



August 10, 2017

Sean Joseph  
Senior Technical Advisor, NWB  
P.O. Box 119  
Gjoa Haven, NU X0B 1J0

**RE: Supplementary Information – Milne Port Accommodations Camp Upgrade  
Water Licence 2AM-MRY1325 – Amend. No. 1**

The purpose of this letter is to provide supplementary information for the Milne Port Accommodations Camp Upgrade modification request submitted by Baffinland Iron Mines Corporation (Baffinland) to the Nunavut Water Board (NWB) on July 19, 2017. In reviewing the original submission for the Milne Port Accommodations Camp Upgrade, Baffinland discovered that the Process Guarantee for the sewage treatment plant was not included.

Horizon North, the camp installation contractor, contracted Banner Environmental Engineering Consultants Ltd. (Banner) to conduct a 3<sup>rd</sup> party design review of the sewage treatment plant (FilterBoxx) provided for the proposed 380 man camp at Milne Port. Banner's review of the plant is provided in Attachment 1 and concludes that the plant's capacity and treatment technology is suitable for the camp's expected flows and that the plant should meet and exceed the effluent discharge requirements outlined in Baffinland's Type A Water Licence.

Engineering drawings showing the general arrangement of the sewage treatment plant are provided in Attachment 2. A general process description of the sewage treatment plant (Section 3 of FilterBoxx O&M Manual) is provided in Attachment 3.

We trust that this additional information is sufficient for reviewing the sewage treatment plant associated with the proposed Milne Port Accommodations Camp Upgrade and look forward to the NWB's response. Please do not hesitate to contact the undersigned or Andrew Vermeer should you have any further comments or questions.

Sincerely,

A handwritten signature in black ink, appearing to read "W. McPhee".

Wayne McPhee,  
Director Sustainable Development

**Attachments:**

Attachment 1: Banner Environmental Engineering Consultants Ltd. – Baffin WWTP Review  
Attachment 2: Horizon North – FilterBoxx WWTP General Arrangement Drawings  
Attachment 3: FilterBoxx WWTP – Process Description (Section 3 of O&M Manual)

Cc: Stephen Williamson Bathory (Qikiqtani Inuit Association)  
David Hohnstein (NWB)  
Justin Hack, Jonathan Mesher, Sarah Forté, Karen Costello (INAC)  
Todd Burlingame, Adam Grzegorzczuk, Andrew Vermeer (Baffinland)

## **Attachment 1**

**Banner Environmental Engineering Consultants Ltd. – Baffin WWTP Review**

August 4th, 2017

**Mr. Justin MacPherson**

Operations Supervisor Water Resources  
Horizon North Logistics Inc. – Camps and Catering  
1802 - 8 St  
Nisku, AB T9E7W2  
(780) 955-2992

Dear Mr. MacPherson,

Banner Environmental Engineering Consultants Ltd. (Banner) has been retained by Horizon North Camps and Catering (HNCC) to perform a 3<sup>rd</sup>-party design review of the Baffin Wastewater Treatment Plant (WWTP) constructed in 2011 by Filterboxx Water & Environmental Corporation (Filterboxx). Banner has over 25 years in collective experience in designing, constructing, commissioning and operating water and wastewater treatment plants all over Western Canada, as well as the arctic.

The Baffin camp shall have the following expected operating parameters:

<b>Maximum Camp Population:</b>	400-persons
<b>Consumption per Capita:</b>	225 L/person-day
<b>Maximum Volume to be Treated:</b>	90 m <sup>3</sup> /day
<b>Biochemical Oxygen Demand:</b>	300 mg/L
<b>Total Suspended Solids:</b>	500 mg/L

The required effluent treatment parameters are as follow:

<b>Biochemical Oxygen Demand:</b>	100 mg/L
<b>Total Suspended Solids:</b>	120 mg/L
<b>Oil and Grease:</b>	No Visible Sheen
<b>pH:</b>	6.0 – 9.5
<b>Toxicity:</b>	Not acutely toxic

HNCC has provided Banner a WWTP design using GE's Zeeweed membrane bioreactor. The Baffin WWTP was previously in operation in HNCC's Black Sands camp located in Fort McMurray, AB. Banner has had experience commissioning and operating plants based on GE's Zeeweed membrane bioreactor technology. And upon completion of our review, Banner has determined that the provided design by HNCC for operation of the Baffin WWTP is suitable and should meet and exceed the requirements for treatment of wastewater effluent.

To initiate the 3<sup>rd</sup>-party design review, HNCC has provided Banner with the following information in-regards to the WWTP:

- Piping and Instrumentation Diagrams
- General Arrangement Drawings
- Control Narrative
- Operation Manual
- Historical Operation

Shown in this review are Banner's comments in-regards to the design of the plant.

## **Piping and Instrumentation Diagram**

### Capacity and Operability

- The provided design indicates that the membranes are able to treat a total 130 m<sup>3</sup>/day at 100% redundancy, and 260 m<sup>3</sup>/day at 0% redundancy.
- Piping size and materials is typical for the required application, and meet the required pressure and flow requirements of the system.
- Single blower provided for each aeration tank. It is recommended that the blowers are provided with 100% redundancy, but not a requirement for effective operation. It is noted that HNCC operations group ensures back-up blowers are always kept in stock on site due to the remote location to provide the additional redundancy recommended.
- Single blower provided for each membrane for scouring. It is recommended that the blowers are provided with 100% redundancy, but not a requirement for effective operation. It is noted that HNCC operations group ensures back-up blowers are always kept in stock on site due to the remote location to provide the additional redundancy recommended.
- Design provides sufficient process gauges and instrumentation for optimal operation of the system.
- Valving used are typical for the required application.
- Single effluent pump provided with level alarm reporting. It is recommended that all pumps are provided with 100% redundancy, but not a requirement for effective operation. It is noted that HNCC operations group ensures back-up pumps are always kept in stock on site due to the remote location to provide the additional redundancy recommended.
- Adequate level alarms are provided.

### Treatment

- Equalization and pre-treatment provided
- Based on the provided required flows, up to a 30-hour hydraulic residence time is provided on the aeration tanks, using both aeration tanks. Actual hydraulic residence time must be controlled by the plant operator. Aeration treatment is considered sufficient to meet the necessary effluent parameters.
- Process redundancy recommended, but not required for treatment tanks. Membrane bioreactors can operate at 100% redundancy, based on the design volumes produced by the camp.
- Aerobic sludge digestion is provided.
- Nominal operating flux rates for the ZeWeed membrane bioreactors are met based on the design.
- UV Disinfection provided for membrane permeate.

### **General Arrangement Drawings**

- WWTP to be provided in sea containers for housing. Foundation details of the housing are not provided.
- General arrangement of the plant is separated into equalization/pre-treatment, membrane bioreactor, and a mechanical container skid (blower housing). No immediate deficiencies in terms of access and spacing are required to be corrected at this time.
- HVAC and HVAC controls to be tested before putting into service. Insulation must be checked for any damages prior to operation.

### **Control Narrative**

- Control narrative provided is typical for the operation of membrane bioreactor WWTPs.
- Alarming provided is sufficient and typical of operation.

### **Operation Manual**

- Sufficient information provided for the operation along with typical operating parameters.
- Operation health and safety requirements are provided, including MSDS.
- Maintenance schedule provided, but is general and sufficient for operation.
- Vendor/supplier list of equipment and motors to be kept with operations manual.
- Remote log-in to the camp has been provided.

### **Historical Operation**

- The plant was operated historically on HNCC's Black Sands Camp
- No historical contraventions to the previous operational approval of the WWTP
- Last testing performed showed effluent BOD results of <2.0 mg/L and TSS results of <3.0 mg/L
- Since the plant has not been in operation for some time, Banner recommends that structural integrity of piping and tanks be checked prior to operation. In addition, all mechanical and electrical equipment be checked prior to operation.

### Conclusions

Based on the provided data and Banner's previous history of operating and commissioning GE Zeeweed Membrane Bioreactors, Banner can confidently confirm that the Baffin WWTP is suitable for operation in HNCC's Baffin camp. In addition, Banner can also confidently confirm that the provided design for the Baffin WWTP should meet and exceed the required effluent discharge requirements for the plant.

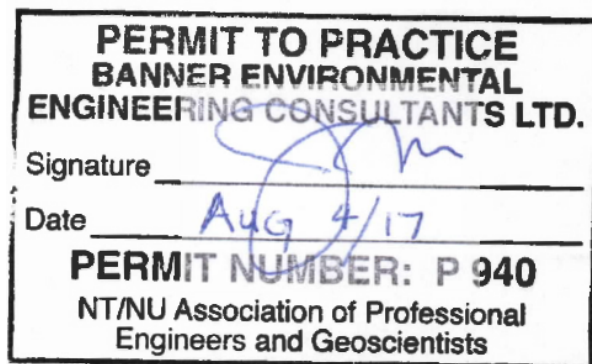
If you require any additional questions, please do not hesitate to contact us at (403) 933-4199.

Sincerely,



James Marr, M. Sc., P. Eng.  
President and Chief Engineer  
Banner Environmental Engineering Consultants Ltd.

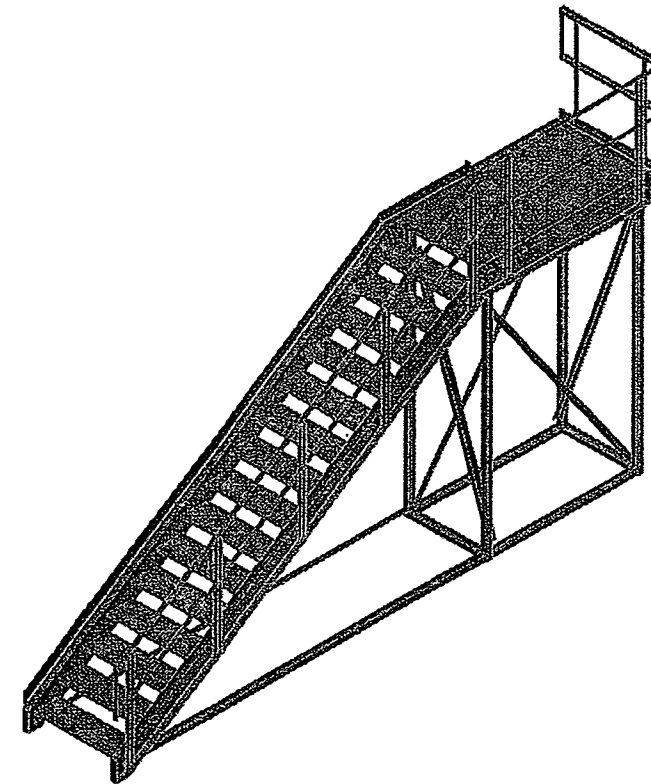
CC: Joseph P. Manacsa



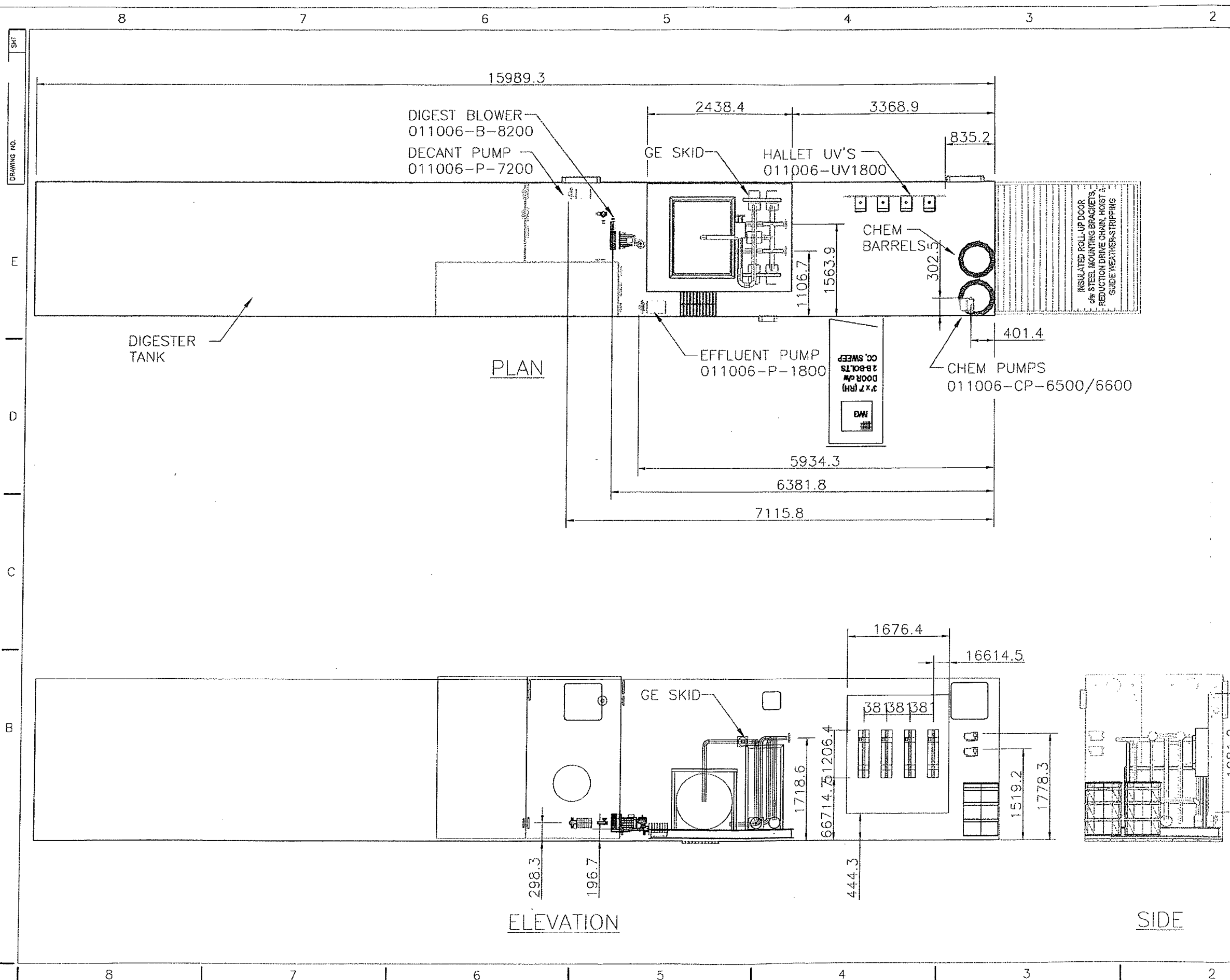
## **Attachment 2**

### **Horizon North – FilterBoxx WWTP General Arrangement Drawings**





REV.  
0



## NOTES

REFERENCE DRAWINGS

[illegible]

THIS DRAWING IS COPYRIGHT AND IS THE PROPERTY OF  
 FILTERBOXX. IT MAY NOT BE COPIED, REPRODUCED  
 OR USED IN WHOLE OR IN PART IN ANY WAY WITHOUT  
 WRITTEN PERMISSION OF FILTERBOXX. USE OF THIS  
 DRAWING IS PERMITTED ONLY FOR THE SPECIFIC PURPOSE  
 FOR WHICH IT WAS ISSUED BY FILTERBOXX, AND IT  
 MUST BE RETURNED IMMEDIATELY UPON REQUEST.

<p> <b>TITLE</b>  GENERAL ARRANGEMENT  HORIZON NORTH  DIGESTER CONTAINER GA </p>	<p> <b>DATE</b>  11/11/81 </p>
--	------------------------------------

PLANT AREA

SCALE

DRAWN BY

SHEET

1 OF 1

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

PRAYING NO.	
-------------	--

011006-LAY-1

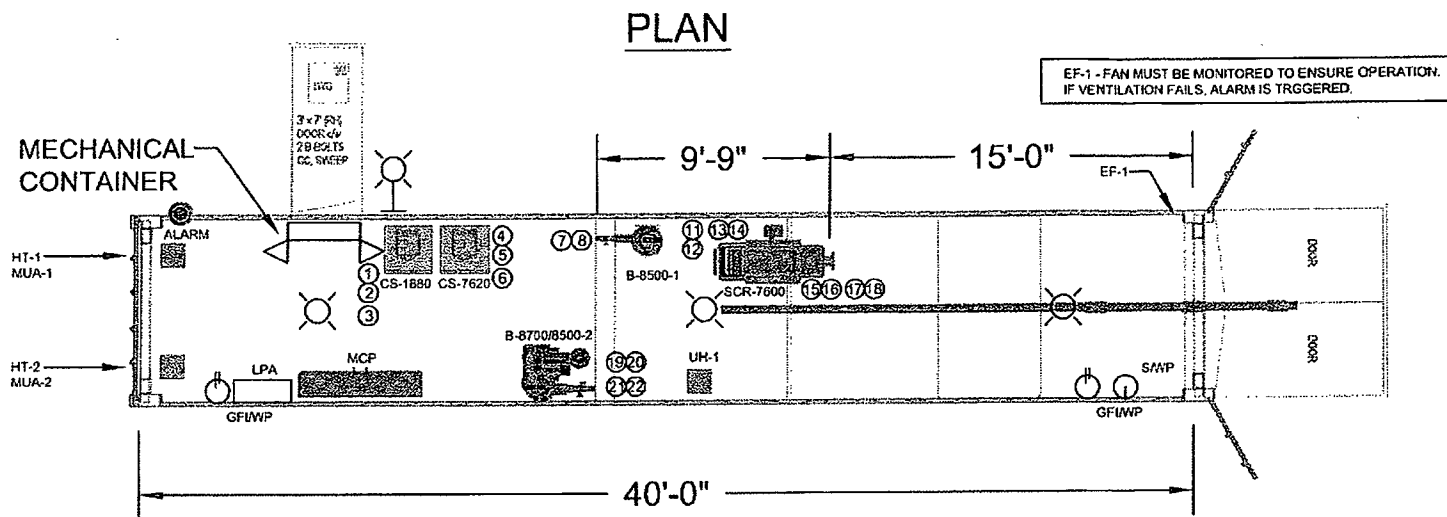
REV.

1









- ① FV-1826
- ② DO-1826
- ③ DO-1880
- ④ FV-7626
- ⑤ DO-7626
- ⑥ DO-7620
- ⑦ DO-8500-1
- ⑧ DI-8500-1

- ⑪ FIT-7620
- ⑫ AI-7620
- ⑬ FV-7660
- ⑭ DO-7660
- ⑮ DO-7600
- ⑯ DI-7600
- ⑰ LSHH-7602
- ⑱ DI-7602
- ⑲ DO-8500-2
- ⑳ DI-8500-2
- ㉑ DO-8700
- ㉒ DI-8700

- NOTES
- WALL PACK (W70SPL120M6/LITHONIA)
  - FLOURESCENT FIXTURE
  - EXIT/COMBO (3LER3000/LUMACELL)
  - GFI
  - WEATHER PROOF COVER & ENCLOSURE
  - 1 POLE SWITCH

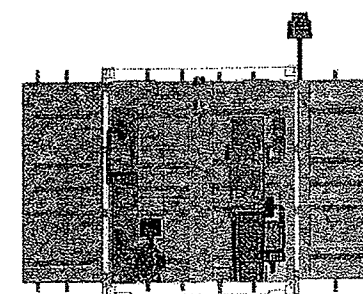
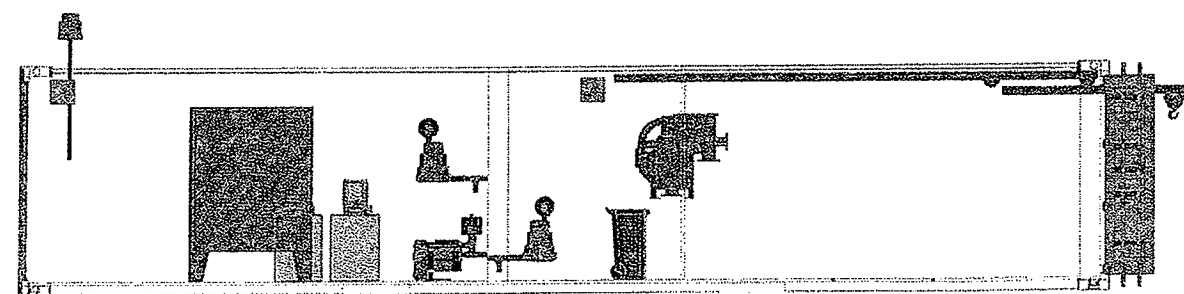
REFERENCE DRAWINGS

REV.	DATE	DESCRIPTION	BY	CHK.	ENG.	APP.
0	10/07/27	ISSUED FOR INFO				

THIS DRAWING IS COPYRIGHT AND IS THE PROPERTY OF FILTERBOX. IT MAY NOT BE COPIED, REPRODUCED OR USED IN WHOLE OR IN PART IN ANY WAY WITHOUT WRITTEN PERMISSION OF FILTERBOX. USE OF THIS DRAWING IS PERMITTED ONLY FOR THE SPECIFIC PURPOSE FOR WHICH IT WAS ISSUED BY FILTERBOX, AND IT MUST BE RETURNED IMMEDIATELY UPON REQUEST.

TITLE  
ELECTRICAL LAYOUT  
600 PERSON C-SERIES  
TYPICAL GENERAL ARRANGEMENT

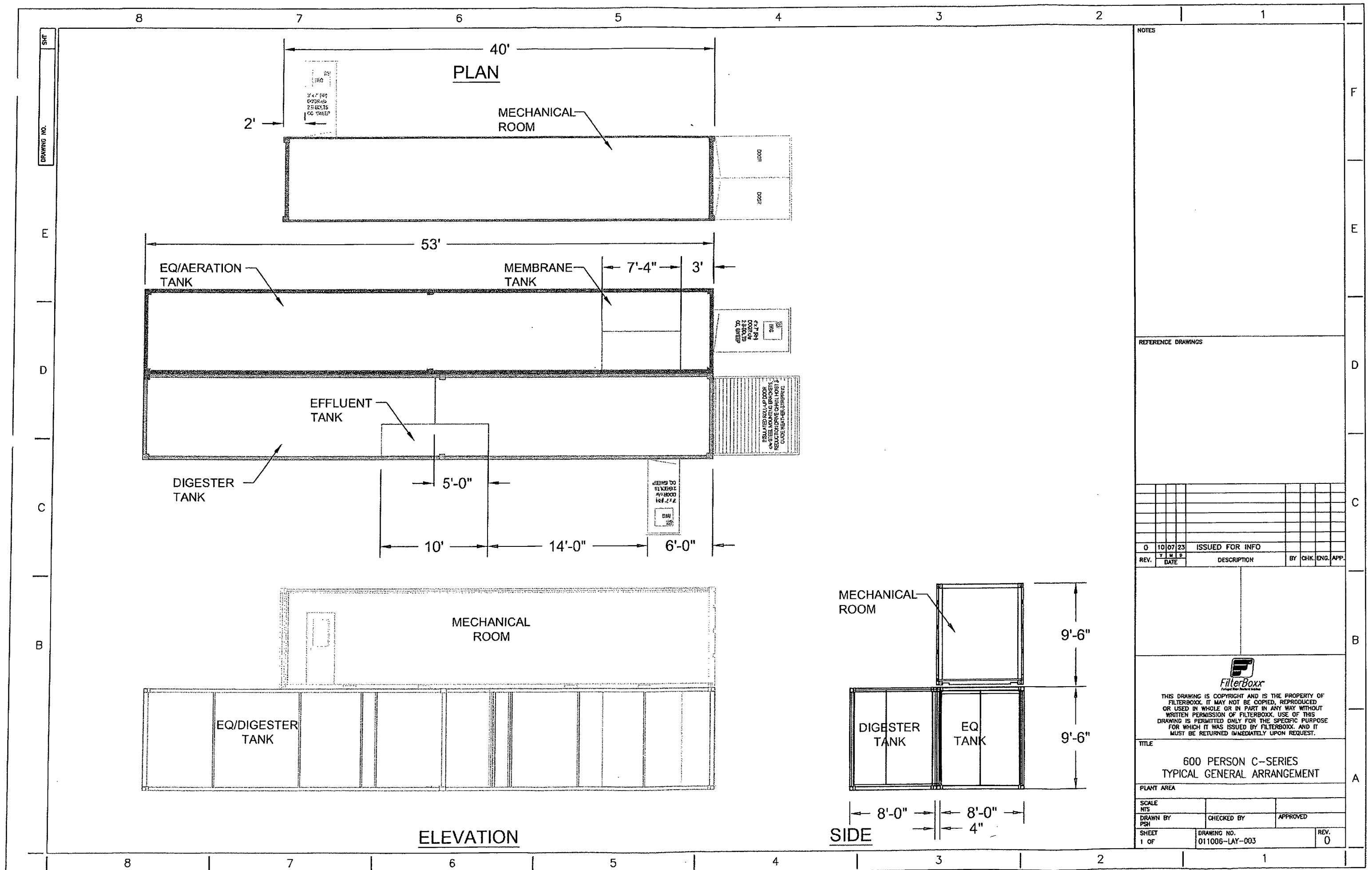
SCALE	NTS	CHECKED BY	APPROVED
DRAWN BY	PSH		
SHEET	1 OF	DRAWING NO. 011006-LAY-006	REV. 0











DRAWING NO.

E

D

C

B

F

E

D

C

B

A

NOTES

REFERENCE DRAWINGS

REV.	DATE	DESCRIPTION	BY	CHK.	ENG.	APP.
0	10/07/23	ISSUED FOR INFO				

**FilterBoxx**  
THIS DRAWING IS COPYRIGHT AND IS THE PROPERTY OF FILTERBOXX. IT MAY NOT BE COPIED, REPRODUCED OR USED IN WHOLE OR IN PART IN ANY WAY WITHOUT WRITTEN PERMISSION OF FILTERBOXX. USE OF THIS DRAWING IS PERMITTED ONLY FOR THE SPECIFIC PURPOSE FOR WHICH IT WAS ISSUED BY FILTERBOXX, AND IT MUST BE RETURNED IMMEDIATELY UPON REQUEST.

TITLE  
DIGESTER CONTAINER  
600 PERSON C-SERIES  
TYPICAL GENERAL ARRANGEMENT

PLANT AREA	
SCALE N.T.S.	
DRAWN BY PSH	CHECKED BY
SHEET 1 OF	DRAWING NO. 011006-LAY-002
	REV. 0

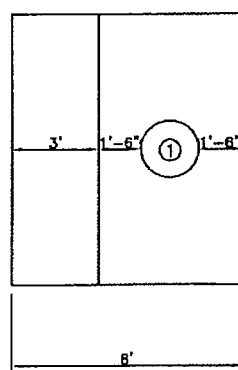
DIGESTER  
CONTAINER NOZZLES  
VENTS AND MANWAYS

- ① 24" MANWAY
- ② 24"x24" CUTOUT
- ③ 24"x24" CUTOUT
- ④ 2" FLANGE (VENT)
- ⑤ 4" MALE CAMLOCK (OVERFLOW)
- ⑥ 3" FLANGE (DRAIN)
- ⑦ 3" FLANGE (P201 DISCHARGE)
- ⑧ 2" FLANGE (P100 SUCTION)
- ⑨ 2" FLANGE (BLOWER)
- ⑩ 2" FLANGE (LT)
- ⑪ 1.5" FNPT (LAHH)
- ⑫ 3/4" FNPT
- ⑬ 3/4" FNPT
- ⑭ 2" MNPT

EFFLUENT  
TANK NOZZLES  
VENTS AND MANWAYS

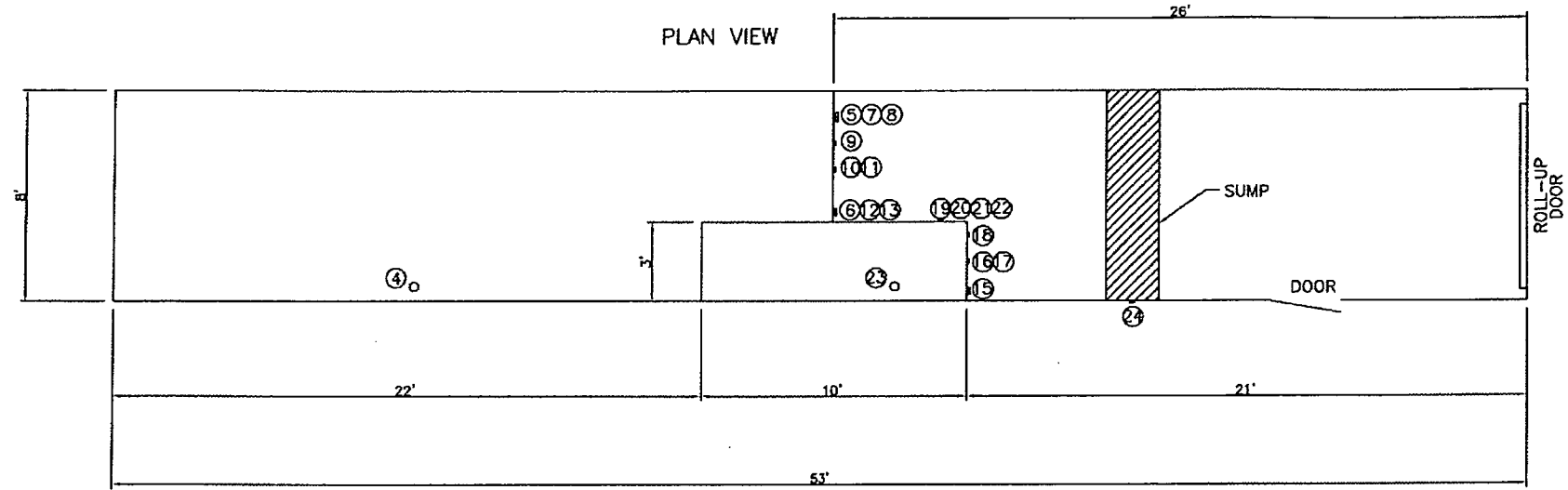
- ⑮ 24" MANWAY
- ⑯ 3" FLANGE (DRAIN)
- ⑰ 2" FLANGE (UV RETURN)
- ⑱ 2" FLANGE (P300 SUCTION)
- ⑲ 2" FLANGE (GE SKID)
- ⑳ 2" FLANGE (LT)
- ㉑ 1.5" FNPT (LAHH)
- ㉒ 3/4" FNPT
- ㉓ 3/4" FNPT
- ㉔ 2" FLANGE (VENT)

EQ/AERATION  
CONTAINER

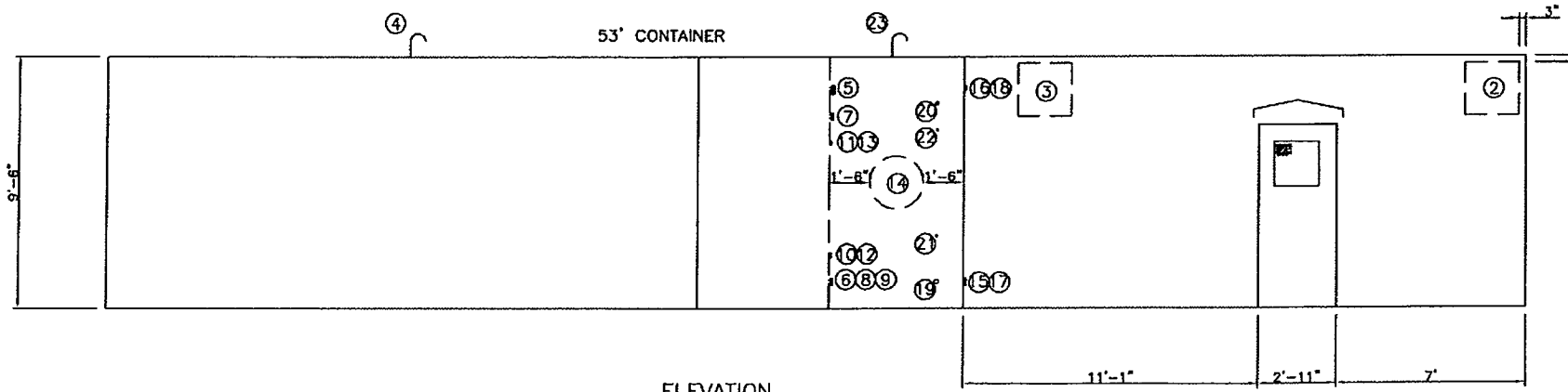


SIDE

PLAN VIEW



ELEVATION





**Attachment 3**

**FilterBoxx WWTP – Process Description**

**(Section 3 of O&M Manual)**

### 3.0 Introduction

This Sewage Treatment Plant (STP) is designed to treat the sewage water from the BlackSand 600m Craft Camp. The facility consists of the following micro systems:

- Influent Prescreening
- Equalization / Aeration Bioreactor
- GE Process Skid
- Ultrafiltration Membranes (UF)
- Treated Water Effluent Disinfection and Distribution
- Sludge Aerobic Digestion and Decant
- Programmable Logic Controller (PLC)
- Human Machine Interface (HMI)
- Motor Control Centre (MCC)

The FilterBoxx Ultrafiltration (UF) STP consists of three buildings assembled together to form the STP. The buildings are equipped with pumps, motors, process control equipment, heating, lighting and monitoring instrumentation which are to be wired directly to the PLC and MCC control panels.

The pre-screened sewage is discharged into the Equalization (EQ)/Aeration Process Tank, TK-3600, where the sewage feed flow will be attenuated. The pre-screen will also be backwashed via sprayer system using the STP's treated water effluent. The majority of the sewage treatment will be performed in the EQ/Aeration Tanks as a suspended growth biological treatment process. The process utilizes aerobic or oxygen using bacteria to remove organic contaminants through a process of biological oxidation.

The air required to meet the oxygen demands of the system and to provide the mixing of the mixed liquor suspended solids (MLSS) is supplied by Aeration Blower, B-8700, and fine bubble diffusers.

The operating level in the EQ/Aeration process tank are monitored by a submerged level transmitter, LT-3626, and a High-High level switch, LSHH-3601. The transmitter and switch control the operation of the membrane trains and warn of potential tank overflow. The EQ tank is also equipped with an overflow line that connects it to the digester.

The sewage is pumped from the EQ/Aeration tanks to the two Ultrafiltration (UF) Membrane Tanks, TK-3400-1/2, via the Membrane Feed Pump, P-3600. The feed to the membrane trains can be controlled via a Flow Control Valve, HCV-3680. The membrane tanks have an overflow back to the EQ/Aeration tank that serves as the Return Activated Sludge or RAS flow.

The two (2) UF Membrane process trains are each designed to handle up to the average daily flow of the plant. They can be operated in either of two modes, Dedicated or Common. The preferred normal operating mode is the Common mode of operation. In this mode the blower and permeate/backpulse lines are connected and the two membrane cassettes work together. The plant will run 0, 1 or 2 permeate pumps depending on the level in the EQ/Aeration tank pulling from both cassettes at the same time. Both backpulse pumps will be in operation when in common mode. The dedicated mode of operation treats each membrane cassette and permeate pump as a separate train. This mode is to be used if a membrane cassette needs to be taken offline for service or cleaning.

Once in the UF membrane tanks the final effluent is processed or filtered through the GE UF Membrane Elements. The UF Membranes are physical barriers designed to filter out suspended solids in the sewage larger than 0.04 µm.

The UF membranes are immersed in the sewage and are referred to as “outside in” filters; therefore the solids that are filtered out of the sewage are retained in the UF Membrane tank and recirculated back to the EQ/Aeration tank via the overflow weir.

The membrane tanks are equipped with low level alarm switches LSLL-3404-1/2. These switches protect the membranes from being exposed to the air. Exposed membranes will dry out and can be permanently damaged.

The final treated effluent drawn through the UF Membranes by the UF Permeate pumps, P-3500-1/2, is discharged into the UF Backwash or Treated Water Effluent tanks via a three-way motorized control valve, FV-3560. Permeate is used to periodically Backwash the UF membrane system by means of the Backwash pumps, P-8800-A/B, and a pair of three-way motorized control valves, FV-3561-1/2. The UF membrane Backwash sequence is performed automatically by the PLC.

The system is equipped with two Membrane Blowers, B-8500-1/2, to provide air scour for the membranes.

The UF Membranes will undergo a scheduled Maintenance Clean with Sodium Hypochlorite or Citric Acid which is dosed directly into the UF Membrane tanks. These chemicals are used to remove the build-up of organic and inorganic foulants on the surface of the UF membranes. This cleaning sequence is performed automatically by the system PLC according to the maintenance cleaning schedule. Maintenance cleans should be scheduled daily at a time of low flow to the system.

The UF Permeate or final effluent is pumped from the Treated Water Tank via the Treated Water Effluent Pump, P-1800, to the four (4) parallel Ultraviolet (UV) disinfection system units. As the final effluent passes around the quartz UV light tubes, the bacteria or viruses that were not filtered by the UF Membrane system will be rendered “inactive” or dead prior to discharge. The effluent pump runs continuously, the level in the effluent tank is controlled by the effluent control valve FV-1860. When this valve is open the effluent is sent out of the system for discharge in the effluent field. When this valve is closed the effluent recirculates through the UV’s and PRV-1879 back to the effluent tank.

To prevent the accumulation of solids and to control sludge age within the biological system, the Waste Activate Sludge pump, P-3400 is used to send solids from the bottom of the membrane tanks to the Sludge tank, TK-7200. The pump operates on a frequency and duration control.

Periodically, supernate can be decanted from the Sludge via the Decant Pump, P-7200 and directed to the EQ/Aeration Tanks. The digested solids are to be periodically hauled off site.

The STP is to be operated under automatic controls by the Programmable Logic Controller or PLC unit during normal operating conditions. All screening, aeration and pump systems are monitored and controlled by the PLC unit and operation may be monitored via the Motor Control Centre or MCC. Equipment should not be operated in MANUAL/HAND mode unless under direct operator attention for equipment test purposes or due to instrumentation failure (**i.e. Alarms/Alerts do not affect MANUAL/HAND control**). AUTO operation is where the system PLC is in full control of the system devices (**i.e. all Alarms/Alerts will control devices**).

### **3.1 System Equipment List**

- **Main Control Panel**

- Programmable Logic Controller (PLC)
- Human-Machine Interface (HMI) Operator Interface Screen
- All electrical equipment/devices within system provided by FilterBoxx
- **Sewage Water Influent and Pre-Screening System**
  - Sampling Points
  - Level and Flow monitoring Instrumentation
  - Pre-Screening and Handling
  - Influent Composite Sampler
- **Equalization and Aeration Process Tank and Inlet Screen**
  - Coated Carbon Steel EQ/Aeration Tank
  - Tank Aeration System
  - Membrane Feed Pump
  - WAS Pump
  - Raw Water Screen
  - Sampling Points
  - Level, Flow and Pressure Control Instrumentation and Monitoring Equipment
- **Ultrafiltration (UF) Membrane System**
  - 2 x 100% Process Equipment Supply
  - Skid mounted package
  - 2 x 6module 500A GE Zenon Ultrafiltration membrane cassettes
  - UF Membrane Support Structures
  - Pumps/Aeration Blowers
    - Permeate Pumps
    - Backpulse Pumps
    - Aeration Blowers
    - Chemical Dosing
      - Sodium Hypochlorite pump
      - Citric Acid pump
  - Polyethylene Backpulse Tank
  - Sampling Points
  - Level, Flow and Pressure Control Instrumentation and Monitoring Equipment
- **Aerobic Digester and Sludge Handling System**
  - Coated Carbon Steel Sludge Holding Tank
  - Pumps/Aeration Blowers
    - Decant Pump
    - Aeration Blower
  - Sampling Points
  - Level, Flow and Pressure Control Instrumentation and Monitoring Equipment
- **Treated Water Effluent Storage and Discharge System**
  - Coated Carbon Steel Effluent Tank
  - Pumps
    - Treated Water Effluent Pump
    - Level, Flow and Pressure Control Instrumentation and Monitoring Equipment

- **Treated Water Effluent Disinfection System**
  - 4 x Ultraviolet (UV) Disinfection System
    - Level, Flow and Pressure Control Instrumentation and Monitoring Equipment