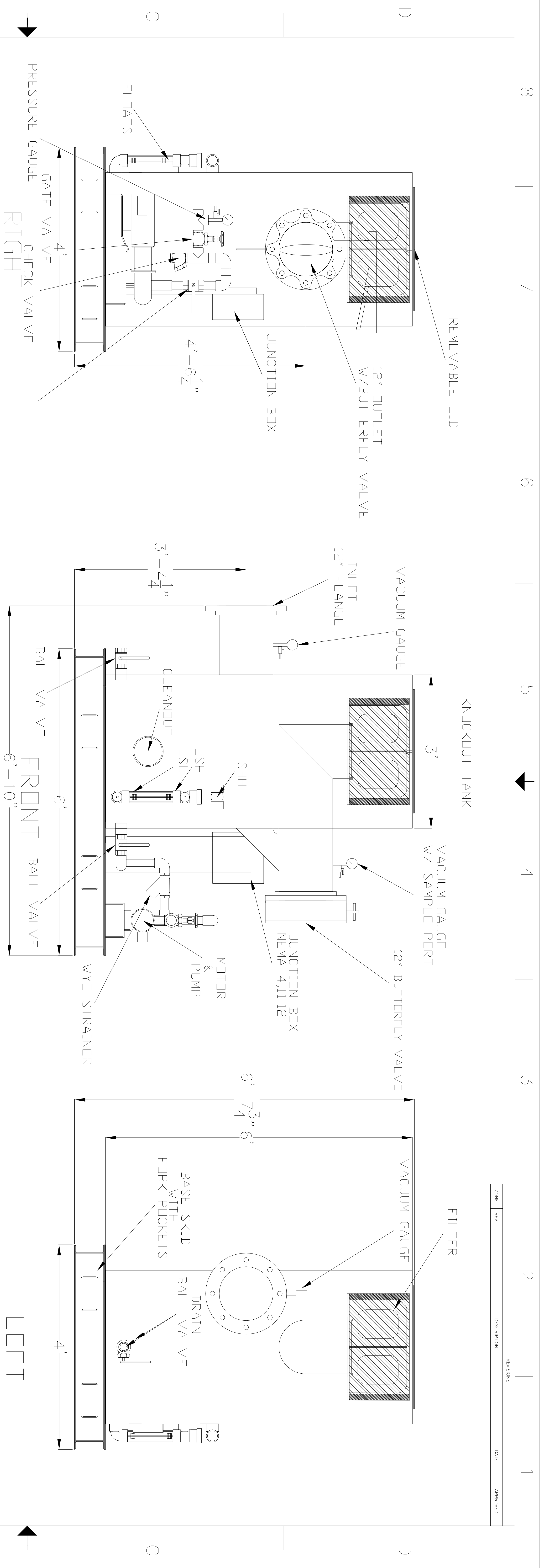
**SOIL VAPOR EXTRACTION (SVE) SYSTEM  
BULK FUELS FACILITY  
PROCESS FLOW DIAGRAM**

Plot Scale Ratio: 1 = 1      Date: 11/22/11      Sheet: P-1  
 Design File: 140705-P1.dwg  
 Spec. No.:      Drawing Code:

File: K:\Kirkland\_AFB\Process\140705-P1.dwg  
 Plot Date/Time: Nov 22 2011 12:04pm  
 Plotted By: jmhubbard



REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



APPROVED BY \_\_\_\_\_  
DATE \_\_\_\_\_

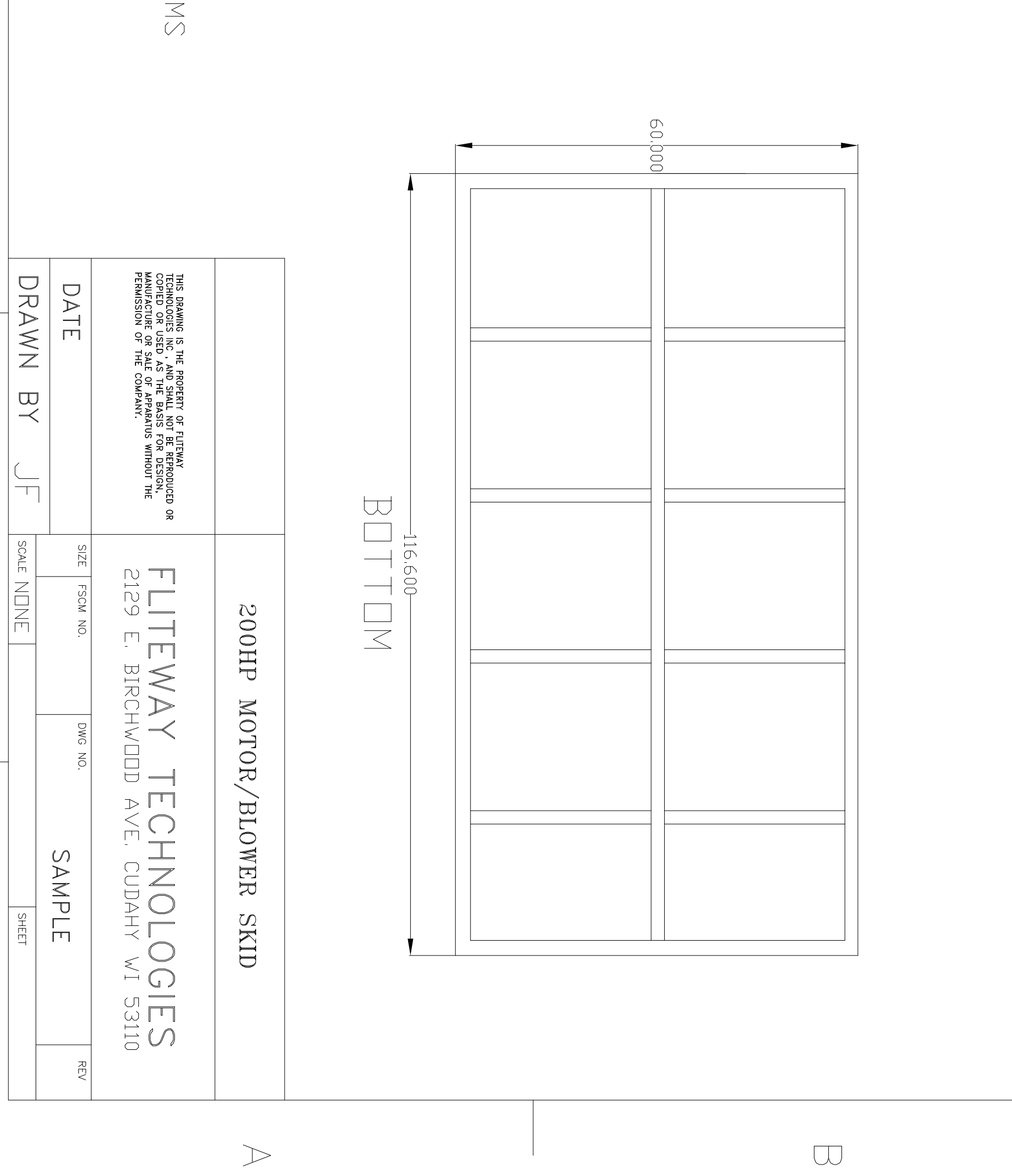
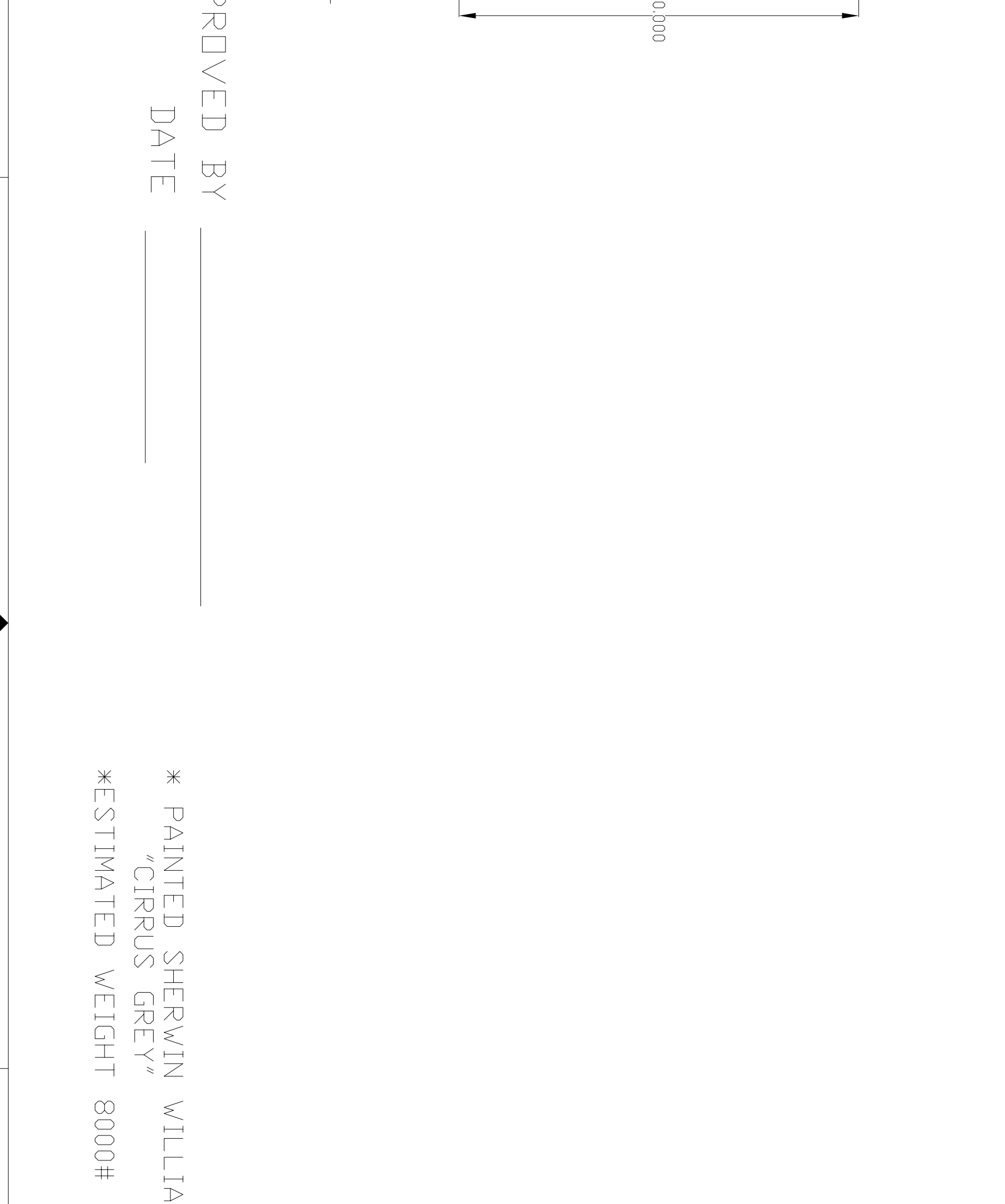
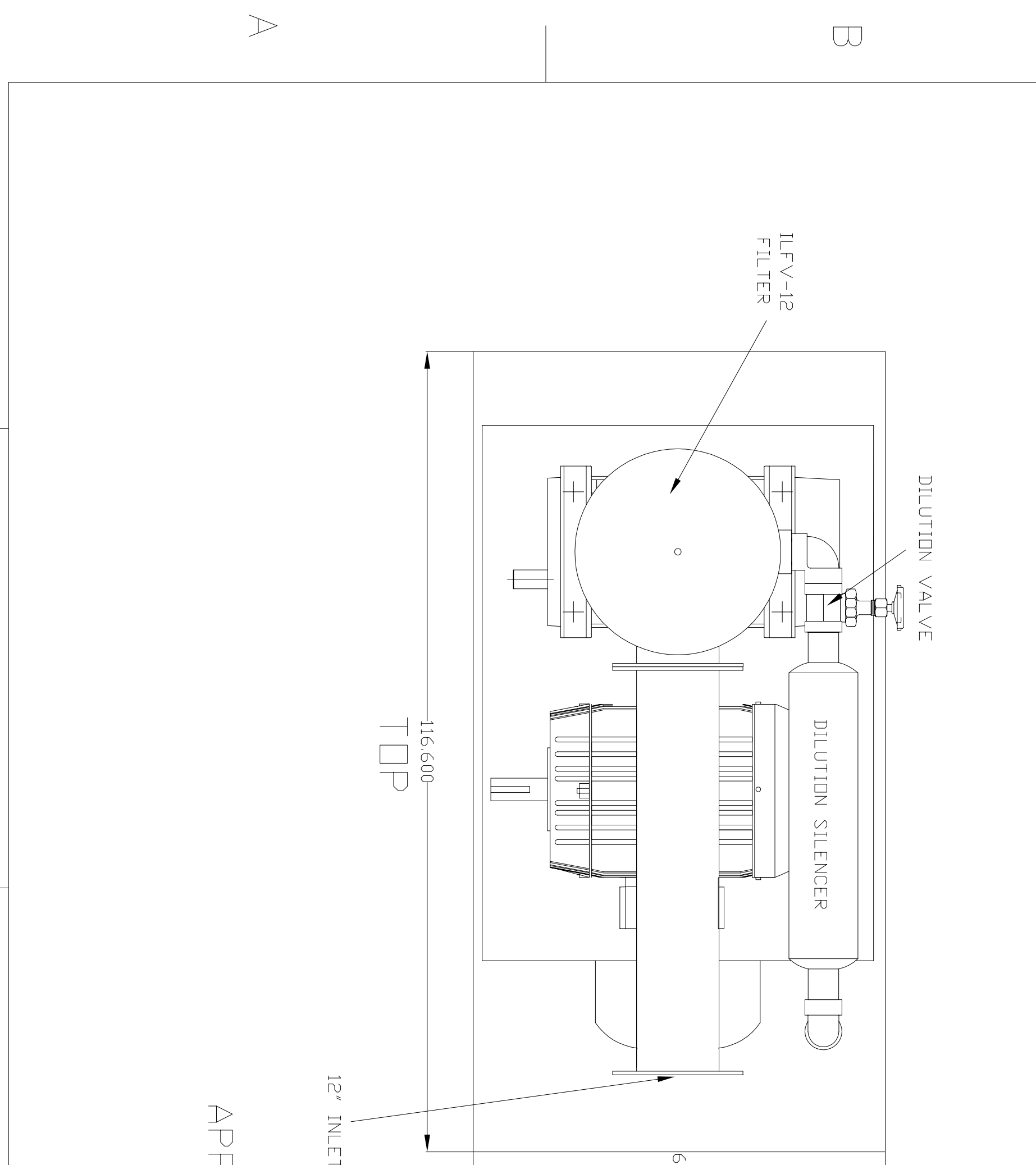
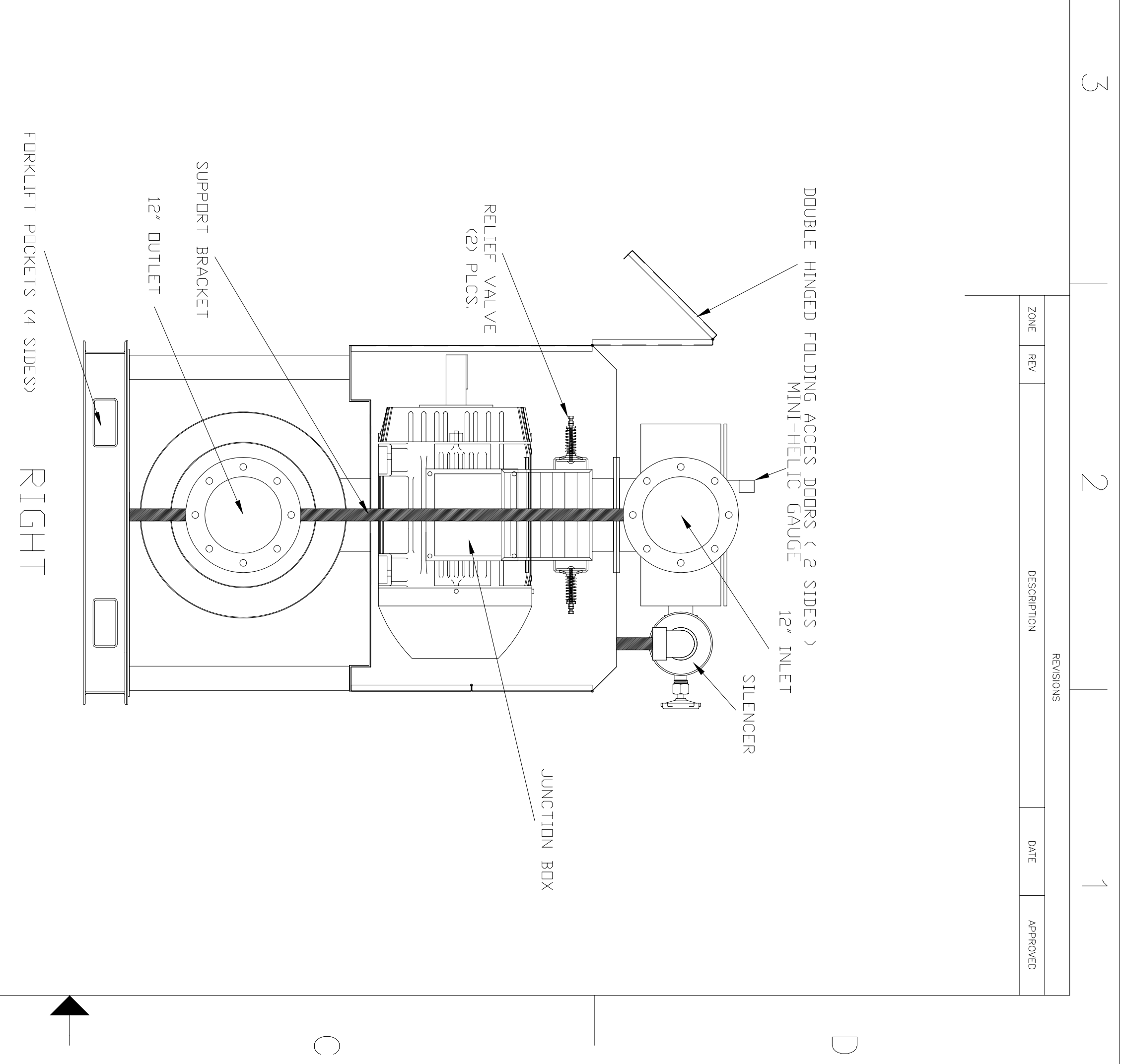
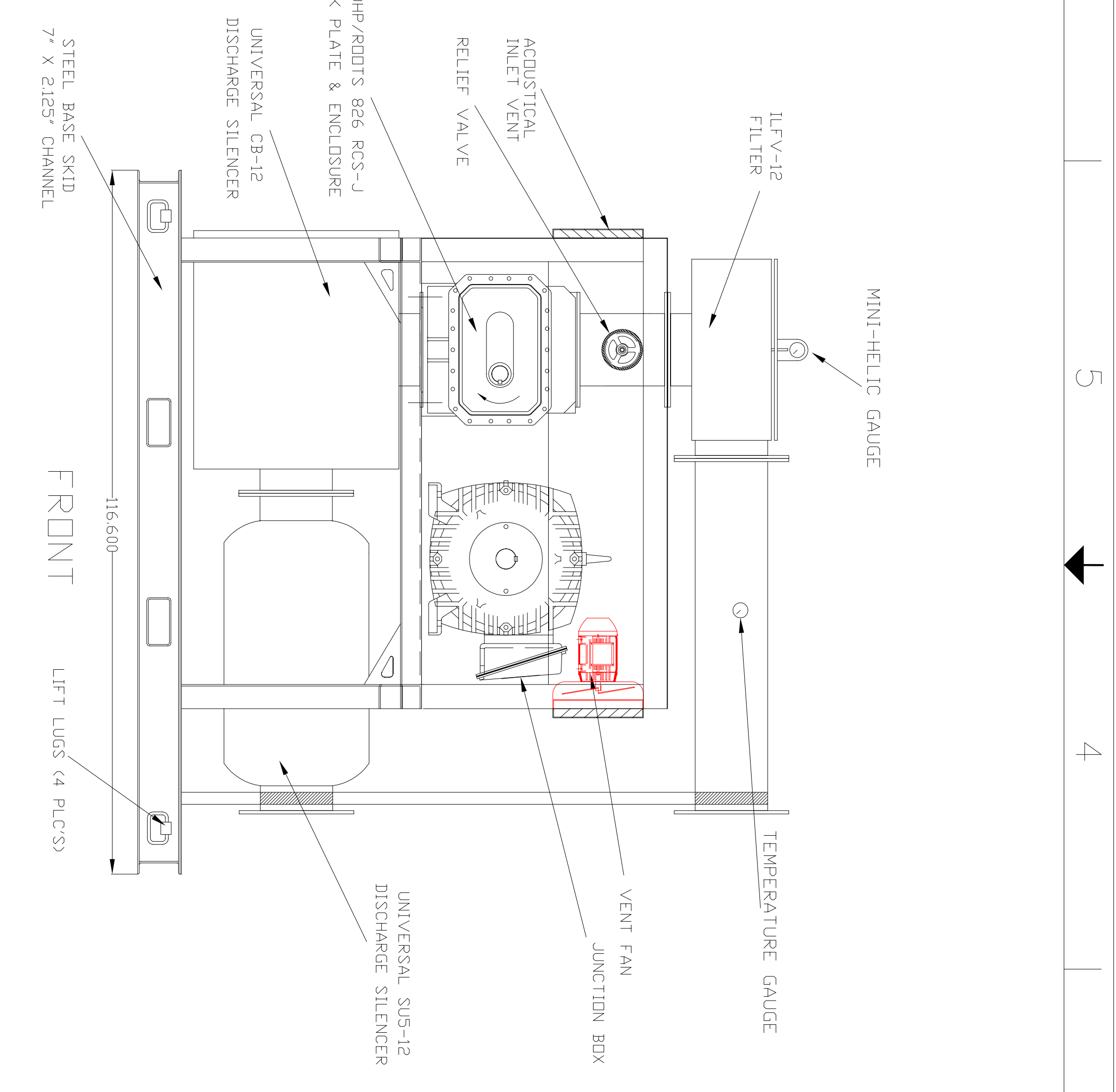
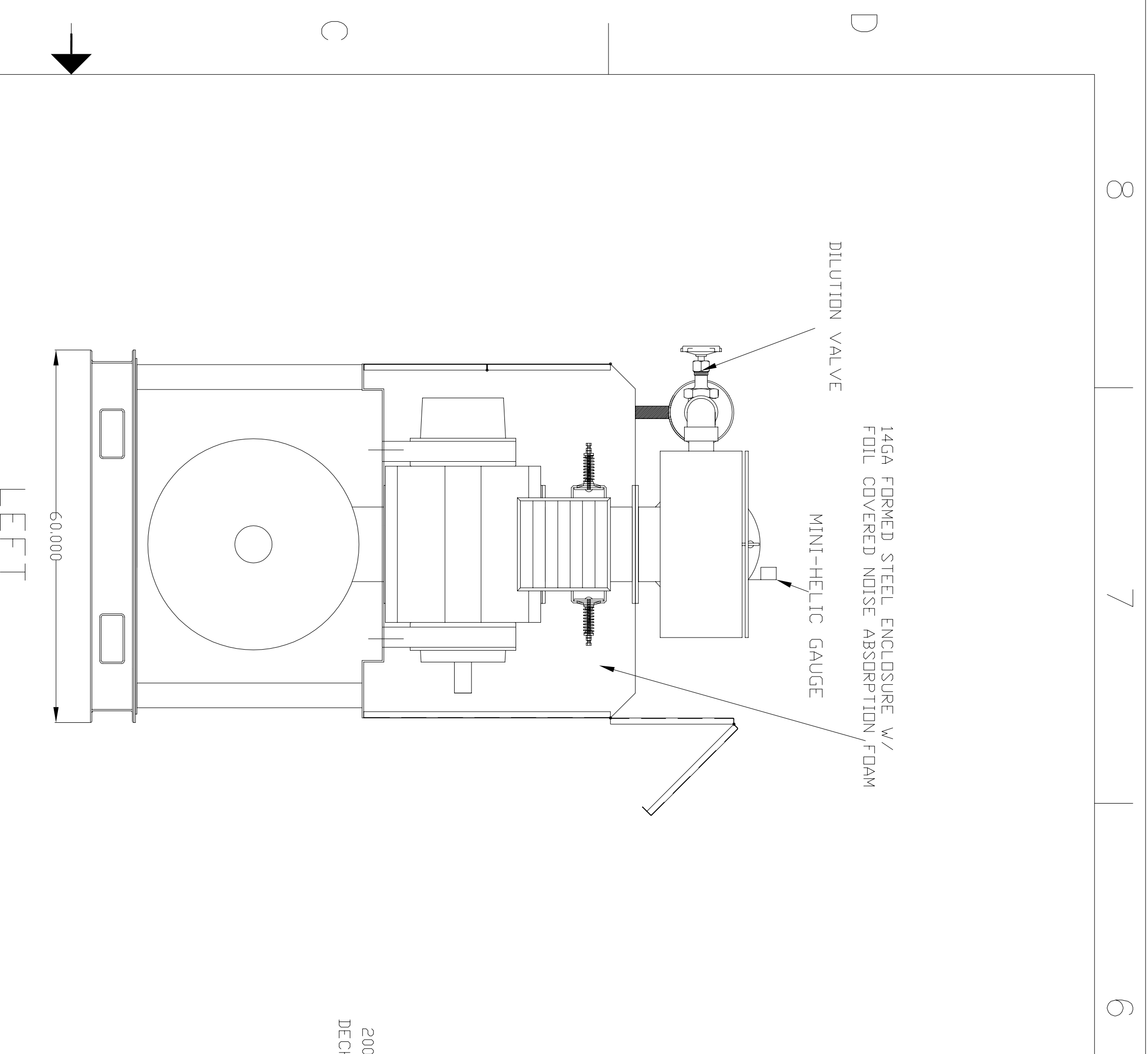
\* PAINTED SHERWIN WILLIAMS  
"CIIRUS GREY"  
\* ESTIMATED WEIGHT 1500#

12" KO TANK WITH BASE

FLUTEWAY TECHNOLOGIES  
2129 E. BIRCHWOODD AVE. CUDAHY WI 53110

DATE	SCALE NONE	DWG NO.	SAMPLE
DRAWN BY JF			

REVISIONS		DATE	APPROVED
ZONE	REV	DESCRIPTION	



APPROVED BY \_\_\_\_\_  
DATE \_\_\_\_\_

\* PAINTED SHERWIN WILLIAMS  
"CIRRUS GREY"  
\*ESTIMATED WEIGHT 8000#

200HP MOTOR/BLOWER SKID	
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DATE	DRAWN BY
SCALE NONE	JF
SIZE FSCM NO.	DWG NO.
SAMPLE	SHEET
REV	