

**APPENDIX B**  
**EQUIPMENT PROPOSAL FOR DAF CLARIFIERS**  
**&**  
**FLOCCULATION TANK**



A Sulzer Brand

Trusted Wastewater Solutions™

DAF System

Proposal



Project: DAF System

Emmitsburg, MD

Proposal Number: 21011511CB-D

Date: November 6, 2023

Sulzer Chemtech USA Inc. dba FRC Systems International  
PO Box 3147 • Cumming, GA 30028 Phone: 770.534.3681 Fax: 770.783.8632  
[www.frcsystems.com](http://www.frcsystems.com)

SULZER CONFIDENTIAL



**Proposal Number: 21011511CB-D**

**Date: November 6, 2023**

|   |   |
|---|---|
| <p><b>Proposal for:</b><br/> <b>John C. Moore, P.E.</b><br/>         Director, Water<br/>         RK&amp;K<br/>         700 East Pratt Street, Suite 500<br/>         Baltimore, MD 21202<br/>         410.728.2900 P   410.462.9479 D<br/>         www.rkk.com</p> | <p><b>Proposal Presented by:</b><br/> <b>Adriaan van der Beek</b><br/>         President<br/>         FRC Systems International<br/>         PO Box 3147<br/>         Cumming,<br/>         GA 30028</p> <hr/> <p><b>Project:</b> DAF System – Emmitsburg, MD</p> |
|---|---|

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**Enclosures**

- a) Process & Instrumentation Diagram (P&ID)
- b) Specification for PCL-15 DAFs

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## 1. Project Rationale

Dear John,

Please find enclosed the technical and commercial details of the PCL-15 DAF systems for the Emmitsburg, MD water treatment plant. **Revision D of this proposal updates pricing from Revision C (March 2022).**

Since only 240V, 1-phase power is available, we need to provide a different electrical control panel with VFDs that can run the 3-phase motors. Instead of proposing one (1) PCL-30 DAF which could not do that, we are offering a system of two parallel PCL-15 units.

We are also offering CSTRs (stirred reactor tanks) in front of each DAF unit for coagulation. Each tank will have a 10 minute residence time at 300 gpm. It has been discussed that the owner would like these CSTRs to have capability to operate in series or parallel (interconnecting piping by others).

A small sludge recycle pump will come with each DAF to return some of the separated solids back into the CSTR system to aid in the formation of larger flocs to enhance separation.

As a standard, we build the support structures and access catwalks for our own equipment out of durable schedule 304 stainless steel.

We design the electrical control panels for our systems in-house. Our standard panel includes Allen Bradley PLC & HMI, motor starters, and a NEMA 4-rated enclosure.

We perform FATs for all equipment we manufacture in-house. Our clients are always invited to come to our factory and observe these tests in person.

Custom materials and configurations are available, don't hesitate to ask if you have materials challenges or requests. Please contact us if you have any questions, comments, or concerns regarding our proposal or attached documents. We look forward to working with you!



**Proposal Number: 21011511CB-D**

**Date: November 6, 2023**

Respectfully,

**Adriaan van der Beek**

President

FRC Systems International

PO Box 3147

Cumming, GA 30028

Office: (770) 534-3681

Cell: (678) 983-6422

Adriaan.vanderBeek@sulzer.com

**Crystal Brokaw**

Applications Engineer

FRC Systems International

PO Box 3147

Cumming, GA 30028

Office: (770) 534-3681

Direct: (770) 203-4421

Crystal.Brokaw@sulzer.com

## 2. System Information

### 2.1 Design Information

The design of the proposed treatment system is based on information provided by client. Client should inform FRC if the system information does not reflect the actual situation.

| Parameter       | Minimum | Average | Maximum |
|-----------------|---------|---------|---------|
| Flow rate [gpm] | 125     | 150     | 300     |
| Turbidity [NTU] | ≤10     | -       | 11-100  |
| pH              | 6       | -       | 7.5     |

### 2.2 Utility Information

| Available at Plant | Quantity                                 |
|--------------------|--|
| Power Supply       | 230 V/60 Hz/1 phase                      |
| Control Voltage    | 120 VAC                                  |
| Air Supply         | From Compressor Offered by FRC @ 100 psi |
| City Water         | For Commissioning/Start-up               |

**2.3 Equipment Information**

| Property                             | Quantity   |
|--------------------------------------|--|
| Power Installed                      | <u>CSTR Mixers (Qty. 2)</u><br>2 HP – each CSTR Mixer<br><u>PCL-15 DAF (Qty. 2)</u><br>1 HP – each Skimmer Drive<br>10 HP – each Recycle Pump (2 per DAF)<br>¾ HP – each Sludge Pump |
| Approx. Weight of PCL-15 DAF (Empty) | 5,100 lbs.   |
| Approx. Weight of PCL-15 DAF (Full)  | 17,900 lbs.  |
| Air usage by Each DAF Process        | Approx. 1 scfm @ 100 psi, dry filtered   |
| Recommended Coagulant                | PAC  |



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## 3. Technical Details

Technical summary of equipment supply for wastewater treatment plant:

### 3.1 Continuously Stirred Reactor Tanks (CSTR)

- Tag ID : T3001A/B
- Type : Flat bottom, open top
- Material of construction : SS304
- Working Capacity : 3,000 gal
- Includes Mixer Bridge
- Quantity : Two (2)

### 3.2 CSTR Mixers

- Tag ID : MX3001A/B
- Power : 2 HP
- Impeller : Stainless Steel
- Shaft : Stainless Steel
- Voltage : 230V/60Hz/1ph
- Quantity : Two (2)

### 3.3 FRC DAF system, model PCL-15

- Tag ID : DAF16001/26001
- Materials : SS 304
- Quantity : Two (2)

#### Rotating top-skimmer

- Skimmer drive
  - Tag ID : SC16005/26005
  - Power : 1 HP
  - Motor : TEFC
  - Voltage : 230V/60Hz/1ph
  - Quantity : One (1) per DAF
- Chain : Polyacetal
- Sprockets : Nylon

#### White water aeration system including:

- Recycle pump



- Tag ID : P16001A/B ; P26001A/B
- Manufacturer/Model : Sulzer CPE 11-1 ANSI w/ C-Flange
- Type : End Suction Centrifugal ANSI
- Recycle flow : 44 gpm @ 185 ft
- Volute/Casing Cover : Ductile Iron
- Impeller : Duplex Stainless Steel
- Shaft : Duplex Stainless Steel
- Mechanical Seal : SS316 Gland, C/SiC Faces, EPDM
- Motor : ABB NEMA Severe Duty 215T TEFC
- Coupling : Rexnord Viva
- Max Power : 10 HP
- Voltage : 230V/60Hz/3ph  
: (VFD In: 230V/1ph Out: 230V/3ph)
- Location : Installed on DAF skid
- Quantity : One (1) + one (1) standby per DAF
- Recycle pump isolation valves : Two (2) 316SS manual valves per pump
- Air Dissolving Tube : SS304
- Manifold : SS304
- Bleed off valves
- Pressure gauges
- White water hosing
- Isolation and aeration valves

**Sand drain valve:**

- Tag ID : V16103/26103
- Type : Double actuating plug valve
- Size : 4"
- Quantity : One (1) per DAF

**Bottom drain valve:**

- Tag ID : V16104/26104
- Type : Double actuating plug valve
- Size : 6"
- Quantity : One (1) per DAF

**Plate pack system**

- Material of construction : SS304
- Free area : 33 ft<sup>2</sup>
- Effective area : 258 ft<sup>2</sup>

**Pneumatic control panel including**

- Pressure Regulator/Filter
- Air Rotameter
- Air Check Valve
- Pressure Switches for:
  - Compressed Air
  - Recycle Pump
- Solenoids for:
  - Inlet Solids Drain
  - Bottom Solids Drain
  - Air supply to DAF

**Float Chamber (Sludge Collection)**

**3.4 Level Probes for DAF Sludge Hopper**

- Tag ID : LSL/LSH16001 ; LSL/LSH26001
- Measurement type : Conductivity probes
- Location : installed on DAF Sludge compartment
- Manufacturer : Warrick
- Probe material : SS 316
- Quantity : Two (2)

**3.5 Sludge Recycle Pumps**

- Tag ID : P18001/28001
- Type : Progressive Cavity
- Capacity : 5 gpm @ 15 psi
- Material of Construction : Cast Iron
- Motor : TEFC
- Installed Power : ¾ HP
- Voltage : 230V/60Hz/1ph
- Including dry run protection

- Quantity : Two (2)

### **3.6 E-Panel for FRC Supplied Equipment**

- NEMA 4, Painted Steel Enclosure
- PLC (Allen Bradley – CompactLogix)
- HMI (Allen Bradley – 10” PanelView)
- E-Panel will include the 3-phase power distribution block and motor controls
- Includes required I/O cards for equipment on attached P&ID
- VFDs for recycle pump motors will be DuraPulse Drives with single phase, 230VAC line voltage and 230VAC three phase load voltage.
- All E-panel design and PLC/HMI programming will be done in-house by FRCs dedicated electrical controls engineering team.
- Quantity : One (1)

### **3.7 E-Shaped DAF Mounted OSHA Compliant Catwalk with Stairs**

- Access to 2 sides and 1 end of each DAF
- Access to 1 side of each CSTR
- Frame : 304 Stainless Steel Square Tube
- Handrail : 304 Stainless Steel Square Tube
- Kick Plates : 304 Stainless 11 gauge
- Stairs : 304 Stainless Steel (45 degree w/ 8” riser)
- Grating : Non-Slip 1” Thick FRP
- Quantity : One (1)

### **3.8 Design Engineering**

- Detailed design and consultation for installed treatment system
- Including:
  - Equipment dimensional drawings (top view, side view, influent/effluent sides)
  - 3D drawings (of DAF only)
  - Dimensional drawing & I/O list for control panel
  - Electrical control narrative document
  - Process & Instrumentation Diagram (PID)
  - Two (2) copies of Operation & Maintenance Manuals
  - Drawings and instructions for installation

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**3.9 Air Compressor**

- Tag ID : CMP7001
- Manufacturer : CAS
- Capacity : 36 cfm @ 100 psi
- Tank Capacity : 120 gallons
- Installed Power : 2x 5 HP
- Electrical Service : 230V/60Hz/1ph
- Including inlet air filter, dryer mounted on discharge, automatic compensated drain valve
- Quantity : One (1)

**Optional**

**3.10 On-site Mechanical Services**

- Supervision of Installation
- Operator Training
- General Field Services

## 4. Commercial Details

| Item #            | Description  | Line Total        |
|-------------------|--|-------------------|
| <b>Main Scope</b> |  |                   |
| 3.1-3.8           | <ul style="list-style-type: none"> <li>• <u>PCL-15 DAF – SS304 Construction</u>: Qty.2               <ul style="list-style-type: none"> <li>○ Dissolved Air (Whitewater) System                   <ul style="list-style-type: none"> <li>▪ Air Dissolving Tube – SS304</li> <li>▪ Recycle Pumps – Duplex Stainless Steel Impeller &amp; Shaft, DCI Casing, Duty/Standby Configuration</li> </ul> </li> <li>○ Sludge Removal                   <ul style="list-style-type: none"> <li>▪ Chain &amp; Flight Top Skimmer</li> <li>▪ PC Sludge Pump: 5 gpm @ 15 psi</li> <li>▪ Sludge Level Probes: 316SS Probe-type level switch</li> </ul> </li> <li>○ Settled Solids Removal                   <ul style="list-style-type: none"> <li>▪ Drain Valves – Plug-style, Pneumatically Actuated</li> </ul> </li> </ul> </li> <li>• <u>Flocculator – CSTR (SS304)</u>: Qty.2               <ul style="list-style-type: none"> <li>○ Working Volume 3,000 Gallons</li> <li>○ Mixer for Each Tank</li> </ul> </li> <li>• <u>Control Panel</u>: Qty.1               <ul style="list-style-type: none"> <li>○ NEMA 4 Enclosure</li> <li>○ PLC &amp; HMI                   <ul style="list-style-type: none"> <li>▪ PLC: Allen Bradley – CompactLogix</li> <li>▪ HMI: Allen Bradley – 10” PanelView</li> <li>▪ In-house Programming</li> </ul> </li> <li>○ 230V power with recycle pump VFDs as DuraPulse Drives</li> </ul> </li> </ul> | <b>\$ 603,900</b> |



|                       |  |                         |
|-----------------------|--|-------------------------|
|                       | <ul style="list-style-type: none"> <li>• <u>Catwalk – SS304 with FRP Grating</u>: Qty.1 <ul style="list-style-type: none"> <li>○ E-shaped to Access All Sides of Both DAFs, Access to both CSTRs on One Side</li> <li>○ OSHA Compliant</li> </ul> </li> <li>• <u>Engineering and Documentation</u>: Qty.1 <ul style="list-style-type: none"> <li>○ Equipment dimensional drawings (top view, side view, influent/effluent sides)</li> <li>○ 3D drawings (of DAF only)</li> <li>○ Dimensional drawing &amp; I/O list for control panel</li> <li>○ Electrical control narrative document</li> <li>○ Process &amp; Instrumentation Diagram (P&amp;ID)</li> <li>○ Two (2) copies of Operation &amp; Maintenance Manuals</li> <li>○ Drawings and instructions for installation</li> </ul> </li> </ul> |                         |
| 3.9                   | <ul style="list-style-type: none"> <li>• <u>Air Compressor</u>: Qty. 1 <ul style="list-style-type: none"> <li>○ 36 scfm @ 100 psi</li> <li>○ Duplex motor for duty/standby configuration</li> </ul> </li> </ul>  | <b>\$ 16,600</b>        |
| Extra                 | Transport DAP Emmitsburg, MD   | <b>TBD</b>              |
| <b>Optional Scope</b> |  |                         |
| Extra                 | <ul style="list-style-type: none"> <li>• <u>NET ADDER to Line Item 3.9</u>: Quiet Air Compressor rated for 32 scfm @ 100 psi, duplex motor for duty/standby configuration</li> </ul>   | <b>\$13,200</b>         |
| 3.10                  | <ul style="list-style-type: none"> <li>• On-site Mechanical Services</li> </ul>  | \$1,450/day + expenses* |

\*Expenses include travel, travel-associated costs, per diem, and 10% administration fee. One 'day' is defined as 8 working hours. Holiday, weekend, and overtime work billed extra. Per diem rate based on those established by the US GSA: <http://www.gsa.gov/portal/category/100120>

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## 5. Items Not Included in Scope of Supply

- Any seismic calculations, civil work, anchor bolts or concrete work
- Any site preparation, building and/or structures to house equipment, landscaping, or painting
- Any cast-in piping or conduit
- Any installation, labor, or material
- Any hoisting or lifting work during unloading and during installation
- Any chemicals or chemical storage totes
- Any influent or effluent piping, valves, fittings or supports
- Any process water piping, valves, fittings or supports, calibration columns etc. for dosing equipment
- Any pump alignment
- Any sludge handling system
- Any solids transfer piping, valves
- Any electrical work, including cables and connections between control panel and equipment
- Any local disconnects required at motor locations for equipment
- Any heat tracing or insulation of pipes or equipment
- Any water for on-site hydrostatic testing of vessels
- Any applicable state, federal or local taxes
- Any signing or sealing of engineering documents by professional engineer
- *All other items unless specifically mentioned in this proposal*



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## 6. Terms

### 6.1 Payment Terms

- 40% with the PO
- 60% with the delivery of the equipment

### 6.2 Equipment Delivery\*

To be agreed upon. Our goal is to meet your project timing, please do not hesitate to contact us if you have specific delivery or timing requirements so we can verify whether expedited delivery is feasible or not.

Please use following guideline:

- Engineering Submittal : 2-3 weeks
- Manufacturing : 20-24 weeks from submittal approval\*
- FAT : 2 days
- Packing & Delivery : 1 week

\*Based on current supply conditions

### 6.3 Delivery Terms

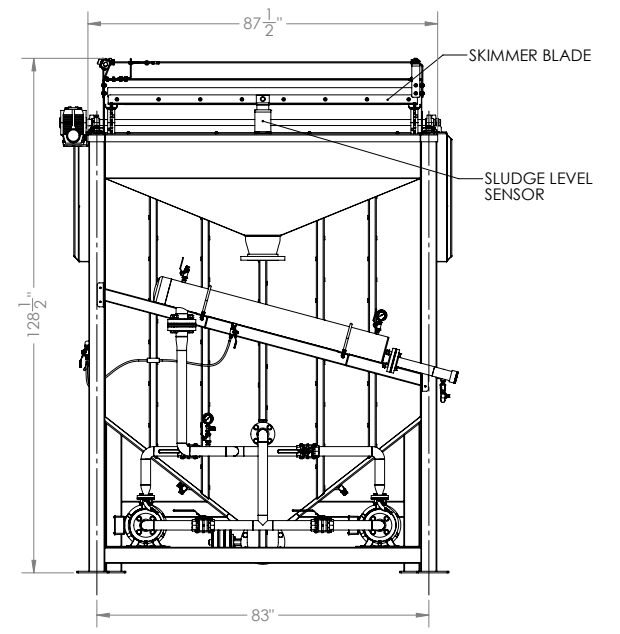
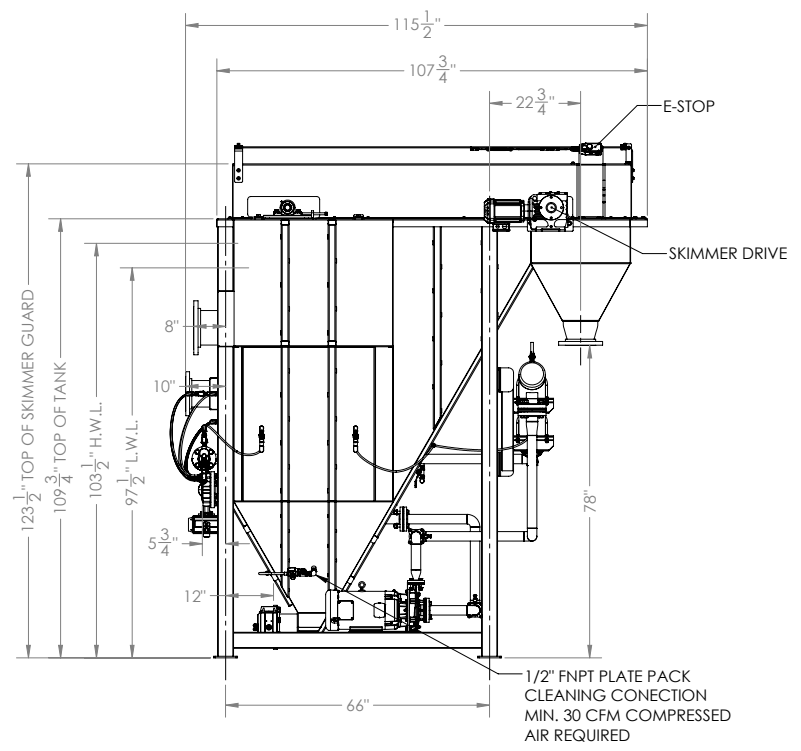
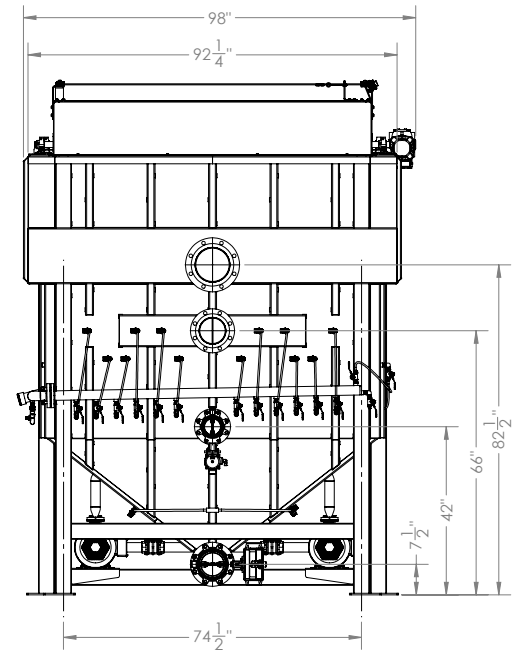
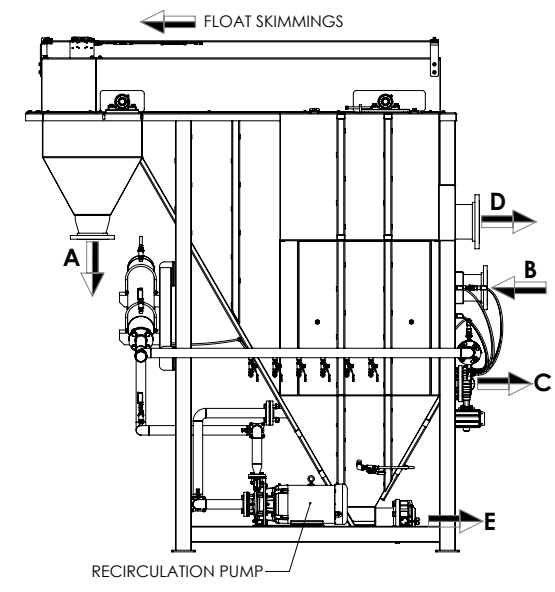
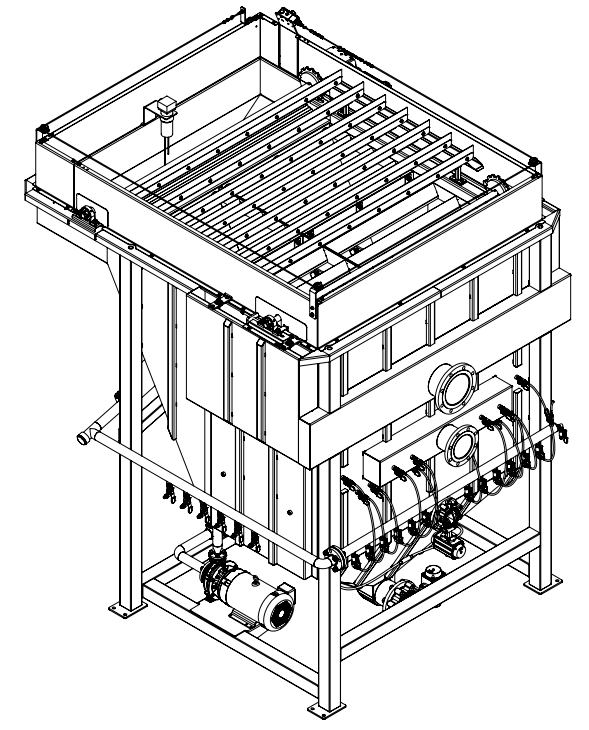
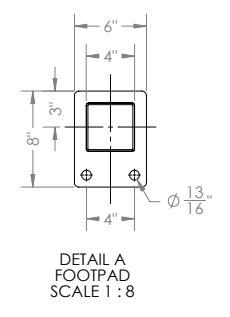
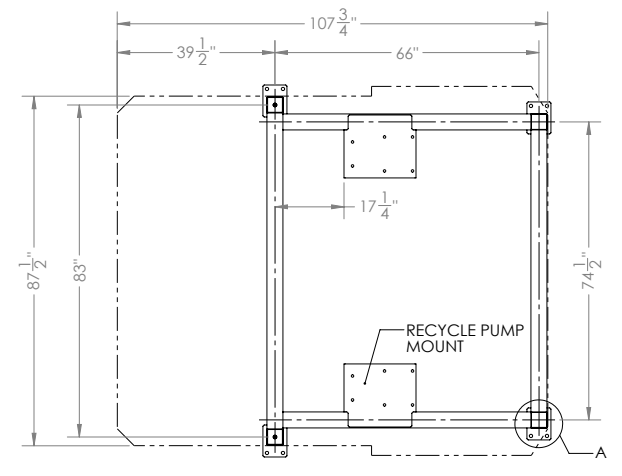
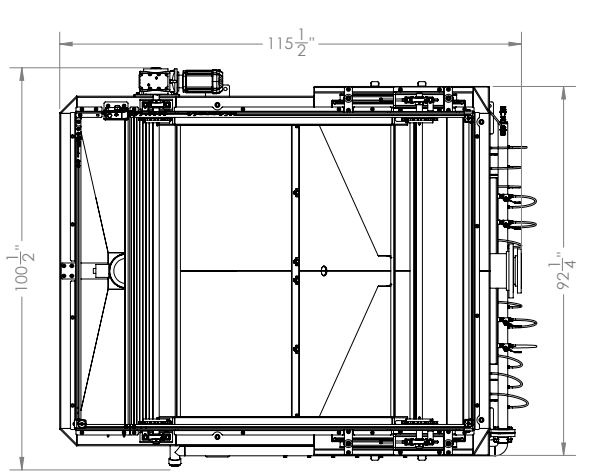
Transport DAP Emmitsburg, MD to be paid by customer.

### 6.4 Terms and Conditions of Sale

Attached Terms and Conditions of Sale are to be considered part of the proposal. A copy of these terms and conditions can also be found at <https://frcsystems.com/terms>.

### 6.5 Validity

30 days from date of proposal.



NOTES:  
 1. ALL DIMENSIONS IN INCHES  
 2. ALL MATERIAL TO BE 304 STAINLESS STEEL UNLESS NOTED  
 3. GENERAL DRAWING - FOR REFERENCE ONLY

SETTING EQUIPMENT:  
 USING A BUBBLE LEVEL THE UNIT SHOULD BE LEVELED TO WITHIN 1/4" LEVEL FRONT TO REAR AND TO WITHIN 1/8" LEVEL SIDE TO SIDE

UNIT WEIGHTS:  
 EMPTY: 5,100 LBS [2313 KGS]  
 FULL: 17,900 LBS [8119 KGS]

PCL 15 - LEFT HAND  
 CHEMFLO 7 PUMPS - CF7PMP  
 SS:15-3 215TC 6.90 SSC (15HP)  
 6" DIA X 56" TUBE

| ITEM | DESCRIPTION     | 150# ANSI FLANGE SIZE |
|------|-----------------|-----------------------|
| A    | FLOAT DISCHARGE | 6                     |
| B    | INFLUENT        | 6                     |
| C    | SAND TRAP       | 4                     |
| D    | EFFLUENT        | 8                     |
| E    | SETTLED SOLIDS  | 6                     |

CUSTOMER NAME  
 CUSTOMER LOCATION

GENERAL

| Name          | Date     | Scale   |
|---------------|----------|---------|
| Drawn: KG     | 11-29-22 | 1:24    |
| Checked: P.M. |          | Sheet   |
| Project No.:  |          | ANSI D  |
| Drawing No.:  |          | REV No. |

3A15L-C

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P.O. BOX 3147  
 CUMMING, GEORGIA 30028  
 PHONE: (770) 534-3681  
 FAX: (770) 783-8632  
 EMAIL: [FRCInfo@sulzer.com](mailto:FRCInfo@sulzer.com)

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| No. | Revisions     | Date     | By |
|-----|---------------|----------|----|
| 0   | FIRST RELEASE | 11-29-22 | KG |
|     |               |          |    |
|     |               |          |    |
|     |               |          |    |
|     |               |          |    |

**INSTRUMENT IDENTIFICATION**

| LETTERS                        | PRIMARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR | FIELD MOUNTED | AUXILIARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR |
|--------------------------------|--|---------------|--|
| Discrete Instruments           |  |               |  |
| Shared Display, Shared Control |  |               |  |
| Programmable Logic Control     |  |               |  |

**INSTRUMENT IDENTIFICATION LETTERS**

| LETTERS | PROCESS OR INITIATING VARIABLE | MODIFIER     | READOUT OR PASSIVE FUNCTION | OUTPUT FUNCTION  | MODIFIER      |
|---------|--------------------------------|--------------|-----------------------------|------------------|---------------|
| A       | Analysis                       |              | Alarm                       |                  |               |
| C       | Conductive                     |              |                             | Control          | Close, Closed |
| D       | Density                        | Differential |                             |                  |               |
| E       | Voltage                        | Emergency    | Primary Element             |                  |               |
| F       | Flow Rate                      | Ratio        |                             |                  |               |
| G       | Gauge                          |              |                             |                  |               |
| H       | Hand(Manual)                   |              |                             |                  | High          |
| I       |                                |              | Indicate                    |                  |               |
| L       | Level                          |              |                             |                  | Low           |
| N       | Turbidity                      |              | Middle/Intermediate         |                  |               |
| O       | User's Choice                  |              | Orifice                     |                  | Open          |
| P       | Pressure(or Vacuum)            |              |                             |                  |               |
| S       | Speed or Frequency             | Safety       |                             | Switch           | Stop          |
| T       | Temperature                    |              |                             | Transmitter      |               |
| V       | Viscosity                      |              |                             | Valve or Damper  |               |
| Y       | Status                         |              |                             | Relay or Compute |               |
| Z       | Position                       |              |                             | Drive or Actuate |               |

**EQUIPMENT & VALVE ABBREVIATIONS**

- T Tank or Sump
- RS Rotary Screen
- P Pump
- PMA Polymer Make Up (Automatic)
- MX Mixer
- PF Pipe Flocculator
- DAF Dissolved Air Flotation Unit
- CMP Compressor
- BW Blower
- SC Skimmer Drive
- AU Auger Drive
- SP Saturation Pipe
- CLF Clarifier
- BP Belt Press Filter
- FP Filter Press
- V Valve
- SV Solenoid Valve

**VALVE SYMBOLS**

- Butterfly Valve
- Check Valve
- Ball Valve
- Gate Valve
- Angle Valve
- Three Way Valve
- Four Way Valve
- Needle Valve
- Actuated Valve
- Pressure Control Valve
- Pressure Relief Valve

**ACTUATOR SYMBOLS**

- Solenoid
- Pneumatic
- Electric

**PRIMARY ELEMENT SYMBOLS**

- Rotameter
- Electromagnetic Flowmeter
- Level Probe
- Parshall Flume

**ABBREVIATIONS & LETTER SYMBOLS**

- MNPT Male Nominal Pipe Thread
- FNPT Female Nominal Pipe Thread
- POTW Public Owned Treatment Works
- VFD Variable Frequency drive

**ELECTRICAL EQUIPMENT SYMBOLS**

- In-Line Pump (General Symbol)
- Centrifugal Pump
- Chemical Feed Pump
- Air Operation Diaphragm (AOD) Pump
- Gear Pump (Rotary Lobe Pump)
- Electric Diaphragm Pump
- Progressive Cavity (PC) Pump
- Submersible Pump
- Centrifugal Compressor
- Screw Compressor
- Blower
- Injector
- Fan Blades
- Submersible Mixer
- Surface Aerator
- Centrifuge
- Auger/ Screen Conveyor or Motorized Chamber
- Skimmer
- Drive Motor

**MISCELLANEOUS SYMBOLS**

- Bag Strainer
- Filter /Regulator
- Drainage to Sewer
- Electrical Motor
- Y Strainer
- Open Vent
- Flame Arrester
- Reducer
- End Cap
- Flange
- Water Surface
- Interface From
- Interface To
- End Cap

**LINE NUMBERS**

- 6534 4" PVC
- Line Material
- Nominal Pipe Size
- Line Designation

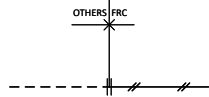
**LINE MATERIAL ABBREVIATIONS**

- CL By Client
- SS Stainless Steel
- CS Carbon Steel
- PVC Polyvinyl Chloride
- CPVC Chlorinated Polyvinyl Chloride

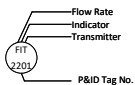
**LINE LEGEND**

- Minor Process Pipe or FRC Skid Boundary
- Major Process Pipe
- Pneumatic Signal
- Process By Customer / Existing
- Electrical Signal
- Optional or Packaged Boundary
- Heat Trace
- Flexible Pipe

**TURNKEY PIPELINE LIMITS**



**INSTRUMENT IDENTIFICATION LETTERS**



**FRC Systems International**  
 PO Box 3147  
 Cumming GA, 30028  
 Phone: (770) 534-3681  
 Fax: (770) 783-8632  
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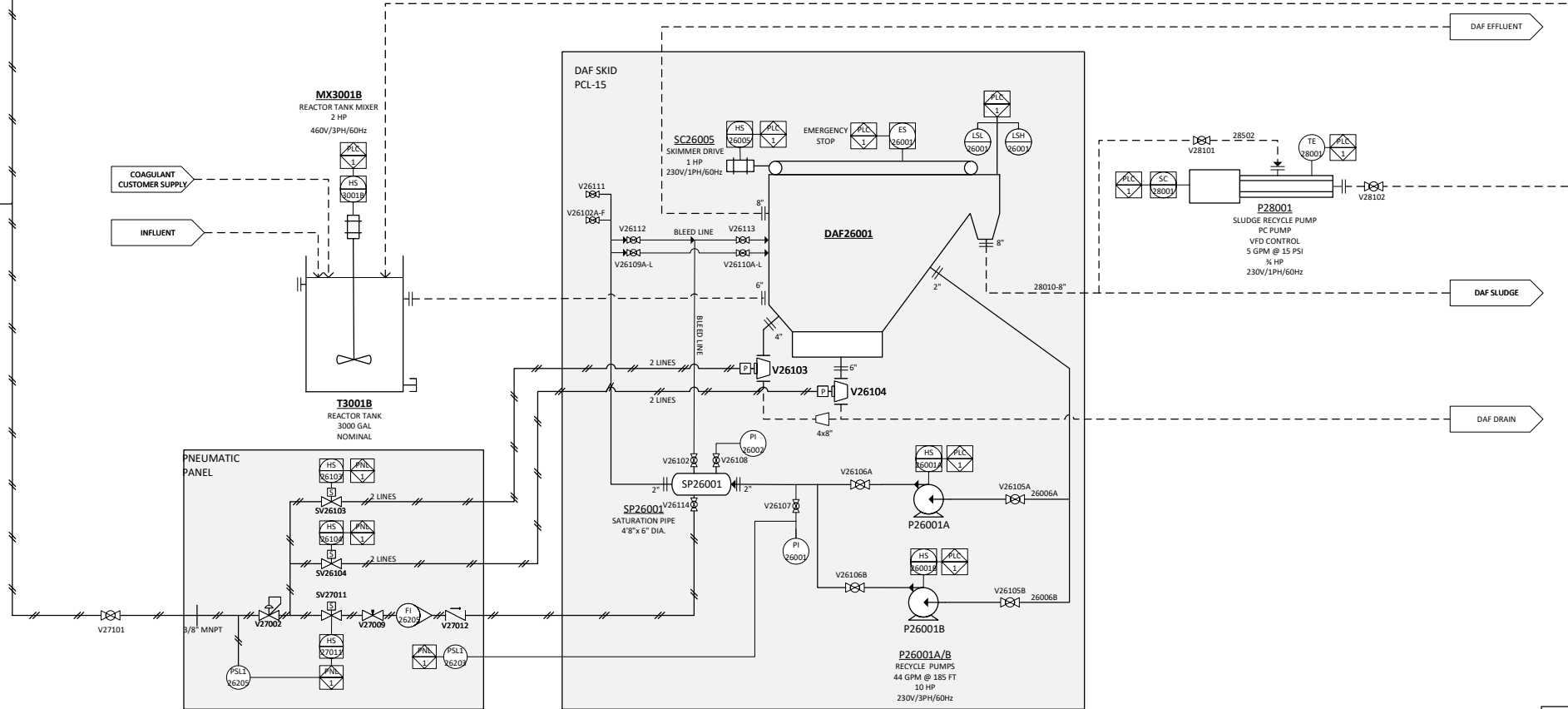
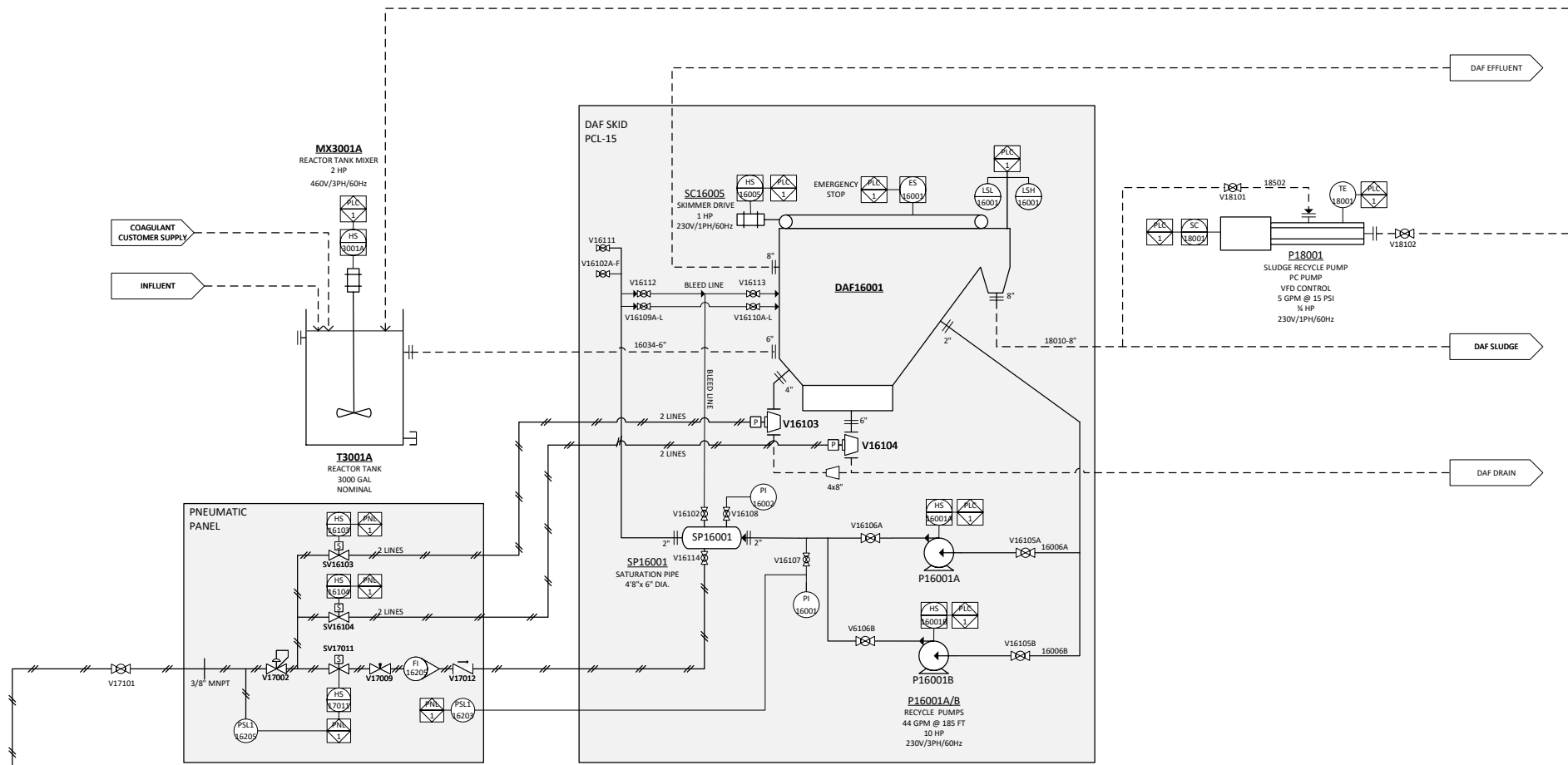
| REV. | DESCRIPTION | DATE | BY |
|------|-------------|------|----|
|      |             |      |    |
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|      |             |      |    |

**NOTES:**

**PROCESS & INSTRUMENTATION DIAGRAM LEGEND**

| SCALE | DRAWN BY | DWG NO        | REV   |
|-------|----------|---------------|-------|
| N/A   |          | P&ID - LEGEND |       |
| SIZE  | 11 x 17  |               | SHEET |





PRELIMINARY

= SKIDDED EQUIPMENT  
 SKIDDED EQUIPMENT IS INCLUDED IN FRC SCOPE OF SUPPLY (INCLUDING SKIDDED VALVES.)  
 NON-SKIDDED MANUAL VALVES ARE BY OTHERS EXCEPT WHERE OTHERWISE MENTIONED.



**FRC Systems International**  
 PO Box 3147  
 Cumming GA, 30028  
 Phone: (770) 534-3681  
 Fax: (770) 783-8632  
[www.frcsystems.com](http://www.frcsystems.com)

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| REV. | DESCRIPTION    | DATE    | BY |
|------|----------------|---------|----|
| D    | PRICING UPDATE | 11/6/23 | CB |

- NOTES:**
1. Dashed piping is installed in field by others.
  2. Equipment in blocks is skidded by FRC.
  3. Skids may require some field assembly.
  4. Each chemical line to go through its own cast-in conduit tube.

|                                   |                |                             |          |
|-----------------------------------|----------------|-----------------------------|----------|
| EMMITSBURG, MD                    |                |                             |          |
| PROCESS & INSTRUMENTATION DIAGRAM |                |                             |          |
| SCALE<br>N/A                      | DRAWN BY<br>CB | DWG NO<br>21011511CB - P&ID | REV<br>D |
| SIZE<br>ANSI C                    | 6 NOV 2023     | SHEET                       | 1 OF 1   |