



West Bay Sanitary District Recycled Water Facility-  
Sharon Heights

Title 22 Engineering Report



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**Prepared for**

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## 1. Introduction

West Bay Sanitary District (WBSD) is a producer of tertiary disinfected recycled water at the West Bay Sanitary District Recycled Water Facility (RWF)-Sharon Heights. This report describes how the WBSD, as a producer, complies with the latest Title 22 Regulation related to recycled water. A separate Purveyor/User Title 22 Engineering Report will be prepared to describe how the recycled water distribution system and reuse will comply with water reuse requirements.

## 2. Regulatory Requirements

The Title 22 disinfected tertiary recycled water requirements when using microfiltration and UV disinfection for treatment are listed in Table 1.

**Table 1. Requirements for Title 22 Disinfected Tertiary Recycled Water Using Microfiltration and UV**

Process	Requirement
Microfiltration	Turbidity does not exceed any of the following: 1) 0.2 NTU more than 5 percent of the time within a 24-hour period; and 2) 0.5 NTU at any time
UV Disinfection	1) A disinfection process that, when combined with filtration, has been demonstrated to achieve 5-log inactivation of virus 2) The median concentration of total coliform bacteria measured in the disinfected effluent does not exceed a most probable number (MPN) of 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed and the number of total coliform bacteria does not exceed an MPN of 23 per 100 milliliters in more than one sample in any 30-day period. No sample shall exceed an MPN of 240 total coliform bacteria per 100 milliliters.

NTU: Nephelometric Turbidity Units

## 3. Wastewater Quality

### 3.1. Chemical Quality

The RWF is located at the upper end of the WBSD collection system where there is minimal wastewater flow available adjacent to the facility. Therefore, wastewater is diverted from a trunk line further downstream in the collection system where adequate flows are available. The RWF influent pump station diverts flow from the 36-inch sewer in Oak Avenue. The 36-inch sewer in Oak Avenue conveys flow from a combination of the 10-inch sewer in Sand Hill Road and 36-inch sewer in Alpine Road. Influent water quality sample data are provided in Table 2.

**Table 2. Influent Water Quality**

Constituent	Unit	Min	Max	Median	95 Percentile
Ammonia as NH <sub>3</sub>	mg/L	22	290	56	298
Boron	mg/L	0.1	0.3	0.2	0.3
Calcium	mg/L	11	51	28	39
Chloride	mg/L	47	380	76	176
Magnesium	mg/L	5.6	23.0	7.5	17.5
Nitrate as N	mg/L	ND	ND	ND	ND
Nitrite as N	mg/L	ND	ND	ND	ND
Silica	mg/L	13	22	18	21
Sodium	mg/L	48	280	70	121
Biochemical Oxygen Demand (BOD)	mg/L	230	1,500	360	1,076
Total Dissolved Solids (TDS)	mg/L	310	1,000	410	609
Total Suspended Solids (TSS)	mg/L	230	3,300	495	2,280
Total Kjeldahl Nitrogen (TKN)	mg/L	46	110	76	102
Total Nitrogen (TN)	mg/L	46	110	76	102
Phosphorus, Total (TP)	mg/L	5.0	15.0	9.3	13.3

(a) Data based on 18 samples from the Sand Hill Sewer between December 2014 and May 2015.

### 3.2. Source of Wastewater

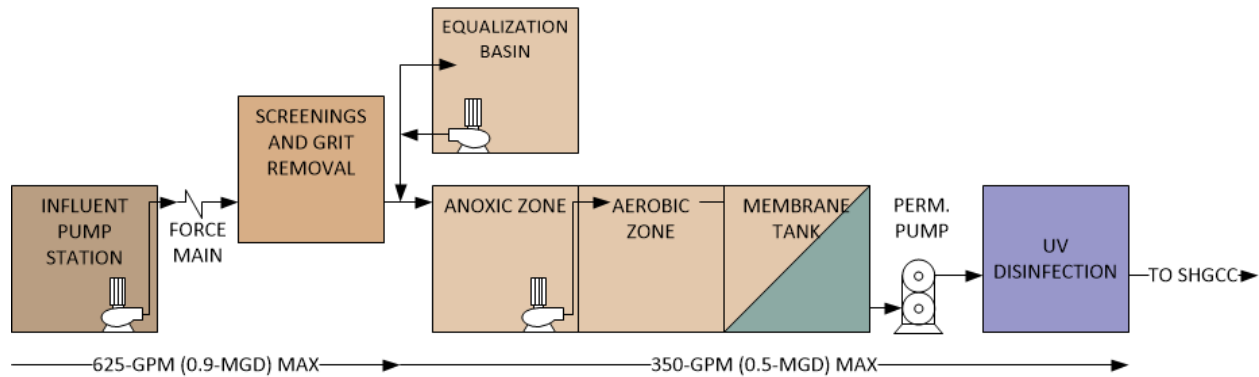
WBSD mostly collects residential and commercial wastewater with some industrial wastewater. An industrial user that discharges water near where the water is being diverted to the RWF is the Stanford Linear Accelerator Center (SLAC). SLAC must notify WBSD before discharging cooling tower blowoff water into the collection system.

### 3.3. Pretreatment

Pretreatment of wastewater is furnished by every customer on the customer’s premises when such wastewater, prior to pretreatment, does not comply with the minimum acceptable requirements and criteria for discharge into the wastewater facilities as set forth in Article VI, Section 603 of the Code of General Regulations of West Bay Sanitary District (see Appendix A). The pretreatment facilities are provided and maintained at the customer’s expense and are of sufficient design and capacity to pretreat wastewater discharged.

## 4. Treatment Process

The water is pumped from the sewer by the influent pump station into the RWF. The facility treatment process includes screening, membrane bioreactor (MBR), and UV disinfection. A treatment schematic is shown in Figure 1 and the treatment components are discussed in the following sections. A detailed process flow diagram is shown in Appendix B. A site plan is shown in Figure 2.



**Figure 1. Water Reclamation Facility Schematic**

#### 4.1. Screenings and Grit Removal

The first step in the treatment process is screenings removal using an Ovivo® Bongo™ dual-aperture drum screen system. The Bongo™ screen unit accomplishes the following processes:

- Screenings removal
- Screenings washing/compacting
- Grit removal

The Ovivo® Bongo™ screen is a dual drum screen and screenings washer/compactor housed in a stainless-steel box. The dual aperture inside/out followed by outside/in drum screen design allows for 2-stage removal of screenings and grit using a 6 mm/2 mm dual aperture drum arrangement.

The first stage is an inside-out 6 mm drum screen. The 6 mm drum removes rags and screenings and protect the second stage drum. Flow from the first stage into the second stage follows a tumultuous path and is slowed down to allow for larger grit settling in the tank.

The second stage is an outside-in 2 mm drum screen which removes small debris, hair and stringy material which are problematic for membrane filtration.

Screenings collected from the two stages are transferred within the unit to the washer/compactor section, which washes, compacts and conveys the collected screenings to the screenings dumpster. Grit which settles to the bottom of the tank collects in a hopper and can be periodically removed by opening a valve on the grit line coming out of the hopper at the bottom of the tank. All of this is accomplished with a single piece of equipment.

The screenings and grit removal systems are in the Headworks Building, a 1000-sf CMU block building, which houses both the screens and the odor fans for the project.

#### 4.2. Grit Handling

Grit which is collected at the bottom of the Bongo™ screen is periodically transferred by gravity to the plant drain system and conveyed back to the sewer system with waste activated sludge and other waste flows from the facility.



### 4.3. Flow Equalization

The flow equalization design for the RWF is designed as a “side stream” equalization basin rather than a “flow through” basin. Any flow that comes into the facility which is 347-gpm or less is directly treated without going through the equalization basin. Flow over 347-gpm is diverted to the equalization basin to return during lower flow periods. The equalization basin operation centers around a 3-way plug valve. Overall flow control is accomplished as described below.

1. Flow through the biological treatment system and membrane tank is controlled by the Feed Forward Pumps and the Permeate Pumps. This flow is limited to 347-gpm. There can be some fluctuation of water level in the Anoxic Zone to accommodate minor flow variability, but if there is more flow coming into the facility than 347-gpm, the level in the anoxic zone rises.
2. If the level in the Anoxic Zone rises to an operator-set “high” elevation, the 3-way valve positions to allow flow to transfer to the Equalization Basin. Once the level returns to below the “high” set-point, then the 3-way valve is positioned to close.
3. If there is wastewater in the equalization basin, the 3-way valve is positioned to “mix” and the Equalization Return Pump turns on. This mixes the equalization basin and prevent stratification and reduce septicity.
4. Once the level in the Anoxic Zone drops to an operator set “low” elevation, indicating that flow coming into the facility is below 347-gpm, then the 3-way valve is positioned to “return” and the Equalization Return pumps pump wastewater back to the Anoxic Zone from the Equalization Basin for treatment.

When the level in the Equalization Basin drops to an operator set “low” elevation, the spray wash nozzles come on, cleaning the sloped floor of the equalization basin

### 4.4. Biological Treatment

The nitrification/denitrification biological treatment system is designed to remove BOD and nitrogen from the incoming wastewater and consists of two trains of Anoxic/Aerobic treatment. Wastewater flows in through a weir splitter box to evenly split flow between the two process trains each designed for 0.25-mgd of wastewater flow.

#### 4.4.1. Chemical Addition

At the headworks splitter box, alkalinity such as sodium hydroxide may be added if necessary, for supporting the process. The turbulence of the water in the splitter box is used to mix the chemical into the water. Fifty percent Sodium Hydroxide is delivered in 55-gallon drums and stored on drum containment pallets in the Headworks Building.

#### 4.4.2. Anoxic/Aerobic Basins

From the splitter box, flow is evenly distributed to the Anoxic Basins. The anoxic basins are mixed with submersible propeller mixers. Flow is pumped at a constant rate from the anoxic basins into the aerobic basins. This is known as “feed forward” hydraulics and starts the gravity flow of mixed liquor from the aerobic basins. The aerobic basins are fed air from the blowers through an air diffuser grid. From the aerobic basins, mixed liquor is distributed in a crossover channel, allowing the mixed liquor from each train to mix, and allowing either membrane tank to be used with either anoxic/aerobic basin combination. Mixed liquor then enters the membrane tank and is filtered through the membranes. Return Activated Sludge (RAS) is transferred from the membrane tanks to the anoxic basins via the RAS pipeline by gravity. RAS flowrate is proportionally controlled using telescoping valves.

The design parameters for the biological treatment system are summarized in Table 3.

**Table 3. Biological Treatment System Design Parameter Summary**

Parameter	Design Value	Unit
Average Daily Flow	500,000	gal/day
Total Anoxic Basin Working Volume (2 trains @ 15'W x 21'L x 14.5' avg. SWD)	71,800	gal
Total Aerobic Basin Working Volume (2 trains @ 15'W x 34'L x 17'SWD)	130,000	gal
Total Reactor Working Volume (excluding Membrane Tanks)	201,800	gal
Total Design Hydraulic Retention Time (HRT)	9.8	days
Aerobic Design Solids Retention Time (SRT) (including Membrane Tanks)	12.9	days
Waste Sludge Volume	21,000	gal/day
Mixed Liquor Suspended Solids (MLSS) Concentration in Bioreactor	8,000	mg/L
Actual Oxygenation Rate (AOR)	2,500	lb O <sub>2</sub> /day

The biological treatment system is designed to produce effluent with water quality as presented in Table 4.

**Table 4. Biological Treatment Anticipated Effluent Water Quality**

Parameter	Design Value	Unit
BOD	≤ 10	mg/L
Ammonia as NH <sub>3</sub> -N	≤ 1 – maximum monthly average ≤ 5 – daily max	
TN	≤ 20	
TDS	≤ 610	
pH	7 to 9	

#### 4.5. Membrane Filtration

The membrane filtration portion of the Membrane Bioreactor uses Suez ZeeWeed 500 hollow fiber membranes to filter the mixed liquor. The ZeeWeed 500 is a reinforced hollow-fiber membrane with a nominal pore size of 0.04 μm. The design criteria and anticipated filtrate water quality parameters for the membrane filtration section of the Membrane Bioreactor are summarized in Table 5 and Table 6.

Citric Acid and Sodium Hypochlorite are used in the Clean in Place (CIP) process for the membranes. Fifty percent Citric Acid is delivered in 55-gallon drums and stored on drum containment pallets in the Headworks Building. Twelve and a half percent Sodium Hypochlorite is delivered in 55-gallon drums and stored on drum containment pallets in the Headworks Building.



**Table 5. Membrane Design Criteria**

Parameter	Design Value	Unit
Flow	500,000	gal/day
Membrane Trains	2	Trains
ZeeWeed 500d Cassettes Installed	1	Cassette/Train
Possible number of Modules per Cassette	50	Modules/Cassette
Provided number of Modules per Cassette	42	Modules/Cassette
Spare Space	19.2	%
Total number of Modules	84	Modules
Surface Area per Module	370	Square feet
Net Flux	16	gal/sf/day
Instantaneous Flux	16.4	gal/sf/day

**Table 6. Membrane Filtrate Anticipated Water Quality**

Parameter	Design Value	Unit
Turbidity	≤ 0.2 more than 5% of any 24-hr period ≤ 0.5 at any time	NTU

#### 4.6. UV Disinfection

The permeate pumps push the filtered recycled water through the UV disinfection system. The UV disinfection system consists of two parallel Trojan UVFit™ UV reactors. Each reactor has the capacity for the full 347-gpm facility flow. The UV system uses low-pressure high intensity amalgam lamps to provide an energy-efficient solution. The Trojan UVFit™ reactor has undergone stringent bioassay validation in accordance with industry protocols published by the (US) National Water Research Institute. The UV system design criteria and equipment summary for this project are summarized in Table 7 and Table 8. The UV validation report is included in Appendix C.

**Table 7. UV System Design Criteria**

Parameter	Design Value
Peak Design Flow:	0.5 MGD (per reactor)
UV Transmittance:	65% (minimum)
Total Suspended Solids:	5 mg/l (Maximum grab sample)
Disinfection Limit:	2.2 Total Coliform per 100 ml, 7-day Median, 23 Maximum of consecutive daily grab samples
Design UV Dose:	80 mJ/cm <sup>2</sup> , bioassay validated (NWRI 2012)
Validation Requirements:	Bioassay Validation – NWRI/AWWARF UV Guidelines (2012) 0.98 Lamp aging factor – NWRI/AWWARF UV Guidelines (2003)

**Table 8. UV System Equipment Summary**

System Component	Provided Equipment
Reactor Model	Trojan UVFit™ - 32AL50
Number of SS316L Reactors	2 (including 1 redundant reactor)
Number of Lamps per Reactor Chamber	32
Total Headloss at Peak Design Flow	2 in - H <sub>2</sub> O
Sleeve Wiping	Automatic Mechanical

#### 4.7. Non-Potable Water System

Downstream of UV disinfection, water is diverted to the 8,000-gallon Non-Potable Water (NPW) feed tank that provides storage for the NPW system. Recycled water customers will have additional storage located at their facilities. Non-potable water is fed to the NPW pumps as well as to the permeate pump skids for backpulsing the membranes. The Non-Potable Water (NPW) system draws water from the NPW Feed tank through a 6" suction line. The NPW pumps cycle based on pressure in the 1,200-gallon NPW Pressure Tank. The NPW Feed Pumps serves all in-facility NPW needs including hose bibs, spray systems, and drum screens. A sodium hypochlorite feed system allows the addition of chlorine to the NPW water to protect nozzles and equipment downstream but is not used for disinfection.

### 5. Reliability Requirements for Full Treatment

For this project, effluent disposal is not dependent on the recycling of water. Furthermore, the recycled water produced by the recycling facility is an interruptible water supply. To avoid prolonged interruption of the recycled water supply and to render the facility as a reliable source of recycled water supply, the critical facilities have the reliability features required by Title 22, Division 4, Chapter 3, Article 10 as discussed below.

1. Emergency storage and disposal of recycled water is not an issue for the RWF. If at any time any of the elements fail to fully treat recycled water, the water is diverted to the sewer.
2. If the primary treatment process is not operational then the water is disposed of in the sewer.
3. The biological treatment unit process has dissolved oxygen, pH, and level alarm and a second treatment channel when one unit is not in operation.
4. The recycled water facility does not have a secondary sedimentation unit process and is exempted from section 60347.
5. The recycled water facility does not have a coagulation unit process and is exempted from section 60349.
6. The Filtration unit process has a low level and high-level alarm. There is sufficient number of membrane racks such that if one unit is being backwashed, the water is treated with the other operating membranes.
8. Monitoring of the filtrate turbidity and UV transmittance ensures that the recycled water quality complies with Title 22 requirements.
9. The facility has a monitoring and alarm system that alerts the facility operator of the various limiting conditions for facility operation. In addition, alarms for individual equipment failure or malfunction and high and low water levels at the critical areas are provided. All alarms are connected to a system control and data acquisition (SCADA) system. The SCADA system is web-accessed by WBSD and accessible from anywhere and includes an automatic telephone dialer so that during periods when the facility is not staffed, the appropriate personal are notified of any irregularities and alarms.

The facility is planned for staffing 7 days/week by a designated T2 Operator-In-Charge (DOIC). For the first 6 months of operations the plan will be operated by Anderson Pacific Engineering Construction, Inc who will contract with a T3 Chief Plant Operator (CPO). After the initial six-month operation, WBSD will operate the plant using internal staff or contracted staff.

Routine operation checks, sampling, process control monitoring and maintenance observation would be expected to take approximately 2-4 hours/day. Operations personnel will be on call 24 hrs/day and 7

days/week. Overall, expected staffing is approximately 0.5 FTE, on average. The facility is operated 24 hrs/day and 7 days/week with periodic maintenance shutdowns.

### 5.1. Supplemental Water Supply

If the facility is not operating, then a recycled water supply is not necessary at the facility. Potable water from the City of Menlo Park is used for safety showers, fire protection, and office facility. The City of Menlo Park’s water supply is available whether the RWF is operating or is not operating.

### 5.2. Monitoring and Reporting Program

The monitoring program will meet the requirements of the regulatory agencies as described in this section. Additionally, any time that untreated water is discharged, contact is made with the regulatory agencies in accordance with the regulations.

#### 5.2.1. Monitored Parameters

Monitored Parameters are listed in Table 9.

**Table 9. Monitoring Program**

Monitoring Parameter	Monitoring Location	Sampling or Reading Frequency	Type of Sample or Reading
Influent Flow	Before MBR	Continuous	Instantaneous and totalized
Total coliform	After UV	Daily	Grab
UV Transmittance	Pre-UV	Continuous	
Turbidity	Pre-UV	Continuous	
Total Dissolved Solids	After UV	Quarterly	Composite
Finished Recycled Water Flow	After UV	Continuous	Instantaneous and totalized

#### 5.2.2. Sampling and Analysis

Sampling and analysis is in accordance with the procedures published in Standard Methods for the Examination of Water and Wastewater. Where composite samples are required, the composite samples are flow-proportioned for 24 hours or the duration of the facility operating cycle, whichever is shorter. Flow, UV transmittance, and turbidity are continuously monitored. The monitoring instruments are calibrated according to professional industry standards.

### 5.3. Contingency Plan

Following the UV reactors, recycled water is delivered to the users. Downstream of the UV reactors there are two motorized valves, one on the recycled water line and one on the reject water line. Turbidity and UV Transmittance is measured upstream of the UV reactors. If the UV reactor parameters (UV Transmittance, UV Dose) or turbidity are out of compliance with permit requirements, or if there are operational problems with the facility that creates out of spec recycled water, the valve on the recycled water line closes and the valve on the reject water line opens, diverting the out of spec water to the sewer manhole and back to the sewer collection system. The recycled water is diverted until it meets effluent requirements.

If there is a power failure, then the facility shuts down as there is no backup power. The outlet valve to the recycled water system is a pneumatic valve with a spring closure. The outlet valve on the reject line is a pneumatic valve with a spring opener. On power fail, the valve to the recycled water system will

close and the valve to the reject line will open, both using spring power, so that no out of spec water goes to the recycled water system, but is instead diverted back to sewer.

#### 5.3.1. Notification Plan

Emergency response and notification procedures are initiated under conditions of facility performance failure. Failure of the system resulting in inadequately treated water being pumped to the reuse sites triggers the following notification procedures. Operator notifies the facility superintendent who notifies RWQCB and DDW by telephone within 24 hours. Written notification within 5 days to include:

1. Statement of condition
2. Cause of condition (if known)
3. Corrective action taken
4. Further corrective action planned
5. Follow-up schedule

**Appendix A – Article VI, Section 603 of the Code of General Regulations of West Bay Sanitary District**

suspended or terminated; (v) the FSE may be issued an administrative citation; (vi) a misdemeanor complaint against the FSE may be filed; and/or (vii) FSE noncompliance may be enjoined as a public nuisance through a civil action brought by District or the San Mateo District County Attorney against the FSE.

## **SECTION 603. Prohibitions.**

### **(01) General Prohibitions.**

No person shall, and it shall be unlawful to, discharge wastes into the wastewater facilities which cause, threaten to cause, or are capable of causing, either alone or by interaction with other substances;

(A) A fire or explosion;

(B) Obstruction of flow, or injury to, the wastewater facilities, or any portion thereof;

(C) Danger to life or safety of persons;

(D) Conditions inhibiting or preventing the effective maintenance or operation of the wastewater facility;

(E) Strong or offensive odors, air pollution, or any noxious, toxic, or malodorous gas-or substance, or gas-producing substances;

(F) Interference with the wastewater treatment process, or overloading of the wastewater facilities, or excessive collection or treatment costs, or use of capacity in the wastewater facilities to which the person is not entitled;

(G) Interference with any wastewater reclamation process, which does or may operate in conjunction with the wastewater facilities, or overloading, or a breakdown of such reclamation process, or excessive reclamation costs, or any product of the treatment process which renders such reclamation process impracticable or not feasible under normal operating conditions;

(H) A detrimental environmental impact, or a nuisance wherever located, or a condition unacceptable to any public agency having regulatory jurisdiction over operation of the wastewater facilities;

(I) Discoloration, or any other adverse condition in the quality of the effluent from the wastewater facilities such that receiving water quality requirements established by any statute, rule, regulation, ordinance, or permit condition cannot be met by the District or the Authority;

(J) Conditions at or near the wastewater facilities, or any portion thereof, which cause, or may cause, the District or Authority to be in violation of the requirements of law.

(K) Pollutants introduced into the wastewater facilities which pass through or interfere with the operation or performance of the wastewater facilities. [Added by General Regulation No. 59.]

### **(02) Storm Drainage and Ground Water.**

No person shall, and it shall be unlawful to, discharge, cause to be discharged, or permit to be discharged, any storm water, ground water, rain water, street drainage, subsurface drainage, swimming pool drainage, or yard drainage, either directly or indirectly into the wastewater facilities, unless a permit therefor is issued by the District Manager. The District Manager may issue such permit only upon a finding by him that no reasonable alternative method of disposal of such water is available.

### **(03) Unpolluted Water.**

No person shall, and it shall be unlawful to, discharge, cause to be discharged, or permit to be discharged any unpolluted water, including, but not limited to, cooling water, process water, or blow-down water from cooling towers or evaporative coolers, either directly or indirectly into the wastewater facilities, unless a permit therefor is issued by the District Manager.

**(04) Garbage Grinders.**

No person shall, and it shall be unlawful to, discharge, caused to be discharged, or permit to be discharged waste from garbage grinders into the wastewater facilities, provided, however, that:

- (A) Wastes generated in preparation of food normally consumed on the premises may be so discharged; or
- (B) Such discharge is made pursuant to a permit issued by the District Manager.

Garbage grinders from which wastes are permitted under either subparagraph (A) or subparagraph (B) above, shall be of such design and capacity to shred wastes used therein such that all waste particles shall be carried freely under normal flow conditions into and through the wastewater facilities.

**(05) Direct Discharge.**

No person shall, and it shall be unlawful to, discharge, cause to be discharged, or permit to be discharged any wastes or wastewater, or any object, material, or other substance directly into a manhole or other opening into the wastewater facilities other than wastes or wastewater through an approved building sewer; provided, however, that wastes or wastewater may be discharged into the wastewater facilities by means other than through an approved building sewer pursuant to a permit therefor issued by the District Manager.

**(06) Holding Tank Waste.**

No person shall, and it shall be unlawful to, discharge, cause to be discharged, or permit to be discharged any holding tank waste into the wastewater facilities; provided, however, that:

- (A) Such discharges may be made into facilities designed to receive such wastes and approved by the District Manager; or
- (B) Such discharge may be made pursuant to a permit issued therefor by the District Manager. Unless otherwise provided by the District Manager, a separate permit shall be required for each separate holding tank waste discharge.

**(07) Radioactive Wastes.**

No person shall, and it shall be unlawful to, discharge, cause to be discharged, or permit to be discharged, any radioactive wastes into the wastewater facilities, provided, however, that;

- (A) Persons authorized to use radioactive materials by the State Department of Health or other governmental agency empowered to regulate the use of radioactive materials may discharge, cause to be discharged, or permit to be discharged such wastes provided that such wastes are discharged in strict conformance with current California radiation control regulations (California Administrative Code, Title XVII, Ch. 5, Sub. Ch. 4, Group 3, Art. 5), and federal regulations and recommendations for safe disposal of such wastes; and
- (B) The person so acting does so in compliance with all applicable rules and regulations of all other regulatory agencies.

**(08) Wastewater Strength.**

Except as noted below under Article VI, Section 603 (10), no person shall, and it shall be unlawful to, discharge, cause to be discharged, or permit to be discharged any wastewater containing any of the following constituents in excess of the maximum allowable amounts respectively hereinafter established therefor:

Facilities Which Discharge 10,000 Gallons Per Day and Above:

- 
- (a) 0.1 mg/l arsenic;
  - (b) 0.2 mg/l cadmium;
  - (c) 2.0 mg/l copper;
  - (d) 1.0 mg/l cyanide;
  - (e) 1.0 mg/l lead;
  - (f) 0.01 mg/l mercury;
  - (g) 1.0 mg/l nickel;
  - (h) 4.0 mg/l silver;

- (i) 0.5 mg/l total chromium;
- (j) 3.0 mg/l zinc;
- (k) 0.1 mg/l dissolved sulfides.

Facilities Which Discharge Below 10,000 Gallons Per Day:

- 
- (a) 0.0038 kg/day arsenic;
  - (b) 0.0076 kg/day cadmium;
  - (c) 0.076 kg/day copper;
  - (d) 0.038 kg/day cyanide;
  - (e) 0.038 kg/day lead;
  - (f) 0.00038 kg/day mercury;
  - (g) 0.038 kg/day nickel;
  - (h) 0.15 kg/day silver;
  - (i) 0.019 kg/day total chromium;
  - (j) 0.11 kg/day zinc;
  - (k) 0.0038 kg/day dissolved sulfides. [Amended by General Regulation No. 63.]

**(09) Additional Limitations,**

No person shall, and it shall be unlawful to, discharge, cause to be discharged, or permit to be discharged any wastewater:

- (A) The temperature of which is higher than 150 degrees Fahrenheit (65 degrees Celsius);
- (B) Containing more than 300 mg/l of oil or grease of animal or vegetable origin;
- (C) Containing more than 100 mg/l of oil or grease of mineral or petroleum origin;
- (D) Having a pH lower than 6.0 or having a corrosive property capable of causing damage or hazard to structures or equipment of the wastewater facilities, or any portion thereof;
- (E) Having a pH high enough to cause alkaline encrustations on sewer walls or other damage to the wastewater facilities;
- (F) Containing in excess of 0.02 mg/l total identifiable chlorinated hydrocarbons, unless otherwise authorized by permit issued pursuant to Article VII, Permits;
- (G) Containing in excess of 1.0 mg/l phenolic compounds, unless otherwise authorized by permit issued pursuant to Article VII, Permits;
- (H) Containing in excess of 20.0 mg/l fluoride compounds, unless otherwise authorized by permit issued pursuant to Article VII, Permits;
- (I) Containing any sand, grit, straw, metal, glass, rags, feathers, paper, tar, plastic, wood, leaves, garden clippings, manure, dead animals, offal, or any other solid or viscous substance capable of causing obstruction to the flow in the wastewater facilities, or which in any way interferes with the proper operation of the wastewater facilities;
- (J) Containing a toxic or poisonous substance not otherwise specifically prohibited in this Code in sufficient quantities to constitute a hazard to humans or animals, or to create a hazard in the wastewater facilities, or to injure or interfere with the operation thereof;
- (K) Containing suspended solids, not otherwise specifically prohibited under the provisions of this Code the characteristics or quantity of which require unusual attention, treatment, or expense in handling or treating such material in the wastewater facilities, or any portion thereof.

**(10) Specific Customer Limitations.**

Notwithstanding the limitations upon the characteristics or quantity of wastewater discharged, caused to be discharged, or permitted to be discharged into the wastewater facilities pursuant to this Article, the District Manager may, in connection with the issuance of permits pursuant to the provisions of Article VII, establish additional or different specific limitations on wastewater strength upon a finding by the District Manager that:



(A) The limitations set forth in this Article may not be sufficient to protect the operation of the wastewater facilities, or any portion thereof, or the waste or wastewater proposed to be discharged otherwise constitutes a hazard to, or an unreasonable burden upon, such operation, or otherwise causes or significantly contributes to violation of the Authority's National Pollutant Discharge Elimination System (NPDES) permit; or

(B) The limitations set forth in this Article may be unreasonably restrictive when applied to a specific industry; and imposing a less stringent limitation will not cause or contribute to violation of any state or federal requirement of law; or

(C) Specific standards have been established by the state or federal government for a specific category of industrial customer which would supersede the limitations set forth in this Article with respect to such category. [Amended by General Regulation No.59.]

#### (11) Protection from Damage.

No unauthorized person shall break, damage, destroy, uncover, deface or tamper with any structure, appurtenance, or equipment which is a part of the District's wastewater facilities.

#### (12) Discharge to Natural Outlet.

It shall be unlawful to discharge to any natural outlet within the District, or in any area under the jurisdiction of the District, any wastewater, industrial wastes, or other polluted waters, except where suitable treatment has been provided in accordance with provisions of this Code.

#### (13) Interference with District Easements.

(A) Except as provided in Subsection (E) below, it is unlawful for any person to obstruct, encroach upon or otherwise interfere with District easements or to permit or allow such obstructions, encroachments or interferences.

(B) Without in any way limiting the breadth of the general prohibition contained in Subsection (A) above, the following conditions are expressly prohibited.

(1) Construction, installation or maintenance of any permanent or temporary structure which is on, in or over any easement and which cannot be readily and easily removed at any time the District requires access to or use of an easement. In this regard, the term "structure" includes buildings, fences, gates, decks, roof overhangs, decorative rocks and boulders, and the like.

(2) Planting, growing or maintaining trees, shrubs or other forms of plant life which restrict access to an easement or which interfere with the use or operation of wastewater facilities located in the easement. Included within this prohibition are: trees and shrubs located on the surface of an easement which inhibits access by District personnel, vehicles and equipment; overhanging vegetation located outside the easement which likewise restricts access; and plants of kind which produce roots that are likely to invade wastewater facilities.

(3) The deposit of any debris, garbage, trash or other solid waste on or in an easement.

(4) The abandonment of any items of property, including vehicles, within an easement.

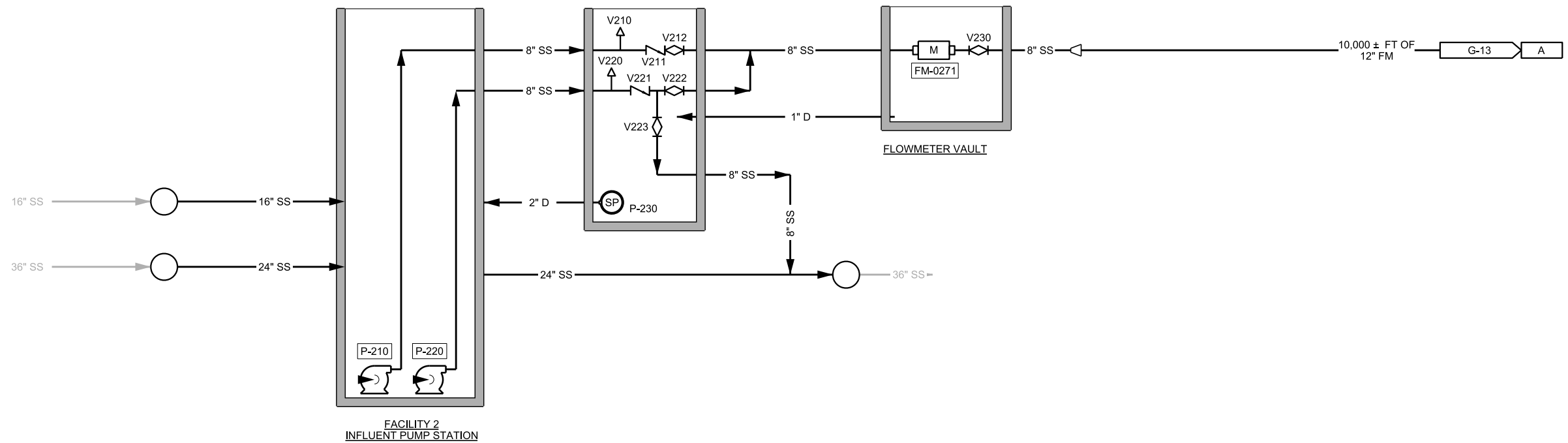
(C) The foregoing prohibitions do not preclude the owner of the real property which is the subject of the District's easement from making uses of the easement so long as such uses are not inconsistent with District's rights.

(D) Any condition which constitutes an obstruction of, encroachment upon or interferences with a District easement shall promptly be removed by the property owner or any other responsible person upon District's demand to do so, provided, however, that in the event of an emergency, District shall be entitled, without prior demand, to remove any obstruction, encroachment or interference by such means as District determines are reasonably necessary, even if such removal will result in damage to or loss of property by the property owner or other responsible person who caused or allowed the condition to occur. In the event a condition is not removed by responsible persons after District's reasonable demand, or without demand in the case of an emergency, District shall be entitled to recover from any responsible persons all costs and expenses incurred by it to remove the condition. The remedies provided to District by this Subsection are in addition to, and cumulative with, any other remedies available to District pursuant to this Code or otherwise as provided by law.

(E) In the event of any substantial hardship, or for other good cause, any affected person may seek relief from the provisions of this Subsection (13) by requesting a variance pursuant to Section 1100 of Article XI of this Code.[ Amended by General Regulation No. 82]

## **Appendix B – RWF Process Flow Diagrams**

PROCESS IDENTIFICATION	
SYMBOL	FLOW STREAM
CA	CITRIC ACID
D	DRAIN
EQ	EQUALIZED FLOW
EQR	EQUALIZATION RETURN
FA	FOUL AIR
FF	FEED FORWARD
FM	SEWER FORCE MAIN
HPA	HIGH PRESSURE AIR
MLR	MIXED LIQUOR RETURN
NF	NUTRIENT FEED
NPW	NON-POTABLE WATER
OF	OVERFLOW
PA	PROCESS AIR
PRMT	PERMEATE
PW	POTABLE WATER
RCL	RECIRCULATION
REC	RECYCLED WATER
REJ	REJECT
SA	SAMPLE
SCE	SCREENED EFFLUENT
SH	SODIUM HYDROXIDE
SHC	SODIUM HYPOCHLORITE
SS	SANITARY SEWER
WAS	WASTE ACTIVATED SLUDGE



DESIGNED  
S KADER  
DRAWN  
B TROTTER  
CHECKED  
S KADER  
APPROVED  
S KADER



**WATERWORKS**  
ENGINEERS  
1405 Victor Avenue, Suite A • Redding, CA 96003 • 530-243-2113

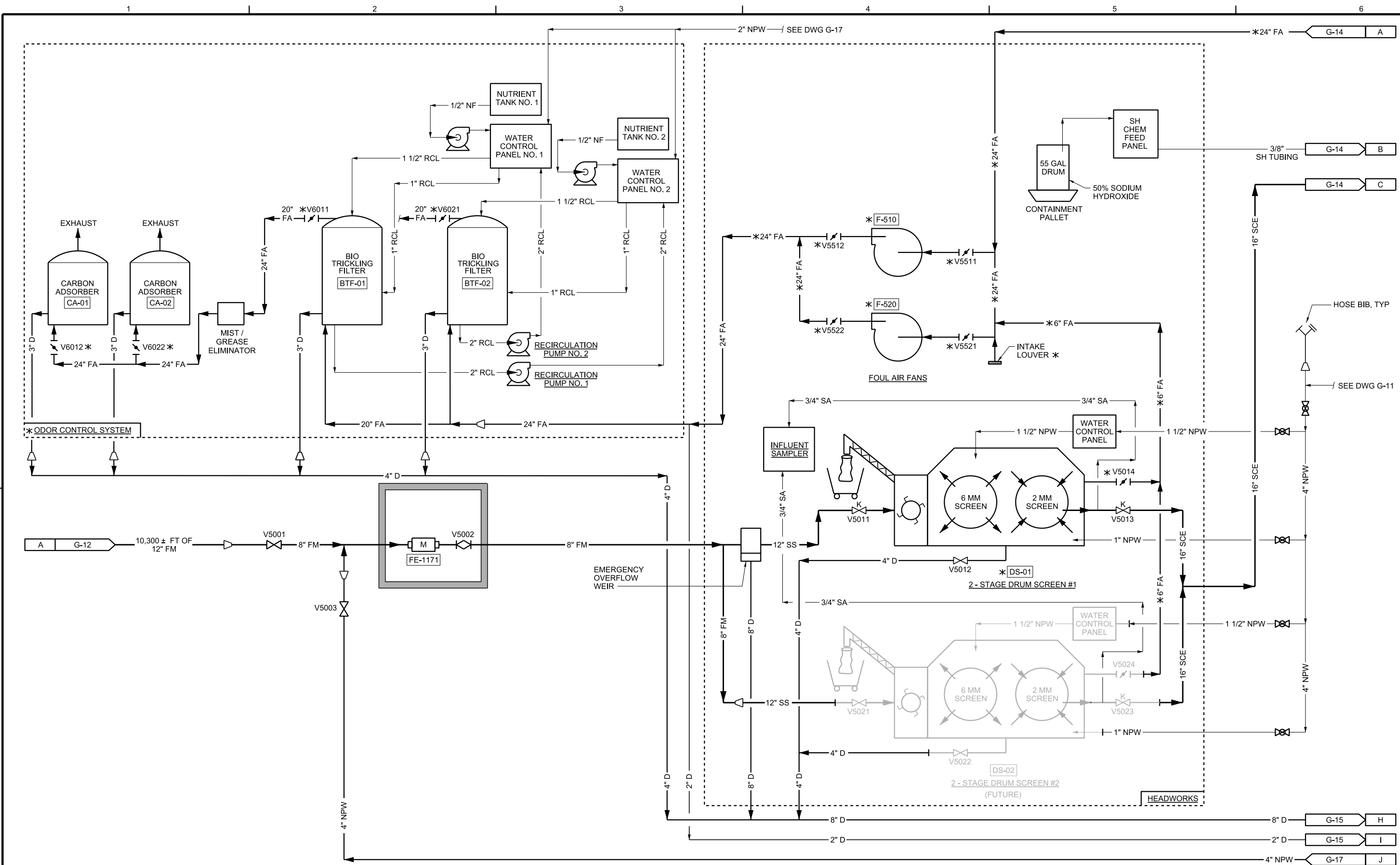


SHARON HEIGHTS  
RECYCLED WATER FACILITY  
WEST BAY SANITARY DISTRICT  
MENLO PARK, CALIFORNIA

GENERAL  
PROCESS FLOW DIAGRAM NO. 1



DATE  
AUGUST 2018  
PROJECT NUMBER  
18-002  
DRAWING NUMBER  
G-12  
SHEET NUMBER 12



NOTES:  
 1. \* (TAG NUMBER)  
 SUEZ/GE PROVIDED  
 EQUIPMENT TAG NUMBER



DESIGNED  
S. KADER  
 DRAWN  
B. TROTTER  
 CHECKED  
S. KADER  
 APPROVED  
S. KADER



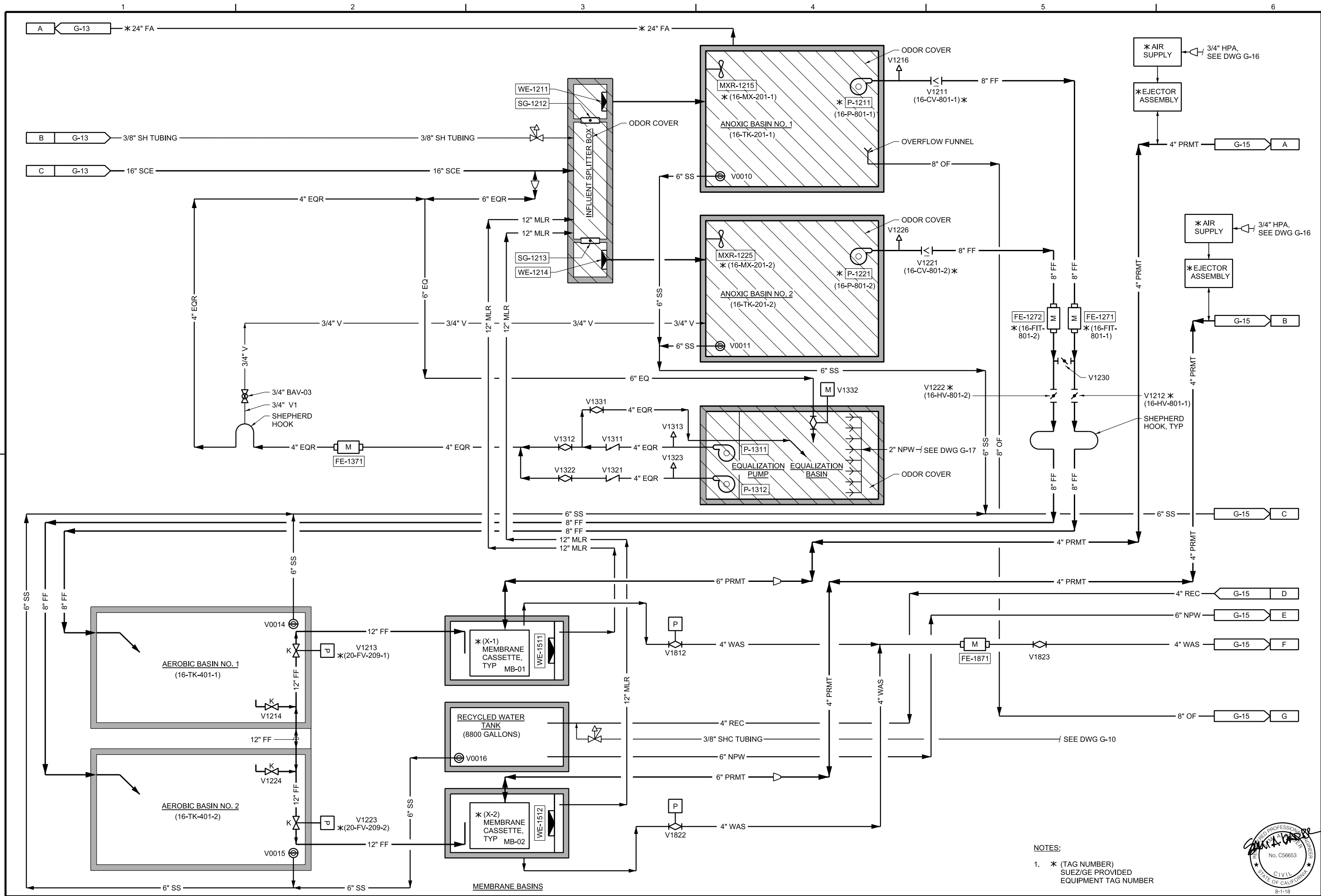
**WATERWORKS**  
 ENGINEERING SERVICES  
 1405 Vicar Avenue, Suite A • Reading, CA 96003 • 530-243-2113



SHARON HEIGHTS  
 RECYCLED WATER FACILITY  
 WEST BAY SANITARY DISTRICT  
 MENLO PARK, CALIFORNIA

GENERAL  
 PROCESS FLOW DIAGRAM NO. 2

DATE  
AUGUST 2018  
 PROJECT NUMBER  
18-002  
 DRAWING NUMBER  
G-13  
 SHEET NUMBER 13



NOTES:  
 1. \* (TAG NUMBER) SUEZ/GE PROVIDED EQUIPMENT TAG NUMBER



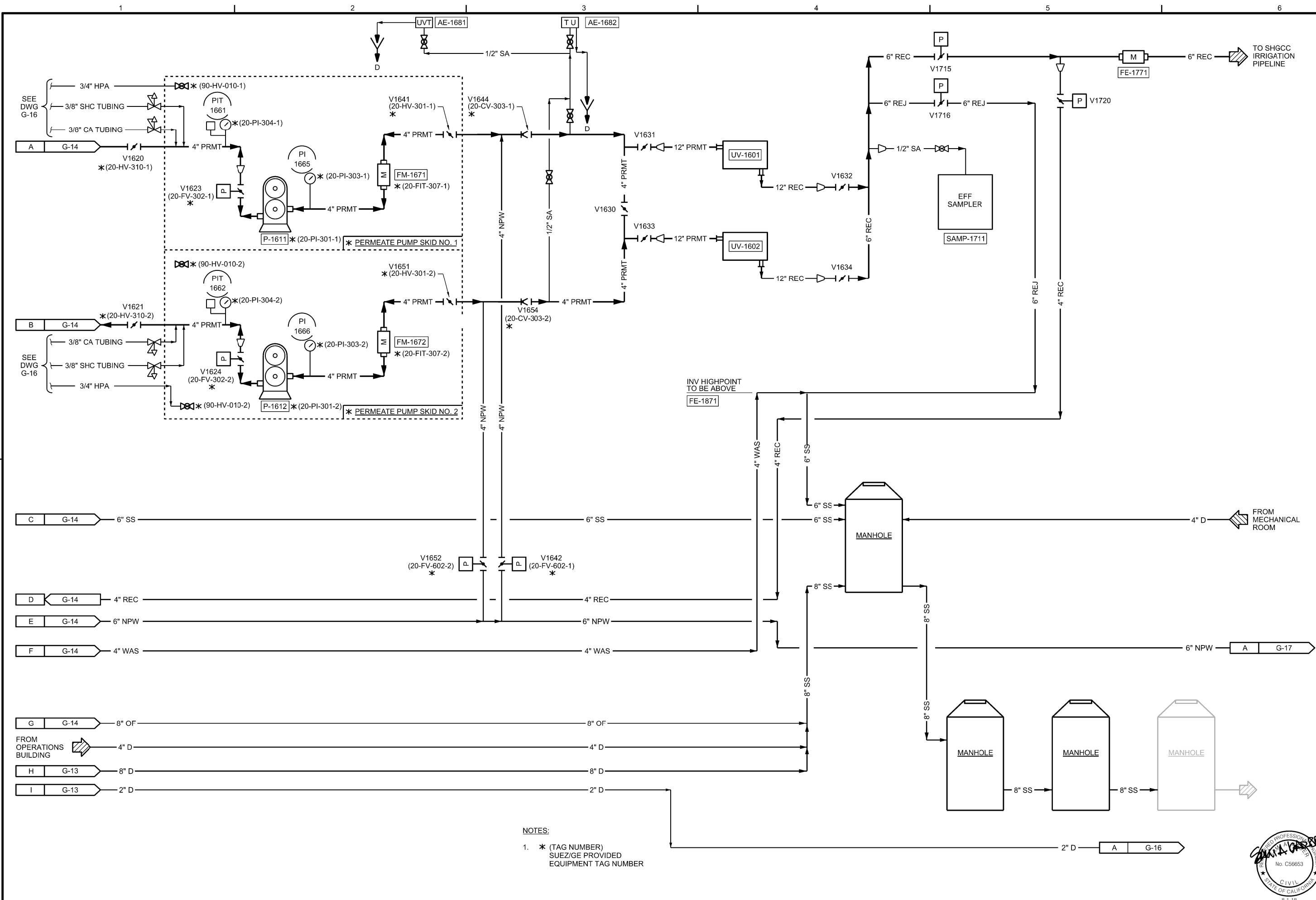
DESIGNED: S. KADER  
 DRAWN: B. TROTTER  
 CHECKED: S. KADER  
 APPROVED: S. KADER

**WATERWORKS**  
 ENGINEERS  
 1405 Vicar Avenue, Suite A • Reading, CA 96003 • 530-243-2113

SHARON HEIGHTS  
 RECYCLED WATER FACILITY  
 WEST BAY SANITARY DISTRICT  
 MENLO PARK, CALIFORNIA

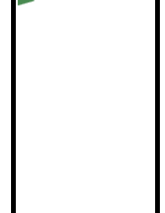
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 PROCESS FLOW DIAGM NO. 3

DATE: AUGUST 2018  
 PROJECT NUMBER: 18-002  
 DRAWING NUMBER: G-14  
 SHEET NUMBER: 14



NOTES:  
 1. \* (TAG NUMBER)  
 SUEZ/GE PROVIDED  
 EQUIPMENT TAG NUMBER

DESIGNED  
S. KADER  
 DRAWN  
B. TROTTER  
 CHECKED  
S. KADER  
 APPROVED  
S. KADER



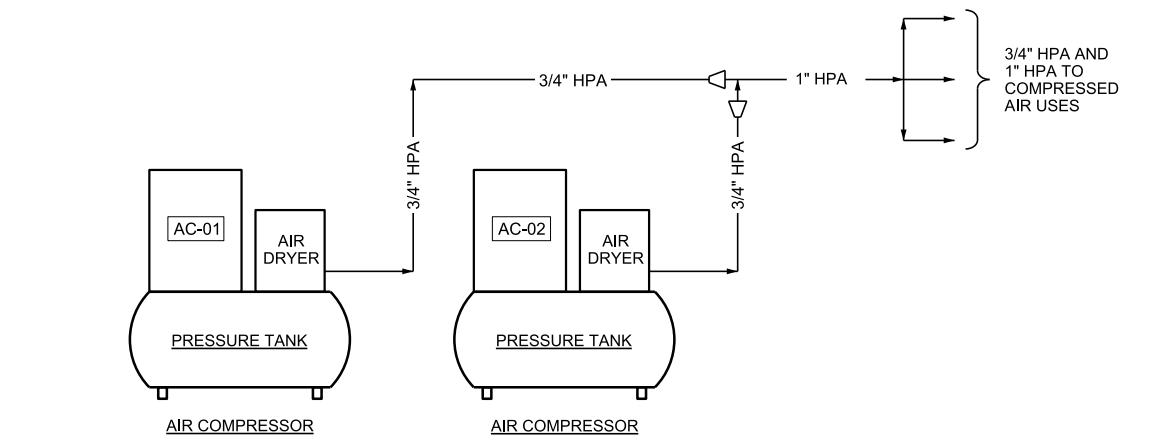
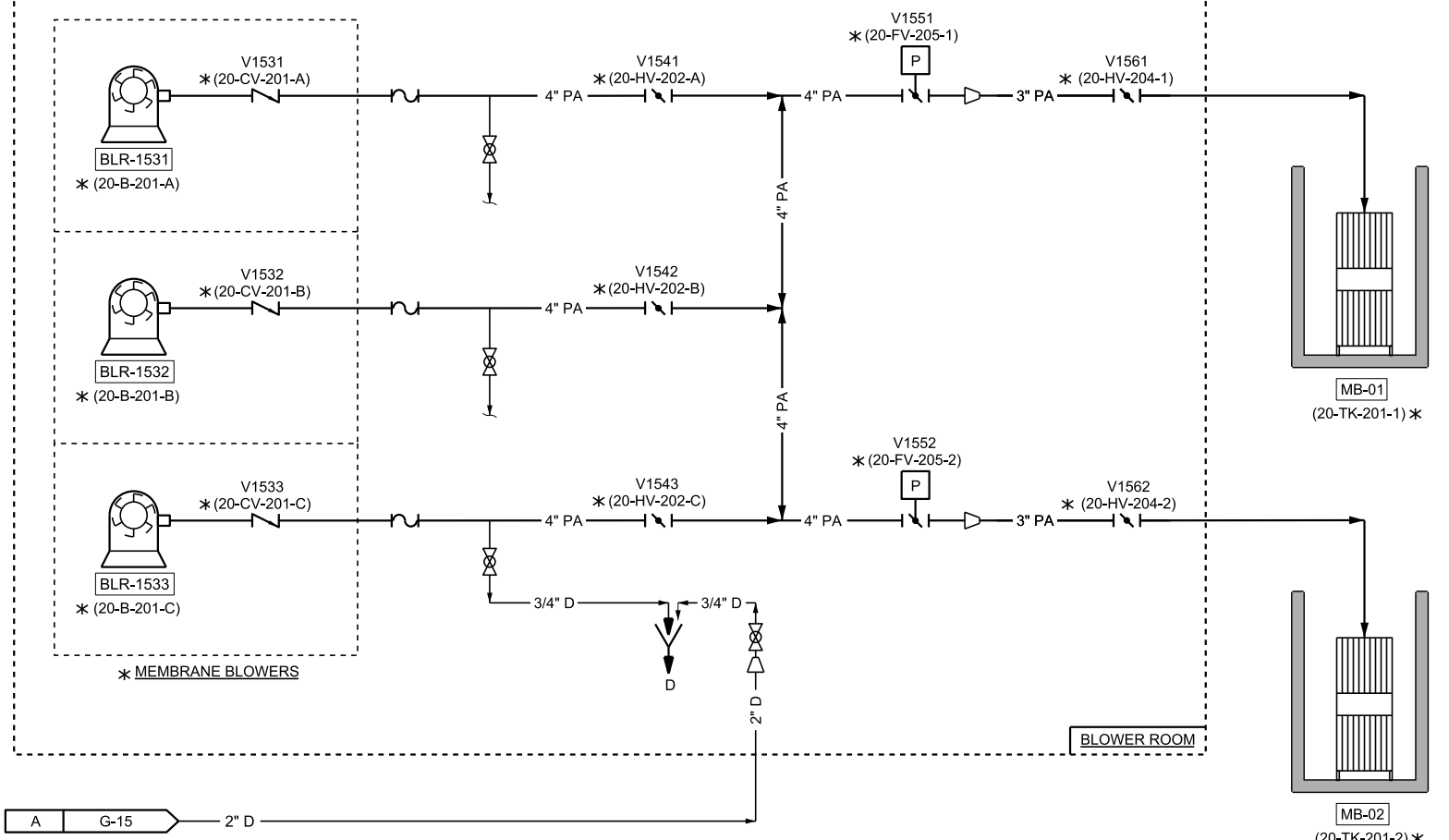
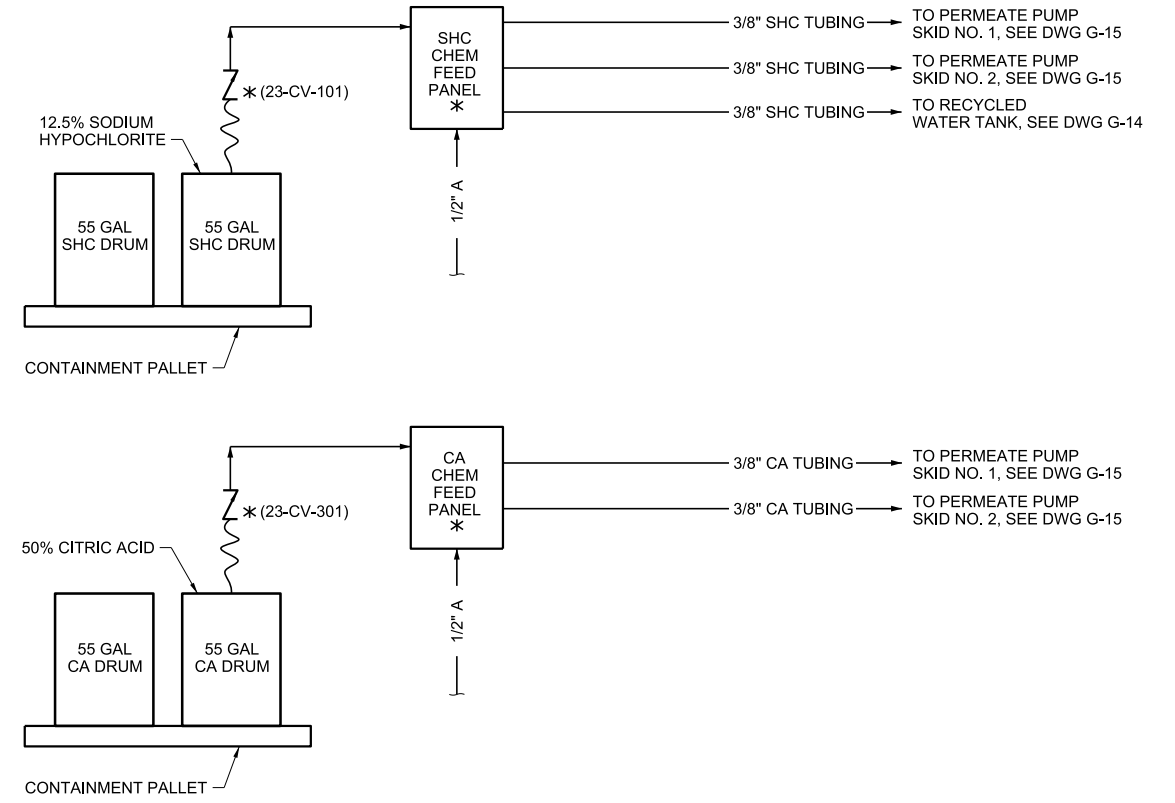
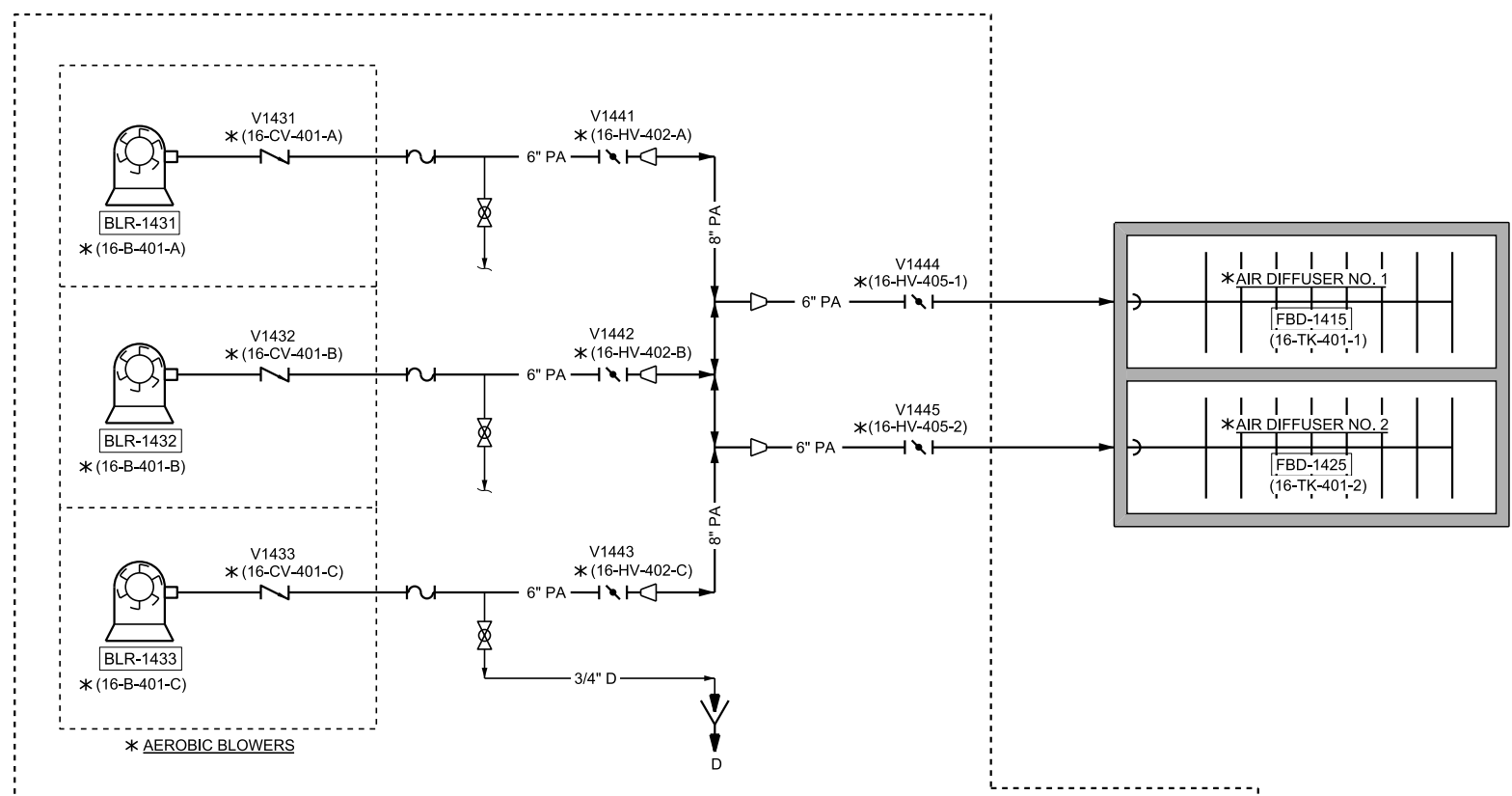
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SHARON HEIGHTS  
 RECYCLED WATER FACILITY  
 WEST BAY SANITARY DISTRICT  
 MENLO PARK, CALIFORNIA

GENERAL  
**PROCESS FLOW DIAGRAM NO. 4**



DATE  
AUGUST 2018  
 PROJECT NUMBER  
18-002  
 DRAWING NUMBER  
G-15  
 SHEET NUMBER 15



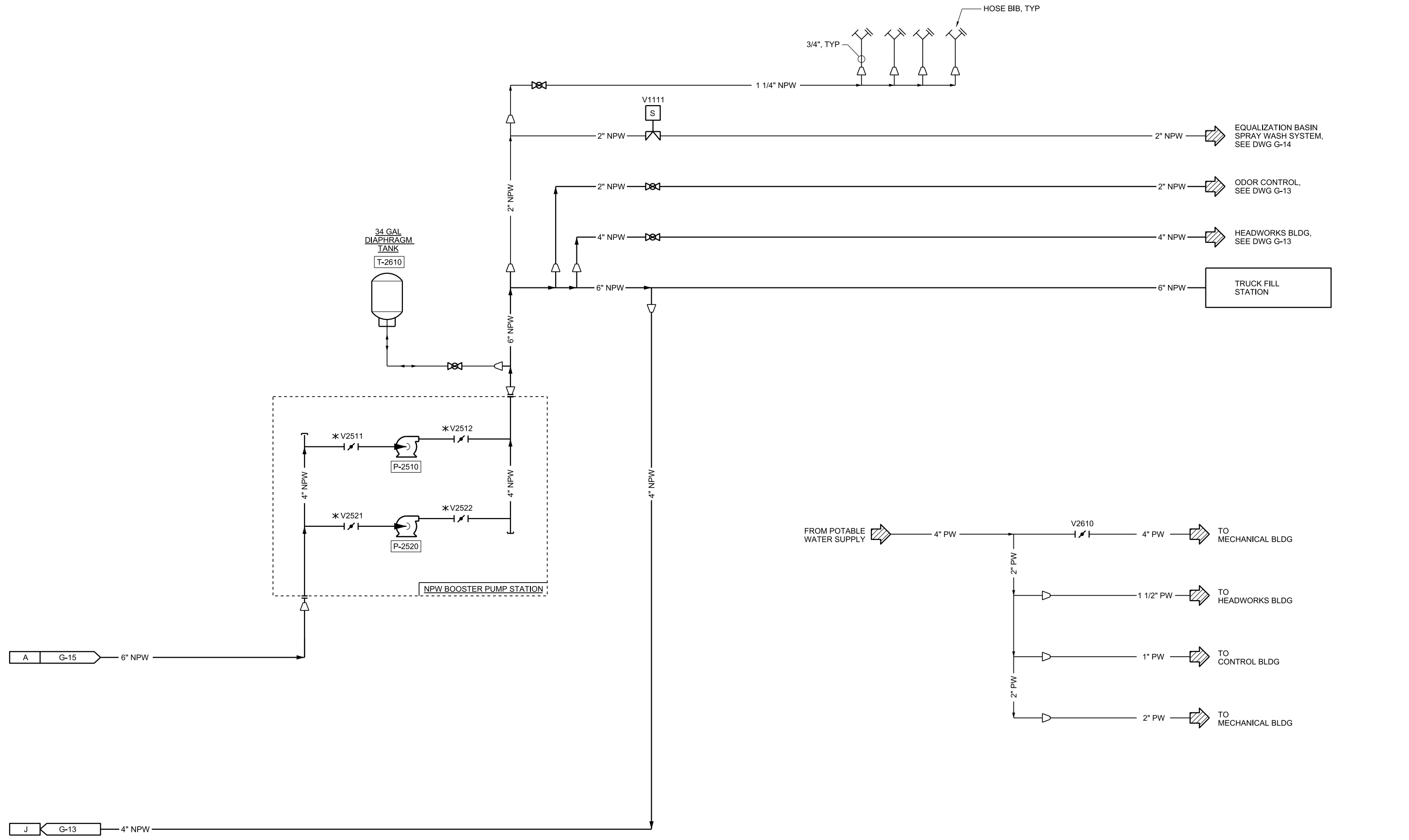
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 SUEZ/GE PROVIDED  
 EQUIPMENT TAG NUMBER



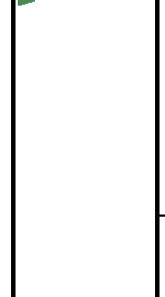
DESIGNED S. KADER	CHECKED S. KADER	APPROVED S. KADER
<b>WATERWORKS</b> ENGINEERS 1405 Vicar Avenue, Suite A • Reading, CA 98003 • 509-248-2113		
SHARON HEIGHTS RECYCLED WATER FACILITY WEST BAY SANITARY DISTRICT MENLO PARK, CALIFORNIA		
GENERAL <b>PROCESS FLOW DIAGRAM NO. 5</b>		
DATE AUGUST 2018	PROJECT NUMBER 18-002	DRAWING NUMBER G-16
SHEET NUMBER 16		



1 2 3 4 5 6



DESIGNED	S KADER
DRAWN	B TROTTER
CHECKED	S KADER
APPROVED	S KADER



**WATERWORKS**  
ENGINEERS  
1405 Vidar Avenue, Suite A • Reading, CA 96003 • 530-243-2113

SHARON HEIGHTS  
RECYCLED WATER FACILITY  
WEST BAY SANITARY DISTRICT  
MENLO PARK, CALIFORNIA

GENERAL  
PROCESS FLOW DIAGRAM NO. 6



DATE	AUGUST 2018
PROJECT NUMBER	18-002
DRAWING NUMBER	G-17
SHEET NUMBER	17

## **Appendix C – UV System CDPH Conditional Acceptance Letter**



RON CHAPMAN, MD, MPH  
Director

State of California—Health and Human Services Agency  
California Department of Public Health



EDMUND G. BROWN JR.  
Governor

January 10, 2012

Mark Eyre  
Market Regulatory Manager  
Trojan Technologies  
3020 Gore Road  
London, Ontario, Canada N5V 4T7

Dear Mr. Eyre,

**CONDITIONAL ACCEPTANCE OF TROJANUVFIT™ MODEL 32AL50 UV  
DISINFECTION SYSTEM, VALIDATION REPORT, FINAL SEPTEMBER 2009**

The California Department of Public Health (CDPH) Drinking Water Program's Recycled Water Committee (RWC) has reviewed the submittal entitled "Trojan Technologies, TrojanUVFit™ 32AL50 Validation Report" (Carollo Engineers, September 2009)<sup>1</sup> which contains the bioassay results. The TrojanUVFit™ Model 32AL50 UV reactor UV disinfection system was tested and the results analyzed in accordance with the 2003 Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse published by the National Water Research Institute/AWWA Research Foundation (NWRI). This reactor is a closed vessel UV system utilizing low-pressure high-output (LPHO) lamps (Heraeus Noblelight, Trojan part number 794447). The ballasts are adjustable from 60 to 100 percent of full power. Model 32AL50 has 32 lamps. The lamps are mounted horizontally and parallel to the flow, within a 20-inch diameter closed vessel reactor. Integral to the performance monitoring of the system is a calibrated germicidal sensor that meets international standards (DVGW) or the USEPA UV Disinfection Guidance Manual (UVDGM), where the sensor is calibrated against a traceable standard.

The reduction equivalent dose (RED) for the TrojanUVFit™ Model 32AL50 UV reactor is a function of flow rate (Q), UVT, and normalized UV sensor value (S/S<sub>0</sub>) or relative lamp output. Detailed testing was performed to determine the flow-specific performance of the TrojanUVFit™ Model 32AL50 UV reactor for flow rates ranging from 0.10 to 6.0 MGD (69 to 4,230 gpm) per reactor, at UVTs ranging from 40 to 80.9 percent, and sensor intensities ranging from 1.10 to 15.11 mW/cm<sup>2</sup>.

<sup>1</sup> Agencies interested in this technology can obtain copies of the September 2009 Carollo Engineers report from Mark Eyre, Trojan Technologies, 3020 Gore Road, London, Ontario, Canada N5V 4T7.